BOOK OF
ABSTRACTS

Ecology across borders

Embedding Ecology in Sustainable Development Goals

29 July - 2 August 2019, Lisbon, Portugal

eef European Ecological Federation

SPECO
SOCIEDADE PORTUGUESA DE ECOLOGIA

PLENARY SPEAKERS

Arjen Evert Jan Wals

29/07 | 15h20
Session **PLENARY SESSION I – SOCIO-ECOLOGICAL CHANGES**
Room 3.2.13/3.2.14/3.2.15/3.2.16

Transforming education and learning in light of urgent socio-ecological challenges and global systemic dysfunction

In this talk I will show and argue that SDG 4 – Education and SDG 17 - Partnerships – represent two mutually reinforcing mechanisms that are critical in realizing all other SDGs. Unlike the other 15 SDGs, these two are not so much content-oriented but rather process-oriented.

However, I will adopt a critical perspective that suggests that not all education or all partnerships will lead to more sustainable ways of living. In fact, education by and large, has been hijacked by economic interests and as a result narrowly focusses on capacity-building and innovation for economic expansion, ignoring that we are living on a finite Earth limited by planetary boundaries.

While there is a lot of talk, and indeed some action, that favors transitions in energy and food systems, there has been hardly any talk about transitions in education. Such a transition is urgently needed at all levels of education, if a citizenry is to emerge that is ecologically literature, empathic towards issues of environmental and social justice, able to see relations and interdependencies, appreciative of diversity, and willing and capable to act out of interests other than economic ones.

In this presentation I will sketch, what I will refer to as, ecologies of learning that can help develop these qualities and capacities.

Laura Airoldi

30/07 | 08h30
Session **PLENARY SESSION II – MARINE RESILIENCE**
Room 3.2.14/3.2.15

Solutions for increasingly urban oceans

Human populations, ocean uses and economic activity in coastal seas are rising rapidly and so is the human footprint on the global ocean. Estimates suggest that today 60% of the world's major marine ecosystems have been degraded or are being used unsustainably, with loss of environmental quality, vital ecosystem services and livelihood. Urbanisation is spreading to offshore areas and non-urban coasts at an incredibly fast rate, and the current and future challenges faced by increasingly urban oceans, exacerbated by acute climate change impacts, are diverse and substantial. To answer these challenges we need to build a greater knowledge base, think across disciplines, break down traditional barriers across sectors, and communicating a wider awareness of the seas to the general public. Despite their human dominated nature, marine urban systems can still support a variety of communities and ecosystem services, provided developments are planned, designed and implemented in ecologically meaningful ways. There is also growing evidence that by supporting ecosystem resilience and services, marine protection can go hand in hand with social equity and economic viability. I will introduce a conceptual framework for designing marine developments that meet multifaceted socio-ecological goals, and will offer examples of "nature-based" approaches that could provide better outcomes in terms of spatial quality, biodiversity values, sustainability of natural resources, ecosystem functioning, socio-ecological resilience and eventually human well-being. I will also explore the management and societal challenges to biodiversity optimization constrained by human use and engineering limitations, and highlight research gaps to increase the short-and long-term success of conservation and rehabilitation efforts in marine urban areas.

Ricardo Trigo

31/07 | 08h30
Session **PLENARY SESSION III – CLIMATE EXTREME IMPACTS**
Room 3.2.14/3.2.15

Climate extremes in Mediterranean climate regions

Mediterranean climate regions have been increasingly affected by record breaking extreme events with unprecedented human and ecological impacts, including the mega-heatwaves of 2003 and 2018 in Europe and southern Australia in 2009, 2018-2019. Likewise, there is an increase in the occurrence of outstanding multi-year droughts such as those of California (2011-2017), Chile (2010-2015) and southern Africa (2016-2018). Here we show that this increasing frequency of droughts and heatwaves in some of these Mediterranean regions is prompted by similar anomalies of large-scale atmospheric circulation, including the frequency of intense ridges and blocking highs, likely induced by the widening of the subtropical band. Both diagnostic and modelling experiments have confirmed that hot extremes are often preceded by surface moisture deficits in some regions throughout the world.

Osvaldo E. Sala
Arizona State University

01/08 | 08h30
Session **PLENARY SESSION IV – ECOSYSTEM SERVICES**
Room 3.2.14/3.2.15

Effects of climate change on ecosystems through directional changes in amount and variability of precipitation

Climate change will result in directional changes in precipitation and temperature leading to warmer and drier arid and semiarid ecosystems. In addition, Climate change will result in increased precipitation variability with more extreme events. Major droughts and floods will become more frequent as a result of the increase in greenhouse gas concentration, as predicted by models and as already observed in several regions around the world. There will be larger precipitation events interspersed with longer periods of droughts within a year, and there will be sequences of extreme dry years followed by multi-year extremely wet periods.

Here, I will use a three-prong approach presenting results from long-term experimentation in the grasslands of the South West USA coupled with large-scale simulation modeling and analysis of global data sets. A twelve-year rainfall manipulation study showed that ecosystem responses depend on the time of exposure to chronic resource alterations. Difference in total aboveground net primary production (ANPP) among precipitation treatments increased within the first three years of manipulation. Sustained drought or wet years had different effect on grass and shrub ANPP with grasses accounting for most of the change in total ANPP. On the contrary, shrub ANPP had little or no response to changes in water availability until the last two years when, unexpectedly, shrubs under drought treatment show significant increases. Results from our enhanced-precipitation variability experiment showed a strong negative effect of precipitation variability on total ANPP even though precipitation mean remained constant; and this effect increased through time. Surprisingly, increased precipitation variability benefited shrubs but their positive response was overshadowed by the negative response of grasses. The enhanced precipitation variability treatment increased species diversity, particularly the evenness component.

We used a process-based ecosystem model to simulate water losses and soil-water availability at 35 grassland locations in the central US under 4 levels of precipitation variability (control, +25, +50 +75%) and six temporal scales ranging from intra- to multi-annual variability. We show that the scale of temporal variability had a larger effect on soil-water availability than the magnitude of variability, and that inter- and multi-annual variability had much larger effects than intra-annual variability. Further, the effect of precipitation variability was modulated by mean annual precipitation. Arid-semiarid locations receiving less than 380 mm mean annual precipitation yr-1 showed increases in water availability as a result of enhanced variability while more mesic locations showed a decrease in soil water availability. The beneficial effects of enhanced variability in arid-semiarid regions resulted from a deepening of the soil-water availability profile and a reduction in bare soil evaporation that may promote future shifts in species composition and dominance to deeper-rooted woody plants for ecosystems that are susceptible to state changes.

Miguel B. Araújo

02/08 | 08h30
Session **ERNST HAECKEL PRIZE CEREMONY & PLENARY SESSION V – BIOGEOPGRAPHY**
Room 3.2.14/3.2.15

Predictive biogeography

Two hundred years have elapsed from the original works of Humboldt and Wallace. Biogeography has since moved from description to prediction but important challenges remain. How do we measure the ecological niche of a species? How do biotic interactions affect species distributions and species co-existence at broad scales? I will provide a synthesis of recent developments and identify some key questions for the future.

KEYNOTE SPEAKERS

Bénédicte Jacquemin Leonard

30/07 | 09h40
Session **KEYNOTE SESSION I – ENVIRONMENTAL RISKS AND HEALTH**
Room 3.2.14/3.2.15

Outdoor Air Pollution Health Effects: an epidemiological perspective

Outdoor air pollution exposure is a public health concern worldwide causing more than 4 million deaths annually. WHO estimated that 91% of the world population is exposed to air pollution levels above the recommended guidelines. In this key note, after a short introduction on what is air pollution and how it is measured, the known chronic and acute health effects will be exposed.

Dawn Sanders

30/07 | 12h10
Session **KEYNOTE SESSION II – SCIENCE COMMUNICATION**
Room 3.2.14/3.2.15

Taking a different View

How do we make public the private lives of plants in our science communication? Does the sound of storm petrels nesting under the cliff make a bigger impact on our audiences than words describing those sounds? How might taking a different view through art-based methods improve human understanding and sensitivity to the lives of other organisms? In this keynote presentation I will draw on inter-disciplinary research and teaching experiences to reflect on ecology across the borders between science and art in the 21st century.

Annemarie van Wezel

30/07 | 14h30
Session **KEYNOTE SESSION III – FRESHWATER ECOLOGY**
Room 3.2.14/3.2.15

Many tiny chemicals, major ecological impacts?

As a society we continue to use chemicals in higher numbers and higher volumes. We use pesticides, biocides, pharmaceuticals, veterinary pharmaceuticals and industrial chemicals, and while doing that these compounds and their transformation products find their entrance to our environment.

Today, having the opportunity to use advanced analytical chemistry technologies, we can measure many of these compounds at once and at very low concentrations. I'll show some examples on non-target-analysis using high resolution mass spectrometry applied within the water cycle and the variety of chemicals that are then encountered.

The physical-chemical properties of the chemicals and their emission volumes are important for their fate and behaviour within the watercycle. This, combined with their emission points and hydrology determines the manner in which the chemicals are distributed within the freshwater environment. I'll discuss some modelling efforts for the whole of Europe, and compare the model results with measured data.

Although as a society we use more and more chemicals, at the same time we worry about their effects both on human and ecological health. For the majority of the chemicals, no official water quality guidelines do exist. I'll show an analysis of the toxicological relevance of these emerging chemicals in the context of drinking water production, as well as the modelled ecological relevance of the mixture of chemicals.

Next to modelling and measuring chemical-per-chemical, direct measuring the summed effect of these chemicals is a developing technology. I'll show some results for these bioassay-type of measurements, and discuss the interpretation of these effect-directed measurements.

The presentation will be finished with some perspectives on possible future policies and mitigation options.

Leen Gorissen

30/07 | 17h00
Session **KEYNOTE SESSION IV – ECO-SOLUTIONS AND BIO-ECONOMY**
Room 3.2.14/3.2.15

Natural Intelligence
Building the future on millions of years of expertise

Mother nature is the undisputed master of continuous experimentation, iteration, organization and ultimately regeneration. She survived the worst of times and thrived in the best of them for 3.8 billion years despite endless disruption, climate changes and meteorite collisions. She knows what works, what lasts and what contributes to the future of life on Earth. What if we would

take cues from the natural world to inspire the way we design products, processes, organisations and cities? We might learn to become life-friendly and self-renewing right where we are and transform our current degenerative value system into a regenerative one. This may sound like science fiction, but is already happening. In this keynote Leen Gorissen shares with you some of the most advanced thinking and novelties in bio-inspired innovation and eco-solutions. Come and learn about the true nature of innovation. Because nature is the largest R&D project in history. Trial & error is how she innovates, doing well by doing good is how she succeeds.

Marco Moretti

31/07 | 09h40
Session **KEYNOTE SESSION V – URBAN SUSTAINABILITY**
Room 3.2.14/3.2.15

Socio-ecological drivers of biodiversity and ecosystem functions and services in cities

Cities are stately expanding human dominated ecosystems, where social-norm driven choices and behaviours heavily influence which species live in cities. Since ecosystem processes mainly emerge from the interaction between species from different trophic levels, socio-ecological choices might ultimately have consequences on the relationship between biodiversity and ecosystem functions (BEF) and services in cities. To understand how humans drive such interactions and ecosystem service delivery, it is important to integrate socio-cultural aspects into biodiversity and BEF models.

In my talk, I will illustrate some examples of integrative socio-ecological approaches and discuss current limitations and future research perspectives allowing to move from an isolated research agenda toward more integrative trans- and interdisciplinary approaches.

Charles Godfray

01/08 | 09h40
Session **KEYNOTE SESSION VI –SUSTAINABLE AGRO-ECOSYSTEMS**
Room 3.2.14/3.2.15

Can we feed a mid-century population of 10 billion people healthily and equitability while still leaving room for nature

Feeding a mid-century global population of around 10 billion sustainably while not destroying the natural capital upon which future food supplies and biodiversity depends is of the greatest challenges of the 21st century. The talk will draw on recent modelling that brings together economic, health and environment drivers to explore the challenges and opportunities of remaking the food system to obtain multiple and positive, health, environmental and social outcomes. It concludes positively, that we can feed the world and leave space for nature, but only if we make significant societal and political decisions soon.

Wolfgang Cramer

01/08 | 12h10
Session **KEYNOTE SESSION VII – CLIMATE AND GLOBAL CHANGES**
Room 3.2.14/3.2.15

Environmental change in the Mediterranean Basin - what is needed for better policies?

The Mediterranean Basin is the theater of multiple accelerating processes of environmental change (climate change, biodiversity loss, pollution, overexploitation), yet little is known about the true key risks for human well-being and the policy measures needed to mitigate them. A large pan-Mediterranean network of scientists has begun to assess these risks, based on the evaluation of the scientific literature. Dominant indicators of detrimental change in ecosystems are diebacks following heat waves on land and in the ocean, consequences of water shortages in many areas, and significant expected changes in the littoral zone due to the expected sea-level rise. Measures of adaptation are standard practice in most regions, and have been so for millennia - however the current rates surpass historical ones on most parameters, the region is more densely populated than ever, and most support systems are finely tuned to current environmental conditions. I will present some of the key risks in more detail and conclude with a description of our way towards better exchange of knowledge between scientists and policymakers.

Rafael Sardá

01/08 | 14h30
Session **KEYNOTE SESSION VIII –MARINE ECOLOGY**
Room 3.2.14/3.2.15

Embedding Marine Ecology in Sustainable Development Goals

We have entered the human-influenced Anthropocene age, and we are witnessing accelerating changes in earth system processes. In a world with huge inequalities, almost one billion people in extreme poverty, and approaching a state-shift in its earth's biosphere, the SDGs can be considered as a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity. From these goals and for the marine environment, SDG14 Life Below Water aims to lay the foundation for the integrated and sustainable management of the oceans and it requires for its implementation a holistic approach, greater international cooperation and to stress its connection with the other SDGs. In the present talk, we will review the role of science to embed Marine Ecology in Sustainable Development Goals by using the DPSWR environmental accountable framework. Marine Scientists must work to provide the best science possible for decision making but also to learn and use a common language that allow mutual interconnectedness with other social agents to work on aspirational objectives and targets for ocean's health.

Fernando Maestre

01/08 | 17h00
Session **KEYNOTE SESSION IX – BIODIVERSITY AND ECOSYSTEMS**
Room 3.2.14/3.2.15

The role of biodiversity in the functioning of global drylands in a warmer, and more arid, world

Substantial research efforts are being devoted in the last decades to understand how biodiversity affect ecosystem functioning and the provision of ecosystem services. However, most of this research has been carried out in ecosystems other than drylands, which cover ~45% and host over 40% of the global population. In this lecture I will summarize the results of recent and ongoing studies by my research group evaluating how multiple biodiversity attributes (species richness, diversity and composition, functional diversity and phylogenetical diversity) modulate multiple ecosystem functions (multifunctionality) across aridity and temperature gradients. These studies use multiple experimental approaches (manipulative and natural experiments), biotic communities (vascular plants, microbial communities and biocrusts dominated by mosses, lichens and cyanobacteria), spatial scales (from local to global) and ecosystem processes linked to hydrology, plant productivity and nutrient cycling. Overall, their results indicate that biodiversity is a key driver of multifunctionality in drylands worldwide and may partially buffer the negative effects of ongoing climate change on their functioning. I will also introduce an ongoing global survey aiming to understand the impacts of joint changes in climate and increased grazing pressure on the structure and functioning of drylands worldwide, knowledge that is sorely needed to test and develop early warning indicators of desertification and forecast its ecological consequences under climate change.

Cristina Branquinho
CE3C – Center for Ecology, Evolution and Environmental Changes, Faculdade de Ciências, Universidade de Lisboa, Portugal

02/08 | 09h40
Session **KEYNOTE SESSION X – LAND DEGRADATION & ECOSYSTEM RESTORATION**
Room 3.2.14/3.2.15

Approaching Essential Biodiversity Change Indicators: towards precision ecosystem management

Understanding and predicting the impact of drivers of environmental change on biodiversity, the basis of the delivery of goods and services to humans, is a critical task in the Anthropocene Era. Understanding this impact is not only important to evaluate the effect at the ecosystem level, but also to manage it by mitigation, adaptation or restoration. The need for such a global monitoring system took to the development of international monitoring networks and frameworks to evaluate changes in biodiversity, e.g. the Essential Biodiversity Variables. Despite the several papers published concerning its development, the practice at local scales relevant for decision-makers and managers are inexistent. To be able to put this framework into practice we need to improve several points. We propose a conceptual model to select the most cost-effective metrics of biodiversity change based on both the type and intensity of the drivers that limit or impact biodiversity and the nature of the Essential Biodiversity Variables which may be affected in each case. We propose ecophysiology-based metrics for lower intensity limiting/impacting drivers, affecting organisms' individual performance; trait-based metrics for medium intensity drivers, affecting the ecological performance of sensitive species before tolerant ones, changing species abundance and community functional traits; taxonomic-based metrics for higher driver intensities which may culminate in species loss. We will also demonstrate the need for a better spatial resolution of the drivers of environmental change to be able to diagnose, manage and restore the ecosystems in a cost-effective way. We further discuss the utility of remote sensing data to measure some of these indicators, allowing to upscale and/or generalize spatial and temporal information. With this work, we expect to contribute to Precision Ecosystem Management.

Acknowledgement
ChangeTracker-FCT-PTDC/AAG-GLO/0045/2014

Ruben Heleno

02/08 | 12h10
Session **KEYNOTE SESSION XI – ECOLOGICAL NETWORKS**
Room 3.2.14/3.2.15

Linking the dots in Ecology

Although the founders of modern ecology readily recognized the importance of biotic interactions as the cement that keeps biological communities up and running, until recently, we didn't have any satisfactory tool to bring together species and interactions under a same quantitative and predictive framework. The incorporation of network theory into the realm of ecology has rapidly occupied that gap by providing a most desirable tool to simultaneously evaluate species roles in the broader context of their biotic communities. Nevertheless, while the advent of ecological networks finally allowed us to have a go at understanding community complexity, for many, this still comes with a bittersweet feeling as such understanding is in itself hindered by the excessive simplification of portraying natural communities as fixed snapshots of interactions between one or two groups of species (unipartite and bipartite networks). I will review current efforts made to push the frontiers of ecological networks by formally integrating information from discrete spatial, temporal, and functional network components. While the road to such multilayer networks is still uncertain, this seems a most promising step to potentiate the use of ecological networks towards their original goal: make sense out of the intrinsic complexity of natural communities.

Michael Bruford

02/08 | 14h30
Session **KEYNOTE SESSION XII – THEORETICAL & EVOLUTIONARY ECOLOGY**
Room 3.2.14/3.2.15

Embedding Evolutionary thinking into the Sustainable Development Goals

The link between biodiversity and sustainable development forms is well appreciated and underpins many ideas and principles of the SDGs. However, biodiversity arises as a result of ubiquitous evolutionary (and eco-evolutionary) processes, thus a more explicit inclusion of evolutionary principles potentially ensures not only that biodiversity is better conserved in the present day but also long into the future. Evolutionary principles are already being applied in arenas as diverse as transport systems optimisation, innovative clean product design and optimally managing plant and animal genetic resource diversty for future breeding under climate change. Here I will synthesis a review I will present on behalf of the Future Earth bioGENESIS project on the need to mainstream evolutionary thinking into SDG solutions and provide a few examples from our research and that of others. I will provide an overview on the role of evolutionary diversity in providing ecosystem services, and on how eco-evolutionary principles may equip humanity to predict and mitigate biodiversity trends and tipping points in the Anthropocene and how evolutionary biology can and is being applied directly in sustainable food production, health and ecosystem management. We call for the explicit acknowledgement and mainstreaming of evolutionary thinking in sustainable development as a means to provide rational and optimised sustainability strategies for the future.

PROGRAMME

<table>
<tr><th></th><th>Sunday 28</th><th colspan="2">Monday 29 – Open Day</th><th colspan="2">Tuesday 30</th></tr>
<tr><td>08h15</td><td rowspan="5"></td><td rowspan="5">Registration</td><td rowspan="3"></td><td colspan="2">Wake up coffee</td></tr>
<tr><td>08h30</td><td colspan="2">PLENARY SESSION
Marine resilience
Laura Airoldi</td></tr>
<tr><td>09h40</td><td colspan="2">KEYNOTE SESSION on
“Environmental risks and health”:
Bénédicte Jacquemin Leonard</td></tr>
<tr><td>10h30</td><td colspan="2">Coffee-break</td></tr>
<tr><td>11h00</td><td rowspan="2">DEBATE
“The geopolitics of global change”,
with: José Félix Ribeiro, Bernardo Ivo Cruz, Helena Freitas, Miguel B. Araújo |
Moderated by Leonídio Paulo Ferreira</td><td>PARALLEL SESSIONS</td><td>PARALLEL SYMPOSIA</td></tr>
<tr><td>12h10</td><td colspan="2">KEYNOTE SESSION on
“Science communication”
Dawn Sanders</td></tr>
<tr><td>13h00</td><td></td><td colspan="2">Lunch</td><td colspan="2">Lunch</td></tr>
<tr><td>14h30</td><td rowspan="8">Registration</td><td colspan="2">Opening Session</td><td colspan="2">KEYNOTE SESSION on
“Freshwater ecology”:
Annemarie van Wezel</td></tr>
<tr><td>15h20</td><td colspan="2">PLENARY SESSION
Socio-ecological changes
Arjen Evert Jan Wals</td><td>PARALLEL SESSIONS</td><td>PARALLEL SYMPOSIA</td></tr>
<tr><td>16h30</td><td colspan="2" rowspan="3">DEBATE
“How is Ecology contributing
to the accomplishment of the SDGs?”
with: Arjen Evert Jan Wals, David Nabarro, Humberto Rosa, Laura Airoldi, Osvaldo Sala Moderated by José Vítor Malheiros</td><td colspan="2">Coffee-break</td></tr>
<tr><td>17h00</td><td colspan="2">KEYNOTE SESSION on
“Eco-solutions and bio-economy”:
Leen Gorissen</td></tr>
<tr><td>17h50</td><td>PARALLEL SESSIONS</td><td>PARALLEL SYMPOSIA</td></tr>
<tr><td>19h00</td><td colspan="2" rowspan="2">Welcome Reception</td><td colspan="2">ECOLOGY & ART – Daniel Pinheiro</td></tr>
<tr><td>20h00</td><td colspan="2">POSTER SESSION
SOCIAL SUNSET</td></tr>
</table>

Wednesday 31		Thursday 1		Friday 2	
Wake up coffee		Wake up coffee		Wake up coffee	
PLENARY SESSION Climate extreme impacts **Ricardo Trigo**		**PLENARY SESSION** Ecosystem services **Osvaldo Sala**		**PLENARY SESSION** Ernst Haeckel Prize 2019 Biogeography | **Miguel B. Araújo**	
KEYNOTE SESSION on "Urban sustainability": **Marco Moretti**		**KEYNOTE SESSION** on "Sustainable agro-ecosystems": **Charles Godfray**		**KEYNOTE SESSION** on "Land degradation & ecosystem restoration": **Cristina Branquinho**	
Coffee-break		Coffee-break		Coffee-break	
PARALLEL SESSIONS	**PARALLEL SYMPOSIA**	**PARALLEL SESSIONS**	**PARALLEL SYMPOSIA**	**PARALLEL SESSIONS**	**PARALLEL SYMPOSIA**
POSTER SESSION		**KEYNOTE SESSION** on "Climate and global changes": **Wolfgang Cramer**		**KEYNOTE SESSION** on "Ecological networks": **Ruben Heleno**	
An amazing afternoon in...? Excursions		Lunch		Lunchv	
		KEYNOTE SESSION on "Marine ecology": **Rafael Sardá**		**KEYNOTE SESSION** on "Theoretical & evolutionary ecology": **Mike Bruford**	
		PARALLEL SESSIONS	**PARALLEL SYMPOSIA**	**PARALLEL SESSIONS**	**PARALLEL SYMPOSIA**
		Coffee-break		Coffee-break	
		KEYNOTE SESSION on "Biodiversity and ecosystems": **Fernando Maestre**		SPECO PhD in Ecology Awards 2019 cerimony and winners' presentations: **Inês Teixeira Gomes** **Adrià Lopez Baucells** **Francisco Pina Martins**	
		PARALLEL SESSIONS	**PARALLEL SYMPOSIA**	**PARALLEL SESSIONS**	**PARALLEL SYMPOSIA**
		POSTER SESSION		Awards ceremony	
				Closing Session	
		Congress dinner			

11h00
Session
DEBATE I – THE GEOPOLITICS OF GLOBAL CHANGES
Speakers
José Felix Ribeiro
Bernardo Ivo Cruz
Helena Freitas
Miguel B. Araújo
Room 3.2.13/3.2.14/3.2.15/3.2.16

14h30
Session
Opening Session
Room 3.2.13/3.2.14/3.2.15/3.2.16

15h20
Session
PLENARY SESSION I – SOCIO-ECOLOGICAL CHANGES
Plenary Speaker
Arjen Evert Jan Wals
Room 3.2.13/3.2.14/3.2.15/3.2.16
ABSTRACT

16h30
Session
DEBATE II – HOW IS ECOLOGY CONTRIBUTING TO THE ACCOMPLISHMENT OF THE SDG'S?
Speakers
Arjen Evert Jan Wals
David Nabarro
Humberto Rosa
Laura Airoldi
Osvaldo Sala
Room 3.2.13/3.2.14/3.2.15/3.2.16

Programme 30.07

08h30
Session
PLENARY SESSION II – MARINE RESILIENCE
Plenary Speaker
Laura Airoldi
Room 3.2.14/3.2.15

09h40
Session
KEYNOTE SESSION I – ENVIRONMENTAL RISKS AND HEALTH
Keynote Speaker
Bénédicte Jacquemin Leonard
Room 3.2.14/3.2.15

11h00
Session I
PARALLEL SESSIONS
PARALLEL SYMPOSIA

12h10
Session
KEYNOTE SESSION II – SCIENCE COMMUNICATION
Keynote Speaker
Dawn Sanders
Room 3.2.14/3.2.15

14h30
Session
KEYNOTE SESSION III – FRESHWATER ECOLOGY
Keynote Speaker
Annemarie van Wezel
Room 3.2.14/3.2.15

15h20
Session II
PARALLEL SESSIONS
PARALLEL SYMPOSIA

17h00
Session
KEYNOTE SESSION IV – ECO-SOLUTIONS AND BIO-ECONOMY
Keynote Speaker
Leen Gorissen
Room 3.2.14/3.2.15

17h50
Session III
PARALLEL SESSIONS
PARALLEL SYMPOSIA

19h00
Session
POSTER SESSION I & SOCIAL SUNSET
Room C6 atrium and interior garden

08h30
Session
PLENARY SESSION III – CLIMATE EXTREME IMPACTS
Plenary Speaker
Ricardo Trigo
Room 3.2.14/3.2.15

09h40
Session
KEYNOTE SESSION V – URBAN SUSTAINABILITY
Keynote Speaker
Marco Moretti
Room 3.2.14/3.2.15

11h00
Session IV
PARALLEL SESSIONS
PARALLEL SYMPOSIA

12h10
Session
POSTER SESSION II
Room C6 atrium and interior garden

Programme 01.08

08h30
Session
PLENARY SESSION IV – ECOSYSTEM SERVICES
Plenary Speaker
Osvaldo Sala
Room 3.2.14/3.2.15

09h40
Session
KEYNOTE SESSION VI –SUSTAINABLE AGRO-ECOSYSTEMS
Keynote Speaker
Charles Godfray
Room 3.2.14/3.2.15

11h00
Session V
PARALLEL SESSIONS
PARALLEL SYMPOSIA

12h10
Session
KEYNOTE SESSION VII –CLIMATE AND GLOBAL CHANGES
Keynote Speaker
Wolfgang Cramer
Room 3.2.14/3.2.15

14h30
Session
KEYNOTE SESSION VIII –MARINE ECOLOGY
Keynote Speaker
Rafael Sardá
Room 3.2.14/3.2.15

15h20
Session VI
PARALLEL SESSIONS
PARALLEL SYMPOSIA

17h00
Session
KEYNOTE SESSION IX – BIODIVERSITY AND ECOSYSTEMS
Keynote Speaker
Fernando Maestre
Room 3.2.14/3.2.15

17h50
Session VII
PARALLEL SESSIONS
PARALLEL SYMPOSIA

19h00
Session
POSTER SESSION III
Room C6 atrium and interior garden

08h30
Session
ERNST HAECKEL PRIZE CEREMONY & PLENARY SESSION V – BIOGEOPGRAPHY
Plenary Speaker
Miguel B. Araújo
Room 3.2.14/3.2.15

09h40
Session
KEYNOTE SESSION X – LAND DEGRADATION & ECOSYSTEM RESTORATION
Keynote Speaker
Cristina Branquinho
Room 3.2.14/3.2.15

11h00
Session VIII
PARALLEL SESSIONS
PARALLEL SYMPOSIA

12h10
Session
KEYNOTE SESSION XI – ECOLOGICAL NETWORKS
Keynote Speaker
Ruben Heleno
Room 3.2.14/3.2.15

14h30
Session
KEYNOTE SESSION XII – THEORETICAL & EVOLUTIONARY ECOLOGY
Keynote Speaker
Michael Bruford
Room 3.2.14/3.2.15

15h20
Session IX
PARALLEL SESSIONS
PARALLEL SYMPOSIA

17h00
Session
PHD IN ECOLOGY AWARDS 2019 CERIMONY AND WINNER'S PRESENTATIONS
Speakers
Inês Teixeira Gomes
Adrià Lopez Baucells
Francisco Pina Martins
Room 3.2.14/3.2.15

17h50
Session X
PARALLEL SESSIONS
PARALLEL SYMPOSIA

19h00
Session
Awards ceremony
Room 3.2.14/3.2.15

19h30
Session
Closing session
Room 3.2.14/3.2.15

11h00

Topic 2 - Science communication
T2.P1 **EMBEDDING ECOLOGICAL CONCEPTS IN SOCIETY**
2.2.12

Learning how to use ecological models: an effective approach
Afonso Dinis

Ecosystem services maps to improve scientific communication
Ana Genua Olmedo

Nature of Science-enriched Problem--Based Learning about the ecological niche concept using a socioscientific issue | **Cristina Sousa**

Ria de Aveiro as a show case for Natura 2000 sites ecosystem-based management | **Ana Lillebø**

Topic 3 - Freshwater ecology
T3.P1 **KNOWING AND MAINTAINING THE FRESHWATER BIODIVERSITY**
2.2.15

Combining geostatistical and biotic interactions modelling to predict amphibian refugia under crayfish invasion across dendritic stream networks | **Mário Mota-Ferreira**

Assessing translocation success of freshwater mussels | **Joaquim Reis**

A trait-based approach to understand the functional structure of bryophyte communities in Portuguese headwater streams | **Juliana Monteiro**

Invertebrate and benthic diatom dynamics in Mediterranean intermittent streams of southern Portugal | **Maria Helena Novais**

Accumulation of microbead in fish species of Dhanmondi Lake, Dhaka
Soharab Hossain

Topic 4 - Eco-solutions and bio-economy
T4.P1 **PAINTING THE ECONOMY WITH GREEN AND BLUE**
2.2.14

Role of fisheries and aquaculture activities in the Northwetern Region of Portugal for national Blue Economy
Emilio Salas-Leiton

Mapping cultural ecosystem services in conflict areas: Considering attractions and constraints acting transboundary in the Sahara-Sahel
Frederico Santarém

Can we trigger green growth in urban-rural systems? Applying socio-ecological lens to blue-green solutions
Kinga Krauze

Assessing ecosystem services with Life Cycle Assessment: The case of sown biodiverse pastures
Ricardo Teixeira

Topic 6 - Sustainable agro-ecosystems
T6.P1 **IDENTIFYING AND SOLVING PEST--RELATED CHALLENGES**
2.2.21

The role of the density of field margins and the structure of their vegetation on parasitism rates of cereal aphids
Agnès Salat Moltó

Ecological intensification and pest control in Mediterranean oak agro-ecosystems | **Tara Canelo**

Similarities of carabid assemblages in neighboring cereal and grassland fields in three intensive agricultural areas | **Damien Massaloux**

The use of subtilases as a disease control approach for grapevine downy mildew | **Joana Figueiredo**

Using model plants to study proteases involved in plant-pathogen interactions
Rita B. Santos

15h20

Topic 1 - Environmental risks and health
T1.P1 **ON THE CONTAMINATION OF FRESHWATER RESOURCES**
2.2.12

Assembly of photogranules for wastewater treatment
Lukas M. Trebuch

Interactions on Cerium oxide nanoparticles with natural biomolecules affect toxicity for aquatic biota | **Camilla Della Torre**

Impacts of silver nanoparticles on freshwater detrital food webs
Daniela Batista

Omics reveal distinct mechanisms of toxicity of nanoparticulate and ionic silver in microbes | **Diana Barros**

Topic 3 - Freshwater ecology
T3.P2 **WATERSHED MANAGEMENT AND RESTORATION**
2.2.14

Hydropeaking: current status and new insights on ecological impacts mitigation | **Miguel Moreira**

Ecological compensation in the Xin'an River Basin, China | **Fengran Xu**

Comparing Policy Mixes and Freshwater Ecosystem Restoration Practices Results in Europe and China
Ana Mendes

Instruments for assessing and arguing in favour of ecological restoration in Lower Danube land Waterscape
Geamana Nicoleta

Topic 5 - Urban sustainability
T5.P1 **SHARING THE CITY WITH OTHER INHABITANTS**
2.2.15

Vegetated roofs support arthropods associated with open dry habitats, but show little benefits for rare species and may introduce non-natives
Kukka Kyrö

Urban Pollinators - Solitary bees in Freising | **Julie Weissmann**

Urban Forest of Bangkok's Inner Orchard | **Vudipong Davivongs**

Topic 6 - Sustainable agro-ecosystems
T6.P2 **THE SOIL UNDER THE CROPS**
2.2.21

The ecology of plant nutrition
Cristina Cruz

Essential oils stimulating microbial activity | **Despoina Vokou**

Nitric oxide and auxin production are required for the Azospirillum brasilense--induced increase in the root density of wheat
Rodolfo Ferreira

Agricultural value of Black Soldier Fly larvae insect frass as organic fertilizer
Regina Menino

Importance of the contribution of nitrogen in irrigation water to gross nitrogen balances, and pollution hotspots, in a Mediterranean context
João Serra

17h50

Topic 1 - Environmental risks and health
T1.P2 **HUMAN EXPOSURE TO ENVIRONMENTAL RISKS**
2.2.12

Urban planning for minimization of air pollution exposure considering "street canyons" | **Olga Krukowskaya**

The interface between ecological models in health and SDGs 2030 Agenda for the promotion of professors' health | **Ivani Carlotto**

Chemicals in daily life - An emerging concern ignored in Portugal?
Susana Fonseca

Human Health, Biodiversity and Ecosystems: Vector-borne Diseases
Paulo Almeida

Risk of anisakid larvae in the most consumed fish species in Madeira archipelago | **Margarida Hermida**

Topic 2 - Science communication
T2.P2 **SCIENCE EDUCATION AT THE SERVICES OF CONSERVATION**
2.4.16

Constructivism in Conservation Education | **Jamie Ashton**

Celebrating the Fungi to boost Conservation | **Susana C. Gonçalves**

Partners in learning and innovative teaching Practices - An approach to conservation education
Antonieta Costa

Playing scientific game to help the protection of the Mediterranean Sea
Federica Rescio

Topic 4 - Eco-solutions and bio-economy
T4.P2 **LOOKING FOR SUSTAINABLE SOLUTIONS**
2.2.14

Biological swimming pools - a Nature--based solution | **Udo Schwarzer**

Potato peel waste as a source of bioactive compounds for the food industry | **Shirley De Lima Sampaio**

Eco-sustainable recovery of ergosterol-rich bioactive extracts from Pleurotus eryngii (DC.) Quél | **Taofiq Oludemi**

Cork thread by Casa GRIGI
Mónica Gonçalves

Topic 6 - Sustainable agro-ecosystems
T6.P3 **CURRENT SCENARIOS OF AGRICULTURAL DEVELOPMENT**
2.2.21

Assessing European-wide biodiversity--landscape relationships in farmland to improve the ecological effectiveness of the Common Agricultural Policy
Mario Díaz

Sustainable Development Goals: How working equids delivers for development of mountain areas | **João B. Rodrigues**

Evaluation and preservation of Montados: the case of Holm oak in Portugal | **Leonor Sucena-Paiva**

Agricultural landscapes and Sustainable Development Goals – a qualitative assessment | **Diana Surová**

Global change-driven modulation of bottom-up forces and cascading effects on biocontrol service | **Han Peng**

Topic 7 - Climate and global changes
T7.P1 **FORESTS RESPONSES TO CLIMATE CHANGE**
2.3.13

Land use legacies influence growth,wood density and sensitivity to climatic extremes in recently established forests
Josep Maria Espelta

Phenotypic integration of Pinus sylvestris along its distribution area
Raquel Benavides

Range-wide variation in local adaptation and phenotypic plasticity of fitness--related traits in Fagus sylvatica and their implications under climate change
Homero Gárate-Escamilla

Combined effects of climate and management on beech tree vulnerability and net ecosystem exchange across Europe | **Cathleen Petit**

Climatic and physiological regulation of the biomodal xylem formation in P. pinaster saplings | **Núria Garcia Forner**

Topic 9 - Biodiversity and ecosystems
T9.P1 **INSIGHTS ON LAND MANAGEMENT**
2.4.16

Trade-offs between fire prevention and bird conservation under fire-smart landscape management scenarios
Silvana Pais

Land-use and related pressures have reduced biotic integrity more on islands than on mainlands
Katia Sanchez-Ortiz

Management of introduced mammals preferentially benefits large, endemic forest birds: a New Zealand meta--analysis | **Nyree Fea**

Changes in Plant Community Composition Along Gradients of Land Management in São Miguel (Azores)
Ângela Vieira

Spatial prioritization of management zones within protected areas for integration of competing objectives
Héctor Abarca Velencoso

SYMPOSIA

3.2.13
S1 Emerging contaminants under global change: perceptions and challenges

3.2.14/3.2.15
S2 (Socio-) Ecological research for sustainable development: the plea for long-term data

3.2.16
S3 Soil food webs and ecosystem services

Topic 7 - Climate and global changes
T7.P2 **ECOSYSTEM FUNCTIONING AND STABILITY**
2.3.13

Wood ant nest surroundings as natural carbon gradients in forest ecosystems – implications for soil organic matter decomposition and sequestration
Veronika Jílková

Effects climate change on above- and belowground ecosystem features and on greenhouse gases fluxes
Jorge Durán

Carbon sequestration scenarios in continental Portugal: Which way to go forward? | **Jorge Cunha**

How survival curves affect populations' vulnerability in a changing climate | **John Maxwell Halley**

Topic 9 - Biodiversity and ecosystems
T9.P2 **FORESTS AND HIGH NATURE VALUE FARMLADS**
2.4.16

High Nature Value farmland and forest areas identification
Lubos Halada

Large scale eucalypt plantations are associated to increased fire risk
Adolfo Cordero-Rivera

Shrub encroachment coupled to extreme droughts reduce the functioning and resilience of water-limited ecosystems | **Maria C Caldeira**

Ecosystem Services and Nature Conservation: looking for win-win areas in Alentejo, Portugal
Lia Laporta

SYMPOSIA

3.2.13
S4 The potential of psychosocial variables in Ecosystem Based Management

3.2.14/3.2.15
S5 Simpósio BCSD

3.2.16
S6 Biodiversity in African Portuguese speaking countries (CPLP)

Topic 7 - Climate and global changes
T7.P3 **SPECIES ADAPTATION AND ACCLIMATION**
2.3.13

The interaction of global change and habitat modification is threatening lichen diversity | **Paolo Giordani**

Effects of global change on mountain dung beetle diversity and ecosystem services | **Ana M. C. Santos**

Ensuring access to high-quality resources reduces the impacts of climate change on bee | **Denis Michez**

Assessing the current and future distribution of two palm species (Hyphaene coriacea and Phoenix reclinata) in Zitundo area, southern Mozambique | **Angelina Martins**

Topic 9 - Biodiversity and ecosystems
T9.P3 **ZOOMING IN MICROBIAL ECOLOGY**
2.2.15

Regional scale factors influencing early stage litter decomposition in Moso bamboo stands | **Marly Orrego**

The fungal endophyte community of two ericaceous dioecious shrubs - sharing the burden of reproduction
Ana Martins

Unravelling fungal diversity through unconventional DNA barcoding and metagenomics: implications for cashew agroecosystem sustainability in Guinea-Bissau (West Africa)
Ana Rita Pena

Plant geographic origin and phylogeny as potential drivers of community structure in root-inhabiting fungi
Akihiro Koyama

Fire and biodiversity dynamics in the mopane ecosystem of the Limpopo National Park: vegetation and microbiome analysis in different landscapes | **Ivete Maquia**

SYMPOSIA

3.2.13
S7 Sustainable Water Stewardship

3.2.14/3.2.15
S8 Regenerating cities with Ecology-based Design. Permaculture Living Lab at Lisbon University

3.2.16
S9 Plant community change and ecosystem services along anthropogenic gradients in forests

11h00

Topic 1 - Environmental risks and health
T1.P3 **THE IMPACTS OF ANTHROPOGENIC ACTIVITIES**
2.2.12

Global economic costs of biological invasions | **Christophe Diagne**

Variations of forest vulnerability to fire along successional dynamics
Martina Sánchez-Pinillos

Larvae of the shrimp Palaemon varians as a model for evaluation of behavioral effects of toxicants
Inês Domingues

Understanding the drivers of bird collision with power lines: what we know (and don't know) after 40 years of research | **Joana Bernardino**

Bird mortality by high speed trains: lessons from two large flagship species | **Cristina Mata**

Topic 2 - Science communication
T2.P3 **FACING SOCIO-ECOLOGICAL CHALLENGES**
2.4.16

Social Solutions for Climate Change
Sherry Nouraini

Debating the science communication of climate change and GMO
Ana Delicado

Opening locked gates: Identifying land owners' attitudes to kaitiakitanga (Māori environmental guardianship)
Corinne Bataille

The importance of São Tomé mangroves: perceptions and ecosystem services | **Filipa Afonso**

Topic 3 - Freshwater ecology
T3.P3 **THE ROLE PLAYED BY THE FUNGI COMMUNITY**
2.2.14

Facing anthropogenic selective pressures: a multigenerational evolution experiment with a host-parasite model and the fungicide tebuconazole | **Ana Patrícia Cuco**

Leaf litter decomposition of sweet chestnut is affected more by oomycte infection of trees than by water temperature rise | **Verónica Ferreira**

Global biodiversity of leaf litter fungi in streams | **Sahadevan Seena**

Functional and structural responses of fungal communities to climate across Iberian Mediterranean streams
Arunava Pradhan

Topic 6 - Sustainable agro-ecosystems
T6.P4 **LIMITATIONS AND PERSPECTIVES IN FOOD PRODUCTION**
2.2.21

Agro-morphological and genetic diversity of four Portuguese *Corema album* (L.) D. Don populations
João Jacinto

Potential vulnerability of Moroccan apple orchard to climate change-induced phenological perturbations
Adnane El Yaacoubi

Wheat production under water and nitrogen limited conditions: impact of conservation agriculture | **Lúcia Barão**

The bionematicide 1,4-naphthoquinone: risk analyses on seed germination and growth of tomato | **Sónia Chelinho**

Topic 9 - Biodiversity and ecosystems
T9.P4 **DYNAMICS AT THE COMMUNITY LEVEL**
2.2.15

Antarctic cryptogamic tundra responses to global warming
Angelica Casanova

Seed size underlies the uncoupling in species composition between canopy and recruitment layers in European forests | **Cristina C. Bastias**

Carnivores' presence patterns in exotic Eucalyptus plantations worldwide
Daniela Teixeira

Drivers of butterfly and dragonfly community change along elevational gradients in a mountainous area
Ana Ceia-Hasse

Topic 10 - Land degradation and ecosystem restoration
T10.P1 **A CLOSER LOOK AT THE SOIL ECOSYSTEMS**
2.3.13

Invasion of a woody legume in the oligotrophic primary dunes: From starting in nurse plants to changing systemic N/P balance | **Florian Ulm**

Soil multifunctionality validates mycorrhization traits as criteria for selecting native plant species for drylands' restoration | **Neji Mahnoudi**

Invasive N-fixing Acacia spp. affect litter decomposition and associated fungal decomposers in streams
Ana Pereira

Dynamics of soil nitrogen cycling during post-agricultural succession in a subtropical karst region | **Dejun Li**

Study of bacteria involved in Acacia longifolia nodulation: influence of fire on symbiosis establishment | **Joana Jesus**

Topic 12 - Theoretical and evolutionary ecology
T12.P1 **RESPONDING TO EVOLUTIONARY FORCES**
3.2.13

Individual responses to climate change: revisiting the ecological meaning of phenotypic plasticity
Fernando Valladares

Environment and evolutionary history control phylogenetic turnover in Atlantic coastal white-sand plant communities
Jhonny Capichoni Massante

The role of polyploidy driving ecological differentiation: Cytotype ecological performance after reciprocal transplants explain allopatric distribution of a diploid-tetraploid complex | **Sílvia Castro**

Is ecological specialization a pathway to disentangle enigmatic radiations? The study case of Aeonium (Crassulaceae) | **Patrícia Dos Santos**

SYMPOSIA

3.2.14/3.2.15
S10 Tools to measure Biodiversity--Ecosystem Services relationships in urban ecosystems

3.2.16
S11 Perspectives for envirobnmental conservation in the tropics: new challenges or old problems in the face of environmental disasters

11h00

Topic 1 - Environmental risks and health
T1.P4 **BIOMONITORING FOR ECOSYSTEM INTEGRITY**
2.2.12

MATOPIBA (Brazil): the role of primary vegetation cover in regulating the hydrological cycle | **Paulo Silva**

Honey bee dietary neonicotinoid exposure is mediated by pollen collection from agricultural weeds
Thomas Wood

Tools to measure and manage the effects of excess nitrogen in ecosystems | **Helena Serrano**

Climate change and the spread of brown-rot disease in peach orchards: insights from an epidemiological model | **Chiara Vanalli**

Impacts of pesticides on bumblebee's nutritional intake abilities
Alexandre Barraud

Topic 3 - Freshwater ecology
T3.P4 **PROMOTING FRESHWATER ECOSYSTEM SERVICES**
2.2.14

Life on inland waters: harmonizing habitat conservation and ecosystem services towards the Sustainable Development Goals
Ana Paula Portela

Freshwater regulation ecosystem services in Urdaibai´s Reserve Biosphere: na integrated approach
Leire Méndez-Fernández

Addressing connectivity between local biodiversity hotspots in freshwater ecosystems | **Marisa Naia**

Topic 8 - Marine ecology
T8.P1 **CONSERVING MARINE RESOURCES**
2.2.21

Genetic and morphological variability in Mediterranean Parazoanthus (Cnidaria, Hexacorallia, Zoantharia): evidence for a complex of species
Marco Abbiati

Taxonomic and functional fish diversity in mangroves of the São Tomé island (Gulf of Guinea) | **Joshua Heumüller**

Reproductive cycle of a NE – Atlantic Holothuria tubulosa population: regional variations require regional care | **Francisco Henriques Lauer De Azevedo E Silva**

Holothuria forskali: a marine resource worth protecting
Tomás Da Fonseca Simões

Boat noise impacts mating behaviour in a vocal fish | **Manuel Vieira**

Topic 9 - Biodiversity and ecosystems
T9.P5 **BIODIVERSITY IN AGROECOSYSTEMS**
2.2.15

Agrarian intensification reduces food availability for a threatened species: the Dupont´s lark case
Margarita Reverter

Does grazing affect ground-foraging birds in Mediterranean agroforestry systems? | **Ana Leal**

Biodiversity-mediated benefits for crop production | **Matteo Dainese**

Antagonistic effects of human management on species and trait diversity of Mediterranean arable plant communities - Implications to their conservation | **Ana Júlia Pereira**

Effects of olive farm intensification on phytophagous insects and their natural enemies | **Sasha Vasconcelos**

15h20

Topic 2 - Science communication
T2.P4 **CONNECTING WITH PEOPLE**
2.2.12

Monitoring and mapping soil quality through citizen science | **Sofia Oliveira**

Experiencing Ecosystem Services
Johannes Rüdisser

Kids Dive, discover the Ocean
Diana Vieira

Breaking the walls: Ciência Viva promotes learning outside the classroom | **Gisela Gaio-Oliveira**

Topic 5 - Urban sustainability
T5.P2 **LIVING UNDER URBAN ENVIRONMENTAL STRESSORS**
2.2.14

How environmental stressors affect the ozone uptake by urban and peri-urban forests in the metropolitan city of Rome | **Lina Fusaro**

A step forward to provide universal measures of environmental quality in cities using ecological indicators
Natália Koch

Assessment of seasonal variability of air pollution by transport
Hanna Malchykhina

Surface runoff deposits contamination in urban areas in Belarus
Marharyta Kazyrenka

Topic 7 - Climate and global changes
T7.P4 **ADAPTING TO DROUGHT**
2.4.16

Forest dynamics after drought-induced mortality worldwide | **Francisco Lloret**

In a Mediterranean ecosystem drought severely constrains growth by reducing growing season length but nitrogen resorption efficiency increases
Raquel Lobo-Do-Vale

Resistance and resilience responses of two co-existing riparian tree species to recurrent drought events in Southern Europe | **Inês Marques**

Functioning and resilience of Mediterranean cork oak ecosystems under recurrent extreme droughts and plant invasion | **Simon Haberstroh**

Assessing the importance of a prolonged dry season and nitrogen deposition on Mediterranean grassland functioning | **Carla Nogueira**

Topic 9 - Biodiversity and ecosystems
T9.P7 **AN OVERVIEW OF ECOSYSTEM SERVICES**
2.2.15

Plant biodiversity regulation of the microclimate in West African Savannas
Nicholas Moret

Will secondary forests sustain ecosystem services in the Brazilian Amazon? Biodiversity and ecosystem functioning in novel landscapes using dung beetles | **Reinaldo Cajaiba**

Ungulates affect ecosystem functioning and mediate trade-offs between biodiversity and ecosystem services in Mediterranean oak woodlands | **Miguel N. Bugalho**

Ant-mediated ecosystem services and disservices in invaded habitats
Maria-Rosa Paiva

Geocaching: assessing cultural ecosystem services through crowdsourcing data
Inês Teixeira Do Rosário

17h50

Topic 5 - Urban sustainability
T5.P3 **TOWARDS MORE SUSTAINABLE GREEN CITIES**
2.2.14

Mapping Green Infrastructure towards SDG 15: integrating biodiversity, connectivity and ecosystem services into landscape planning decisions
Erica Honeck

Governance of Green Infrastructures: theory and practice in the Metropolitan Area of Lisbon, Portugal
Isabel Loupa Ramos

A multi-scale planning tool towards a green infrastructure: The Nacional Ecological network to mainland Portugal | **Natália S. Cunha**

Scenarios for future ecosystem service trade-offs in Lisbon | **Thomas Elliot**

Novel Urban Ecosystems in the Anthropocene: Opportunities to Urban Sustainability
Catarina Patoilo Teixeira

Topic 8 - Marine ecology
T8.P2 **NEW PARADIGMS IN MARINE GOVERNANCE**
2.2.12

Harnessing individual and collective action towards empowered marine conservation: determinants and implications | **Ana Nuno**

Are MPAs working for top predators? An island wide assessment of Jamaica's shark populations
Fabian Kyne

An overview of ecological status and vulnerability of the Northwest Portuguese coast | **Luis R. Vieira**

Temporal and spatial distribution of microplastics in subtidal sediments and seawater surface at a Portuguese coastal area | **Diana Rodrigues**

Topic 9 - Biodiversity and ecosystems
T9.P9 **ARTHROPOD COMMUNITY DYNAMICS**
2.2.15

Body size shifts in wild bees
Maxence Gérard

A novel mistletoe-columnar cacti-stemborer interaction promotes suitable habitats for arthropods in semiarid Chile | **Patricia Guerra**

Metabarcoding unveils the role of trophic interactions in biodiversity patterns of leaf beetles
Carola Gómez-Rodríguez

Influence of landscape homogenization on the local diversity of spiders in eucalypt plantations settled in a grassland ecosystem
Carolina Pinto

Topic 9 - Biodiversity and ecosystems
T9.P10 **DEEPENING OUR KNOWLEDGE ON THE ECOSYSTEMS**
2.2.21

Consumer food webs contribute to core and integrative domains of research on biodiversity and ecosystem functioning | **Jes Hines**

Cryptic trophic cascades in multi-species systems: Predator effects on ecosystem stoichiometry
Elizabeth Le Roux

A Study on the National Vegetation Classification Using Deep Learning
Junseok Lee

Understanding the interplay of environmental responses and species interactions in determining coexistence at different scales
Joaquín Hortal

Drivers of mammal richness, abundance and occupancy in a landscape composed by eucalyptus plantations, savannas and forest patches | **Tony Enrique Noriega Piña**

Topic 9 - Biodiversity and ecosystems
T9.P6 **SEARCHING FOR VARIABLES AND MODELS**
2.3.13

Estimating the contribution of the environment to determining species and diversity distributions
Duarte Viana

Optimizing trophic-based rewilding in Europe under climate change: where to introduce which species?
Diogo Alagador

Species distribution models have good spatial transferability: a global overview | **Chunlong Liu**

Harnessing biodiversity data sources to inform Essential Biodiversity Variables | **Vânia Proença**

Distribution, degree of damage and risk of spread of *Trioza erytreae* (Hemiptera: Triozidae) in Kenya
Owusu Fordjour Aidoo

Topic 12 - Theoretical and evolutionary ecology
T12.P2 **DIVERSITY AND STRATEGICAL OUTCOMES**
2.4.16

Interactive effects of activity and temperature on ontogenetic metabolic scaling | **Douglas Glazier**

The end of a lichen relationship: how the mycobiont survives without the photobiont | **Silvana Munzi**

Host and habitat specialization of avian blood parasites within an oceanic island | **Claire Loiseau**

Pre-dispersal seed predation and reproduction strategy affect genetic diversity in range-expanding tree populations | **Violette Doublet**

SYMPOSIA

3.2.13
S12 Towards precision agro-ecology for sustainable grazing

3.2.14/3.2.15
S13 Integrative Assessment of Land use conflicts

3.2.16
S14 Tracking vegetation phenology in a climate change context. From proximal to remote sensing

Topic 9 - Biodiversity and ecosystems
T9.P8 **CONNECTING LANDSCAPE AND ECOLOGY**
2.3.13

Reconnecting wilder landscapes in Europe | **Néstor Fernández**

The relative contribution of local and regional factors shaping coastal dune plant communities | **Sara Lobo Dias**

Scientific base of selected landscape--ecological main-stream themes
László Miklós

Starting to account for phylogeny in the numerical classification of vegetation. A case-study on the woody formations of Macaronesia
Jorge Capelo

Open-access satellite imagery and species occurrence data to describe bird diversity patterns in Mediterranean rural landscapes
Inês Ribeiro

Topic 10 - Land degradation and ecosystem restoration
T10.P2 **SETTING THE FIRST STEPS**
2.3.13

Allelopathic Effects of Aqueous Extract of *Lantana camara* L. on Seed Germination of *Afzelia quanzensis*
Célia Marilia Martins

Assessing seed germination of Iberian endemisms to enhance plant conservation on linear infrastructures
Mariana P. Fernandes

Development of seed transfer zones for restoration in Hungary, combining biogeographical information and the multiple potential vegetation model
David Cevallos

Assessing the role of macro and microclimate on Holm oak germination and establishment in Mediterranean drylands | **João Serafim**

Topic 12 - Theoretical and evolutionary ecology
T12.P3 **SHAPING SPECIES BIOGEOGRAPHY**
3.2.13

The global mosaic of reproductive isolation of an invasive weed
Ramona-Elena Irimia

Ecological divergence contributes to the allopatric distribution of a diploid-tetraploid complex | **Mariana Castro**

The inflorescence height as an approach to explain species distribution of Aeonium genus in Tenerife (Canary Islands)
Miguel Ângelo Brilhante

Biogeography of the water use efficiency of an invasive plant species
Miguel Barreira

SYMPOSIA

3.2.14/3.2.15
S15.1 Role of agriculture in the climate change era for achieving the Sustainable Development Goals

3.2.16
S16 Managing biological invasions and their impacts in the Anthropocene

Topic 10 - Land degradation and ecosystem restoration
T10.P3 **REGAINING LAND STRUCTURE AND FUNCTION**
2.3.13

Forest-steppe reconstruction as an alternative to landscaping in industrial areas | **Melinda Halassy**

Long-term effect of management to replace invasive tree plantations with Pannonian sand grassland **Bruna Reis**

Governance of secondary forest and challenges to passive restoration of degraded areas of eastern brazilian amazon | **Ima Vieira**

Restoration underground: context-dependent effects of threatened digging mammals on soil functions
Orsi Decker

Climate change-driven effects on coastal soils and adjacent aquatic systems: assessment of salinization, temperature and moisture
Sonia Chelinho

Topic 12 - Theoretical and evolutionary ecology
T12.P4 **INNOVATIVE METHODS AND APPROACHES**
2.4.16

Genetic consequences of social structure in the golden-crowned sifaka | **Bárbara Parreira**

Extreme Value Theory as a tool to study Biodiversity patterns
Luís Borda-De-Água

A new approach to uncover species interactions from their co-distribution
Sara Si-Moussi

Next Generation Conservation: preserving the continuum of life in space and time | **Silvia Carvalho**

SYMPOSIA

3.2.13
S15.2 Role of agriculture in the climate change era for achieving the Sustainable Development Goals

3.2.16
S17 Dynamic Energy Budget theory – A general metabolic theory for all life on Earth

11h00

Topic 6 - Sustainable agro-ecosystems
T6.P5 **(BIO)DIVERSE AND SUSTAINABLE PRACTICES**
2.2.15

Rock outcrops: Nature-based solutions to promote heterogeneity in oak wood pastures | **Sergio Chozas**

Impact of honey bee density on crop yield: A meta-analysis | **Orianne Rollin**

Ecological and evolutionary studies of entomofauna for sustainable management in an organic vineyard agroecosystem | **Sofia G. Seabra**

Eco-evolutionary agriculture: a study in crop rotations | **Maria Bargués-Ribera**

On the contribution of satellite earth observation to grasslands sustainable management | **Sofia Cerasoli**

Topic 7 - Climate and global changes
T7.P5 **CREATING ECO-TECHNOLOGICAL TOOLS**
2.2.12

Rapid shifts in lichen trait diversity due to recent changes in climate reinforce their potential as climate change ecological indicators | **Paula Matos**

Detection of drought induced changes in aquatic ecosystems across biogeographic gradients – a comparison between eDNA and conventional approaches | **Catia Lúcio Pereira**

Acorns as proxies to Quercus adaptation response to increased drought under climate change | **Carla Alegria**

New insights on adaptation and population structure of cork oak using genotyping by sequencing
Francisco Pina-Martins

Response of lichen and moss tissue traits to simulated climate change: insights from dryland biocrusts
Laura Concostrina-Zubiri

Topic 8 - Marine ecology
T8.P3 **MARINE MICROALGAE COMMUNITIES**
2.2.14

Phytoplankton community diversity explained by a bottom up mechanism involving allelopathy
Aldo Barreiro Felpeto

Phytoplankton communities and HAB species: one-year observations from two sheltered bays | **Mariana Santos**

Tidal influence on the Phytoplankton community of Tagus estuary
Rui Cereja

Coccolithophores as potential marine resource for sustainable aquaculture
Bernardo Vicente

Topic 9 - Biodiversity and ecosystems
T9.P11 **UNDER ANTHROPOGENIC PRESSURES**
2.2.21

Roads as overlooked drivers of change in bird communities
Fernando Fernando Ascensão

Wind farms increase nest predation and lead to local extinctions of small--passerine populations
Julia Gómez-Catasús

Evaluating impacts of recreational trails in the Azorean native forests
Rui Miguel Dos Santos Mendes Carvalho

The impact of historic land-clearing on the fire-response of an endangered bird species | **Simon Verdon**

The value of southwestern Ethiopian forests for mammal diversity conservation: insights from a coffee growing region under rapid change
Patricia Rodrigues

15h20

Topic 7 - Climate and global changes
T7.P6 **BUILDING MODELS AND SCENARIOS**
2.2.12

Regional-scale heterogeneity in long-term trends of coastal primary productivity along the Humboldt upwelling ecosystem: the complexity of climate fluctuations
Nicolas Weidberg

Simulating plants biological processes for global change impacts modelling on species distribution
Matthieu Vignal

Limitations of species distribution models based on available climate change data: a case study in the Azorean forest | **Lara Dutra Silva**

Niche, distribution and climate change: are niche and spatial metrics valuable predictors of plants' vulnerability to climate change? | **Helena Hespanhol**

Topic 8 - Marine ecology
T8.P4 **EXPLORING ECOLOGICAL INDICATORS**
2.2.14

Exploring the distribution and diagnostic power of microbiomes across the Great Barrier Reef towards the implementation of microbial observatories | **Pedro Frade**

Biomass-density relations of algae and seagrass and their use as ecological indicators | **Vasco Vieira**

How can environmental factors influence the settlement of Diplodus spp. juveniles in a temperate rocky reef | **Pedro Duarte-Coelho**

Topic 9 - Biodiversity and ecosystemss
T9.P12 **LOOKING AT THE POPULATION PICTURE**
2.2.15

Population cycles of Gray-sided Voles in the Arctic Tundra | **Pedro G. Nicolau**

Dietary preferences of the European bee-eater (*Merops apiaster*): seasonal and between-habitat variation
Joana Costa

Influence of changes in abiotic conditions on the migration phenology of Common Cranes in south--western Europe | **José María Orellana**

Urbanization and individual consistency in behaviour in a tropical lizard | **Ana Catarina Miranda**

Could marked presence of Blastocystis in intestinal microbiome of Little and Great Bustards, be an indicator of stress? | **Xabier Cabodevilla**

Topic 10 - Land degradation and ecosystem restoration
T10.P4 **RESTORING MEDITERRANEAN ECOSYSTEMS**
2.2.21

Embedding environmental stewardship in ecological networks definition. An opportunity for policy mix approaches in southwestern Portugal
Rosário Oliveira

Quantifying microclimate impact in Mediterranean oaks from tree to landscape level | **Adriana Príncipe**

Long-term dynamics of canopy cover in Mediterranean evergreen oak woodlands reveals a degradation trend determined by management and climate | **Vanda Acácio**

Responses of woody vegetation to groundwater changes: insights from Mediterranean and Tropical coastal dune ecosystems | **Cristina Antunes**

Sustainable use of the land in semiarid regions with *Argania spinosa*
Mari Cruz Díaz-Barradas

17h50

Topic 7 - Climate and global changes
T7.P7 **FRONTIERS WITH POLICY AND SOCIETY**
2.2.12

Natura 2000 Network adaptation strategies in the face of climate change | **Monica Lanzas**

Essential Biodiversity Variables: a framework for monitoring biodiversity change and support decision making
Laetitia Navarro

A multimodel comparison of biodiversity historical trends and future scenarios with the shared socio-economic pathways | **Henrique Pereira**

Climate scenarios: crossing boundaries between natural and social sciences to tackle adaptation challenges | **Luísa Schmidt**

Topic 8 - Marine ecology
T8.P5 **RESTORING THE COASTAL AND MARINE REALM**
2.2.14

Current status, conservation and restoration of seagrass meadows: Ria de Aveiro (Portugal) as a show case
Ana I Sousa

Intertidal fungal diversity from megatidal Nova Scotia, Canada: implications for coastal restoration and bioremediation | **Allison K. Walker**

Introduction of non-indigenous Spartina species in Mediterranean salt marsh ecosystems: past, present and future | **Bernardo Duarte**

A Janzen-Connell filter: adult presence limits propagule survival but not settlement in six coral species
Carrie Sims

Topic 9 - Biodiversity and ecosystems
T9.P13 **DIVERSITY IN CONSERVATION STRATEGIES**
2.2.15

Biotechnological tools in the preservation of endemic plant genetic resources | **Natacha Coelho**

Conservation and restoration of Mediterranean temporary ponds
Carla Pinto-Cruz

Armed conflicts and wildlife decline: challenges and recommendations for effective conservation policy in the Sahara-Sahel | **José Carlos Brito**

Into the path of steppe birds' recovery: Fallow management increases bird occurrence through changes in vegetation structure | **Ana Sanz-Pérez**

Alternative Financing Schemes for Tiger Conservation in Nepal
Hemanta Kafley

Topic 9 - Biodiversity and ecosystems
T9.P14 **THE INVASIVE SPECIES DILEMMA**
2.2.21

Adding knowledge to the ecology of a recent invasive insect in Europe - the bug *Leptoglossus occidentalis*
Ana Farinha

7 out of 17, attending invasive species, is a good way to achieve the ODS
Georgia Born-Schmidt

Detecting early indicators of high impact of an invasive ecosystem engineer using remote sensing
André Große-Stoltenberg

The story of a trans-hemispheric shift: establishment of an Australian biological control agent against an invasive plant in Europe | **Hélia Marchante**

Sustainable invasive species management - a study on invasive social wasps on offshore islands in New Zealand | **Julia Schmack**

Topic 11 - Ecological networks
T11.P1 **POLLINATORS ROLE IN ECOSYSTEMS**
2.3.13

The effect of traits and isolation on Individual-based pollination networks of the island endemic Echium candicans | **Ricardo Costa**

Impact of ozone on the perception of olfactory signal by generalist pollinators | **Maryse Vanderplanck**

Using pollination networks for sustainable provisioning of multiple ecosystem services in agricultural landscapes | **Isabel Marques**

How to integrate public perception of nature into scientific questions: Plant--Pollinator networks in a botanical garden | **Manuela Giovanetti**

SYMPOSIA

3.2.13
S18 A new bryophyte Red List and Checklist for Europe: A real basis for energising bryophyte conservation in Europe

3.2.14/3.2.15
S19 Restoring ecosystem structure and functioning to an uncertain future under global change

3.2.16
S20 Evolutionary ecology in the marine realm

Topic 11 - Ecological networks
T11.P2 **SOIL-PLANT-ANIMAL INTERACTIONS**
2.3.13

The hormetic effect of cadmium accumulation on herbivorous spider mites is unaffected by organic defences or plant sugars
Diogo Prino Godinho

Oranges and apples? Plant responses to insect herbivores of distinct feeding guilds | **Asaf Sadeh**

Floral trait preferences of nonflower-specialized birds and insects on the Galápagos | **Sandra Hervías-Parejo**

Ecological multiplex interactions determine the role of species for parasite spreading | **Cecilia Andreazzi**

Making inferences on host-microbiota interactions using ecological network methods | **Francois Massol**

SYMPOSIA

3.2.14/3.2.15
S21 Ecology: from communities to amazonian (agro)ecosystems

3.2.16
S22 Macro and Microevolutionary Processes in Macaronesian Plant Lineages

Topic 10 - Land degradation and ecosystem restoration
T10.P5 **MANAGING LANDSCAPE RESTORATION**
2.3.13

Quarry Restoration and Biodiversity. SECIL-Outão in Arrábida Natural Park
Alexandra Silva

The Baixo Guadiana Landscape - Planning and Restoration | **Luísa Franco**

Assessment of River Restoration Ecosystem Services in China and the impact Protection and Rehabilitation measures had on their functions
Bayinbaoli Gao

Restoring ecological infrastructure in the biodiversity-rich Seixe River Basin in southwestern Portugal
Justin Roborg-Söndergaard

Changes in ecosystem multifunctionality in grasslands undergoing restoration management towards semi-natural Nardus grasslands | **Eva Decock**

Topic 11 - Ecological networks
T11.P3 **NETWORKING AT SPECIES AND POPULATION LEVELS**
2.4.16

Clinging onto your neighbours when scared? Mussels cooperation is altered by perceived levels of predation risk but depends upon environment | **Camilla Bertolini**

Coexistence of diverse strategies of symbiotic dinitrogen fixation in Mediterranean herbaceous legumes
Efrat Sheffer

Does fear of predators make leafhopper vectors less infectious?
Ferenc Samu

Identifying fungal associations of the endangered plant Crocanthemum canadense (L.) Britt. (Cistaceae) in Nova Scotia, Canada | **Philicity R. M. Byers**

Does habitat fragmentation have a positive effect on species diversity?
Jordan Chetcuti

Topic 12 - Theoretical and evolutionary ecology
T12.P5 **LOOKING AT SPECIES GENETIC POOL**
3.2.13

Conserving evolutionary processes for three amphibian species in the Iberian Peninsula | **Jeffrey O. Hanson**

Genetic paucity, inbreeding, pollution and surprising connections: the intriguing case of the Sado bottlenose dolphin population (Portugal)
Inês Carvalho

Population genetics of the tick Ixodes ricinus: towards a better understanding of spatial structure | **Pedro Poli**

Demographic history of West African primates inferred from genomic data
Tânia Minhós

SYMPOSIA

3.2.14/3.2.15
S23 Linking agricultural policies to Sustainable Development Goals: a focus on biodiversity and ecosystem services provisioning

3.2.16
S24 Long-term ecological monitoring on islands

SYMPOSIA

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.13

Symposium 1 - Emerging contaminants under global change: perceptions and challenges

Chair
Maria João Bebiano

Presenters
Maria João Bebiano, Lúcia Guilhermino, Susana Loureiro, Cláudia Pascoal and Fernanda Cássio

Contaminants of emerging concern are chemical compounds that appear in the environment at low concentrations, globally distributed or as new contaminants with the potential of inducing adverse effects on organisms and ecosystems, and still lacking information on their effects, exposure scenarios, environmental fate and behaviour. They are considered of emerging concern, due to the potential risk they pose to humans and to the environment. Microplastics, nanomaterials, pharmaceuticals, and personal care products (PCPs) include chemicals with these characteristics. This session is devoted to better understand the effects of emerging contaminants on biological systems and their consequences to ecological functions under the ongoing climate changes. Questions related to the quantification and characterization of emerging contaminants in natural environments and organisms, and biological and ecological effects are very welcome. All environmental compartments are from interest, from marine, brackish/estuarine, freshwaters, sediments, and soils. Considering the global changes predictions for the near future, it is also prone to understand how organisms will deal with these new threats, under extreme environmental conditions.

This is a collaborative Symposium from SPECO- Sociedade Portuguesa de Ecologia, EEF - European Ecological Federation and SETAC- Society of Environmental Toxicology and Chemistry.

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.13
Symposium 1 - Emerging contaminants under global change: perceptions and challenges

EFFECTS OF MICROPLASTICS, NANOMATERIALS AND OTHER CONTAMINANTS IN A CHANGING WORLD: IMPLICATIONS TO MARINE ECOSYSTEM FUNCTIONING

Luís Gabriel Barboza[1,2] , Luís R. Vieira[1,2], Lúcia Guilhermino[1,2]*

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2 - CIIMAR – Interdisciplinary Centre of Marine and Environmental Research, University of Porto, Research Team of Ecotoxicology, Stress Ecology and Environmental Health (ECOTOX), Portugal
* presenting author, e-mail: lguilher@icbas.up.pt

Microplastics, nanomaterials and a wide range of other chemicals are widely used resulting in the contamination of marine ecosystems with potential biological and ecological adverse effects. Moreover, in several regions of the world, such ecosystems are already under pressures resulting from global climate changes.

The objectives of this presentation are to discuss results from studies on the toxicity of microplastics alone and in mixture with other contaminants (gold nanoparticles, pharmaceuticals, metals) in marine organisms, the influence of temperature changes on such effects, and the implications to ecosystem functioning.

Organisms of different tropic levels were exposed to microplastics, gold nanoparticles, other metals and pharmaceuticals, individually and in binary mixtures (microplastics + other contaminants). In selected cases, the effects of temperature changes were also investigated. Effect criteria included: predatory performance, post-exposure swimming performance, biomarkers indicative of neurotoxicity, energy alterations and oxidative stress, population growth rate.

Mcroplastics modulated the toxicity of several contaminants, mixtures were often more toxic than their components individually, mixtures with low or high concentrations of their components induced different types of toxicological interactions, and temperature rise increased the toxicity and bioaccumulation of several pollutants.

The findings of these studies show that the pollution of marine ecosystems with mixtures of microplastics and other pollutants is likely to change marine ecosystem functioning with negative effects to ecosystem services, particularly at increased temperatures, and highlight the need of more research on this global paradigm.

Keywords: microplastics, mixtures, global warming, marine ecosystem functioning, ecosystem services

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.13
Symposium 1 - Emerging contaminants under global change: perceptions and challenges

EMERGING CONTAMINANTS IN FRESHWATERS: CURRENT PERCEPTIONS AND FUTURE PERSPECTIVES

Fernanda Cássio e Cláudia Pascoal

University of Minho
Centre of Molecular and Environmental Biology
Braga

Contaminants of emerging concern are chemical compounds that appear in the environment at low concentrations, globally distributed or as new contaminants with the potential of inducing adverse effects on organisms and ecosystems, and still lacking information on their effects, exposure scenarios, environmental fate and behaviour. They are considered of emerging concern, due to the potential risk they pose to humans and to the environment. Microplastics, nanomaterials, pharmaceuticals, and personal care products (PCPs) include chemicals with these characteristics. We will address the current knowledge on the effects of emerging contaminants on biological systems and their consequences to ecological functions under the ongoing climate changes. Questions related to the quantification and characterization of emerging contaminants in natural environments and organisms, and biological and ecological effects will be discussed. Considering the global changes predictions for the near future, we will try foresee how organisms will deal with these new threats, under extreme environmental conditions.

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.13
Symposium 1 - Emerging contaminants under global change: perceptions and challenges

HAZARD ASSESSMENT OF NANOMATERIALS IN SOILS: TOOLS AND APPROACHES

Susana Loureiro[1], Joana Neves[1], Zahra Khodaparast[1], Amadeu M.V.M. Soares[1], Fred Wrona[2] and Kees van Gestel[3]

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3 Vrije Universiteit Amsterdam, Department of Ecological Science, The Netherlands.
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Nanomaterials (NM) and nanoparticles (NP) are nowadays present in several products that are used in daily care products, medical devices, agriculture, paints and construction, among many others. Their release into the environment is therefore expected through intentional applications (e.g. pesticides and fertilizers) or unintentionally (e.g. effluents and biosolids) from waste water treatment plants.

In the soil compartment, and considering the different emission scenarios, different approaches have to be defined in order to predict or assess risks to the environment. Therefore, the existing protocols have to be adapted considering the special characteristics that are inherent to NM and NP, like their high reactivity, dissolution patterns in time, surface charge and composition, among many others. Adaptations to provide stable and reproducible exposures in the laboratory, methodologies for exposure media and dosing protocols and accurate characterization of exposure are the first approach to be tackled. Afterwards, understanding how this exposure will turn into effects is crucial. The bioavailable fraction, as well as how internally organisms deal with particles are indeed important to understand how they are retained in biota and how and to what extent are they prone to be excreted.

In the soil compartments, plants and small invertebrates are key elements of trophic chains, being plants also part of the human feed. Therefore, understanding how soils and biota act as reactors during NM and NP emissions is crucial to derive an accurate predicting of risks to the environment. The sister projects NanoFASE (HORIZON 2020; http://nanofase.eu/) and NanoFARM (ERA NET SIINN; https://research.ce.cmu.edu/nanofarm/) tackled these issues for both unintentional and intentional released of NM into the soil compartment.

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.14/3.2.15

Symposium 2 - (Socio-) Ecological research for sustainable development: the plea for long-term data

Chair
Margarida Santos-Reis

Presenters
Alice Nunes, Daniel E. Orenstein, Ricardo Díaz-Delgado and Jan Dick

All humanly used resources are embedded in complex, social-ecological systems, and scientific knowledge is needed to enhance efforts to sustain it, combining data from the ecological and social sciences. These two sciences developed mostly apart, but changes in ecosystem structure, key ecological processes and services provided are mostly driven by human activities. This calls for a unified approach and long-term data to be fully understood and to develop management options.
This issue is addressed by the international network ILTER (https://www.ilter.network), the European infrastructure eLTER (http://www.lter-europe.net/elter-esfri) and many national networks which have mostly dedicated to creating, combining and analyzing long-term ecosystem research data. Socio-ecological research within the European network is a relatively young field that studies coupled ecological and social systems to advance solutions for contemporary challenges in human-nature interactions. In this session we will focus on (socio-)ecological system studies, based on already established time series or studies which are intended to run for a long time, and presenters are expected to demonstrate the relevance of their work highlighting its potential for transdisciplinary approaches and its contribution to the SDGs challenges.

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.14/3.2.15
Symposium 2 - (Socio-) Ecological research for sustainable development: the plea for long-term data

MULTI-SCALE REMOTE SENSING FOR LONG-TERM MONITORING AND CONSERVATION MANAGEMENT IN DOÑANA LTSER PLATFORM

Ricardo Díaz-Delgado

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One of the major challenges of remote sensing is the upscaling of natural processes. Although there is a huge availability of sensors, the nature of the process to be monitored constrains the upscaling possibilities. This is especially evident for phenological processes such as flowering, fruiting, leaf emergence or fall as well as for decay processes. This work will show several solutions entailed for the long-term monitoring program of Doñana LTSER platform in order to scale up the collected in situ information with the use of drone-borne, airborne and satellite images. After a short introduction on the background and rationale we will point out the relevance to complement traditional monitoring techniques with information provided at landscape scale. In Doñana protected area several monitoring protocols have adopted the multi-scale approach either to test the accuracy of remote sensing products or to enlarge the implementation scale. Similar procedures are being set up under the umbrella of eLTER RI for the whole set of eLTER sites.

Keywords: Ecological monitoring, Long-term ecosystem research, Remote sensing products, Scale-up

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.14/3.2.15
Symposium 2 - (Socio-) Ecological research for sustainable development: the plea for long-term data

THE IMPORTANCE OF LONG-TERM SOCIO-ECOLOGICAL DATA

Jan Dick

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With over seven billion people on the earth and population growth of 1.1% the need to manage human activity to create a more sustainable biosphere and a more equitable society is urgent. The knowledge needed to enable society to enhance and save guard the lives of all creatures on earth, human and non-human, requires data of many forms and collected over long periods of time. The European Long-Term Socio-Ecological Research Platforms (LTSER) are a network of sites across Europe who have been collecting ecological and society relevant data over decades. These place-based research sites enable a synthesis of data relevant to a place on the earth surface utilising five main types of data:

(i) ecological data including biotic and abiotic variables

(ii) publically available socio-economic data collected by public agencies (census data),

(iii) spatially explicit land use or land cover data (often derived from remote sensing data)

(iv) social media data available in ever increasing qualities including citizen science data on a wide range of fauna and flora and

(v) human attitude and perception survives.

The integration of these data sources to provide knowledge to enable sustainable management is a non-trivial task. Examples of successes and failures will be provided using real-world examples from across Europe and conclusions to enhance sustainable development provided.

Keywords: Place-based, Transdisciplinary, Nature-based solutions, Ecosystem services, SDG

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.14/3.2.15
Symposium 2 - (Socio-) Ecological research for sustainable development: the plea for long-term data

HERDING CATS: THE CHALLENGES OF SEEKING HARMONIZED DATA SETS FROM A NETWORK OF SOCIO-ECOLOGICAL RESEARCH PLATFORMS

Daniel E. Orenstein[1] (presenting author), Jennifer Holzer[1], Jan Dick[2]

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Large ecological research infrastructures (RI) aim for systematic and harmonized data monitoring with broad spatial coverage. The European Long-Term Ecological Research (eLTER) network has been engaged in a four-year effort to define a set of crucial socio-ecological variables and a protocol for collecting them across European ecosystems. Insights were derived from two components of the evaluation: (1) a literature survey conducted in 25 LTSER platforms across the RI, including questions regarding data use (Dick et al. 2018), and (2) interviews with stakeholders of four platforms regarding their research program and its impacts (Holzer et al. 2018; Holzer et al. *in preparation*).

Challenges facing the RI include (1) relatively low reliance on social data sets; (2) lack of systematic collection of social data; (3) research agendas and data collection of local platforms strongly influenced by local needs, staffing and funding, and; (4) top-down funding influences research guidelines and foci. Most research concur that the RI and its stakeholders would greatly benefit from systematic collection of socio-ecological variables in order to better define human-nature interactions and address grand environmental challenges. This process demands top-down support for RI members, while allowing for flexibility for bottom-up constraints and interests. Guidelines specifying variables and data collection protocol are currently being developed.

Keywords: Socio-Ecology, Long-Term Ecosystem Research Network, Data, Europe

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.14/3.2.15
Symposium 2 - (Socio-) Ecological research for sustainable development: the plea for long-term data

HOW PAST LESSONS CAN HELP SHAPING THE FUTURE? ADAPTING FOREST LANDSCAPES TO CLIMATE CHANGE.

Alice Nunes[1] (presenting author), Melanie Batista[1], Adriana Príncipe[1], Pedro Pinho[1], Paula Matos[1], Helena Serrano[1], Laura Concostrina-Zubiri[1], Cláudia Listopad[2], Clara Wendt[1], João Serafim[1], Alexandra Oliveira[1], Cristina Soares[1], Alzira Ramos[3], Bernardo Rocha[1], Margarida Santos-Reis[1], Otília Correia[1] & Cristina Branquinho[1]

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Open oak forests (montados) are semi-natural ecosystems with a remarkably rich biodiversity, which supports their functioning and multiple ecosystem services. Yet, their sustainability is at risk due to global change factors such as overgrazing, nitrogen pollution, desertification and climate change. In order to anticipate the effects of these threats, and to define the best strategies to promote sustainable land management, climate change mitigation and adaptation, and halt and reverse biodiversity loss, we need ecological indicators that reflect changes in ecosystem functioning at different spatial scales, and enable to monitor the effectiveness of such strategies on the long run.

Here, we address the response of several taxa (biological soil crusts, vascular plants, lichens and ants) to grazing, nitrogen deposition and aridity, in montado LTsER sites. Structural, taxonomic and functional diversity metrics are used, as well as remote sensing-based metrics, which can be related with key ecosystem processes and associated ecosystem services.

Climate strongly influences montado functioning and the success of natural and assisted cork oak and holm oak establishment. A number of climate effect' indicators are available at macro and micro scales, that can be upscaled and translated into ecosystem services, and disseminated to stakeholders and decision-makers at national and UN level to help build sustainable solutions. Trait-based indicators enabled to establish critical levels for N pollution on montado, and to measure air quality directives' success. Grazing strongly impacts montado, and many indicators can be used to fine tune land management strategies and evaluate their success in restoring multiple ecosystem services.

Keywords: Ecological indicators; Ecosystem services; Functional trait diversity; Open oak forest; Remote sensing

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.16

Symposium 3 - Soil provides ecosystem services under nautral and men made environments.

Chair
Cristina Cruz

Presenters
Birgit Lang, Pablo PC Vaglini and Mara Grube

Soil is a hotsopt of biodiversity. Soil organisms range in size from the tiniest bacteria, algae, fungi, and protozoa, to the more complex nematodes, micro-arthropods, visible earthworms, insects, small vertebrates, and plants. As these organisms eat, grow, and move through the soil, they create food webs; and make possible to have clean water and air, healthy plants, and moderated water flow. Ecosystem, and consequently soil, management are expected to feedback into the structure and size (nodes/taxa) of these food webs. Experimental approaches linking structure and function, allowing to learn vastly more about who eats what, where and when are those fundamental to a more knowledge based soil management. Policy makers involved in ongoing international agreements, such as the United Nations Convention to combat desertification, the convention of Biodiversity and the Intergovernmental Panel on Climate Change, are seeking multiple solutions and need reliable scientific information on soils, their biodiversity and the many services they provide, as well as their resilience under the interacting environmental challenges. The main objective of this symposium is to show soils as major ecological regulator of Earth.

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.16
Symposium 3 - Soil provides ecosystem services under nautral and men made environments.

(EEF2019-13888) - MODULATION OF THE WHEAT MICROBIOME BY THE PLANT GROWTH PROMOTING BACTERIA HERBASPIRILLUM SEROPEDICAE

Pablo Pablo Pc Carril (Portugal)[1]; Joana Cruz (Portugal)[2,3]; Juliana Melo (Portugal)[1]; Rogério Tenreiro (Portugal)[3]; Cristina Cruz (Portugal)[4]

1 - Center for Ecology, Evolution and Environmental Changes;
2 - BioISI-;
3 - Biosystems and Integrative Sciences Center - FCUL University of Lisbon;
4 - Center for Ecology, Evolution and Environmental Changes (CE3C) - FCUL, University of Lisbon

Our aim is to assess whether the application of plant growth promoting rhizobacteria (PGPR) in wheat seedlings modulates the composition and diversity of the microbiome naturally occurring within the plant from its germination stage. In relation with this, we aim to determine if this modulation is linked to enhanced plant resistance against pathogens.

We have grown surface-sterilized wheat seeds in growing chambers containing sterile Hoagland solution and supplemented with 10% of PGPR inoculum. Four different PGPR where used as inoculants: two associative and two endophytic strains from both the genus Herbaspirillum and Azospirillum. Molecular identification of the cultivable microbiome was carried out.

Our results show that inoculation of 4day-old seedlings with H. serpedicae RAM led to a significant decrease of the total plant-associated bacterial load both in the Hoagland solution and in the root-associated epi- and endophytic community. This phenomenon was observed 4 days after PGPR inoculation, while in later timepoints (10 and 16days post RAM-inoculation), bacterial load in the seedlings is established again to the level of control PGPR-free plants. Furthermore, bacterial diversity was reduced in RAM-inoculated seedlings, suggesting that that H. seropedicae modulates the composition of the plant microbiome by favoring specific bacteria.

The inoculation of the PGPR H. seropedicae in 4day-old wheat seedlings leads to a significant decrease in both the plant bacterial load as well as a change in the bacterial diversity. This phenomenon may be essential to understand the defense priming effect induced by these PGPR in wheat plants.

Keywords: Microbiome, Wheat, Priming, PGPR

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.16
Symposium 3 - Soil provides ecosystem services under nautral and men made environments.

(EEF2019-13633) - WHAT CAN FTIR SPECTROSCOPY TELL ABOUT GLYPHOSATE-DEGRADING POTENTIAL OF SOIL BACTERIA?

Mara Grube (Latvia)[1]; Uldis Kalnenieks (Latvia)[1]; Olga Muter (Latvia)[1]

1 - Institute of Microbiology & Biotechnology, University of Latvia, Riga, Latvia

Bio-remediation of herbicide-contaminated environment is a topical problem. Glyphosate-based herbicides (GBHs) are the most widespread broad-spectrum herbicides that contaminate soils and waters, are toxic to microbiota, plants and animals. Particular soil bacteria and fungi can degrade GBHs. Hence, search for new GBH-degrading strains, effective under specific growth and local environment conditions, is a promising solution for bio-remediation. Consequently, there is a need for rapid and informative methods to evaluate the GBH-induced changes of the metabolic pathways in cells, that may serve as indicators of GBH-degrading potential.

The metabolic response of three newly isolated GBH-degrading bacterial strains, Pseudomonas sp., Actinobacteria and Serratia sp. to elevated concentrations of glyphosate - 100 and 500 mg/L, in GBH KlinikÒ 360 SL was examined by microbiological and FTIR spectroscopy methods (1).

This study showed that new isolates of Pseudomonas sp., Actinobacteria and Serratia sp. were resistant to elevated concentrations of GBH KlinikÒ and exhibited the potential for GBH degradation. FTIR spectra of bacterial strains incubated with/without GBH, were similar, thus indicating their GBH-resistance in agreement with the results of microbiological tests. The absorption peak at 1736 cm-1, assigned to ester carbonyl stretch vibrations of phospholipids or poly-β-hydroxybutyrates, was detected in spectra of all three bacteria. An increase of cellular amounts of esters indicates the degradation of glyphosate. Therefore, detection and evaluation of the ester carbonyl band in FTIR spectra of bacteria may speed up the search of GBH-degrading strains.

Keywords: glyphosate, bacteria, FTIR

30/07 | 11h00
PARALLEL SYMPOSIA – SESSION I
Room 3.2.16
Symposium 3 - Soil provides ecosystem services under nautral and men made environments.

(EEF2019-13623) - ON THE ROLE OF SOIL FAUNA FOR PROVIDING SOIL FUNCTIONS – A META-STUDY

Birgit Lang (Germany)[1]; David J. Russell (Germany)[1]

1 - Senckenberg Museum of Natural History Görlitz

Soils are fundamental for functions leading to important ecosystem services. However, soils are threatened worldwide, e.g. by land degradation, which is problematic as their functionality cannot simply be replaced once lost. To maintain a sustainable use of soils, a comprehensive functional understanding of soil systems is needed. To this end, the research program “BonaRes - Soil as a Natural Resource for the Bio-Economy” was launched by the German Federal Government.

Soil fauna and their interactions play a key role in a number of ecosystem processes and functions, e.g. through the modification of soil structure. Understanding how soil faunal activity affects soil-structural properties, such as bulk density as a prominent indicator of soil structure, is thus of utmost importance. However, a quantitative understanding of the contribution of soil fauna to bulk density and their potential for counteracting compaction is lacking. To fill this gap, we conducted a global meta-analysis on soil faunal effects on bulk density. Nearly all studies primarily investigated earthworm effects. Their effects depend on species and site-specific factors, and are highly variable due to interactions between species, soils and experimental design. Knowledge gaps regarding compacted soils, the interactive influence of soil characteristics, ecological groups, and the replication across earthworm species are identified. Understanding how such factor combinations influence soil biota’s effects on soil structure is, however, a prerequisite for developing soil-management strategies that strengthen biotic interactions with soil-structure dynamics. Comparative studies taking factor combinations into account are therefore still highly necessary.

Keywords: soil functions, soil fauna, earthworms, compaction, sustainable soil use

30/07 | 15h20
PARALLEL SYMPOSIA – SESSION II
Room 3.2.13

Symposium 4 - The potential of psychosocial variables in Ecosystem Based Management

Chair
António Nogueira

Presenters
Ana Lillebø, Sílvia Luis and António Nogueira

Human well-being has gain increasing relevance since the consequences of ecosystem change were assessed in the scope of the Millennium Ecosystem Assessment. Furthermore, in 2015 the United Nations approved the Sustainable Development Goals for 2030, which include environmental, social and economic related goals.
Ecosystem Based Management (EBM) as a concept, emerged from resilience science, adaptive management and ecological policy design, enabling to address social-ecological systems, towards sustainable development and human well-being, in a more holistic perspective.
In coastal territories, current and foreseen changes connected to human activities, namely land and water uses, and potential conflicts, in frame of environmental policies, sustainable economic development and human well-being require the implementation of EBM planning processes.
In this context, the aim of this symposium is to combine natural and social sciences perspectives as a way to bridge society and ecological sustainability.
A major shared communication, focusing on EBM planning process and on the potential of psychosocial variables to understand social problems and promote change, will be followed by a round-table discussion.

30/07 | 15h20
PARALLEL SYMPOSIA – SESSION II
Room 3.2.14/3.2.15

Symposium 5 - BCSD

Chair

Presenters

30/07 | 15h20
PARALLEL SYMPOSIA – SESSION II
Room 3.2.13

Symposium 6 - Biodiversity in African Portuguese speaking countries (CPLP)

Chair
Helena Freitas

Presenters
Sílvia Castro, Orlando da Mata, Esperança Costa and Maria do Céu de Madureira

Assigned in 2014 to the University of Coimbra, the UNESCO Chair on Biodiversity Safeguard for Sustainable Development aims to act as an integrated platform in education, research, information and science communication, in the fields of biodiversity, ecology, conservation and sustainable use of biological resources. We aim to increment inter-university cooperation and strengthening of scientific networks with African Portuguese speaking countries, for the benefit of the environment and the sustainable management of regional biological resources and collections.

30/07 | 15h20
PARALLEL SYMPOSIA – SESSION II
Room 3.2.13
Symposium 6 - Biodiversity in African Portuguese speaking countries (CPLP)

PLANT LETTERS: A CITIZEN SCIENCE PROJECT READING HISTORICAL BIODIVERSITY DATA

Sílvia Castro[1], Dias da Silva, A.M[1]; Girão da Cruz, M.T.[1,2]; Cabral-Oliveira, J.[1,3]; Freitas, H.[1,3]; Gouveia, A.C[1,3]

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Historically, the exchange of letters was the privileged means of circulating information and knowledge. At the University of Coimbra (UC), the Life Sciences Department safeguards almost 5000 letters and other documentation addressed to directors, gardeners and other collaborators of the Botanic Garden. These records of Portuguese botanical science and expeditions of plant discovery, collection and identification are held in thousands of handwritten letters, species lists and assorted notebooks, in more than five different languages. As a colonial country for many centuries, the records of Portuguese scientific activity and occupation strategies of overseas territories, in Africa, South America, Asia and the Pacific, are also documented, and its data (e.g., historical biological records) is of crucial importance to these now independent countries.

In order to uncover historical biodiversity data within this archival material, we have implemented Plant Letters (https://www.zooniverse.org/projects/catedraunesco/plant-letters), a citizen science transcription project that seeks to uncover the stories within these historical archives, the tales of travellers and scientists, on the quest of recording of the world's diversity, mostly in the Portuguese ex-colonies in sub-Saharan Africa. Using the collaborative platform Zooniverse (https://www.zooniverse.org), users are requested to engage with the archive and transcribe mostly handwritten letters in several languages, giving dimension to our continuous efforts of promoting open and widespread access to information. The main purpose of this project is to track plant species, locations and scientists in the correspondence received in the 19th and 20th centuries at the Botanic Garden of the University of Coimbra. To do so, Plant Letters seeks in users, both experts or simply curious, a source of participation in the construction of knowledge, making use of collective intelligence, in a lively exchange of information, experiences and knowledge.

30/07 | 15h20
PARALLEL SYMPOSIA – SESSION II
Room 3.2.13
Symposium 6 - Biodiversity in African Portuguese speaking countries (CPLP)

TREASURES D'OBÔ PROJECT: IMPLEMENTATION OF AGROFORESTRY SYSTEMS IN S. TOMÉ AND PRÍNCIPE AND DEVELOPMENT OF NON-TIMBER FOREST PRODUCTS IN ANGOLA AND S. TOMÉ E PRÍNCIPE

Maria do Céu de Madureira[1], Helena Freitas[1,2], António C. Gouveia[1,2]

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The main objective of the Tesouros D'Obô ("treasures of the forest") project is to contribute to the sustainable reduction of poverty, ensuring greater food and nutritional security, sustainable agriculture, to reduce hunger and improve the well-being of the population of two African countries: S. Tomé and Príncipe and Angola. The Project is funded by the African Union (AURG-II-1-254) and coordinated by the University of Coimbra, with the Centre for Botanical Research and Development of Agostinho Neto University and the National Technological Centre (CTN) as partners in Angola, and the Natural Park of S. Tomé, and the Directorate of Forests and Biodiversity of the Ministry of Agriculture, Fisheries and Rural Development as Partners in S. Tomé and Príncipe.

The project lasts 36 months (2018-2021) during which agroforestry practices will be implemented for land rehabilitation, community forest management practices, tree domestication and the development of non-timber forest products (scientific identification, selection and production of aromatic and medicinal plants, and mushrooms), and soil fertility research and management. The techniques to be implemented represent a highly adaptable generic model for the rehabilitation and improvement of smallholder farming practices in Africa, which will contribute to poverty reduction and provide social benefits for the entire population. In fact, these integrated agroforestry practices are ecological enhancement approaches that enhance biodiversity while optimizing the use of ecosystem services to produce food and / or drugs at the lowest cost and environmental impact, thereby fulfilling the objectives and priorities of the SDGs.

Keywords: Agroforestry systems; Community Management of Forests, Medicinal Plants; Aromatic Plants, Mushrooms; Angola; S. Tome and Principe.

30/07 | 15h20
PARALLEL SYMPOSIA – SESSION II
Room 3.2.13
Symposium 6 - Biodiversity in African Portuguese speaking countries (CPLP)

THE BIODIVERSITY OF ANGOLA: SAFEGUARDING FOR SUSTAINABILITY

Orlando da Mata

Dean of the University Mandume ya Ndemufayo. Lubango. Angola

This presentation highlights Angola's rich biodiversity as well as its main centers of biodiversity and endemism. The various biomas that exist in the country are evidenced, all the way from the rainforest and closed Mayombe Forests in Cabinda and Zaire, to the semi-desert region of Namibe, where the beautiful Welwitshia mirabilis "reigns", the conspicuous xerophytic plant endemic to the Namib Desert. Along the way we find open forests of the central plateau, dry savannas and coastal mangrove forests in areas of confluence with rivers. The loss of biodiversity and the main threats to it are addressed, and given the urgent need to reverse the picture, the main actions and efforts for the conservation of Biodiversity in Angola are laid out.

Keywords: Biodiversity, Angola, endemisms, threats, conservation.

30/07 | 15h20
PARALLEL SYMPOSIA – SESSION II
Room 3.2.13
Symposium 6 - Biodiversity in African Portuguese speaking countries (CPLP)

ETHNOBOTANICAL POTENTIAL OF OKAVANGO REGION, CUANDO CUBANGO, ANGOLA

Esperança da Costa

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The study addresses the diverse use of plants of Cuito Cuanavale and Cuchi in a region of Cuando Cubango province of Angola. The study was conducted during the months of April and May, 2009 during the survey to establish the Okavango river basin transboundary diagnostic analysis. Also in 2014 during the month of November, in the rainy season, a new field trip was conducted to collect more elements for deficient data. A semi –structured interviews were done resulting in thirty five persons interviewed and about 122 data records for about 39 different species belonging to 18 famillies .The study shows that most plants are used as a timber, fuel and in more than one treatments (Ricinodendron heudelotii, Pterocarpus angolensis, sclerocarya birrea). Medical treatments comprised a high range of different symptoms, among which fevers, stomach, malaria and respiratory diseases. The study also show that various species have a highest cultural importance.The study points out the high importance of the Cuando Cubango region in terms of useful plants and serves as a basis for further studies illustrating plants with a high potential for pharmaceutical studies. The study also points that the use of traditional knowledge and the development of new plant produtcts must have into consideration the biodiversity conservation and the benefit-sharing including local populations.

Keywords: Ethnobotany, useful plants, traditional knowledge, Angola

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.13

Symposium 7 - Sustainable water stewardship

Chair
Rosalina Tanganho

Presenters

For Tabaqueira and Philip Morris International (PMI), sustainability means creating long-term value while minimizing the negative externalities associated with our products, operations and value chain.

We are creating a smoke-free future where cigarettes are replaced with less harmful, smoke-free products as soon as possible – the right thing for any tobacco company to do.

Our sustainability strategy is a key element of PMI's overall business strategy and is structured around four pillars, which enable our vision of a smoke-free future: transforming our business* to reduce to the largest extent possible the harm associated with our products; being respectful of people throughout the value chain; reducing our environmental footprint; and driving operational excellence for sustainability.

PMI joined the Alliance for Water Stewardship (AWS) in 2017, a leading organization dedicated to better managing water within the local watersheds.

Our efforts are geared towards improving water efficiency, conservation, and reusing or recycling water where possible. Tabaqueira's factory is undergoing an AWS certification.

We do not just seek to reduce water use, but also to act as a good water steward by promoting an Alliance for Water Stewardship.

*PMI developed Business Transformation Metrics to report periodically in its Sustainability Report (2018 report predicted to be published in April 2019).

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.13
Symposium 7 - Sustainable water stewardship

SUSTAINABLE WATER STEWARDSHIP

“Philip Morris International (PMI) is leading a transformation in the tobacco industry to create a smoke-free future. As part of its Environmental Policy, PMI is committed to actively reduce the negative impact on the environment of its products, operations and value chain.

Our water strategy accounts for the risks we face from water stress and pollution and drives action to ensure water is managed sustainably as a shared resource. In the tobacco supply chain for example, we work with suppliers and farmers to implement Good Agricultural Programs to protect water resources and promote access to safe water and sanitation (WASH).

Across our manufacturing operations, we have implemented the ISO 14001 Environmental Management standard, and we run programs to use water more efficiently.

Building on these successes, we joined the Alliance for Water Stewardship (AWS) in 2017. Based on a successful pilot in Brazil in 2018, we committed to implement the AWS standard across our factories. The second site to become certified, and the first in Europe, is our manufacturing operation in Sintra, Portugal, which reached certification in March 2019. The very thorough and complete assessment needed for the AWS standard brought many learnings, and also highlighted innovative opportunities for improving the local watershed, besides including initiatives to raise environmental awareness in the catchment area local community.

Four more PMI factories are scheduled to become AWS certified in 2019, with all factories targeted to become certified by 2025.

We maintain transparent external reporting regarding our water use via our sustainability report and our CDP Water disclosure, for which we achieved a B rating in 2018.”

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.14/3.2.15

Symposium 8 - Regenerating cities with Ecology-based Design. Permaculture Living Lab at Lisbon University

Chair
David Avelar

Presenters
David Avelar, António Alexandre and Florian Ulm

How to integrate and implement the Sustainable Development Goals (SDG) in a city, while taking in consideration the lessons from Nature? How to transfer ecological knowledge to the spacial, social and economic sphere of a city? How to capitalize on ecology and evolution wisdom?

This session wants to address in particular the UN SDG 11, which covers “Sustainable Cities and Communities”. The challenges cities face can be overcome with nature-based solutions in ways that allow them to continue to thrive and grow, while improving resource use and reducing pollution and poverty.

The symposium will consist in flash presentation in a PechaKucha way (20 slides 20 seconds each) to inspire and activate the discussion. The presentations will be about patterns in ecology to support the nature-based design discussion.

The discussion will follow the Open Space Technology and will be about how to apply the scientific evidence about ecosystems dynamics and patterns in cities in different domains: socio-economic, energy and transportation; food consumption and production; resource use efficiency.

Acknowledging HortaFCUL Permaculture project bred at Lisbon University, from which the Permaculture Living Lab flourished, it will be shared ten years of lessons and it contributions for a sustainable future.

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.14/3.2.15
Symposium 8 - Regenerating cities with Ecology-based Design. Permaculture Living Lab at Lisbon University

ECONICS: DYNAMICS AND FUNCTIONING OF COMPLEX AND HOLARCHICALLY NESTED ECOLOGICAL SYSTEMS.

David Avelar

Econics is the discipline that promotes the mimicking of ecological system dynamics and functioning for an improved ecosystem management and functioning of socio-economic systems as a gateway towards sustainable development. It addresses research questions like: What makes ecological systems efficient? What are the drivers of system evolution in a changing world? How do ecological systems become resilient against disturbances?

Since life on Earth emerged 3.90–3.85 billion years ago, natural selections has been choosing i) processes that better capture energy to move further from thermodynamic equilibrium and maintain a state of low-entropy and high-exergy relative to its surrounding and to thermodynamic equilibrium, and ii) patterns better adapted to the environmental shocks and new disturbances, in other words, the most productive and resilient as possible. A central principle that emerges from the study of those processes and patterns is that functional integrity, adaptive capacity and resilience in ecosystems are maintained by conserving energy dissipative structures in the form of biomass, networks, and information, the so called eco-exergy.

It will be presented the evidence of a three year research on case-studies at different spatial scales, and some reflections about the role of eco-exergy growth, natural banking development and ecosystems innovation in creating resilience to unexperienced disturbances. It will be shared some proposals about how can we apply the different ecosystem theoretical frameworks on concrete human systems as an Ecology-based Approach to contribute to SDG accomplishment.

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.14/3.2.15
Symposium 8 - Regenerating cities with Ecology-based Design. Permaculture Living Lab at Lisbon University

LEARNING FROM ECOLOGY TO IMPLEMENTING AT LISBON UNIVERSITY: THE 10 YEAR OLD HORTAFCUL PERMACULTURE PROJECT

António Alexandre

It has never been more urgent to adjust our way of life to the ongoing chain of events that human activities have triggered through a more conscious and nature-like approach, especially in urban environments. At the Faculty of Sciences of the University of Lisbon, in the heart of a metropolis such as Lisbon, a permaculture project named “HortaFCUL” - a bottom-up project led by students and guided by nature’s principles during 10 years - has had, since its inception, the will to educate and promote such an approach, both from an ecological and a social standpoint.

This project has worked proactively upon three major pillars: the ecological importance of cycles, diversity and networks. Acknowledging the importance of cycles such as the organic cycle, hydrological cycle, life cycle and social cycle, promoting diversity in its biological as well as social facets along with the expansion of networks in biologically, socially and institutionally meaningful ways.

Therefore, this presentation aims to demonstrate how HortaFCUL has promoted the bond between ecology and agriculture with a hands-on approach, demonstrating how we have worked on these three pillars, cultivating a more conscious and balanced community and contributing to the UN’s Sustainable Development Goals for 2030.

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.14/3.2.15
Symposium 8 - Regenerating cities with Ecology-based Design. Permaculture Living Lab at Lisbon University

HEALTHY SOIL AS THE BASIS FOR A SUSTAINABLE FUTURE

Florian Ulm

The challenges urban systems are facing are manifold and interconnected. While the worlds' urban population increases, peri-urban farming land decreases and as a result urban populations are increasingly dependent on distant agriculture systems while wasting food along the supply chains and in urban homes. This waste than needs to be transported into nearby landfills, often without recycling residual nutrients, which turns our current urban food production system very unsustainable.

Additionally, the heavy dependence of modern agricultural systems on big machinery, mineral fertilization, biocides and monocultures has devastating consequences on soils and the ecosystems that rely on them. Loss of soil organic matter (SOM) and soil life is tightly connected to industrial agriculture, turning this type of agriculture extractive and threatening food sovereignty of many metropolitan areas of the world. In contrast to these linear nutrient and energy streams, ecosystem processes always follow circular patterns and furthermore, are redundant in nature, with each piece of the system supporting various functions simultaneously.

One way to turn urban organic matter waste streams circular is to compost the waste and use the resulting soil amendment as a nutrient source for local food production. This could increase urban food sovereignty and resilience while sequestering carbon, increase SOM and soil life, while decreasing dependency on distant agricultural sites, further diminishing other negative consequences of the current food system, such as energy demand for transport and cool chains. However, this type of food production demands turning away from commercial hybrid crops that require heavy fertilization and do not return viable seeds for subsequent planting. To tackle this challenge, we grew a local, open-pollinated variety (OPV) of maize (Zea Mays) vs. a commercial hybrid variety in an urban setting (PermaLab, FCUL, Lisbon, Portugal) under two types of compost fertilization regimes.

We hypothesized that as OPVs were bred in oligotrophic systems, they should be more adapted to compost fertilization, yielding more grain of higher nutritional value. We used two types of compost: Green waste compost that increases SOM and nutrient retention as well as municipal compost that has a high nutrient content and serves a organic fertilizer. Using this setup we were able to produce a substantial amount of food in a small area, while increasing SOM, recycling organic matter waste and producing ample seed supply for the next growing season, thus turning the system interconnected, sustainable and resilient.

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.16

Symposium 9 - Plant community change and ecosystem services along anthropogenic gradients in forests

Chair
Luís Silva

Presenters
Luís Silva, Lurdes Borges Silva, Diogo C. Pavão, Maria Ventura and Fernando Lopes

Forests provide a panoply of ecosystem services, but their contribution is not homogeneous. Due to land changes associated with anthropogenic activity, primordial forests have been cleared and replaced by production forest and by secondary forest, often constituted by exotic woodland. This has led to significant changes in biodiversity patterns. Also, ecosystem services, envisioned by local stakeholders, are of considerable importance, notably when addressing forests in conjunction with and other land uses. Thus, different groups (e.g., farmers, foresters, hunters, ecotourists, local residents) might attribute different use values to the different types of forests (i.e., natural forest, production forest, exotic woodland), and to the different landscape elements. The Azores, an oceanic archipelago, with nine diverse islands of volcanic origin, are an interesting region to be used as a model in studies devoted to biodiversity pattern changes associated with anthropogenic activity, and to the potential ecosystem services originated by different types of forests. In this symposium we aim to discuss some of the diverse aspects that can be used to express ecosystem services derived from forest in an island system, including: taxonomic and structural diversity, reservoir of endemic and native species, potential for carbon accumulation, potential for biomass production, touristic relevance, and stakeholder valuation.

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.16
Symposium 9 - Plant community change and ecosystem services along anthropogenic gradients in forests

OC - (EEF2019-13655) - PLANT COMMUNITY CHANGE AND ECOSYSTEM SERVICES ALONG ANTHROPOGENIC GRADIENTS IN FORESTS

Luís Silva (Portugal)[1]; Ana Moniz (Portugal)[2]; Diogo Pavão (Portugal)[1]; Fernando Lopes (Portugal)[2]; Francisco Moreira (Portugal)[4]; Francisco Silva (Portugal)[2]; Lurdes Borges Silva (Portugal)[1]; Maria Ventura (Portugal)[1]; Mónica Moura (Portugal)[1]; Rui Elias (Portugal)[3]

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2 - Faculdade de Economia e Gestão/School of Business and Economics Universidade dos Açores, Rua da Mãe de Deus, 9501-801 Ponta Delgada, Açores, Portugal and CEEAplA – Centre of Applied Economic Studies of the Atlantic;
3 - cE3c/ABG – Centre for Ecology, Evolution and Environmental Changes/Azorean Biodiversity Group and University of the Azores, 9700-042 Angra do Heroísmo, Azores, Portugal.;
4 - CIBIO/InBIO – Centro de Investigação em Biodiversidade e Recursos Genéticos, Laboratório Associado, Universidade do Porto, Campus Agrário de Vairão, 4485-601 Vairão, Portugal.

Forests provide a panoply of ecosystem services, but their contribution is not homogeneous. Due to land changes associated with anthropogenic activity, primordial forests have been cleared and replaced by production forest and by secondary forest, often constituted by exotic woodland. This has led to significant changes in biodiversity patterns. Also, ecosystem services, envisioned by local stakeholders, are of considerable importance, notably when addressing forests in conjunction with other land uses. Thus, different groups (e.g., farmers, foresters, hunters, ecotourists, local residents) might attribute different use values to the different types of forests (i.e., natural forest, exotic woodland, production forest), and to the different landscape elements. The Azores, an oceanic archipelago, with nine diverse islands of volcanic origin, are an interesting region to be used as a model in studies devoted to biodiversity pattern changes associated with anthropogenic activity, and to the potential ecosystem services originated by different forest types. In this symposium we discuss some of the diverse aspects that can be used to express ecosystem services derived from forests in an island system, including: soil preservation, taxonomic and structural diversity, reservoir of endemic and native species, potential for carbon accumulation, potential for biomass production, touristic relevance, and stakeholder valuation. The global results of the FOREST-ECO2 project revealed clear quantitative differences between three main forest types: i) natural forest as a main reservoir of native biodiversity; exotic woodland as a reservoir of biomass and provider of some economic uses; and production forest as a carbon sink and provider of timber.

Keywords: Forests, Islands, Ecosystem services, Anthropogenic, Gradient

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.16
Symposium 9 - Plant community change and ecosystem services along anthropogenic gradients in forests

OC - (EEF2019-13625) - ANTHROPOGENIC LAND COVER DOMINATES HIKING TRAILS IN A NATURE TOURISM DESTINATION

Diogo C. Pavão (Portugal)[1]; João Porteiro (Portugal)[1]; Maria A. Ventura (Portugal)[1]; Lurdes Borges Silva (Portugal)[1]; António Medeiros (Portugal)[2]; Ana Moniz (Portugal)[3]; Mónica Moura (Portugal)[1]; Francisco Moreira (Portugal)[4]; Luís Silva (Portugal)[1]

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Nature-based tourism is the new paradigm of nature destinations, thus tourists are increasingly interested in peculiar aspects related with local landscape and biodiversity. The Azores are considered a sustainable nature destination, with several tourist attractions including hiking

trails. To test the hypothesis that natural vegetation/forest may have a relevant role along trails, we performed a quantitative geographic information system-based analysis to determine the predominant types of land cover along hiking trails in the Azores. All the different statistical results showed that agriculture/pastureland dominate most of the trails, and that land cover distribution along trails was correlated with global land cover partitioning in the respective island. Only a reduced number of trails showed distinct composition of land cover, including natural vegetation/forest. Therefore, we conclude that land cover of hiking trails in this nature destination is dominated by a humanized landscape, which raises relevant questions regarding tourists' expectations when visiting the Azores.

Keywords: Azores archipelago, Land cover, Nature-based tourism, Hiking trails, Tourists' expectations

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.16
Symposium 9 - Plant community change and ecosystem services along anthropogenic gradients in forests

OC - (EEF2019-13806) - LANDSCAPE PREFERENCES OF TOURISTS HIKING IN THE TRAILS OF S. MIGUEL ISLAND (AZORES, PORTUGAL): IMPLICATIONS FOR CONSERVATION

Maria Ventura (Portugal)[1]; Ana Moniz (Portugal)[2]; Fernando Lopes (Portugal)[2]; João Porteiro (Portugal)[1]; Diogo Pavão (Portugal)[1]; Lurdes Borges Silva (Portugal)[1]; Francisco Silvia (Portugal)[2]; Mónica Moura (Portugal)[1]; Rui Bento Elias (Portugal)[3]; Luís Silva (Portugal)[1]

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3 - cE3c/ABG – Centre for Ecology, Evolution and Environmental Changes/Azorean Biodiversity Group & University of the Azores, 9700-042 Angra do Heroísmo, Azores, Portugal

In the last decade, the Azores, a part of the Macaronesian biogeographic region, turned from an almost unknown region to a highly awarded tourist destination. The Azorean trails were designed to maximize the tourists' contact with nature. We selected São Miguel Island (SM) as a first case-study, because it is the larger and more populated island and is also the one receiving more tourists. To understand the tourists' motivations for hiking and their landscape preferences along the visited trails, we applied a structured questionnaire to a sample of 348 trail users in four trails in SM, with different land cover patterns, during the summer of 2017 and 2018: "Mata do Canário"; "Vista do Rei"; "Salto do Cabrito"; "Lagoa do Fogo". The questionnaire was divided into several sections; one to characterize the tourists' profile, another to evaluate their main motivations to visit the Azores and hike on trails, and another meant to rate their experience on the trails and ask them about their perceptions concerning the trails' use by other hikers. To evaluate landscape preferences along the trails, tourists were asked to pin-point their preferred trail sections in an orthophotomap covered with a geo-referenced grid, whose cells were then used to calculate the percent cover preferences for each type of vegetation cover. We then compared the trail vegetation cover that we have on SIG's database with the tourists' preferences, in order to understand the importance, they gave to the presence of forest or other types of soil uses, along the trails.

Keywords: Nature-based tourism, Azores archipelago, Hiking trails, Conservation

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.16
Symposium 9 - Plant community change and ecosystem services along anthropogenic gradients in forests

OC - (EEF2019-13650) - VALUE ATTRIBUTED TO FOREST AND OTHER LAND USES: THE STAKEHOLDERS' PERSPECTIVE

Fernando Lopes (Portugal)[1]; Luis Silva (Portugal)[1]

1 - Universidade dos Açores

The concept of ecosystem bundles as sets of consistently associated ecosystem services (ES) is used to quantify ES relationships and the socio-ecological conditions that drive them. Identifying ES bundles and their drivers is a useful strategy to improve management and policy decisions that goes beyond the concept of multifunctionalty and addresses possible synergies and trade-offs between this services.

Structured interviews of farmers, tourism agents, local decision makers, technical staff and environmental ONG representatives were conducted across 4 Azorean boroughs during 2017 and 2018 summer months using a strategy of purposeful sampling to address information rich residents.

Asked to identify and locate ecosystem services that contributed to their welfare more than 72% identified food production, scenic views and water provision as the most relevant. Wood production, memory and value for future generations was valued by 41%% of the respondents, while the contribution to welfare of biodiversity, learning from nature and wood collection was relevant to less 10% of respondents.

Previous studies showed local communities have greater preference for direct use values such as provisioning services so it is surprising that interviewees also associates scenic views in the same bundle. The second difference is the association of water provision and hunting, which use natural resources managed in common, or of free access. Carbon sequestration was not selected either because questions are framed in terms of contribution to personal welfare or due to limited information on climate regulation.

Keywords: Bundles, Ecosystem services, Land use management

30/07 | 17h50
PARALLEL SYMPOSIA – SESSION III
Room 3.2.16
Symposium 9 - Plant community change and ecosystem services along anthropogenic gradients in forests

OC - (EEF2019-13660) - ECOSYSTEM FORESTS IN ISLANDS: BIODIVERSITY PATTERNS AND SERVICES

Lurdes Da Conceição Borges Silva (Portugal)[1]; Diogo Cláudio Pavão (Portugal)[1]; Rui Elias (Portugal)[2]; Mónica Moura (Portugal)[1]; João Porteiro (Portugal)[1]; Maria De Anunciação Ventura (Portugal)[1]; Fernando Rosa Rodrigues Lopes (Portugal)[3]; Ana Isabel Arruda Moniz (Portugal)[3]; Francisco Silva (Portugal)[3]; Francisco Moreira (Portugal)[4]; Luis Silva (Portugal)[1]

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3 - Faculdade de Economia e Gestão/School of Business and Economics Universidade dos Açores, Rua da Mãe de Deus, 9501-801 Ponta Delgada, Açores, Portugal and CEEAplA – Centre of Applied Economic Studies of the Atlantic;
4 - Institute of Agronomy, Centre for Applied Ecology, University of Lisbon, Portugal.

Forests provide a broad range of ecosystem services, but their contribution is not homogeneous. Due to land changes associated with anthropogenic activity, primordial forests have been replaced by production and secondary forest, often constituted by exotic woodland, particularly in islands. This research addresses ecological and economic valorisation of forests in the Azores, an interesting model region in studies devoted to biodiversity pattern changes, associated with anthropogenic activity. We assessed biodiversity, structure and carbon accumulation in a gradient of forest types in three islands, including 30 stands for each type (production forest - PF, exotic woodland – EW, and natural forest - NF). Regarding taxonomic diversity, there was ample evidence that NF harbored the highest biodiversity levels and PF the lowest. Dendrometric analysis of almost 3000 trees revealed the dominant tree species in each forest type: PF – Cryptomeria japonica used for timber production; EW - the invasive tree Pittosporum undulatum; NF – the endemic trees Juniperus brevifolia and Laurus azorica. Diversity levels were generally lower for structural than for taxonomic data, particularly for PF. Regarding carbon accumulation, although differences between soils were small, aboveground carbon stocks were much higher in PF. As a whole, we concluded that NF play an important role as native biodiversity hotspots, PF provides economic assets and could play a major role as carbon sink, while EW presently has a marginal role, for instance in honey and compost production, while its biomass has potential for energetic valorization. Other services, such as tourism and recreation are also discussed.

Keywords: Azores, Ecosystems services, Forests, Biodiversity, Carbon sink

31/07 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.14/3.2.15

Symposium 10 - Tools to measure Biodiversity-Ecosystem Services relationships in urban ecosystems

Chair
Pedro Pinho

Presenters
Ana Catarina Luz, Cristiana Aleixo, Filipa Grilo, Marco Moretti and Pedro Pinho

Urban areas are increasingly important hubs for human development. However, urbanization causes multiple environmental problems, such as air pollution and urban heat island, that impact human wellbeing. Nature-based solutions, implemented in cities green and blue infrastructure, can provide ecosystem services to mitigate those effects. Ecosystem services provision of urban vegetation depend on its biodiversity. However, a lack of knowledge exists on the relationship between biodiversity and the provision of ecosystem services in urban areas. This prevents the optimization of cities green infrastructure to provide ecosystem services. The aim of the symposia is to discuss the tools currently available to measure the relationship between cities biodiversity and the provision of ecosystem services looking at the importance of trait-based ecology, the types of metrics available, the key importance of spatial resolution and of cities morphology, and also how citizens must be involved in these assessments. In a world under change, this can contribute to increase cities resilience and fulfill UN sustainable development goals in the XXI century.

31/07 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.14/3.2.15
Symposium 10 - Tools to measure Biodiversity-Ecosystem Services relationships in urban ecosystems

METRICS TO QUANTIFY BIODIVERSITY-ES RELATIONSHIPS OVER SPATIAL SCALES

Pedro Pinho[1], Joana Vieira[1], Teresa Mexia[2], Cristiana Aleixo[1], Filipa Grilo[1], Paula Matos[1], Cristina Branquinho[1]

1 cE3c – Centre for Ecology, Evolution and Environmental Changes, Faculdade de Ciências, Universidade de Lisboa, Portugal
2 CEF - Forest Research Center, Instituto Superior de Agronomia, Universidade de Lisboa, Portugal

Cites are the hubs of social and economic life on the planet, but also places where human wellbeing is challenged by environmental problems. The EU and UN suggest that these problems can be mitigated by cities green infrastructure, which provides ecosystem services. Ecosystem services provision depends of green spaces biodiversity but quantifying the relationship between biodiversity and ecosystem services is not straightforward. This is because biodiversity can change in short distances, due to green spaces management, and thus ecosystem system provision, including the trade-offs between services, can also change at short scales.

To overcome this problem, we use multiple metrics of biodiversity, including taxonomical and trait-based ones, to quantify biodiversity, and assess its relation to environmental factors, including microclimate and air pollution, as well as habitat fragmentation. In general, the more appropriate metric of diversity is closely linked to the dominant environmental factor: while in cities with moderate air pollution air quality regulation taxonomic-based metrics are useful, in cities with lower air pollution, the effect of the urban heat-island becomes more obvious and trait-based. Assessing biodiversity-ecosystem services relationship was done at a city and green-space scale, showing that independently of the spatial scale, vegetation structure is critical for both biodiversity and ecosystem services. By using the biodiversity-based metrics, sampled with high spatial resolution, we also provided the evidence that trade-offs of ecosystem services occur, and that management and planning options influence the provision of ecosystem services.

31/07 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.14/3.2.15
Symposium 10 - Tools to measure Biodiversity-Ecosystem Services relationships in urban ecosystems

MODELING THE RELATION BETWEEN URBAN MORPHOLOGY AND MICROCLIMATE REGULATION AT A SQUARE LEVEL

Filipa Grilo (Portugal)[1] ; Pedro Pinho (Portugal)[1] ; Cristina Catita (Portugal)[2] ; Cristiana Aleixo (Portugal)[1] ; Patrícia Silva (Portugal)[3] ; Nuno Lopes (Portugal)[3] ; Catarina Freitas (Portugal)[3] ; Margarida Santos-Reis (Portugal)[1] ; Cristina Branquinho (Portugal)[1]

1 - Centre for Ecology, Evolution and Environmental Changes, Faculdade de Ciências, Universidade de Lisboa;
2 - Instituto Dom Luiz, Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisbon, Portugal;
3 - Department for Environment,Climate, Energy and Mobility of the City Council of Almada, Portugal

The urban heat island effect (UHIE), originated by the absorption of the sun's heat by grey infrastructures and cities' lack of vegetation, exacerbates cities' temperatures and decreases moisture, compromising citizens' wellbeing. The UHIE can be observed from the city to the local scale, although it has been mostly addressed at a large scale, however, planning stakeholders need detailed and applicable information. Therefore, the main aim of this work is to model the effect of green spaces on alleviating UHIE with a high spatial resolution. For that, 20 temperature and relative humidity (RH) sensors were placed in two squares and adjacent green spaces in the city of Almada, Portugal, for 6 months in summer and winter. The detailed land-use was mapped in different sized buffers surrounding the sensors. Correlations were calculated between the sensors' outputs and land-use classes, for all buffers; the maximum correlation coefficient obtained was considered the distance of influence of the land-use. Results showed significant correlations between temperature and RH, and tree cover. A model based on the land-use was developed to describe the differences in temperatures and RH at high spatial resolution given by local green spaces and showed that the average summer temperature is mainly influenced by potential solar radiation of the hottest month and the tree cover. This information is particularly useful to Municipalities and city planners for proper management and planning of these areas.

31/07 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.14/3.2.15
Symposium 10 - Tools to measure Biodiversity-Ecosystem Services relationships in urban ecosystems

TRAIT-BASED APPROACHES IN URBAN ECOLOGY

Marco Moretti

Swiss Federal Research Institute WSL, Biodiversity & Conservation Biology, Birmensdorf, Switzerland

Cities worldwide are characterized by unique human stressors potentially leading to biodiversity loss through strong filtering of species. In this regard, functional traits (i.e. fitness-related individual features) are considered good candidates to predict biodiversity changes under different stress scenarios across taxa and regions better than species. Traits can further shade light on the mechanisms underlying the effects of biodiversity changes on ecosystem functions (EF) and services (ES). However, most of our current knowledge about trait-based biodiversity-ecosystem functioning/services (BEF/BES) relationship is based on plants and on (semi)natural systems, while very little is known about that in urban ecosystems and other taxonomic groups.

To advance in trait-based urban BEF/BES ecology, we need first to identify the main filters and traits under selections, and then test their direct and indirect effects on measurable EF/BS.

In my talk, I will summarize the concepts and the results of studies that have investigated functional aspects of biodiversity in cities. I will illustrate which traits are filtered from the regional species pool to the urban species pool, how this latter is further shaped by the mosaic of urban green space types, and how the resulting species assemblage affects EF/ES. Finally, I will present future perspectives, such as the importance of intraspecific trait variation to investigate species adaptation to urban ecosystem and the potential role of trait-based approaches to bridge ecological and social science and improve conservation in the face of an urbanizing world.

31/07 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.14/3.2.15
Symposium 10 - Tools to measure Biodiversity-Ecosystem Services relationships in urban ecosystems

REMOTE SENSING TOOLS TO QUANTIFY ECOSYSTEM SERVICES AND VEGETATION STRUCTURE IN URBAN AREAS

Cristiana Aleixo, Filipa Grilo, Ana Luz, Cristina Branquinho and Pedro Pinho

Urban ecosystems provide multiple services essential for human health and well-being. The ecosystems services (ES) provision depends on the characteristics of urban green infrastructure (UGI), namely (i) structural diversity of vegetation, (ii) spatial arrangement and distribution of green spaces and (iii) type of management practiced in green spaces. In this way, quantifying and mapping the ES provided by UGI is essential allow more sustainable decision-making and thus increasing city resilience to emerging global challenges. However, it is difficult to quantify, and map ES based on biodiversity in-situ data. In this sense, remotely sensed data may be useful for assessing ES with high spatial resolution. The objective of this work is to assess some provisioning and regulation services at the municipality and green space levels through satellite images (Sentinel-2A and Landsat 7-8): primary production, carbon stock and climate regulation.

Spatial analysis of the ES provision has revealed that several green spaces have multiple functions and services that depend mostly on the vegetation structure and its management. Carbon sequestration varies according to the vegetation structure, while primary productivity and climate regulation are also influenced by the management type. These results revealed that UGI is not homogeneous in terms of ES, and management actions in green spaces can promote a particular service or balance the tradeoffs between competing ES.

31/07 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.14/3.2.15
Symposium 10 - Tools to measure Biodiversity-Ecosystem Services relationships in urban ecosystems

MAPPING AND MODELLING LISBON GREEN SPACES USES THROUGH A PARTICIPATORY MAPPING APPROACH

Ana Catarina Luz[1], Maartje Buijs[1], Cristiana Aleixo[1], Inês Metelo[2]; Filipa Grilo[1]; Cristina Branquinho[1]; Margarida Santos-Reis[1]; Pedro Pinho[1]

1 - cE3c – Centre for Ecology, Evolution and Environmental Changes, Faculdade de Ciências, Universidade de Lisboa, Portugal
2 - Câmara Municipal de Lisboa

In an increasingly urbanized world urban green spaces (UGS) are critical for ensuring residents' health and well-being, due to the ecosystem services provided. UGS planning is being instigated to maximize its potentials to increase responsiveness to major societal and environmental challenges and emerging policy demands. In this paper we aim to identify the spatial patterns of UGS uses in Lisbon city, Portugal. Specifically, we ask if urban residents have equal accessibility to UGS within their residential zip area and what are the key factors related to residents' decisions to visit UGS within or outside their zip. We used a Public Participation GIS to collect spatially explicit data about residents most frequented UGS. The survey was conducted between February and April 2017. We collected data from 569 respondents, corresponding to 2010 UGS locations. Our results show that resident's do not have equitable accessibility to UGS, caused by the uneven distribution of UGS within the city. We also found that the number of residents traveling.

for UGS outside their zip area was significantly related to the UGS coverage and vegetation heterogeneity in their own zip area. Our regression model determines that to have less than 50% of outflux Mediterranean cities need to have at least 25% of green space in a zip area. These results can support planners and decision-makers by providing guidance on how to identify areas of unequal accessibility and where to allocate efforts.

31/07 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.16

Symposium 11 - Perspectives for environmental conservation in the tropics: New challenges or old problems in the face of environmental disasters?

Chair
Simone Vieira

Presenters
João Meira, Cristina Antunes and Simone Vieira

Society and the environment coevolved through feedbacks between human demands for natural resources and enviromental carrying capacity. Coupled socio-ecological systems are complex, adaptive and delimited by spatial or functional bound-aries surrounding ecosystems in which natural components (e.g., water, land, forest) are affected by human interactions.

Using a territorial and integrative approach based on ecological and socioeconomic factors, we envision innovative policies and initiatives aiming to reconcile urban economic development with rural conservation and restoration projects.

Ecologists and environmentalists have faced a dilemma during the last years in Brazil. Since the Samarco disaster in 2015, there is a high demand for ecological studies generated by environmental disasters, but the calls are often rigidly scoped, avoiding unfolding that would generate large expenditures by responsible companies or avoiding embarrassing inadequate activities. Such projects would eventually achieve scientific and environmental relevance, but restricting calls only to the immediate needs of governments and businesses, achievements may be far less effective than those obtained through advance-induced research, studying threatened communities, ecosystems and landscapes.

We postulate that more freely induced research aimed at deepening the environmental knowledge in threatened areas can generate not only relevant scientific information, but also improve conservation actions demanded when the problems arrive.

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.13

Symposium 12 - Towards precision agro-ecology for sustainable grazing

Chair
Tiago Domingos

Presenters
Gonçalo M. Marques, Marjan Jongen, Vânia Proença, Emanuel Lourenço, Carlos Teixeira and Ricardo Teixeira

Grazing systems are a complex combination of soil, vegetation, herbivores and human management, which are central to many socio-ecological systems. The fine balance between negative and positive environmental impacts by grazing land and livestock, combined with their economic importance for rural areas, has created awareness for the need to improve the environmental and economic sustainability of such systems. Any sustainability research programme that aims to understand and act on these systems must therefore follow an integrated approach, based on the progressive development of a solid transdisciplinary scientific framework, harnessing the power of modern technologies for data gathering, processing and system control.

In this symposium we will address the impacts and benefits of grazing systems for sustainability, as well as tools and modelling approaches to assess their performance. In particular, this session brings together research aimed at the following operational aims:

1. To optimize pasture-based livestock farming, minimizing its requirements for land that could be used for direct human consumption and maximizing its environmental services

2. To optimize the management of pastures, by improved grazing and fertilization

3. To foster the ecological role of herbivory on ecosystem management and restoration

4. To develop tools for the analysis of the direct and indirect environmental, social and economic impact of different livestock management options.

This session will draw from the research and application work currently carried out under the “Grazing for Sustainability” thematic area led by MARETEC/LARSyS at Instituto Superior Técnico.

The session will last approximately 60 minutes and includes 6 short presentations (~10 minutes, including questions) that highlight the main contributions made towards these goals.

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.13
Symposium 12 - Towards precision agro-ecology for sustainable grazing

MACHINE LEARNING FOR ESTIMATING, MODELLING AND OPTIMIZING SOILS AND PASTURES

Tiago G. Morais, Marjan Jongen, Camila Tufik, Ivo Gama, Nuno R. Rodrigues, Ana Elisa Rato, João Serrano, Tiago Domingos, Ricardo F.M. Teixeira

Grasslands are a crucial resource that support animal grazing and provide other ecosystem services. Here, we use remote and proximal sensing combined with machine learning to estimate the main springtime properties of Portuguese sown biodiverse permanent pastures rich in legumes (SBP). We used remote sensing data obtained from Sentinel-2 and unmanned aerial vehicles (UAVs) and lab spectrophotometry as inputs for a backpropagation artificial neural network estimating measured field data from three farms in the spring of 2018 (four plant parameters and four soil parameters). We used seven different multi-level combinations of input data sources. We tested the quality of results by assessing their improvement with additional input data (electrical conductivity) and used only two farms for training and testing and the third farm for validation of the algorithm. Results show that, in general, estimation accuracy increases with the number of levels involved. The accuracy of the estimation of parameters is maximum in the two-level approach that uses both UAV and Sentinel-2 as input (MSE: 0.603; R2: 0.781). Validation of results showed that accuracy is not significantly improved with new data inputs. Nevertheless, the sensibility of results to the individual farms used as validation set is high. Overall R2 decreased for values between 0.4 and 0.6, depending on the farm used as validation set. However, using up to three samples from the validation farm in the training set, R2 increased up to 0.732. This work demonstrated the potentialities of multi-level approaches to indirectly estimate pasture parameters.

Keywords: Spectrophotometry; Sentienel-2; Unmanned aerial vehicle; Machine learning; Neural networks

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.13
Symposium 12 - Towards precision agro-ecology for sustainable grazing

SOWN BIODIVERSE PASTURES: QUANTIFYING THE CONTRIBUTION OF FUNCTIONAL GROUPS TO PRODUCTIVITY

Marjan Jongen, Vânia Proença, Tiago Domingos

In Portugal, the concept of sown legume-rich pastures in agro-silvo-pastoral systems, as a strategy to boost productivity and soil fertility has increasingly gained popularity, with these pastures now occupying more than 4% of the agricultural land. By introducing species specific to semi-arid regions, this approach aims to establish a functioning ecosystem with complementary ecological niches. Our objective was to assess the effects of these sown pastures on productivity, legume abundance and plant biodiversity through field-based experimental studies, and disentangle the impact of soil, climate and management on the success of this agricultural practice. We selected three farms, differing in climate and soil characteristics. In each farm we selected two pastures: a sown pasture (SBP) and a semi-natural pasture (SNP), with SBP installed in 2014 and SNP acting as a baseline comparison. Data collection ran for five consecutive years, from 2015 until 2019. We assessed productivity and soil parameters. In addition, the line intercept method was employed at 1-m intervals along four 100 m transects, with subsequent calculation of diversity and similarity indices. Preliminary results indicate that, as compared to SNP, productivity and legume cover in SBP increases, while plant biodiversity is sustained. The increase in legume cover is persistent over time. Detailed results will be presented, including data collected in spring 2019. Ultimately, our time-series will elucidate whether SBP promotes ecosystem functionality and stability. Our results show that SBP can be a cost-efficient way to improve the environmental and economic sustainability of agro-silvo pastoral systems.

Keywords: Agro-silvo-pastoral systems; Legume-rich pastures; Persistence; Pasture yield and quality

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.13
Symposium 12 - Towards precision agro-ecology for sustainable grazing

PROCESS-BASED "DYNAMIC ENERGY BUDGET" METABOLIC THEORY FOR MANAGING LIVESTOCK GROWTH AND EMISSIONS

Gonçalo M. Marques, Carlos M.G.L. Teixeira, Tânia Sousa, Tiago G. Morais, Ricardo F.M. Teixeira, Tiago Domingos

Livestock production is one of the main contributors to global greenhouse gas (GHG) emissions. The tools provided by the Intergovernmental Panel on Climate Change to estimate GHG emissions (Tier 1 and Tier 2) are useless as a tool for advising farmers or national policy on how to minimize GHG emissions. For that, we need a metabolic model that obeys mass and energy balances and that models the tradeoffs between different allocations of energy in the organism, throughout the life-cycle, as a function of environmental variables such as temperature and the amount and type of food. We use the Dynamic Energy Budget (DEB) Theory to build models for four bovine breeds – Alentejana, Angus, Charolais and Limousin. The fitness of DEB models to data is good for all breeds. Differences in DEB breed specific parameters explain differences in GHG emissions, ultimate lengths and weights and von Bertallanffy growth rates. Accumulated methane (nitrogen) production ranges between 0.2 (0.1) and 2 (0.7) kg per kg of beef. In terms of accumulated GHG emissions, Angus breed is a better choice if the cow is slaughtered younger than 200 days (or 450 kg) while for older (heavier) cows, the Charolais breed is a better option.

Keywords: Dynamic Energy Budget theory; Livestock; Greenhouse gas emissions

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.13
Symposium 12 - Towards precision agro-ecology for sustainable grazing

LIVESTOCK HERBIVORY AS TOOL FOR ECOSYSTEM MANAGEMENT AND RESTORATION

Vânia Proença, Tiago Domingos, Ivo Gama, Daniel Oliveira, Inês Ribeiro, Nuno R. Rodrigues, Leonor Themudo Barata

Farmland abandonment is causing severe changes in ecosystem structure. A fundamental consequence of abandonment is the decline in grazing disturbance by large domestic herbivores. The loss of extensive grazing systems, where moderate disturbance maintains habitat diversity and resilient landscapes, is leading to changes in the ecosystems structure and in the fire regime. We are currently testing the use of livestock in a free-range grazing regime to manage vegetation structure in regenerating oak forests, with heterogenous vegetation cover. Cattle movement data, tracked by GPS collars in a forest test site of ca. 100 ha (Quinta da França, Covilhã, Portugal), are analyzed to assess the use of space and habitat selection by cattle, at different temporal scales (daily and the grazing season), and to investigate the factors, including land morphology, vegetation cover and structure, and distance to trails, associated to the use of space and habitat selection. Preliminary results show that although animals have unrestricted access to test site, cattle trajectories respond to slope and to the presence of trails. Habitat patches dominated by herbaceous cover were actively selected as well as forest edge habitats. Moreover, the spatial-temporal patterns of habitat selection appear to be associated to daily routines and to different uses of the vegetation. These results illustrate the potential of cattle grazing and trampling to manage vegetation structure and limit biomass accumulation in regenerating forest but also the limitations related to habitat selection, which may avoid areas where biomass control is required while exposing other areas to increased grazing pressure.

Keywords: Silvo-pastoral systems; Vegetation structure; Disturbance; Habitat selection

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.13
Symposium 12 - Towards precision agro-ecology for sustainable grazing

VIRTUAL FENCING FOR PRECISION ECOSYSTEM MANAGEMENT AND RESTORATION: A REVIEW

Emanuel Lourenço, Vânia Proença

Large herbivores perform important ecological functions to maintain ecosystems structure, function and composition. Livestock can provide a surrogate for the functional role of large wild herbivores, when these are absent or scarce. However, to be effective, livestock disturbance needs to be kept at moderate levels and supervised (i.e., direct animals to where they are needed, exclude them from sensitive or conflict areas), to avoid negative impacts and promote desired effects, such as the maintenance of vegetation heterogeneity. Virtual fencing has been successfully tested and developed for precision livestock farming to condition animal's movement using sensory cues, instead of a physical barrier. We performed a literature search and review to identify relevant evidence and case studies on the use of virtual fencing in ecosystem management approaches, as well as perceived and reported strengths and limitations that could guide the development and future application of this type of tools. Overall, most studies report the use in farm environments, and there are still few examples of specific applications to ecosystem management. Among these, we found examples on the use of virtual fencing to protect natural values, as protected areas and species, enhance the management of riparian buffers, reduce conflicts with wildlife and wildfire prevention. The review suggests that virtual fencing has potential to be used in biodiversity conservation approaches. The use of virtual fencing may help to safeguard sensitive areas, or to avoid conflict with people or predators, while directing animals to areas where grazing is more required.

Keywords: Grazing management; Silvo-pastoral systems; Sustainable herbivory; Virtual shepherding

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION IV
Room 3.2.13
Symposium 12 - Towards precision agro-ecology for sustainable grazing

EFFECTIVE BIODIVERSITY CRITERIA FOR STANDARDS AND LABELS APPLIED IN LIVESTOCK GRAZING SYSTEMS

Carlos M.G.L. Teixeira, Nuno Sarmento, Vânia Proença, Tiago Domingos

The conservation and sustainable use of biodiversity are essential for maintaining ecosystem services, agricultural production and ultimately human nutrition and quality of life. The livestock sector is one of the fastest growing in the agricultural economy, due to the shift in diet and food consumption patterns towards livestock products. It is the world's largest user of land resources. Generally, livestock production has been described as having both positive and negative impacts on biodiversity, through five main drivers of change: habitat change, pollution, climate change, over-exploitation and invasive species. The project EU LIFE Project "Biodiversity in Standards and Labels for the Food Industry" aims at improving the performance of standards and labels, within the food industry, regarding biodiversity. In this project, a set of 54 standards and company requirements were screened for their biodiversity performance. Both the policy section and criteria of every document were analysed. Additionally, a biodiversity fact sheet specifically for animal production on livestock grazing systems was produced. The most relevant criterion found on standards and company requirements regarding livestock refers to grazing livestock density. European standards focus mostly on the 1.4 LU/ha limit for extensive systems. Such a limit is inadequate for high nature value farmland such as Montado. Despite lower values found on regulations from several Member-states, standards and company requirements lack specific criteria.

Very good practices for livestock grazing systems, regarding biodiversity, concern mostly: grassland management; nutrient management and fertilization; pest control and plant protection; harvesting and mowing; grazing management; and fodder production and importation.

Keywords: Biodiversity; Standards; Labels; Food sector; Grazing livestock density

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION V
Room 3.2.14/3.2.15

Symposium 13 - Integrative Assessment of Land use conflicts

Chair
Lubos Halada

Presenters
Lubos Halada, László Miklós, Zita Izakovičová and Jana Špulerová

In the recent period, the European countries faced many substantial socio-economic changes, which are also reflected in the environment, land use and landscape structure. Changes in the land use are often accompanied by many environmental problems, like depletion and qualitative degradation of natural resources, decline of natural ecosystems, increasing anthropization of landscape, negative impact of agricultural abandonment on landscape biodiversity, land desertification, invasions of alien species, etc. Changes in landscape structure and substantial anthropization contribute to the climate change, which besides the impacts on biodiversity consecutively cause more intensive manifestation of natural risks and hazards, like floods, droughts, etc. From this aspect, it is important to focus the landscape studies not only on the land use forms and land cover elements, but also to issues related to their position and relations in the landscape (cause – consequence). The knowledge on reasons and causalities of these changes is very important for reasonable utilization of the landscape. It is essential to apply an integrated approach to land use management. The scientific basis of this approach is the understanding of the landscape as a geosystem, and, in particular, the proper interpretation of mutual relations of the primary, secondary and tertiary landscape structures and their role in the assessment of the conflicting interests.

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION V
Room 3.2.16

Symposium 14 - Tracking vegetation phenology in a climate change context. From proximal to remote sensing

Chair
Sofia Cerasoli

Presenters

Mirco Migliavacca, Edoardo Cremonese and Nicolas Delpierre

Phenology is the study of changes in vegetation life cycles and how they are affected by climate variables. Changes in phenology are major biological indicators of the impact of climate change on vegetation, with consequences on carbon sequestration and biodiversity. The study of phenology is a key stone in our understanding of ecosystem functioning under climate change in the long term or during climate extremes.

Traditional phenological observations are massively time and resources consuming. In recent years, the use of digital photography and proximal spectral sensors proved their suitability in measuring phenological parameters in a cost-effective way at local scale. However, methodological issues, such as the analysis of long temporal trends or of complex ecosystems are still open and deserve further studies.

Time series from remote sensed observations at moderate spatial resolution can also be employed to analyze vegetation changes overtime. However, the low number of available observations and a mismatch between spatial and temporal scale between in-situ and remote observations is still a challenge in the interpretation of remote sensed information for phenology studies.

The objective of this symposia is to present actual opportunity and future perspectives in the area of remote sensed vegetation phenology for ecology studies.

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION V
Room 3.2.16
Symposium 14 - Tracking vegetation phenology in a climate change context. From proximal to remote sensing

THE INTEGRATION OF PROXIMAL AND REMOTE SENSING FOR PHENOLOGY STUDIES

Edoardo Cremonese[1], Gianluca Filippa[1], Marta Galvagno[1], Xuanlong Ma[2], Yunpeng Luo[2], and Mirco Migliavacca[2]

1 - Environmental Protection Agency of Aosta Valley, Climate Change Unit, Italy
2 - Max Planck Institute for Biogeochemistry, Jena, Germany

Climate change is exerting a profound influence on phenology i.e. the timing of seasonal development of vegetation worldwide. In recent years the increase in proximal and remote sensing data availability allowed significant advances in understanding plant phenology and its feedbacks to the climate system.

In particular, by providing continuous sub-daily images of canopy development, phenocams (i.e. repeat digital photography) proved to be effective tools for phenology monitoring at species and community level. Like phenocams, NDVI ground-based sensors provide continuous time series of vegetation development that can be used for the validation of phenological products derived from remote sensing. These data can be highly relevant in the light of the evaluation of Copernicus Sentinels images that are opening the gates to unprecedented opportunities to overcome some of the difficulties faced in remotely sensed phenological research based on the previous generation of satellite.

Here we review the most relevant literature on phenocams with a specific focus on applications related to i) proximal and remote sensing data integration, ii) ecosystem productivity iii) model data integration and iv) future directions of phenocam studies. Insights from different ecosystems will be presented.

Moreover, by taking advantage of continuous ground NDVI measurements collected through a broad observation network encompassing Alpine and Mediterranean ecosystems in Europe, we aim at understanding whether Sentinel-2 vegetation indexes (VIs, e.g. NDVI) can accurately describe the seasonal trajectory of vegetation development in these ecosystems and thus provide accurate estimates of phenological events.

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION V
Room 3.2.16
Symposium 14 - Tracking vegetation phenology in a climate change context. From proximal to remote sensing

UNDERSTANDING THE PHENOLOGY OF ECOSYSTEM FUNCTIONS AND STRUCTURE COMBINING MULTIPLE DATA STREAMS

Mirco Migliavacca[1], Yunpeng Luo[1], Tarek El-Madany[1], Arnaud Carrara[2], Edoardo Cremonese[3], Gianluca Filippa[3], Marta Galvagno[3] and Markus Reichstein[1]

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The continuous and automated monitoring of canopy phenology is of increasing scientific interest for the multiple implications of vegetation dynamics on ecosystem carbon and energy fluxes. Continuous measurements of carbon and water fluxes are, on the other hand, necessary to characterize seasonal and interannual variability of ecosystem functions.

In this contribution we discuss the applicability of digital camera imagery (Phenocam) at eddy covariance flux towers, for monitoring and modeling phenology and physiology of a variety of ecosystems (from Mediterranean grasslands, Savanna, temperate forest and subalpine ecosystems). We will show how the phenological transition dates derived from indices calculated from Phenocam (NIRv, NDVI) are related with carbon fluxes. Finally we will show the potential of the joint use of this information to study the effects of climate, nutrient, and biodiversity on the dynamics of ecosystem structure and physiology.

01/08 | 11h00
PARALLEL SYMPOSIA – SESSION V
Room 3.2.16
Symposium 14 - Tracking vegetation phenology in a climate change context. From proximal to remote sensing

OBSERVING THE VARIABILITY OF PHENOLOGICAL TRAITS IN TEMPERATE FOREST TREE POPULATIONS: FROM GROUND OBSERVATIONS TO PROXIMAL REMOTE SENSING

Nicolas Delpierre*, Daniel Berveiller, Eric Dufrêne, Gaëlle Vincent, Kamel Soudani.

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Leaf phenology is a major driver of ecosystem functioning in temperate forests, and a robust indicator of climate change. Both the inter-annual and inter-population variability of leaf phenology have received much attention in the literature; in contrast, the within-population variability of leaf phenology (WPV) has been far less studied. In this contribution, we present recent advances in the monitoring and attribution of the within-population variability of (spring and autumn) leaf phenology. We show that WPV is considerable in temperate forests, amounting 30% of the continental variability of leaf phenology. We show that WPV can efficiently be monitored using proximal remote sensing, with very high correlations with ground observations. Finally, we demonstrate the impact of the seasonal and pre-seasonal temperatures on WPV. These results open the way to the study of the within-population variability of phenological traits, with important implications for micro-evolution modelling.

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.14/3.2.15

Symposium 15.1 - Role of agriculture in the climate change era for achieving the Sustainable Development Goals

Chair
Patrícia Vidigal and Filipa Monteiro

Presenters

Filipa Monteiro, Patrícia Vidigal, Mónica Sebastiana, Andreia Figueiredo, João Santos Silva and Joana Ferreira

To accomplish the Sustainable Development Goals (SDGs), agriculture is essential to meet these targets. The key role of agriculture adapted to climate fluctuations can contribute towards ensuring food and nutrition security by reducing losses, increasing productivity, with less dependency on production inputs, while preserving land and water biodiversity. Projections for global climate variations expect an increase of aridity, salinization, temperature fluctuations to occur sharply and frequently, and spatial and temporal distribution of rainfall to be disturbed, all of which will increase abiotic and biotic stress-related challenges to crops. Countering these challenges and to meet the food requirement for future generation (expected to reach 10 billion by 2050) we need to (1) develop and use resilient crops for mitigating adverse climatic changes; (2) build farming systems that optimize land and water availability to achieve consistent productivity; (3) adopt farming techniques towards soil conservation; (4) invest in technology and knowledge transfer to influence the creation of viable policies towards future nation-wide and worldwide sustainability. This symposium will gather scientists and stakeholders that are actively contributing for the Iberian Peninsula agriculture and the World agriculture to meet SDGs.

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.14/3.2.15
Symposium 15.1 - Role of agriculture in the climate change era for achieving the Sustainable Development Goals

AGRICULTURE-BASED SDGS: HOW TO ACHIEVE SUSTAINABILITY IN WEST AFRICA

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The 2030 Agenda for Sustainable Development have set up 17 Sustainable Development Goals (SDGs), which are constituted by several indicators defined by UN working groups. Yet many of the SDGs are interconnected in order to accomplish the ultimate goals of the 2030 agenda. Sustainable food and agriculture have a great potential to address many global agricultural challenges, e.g. serving up affordable, nutritious food, strengthening livelihoods, revitalizing rural and urban landscapes, and delivering inclusive national growth. In this study, we set up a baseline assessment of the agriculture- related SDGs on an African region basis, using West Africa region members (ECOWAS countries) as a case-study. Selection of agriculture based SDGs followed a systematic approach, by and applying principal components analysis on normalized indicators to elicit regionally defined weights for representing in-country SDGs. The performance of SDGs in the West African region provides important clues on the main aspects affecting the sustainable application of Agenda 2063 of the Africa Union UN providing an approach based on regional needs assessment. This demonstrates clearly the diverse performance of the goals in different agriculturally-dependent economies. Furthermore, Guinea-Bissau will be used as a case study to address agricultural related paradigms that may have influenced current underperformance of SDGs and also provide directions towards future implementation.

Keywords: Sustainable developmental goals, agribusiness, cashew, Guinea-Bissau, crop diversification.

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.14/3.2.15
Symposium 15.1 - Role of agriculture in the climate change era for achieving the Sustainable Development Goals

EXPLORING THE POTENTIAL OF MULTIPURPOSE CROPS TOWARDS SOIL CONSERVATION AND SUSTAINABLE PRODUCTION TO FACE CLIMATE CHALLENGES

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Land occupies 30% of the world, but only 10% is arable land, thus with the prediction that by 2050 we will be 10 billion, it is imperative to find various solutions that help us to overcome this challenge. Agriculture is the sector that faces the biggest pressure, to produce more food with limited land area. Moreover, the past and present pressures that farming has set on the environment aggravated the situation, because in the future is not just more land, but also suitable land, increasing temperatures and erratic precipitation. Thus, farmers have to come up with strategies that offer sustainable yields in the future. Researchers and decision makers have discussed this subject widely, with the common denominator being we need major innovations how we eat and farm. These innovations result from the conjunction of several technologies, such as plant improvement for more resilient varieties. Nevertheless, the world relies on only 30 species to eat and explore, while there are 12,000 crop species classified as suitable for human consumption, but have been neglected by researcher and decision makers. Some of those crops are multipurpose, offering farmers and consumers a wider range of possibilities for food and to efficiently use the limited natural resources at our disposal. The role that these crops have in the farming ecosystem and in our diets will be discussed.

Keywords: soil conservation, orphan crops, climate change, sustainable production

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.14/3.2.15
Symposium 15.1 - Role of agriculture in the climate change era for achieving the Sustainable Development Goals

MYCORRHIZAL SYMBIOSIS AS A TOOL TO MITIGATE THE NEGATIVE EFFECTS OF DROUGHT STRESS

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Drought is one of the most important abiotic stress that plants have to cope with, limiting survival, growth and productivity. The severity of drought is dangerously increasing due to global climate change which is adding extra heat to the climate system that will translate into more intense and longer periods of drought, particularly in the sub-tropical dry zone were the Mediterranean area is located. Therefore, increasing knowledge on plant's response to drought is key to develop new strategies to improve plant's tolerance to drought, mitigating the expected negative effects on plant yield and survival. On way to is to take advantage of the symbiosis between plants and micro-organism from the rhizosphere. Root symbiosis, such as mycorrhizas, are known to improve the nutritional status of plants, increasing growth and performance and also the tolerance of plants to biotic and abiotic stress. To investigate whether the performance of plants under water stress could be improved by mycorrhizal colonization, we analysed growth, physiology, water status, mineral nutrients, oxidative damage, carbohydrate and lipid metabolism of cork oak plants inoculated with the ectomycorrhizal fungus Pisolithus tinctorius. Results show that mycorrhizal cork oak plants are more tolerant to drought as shown by their increased height, root biomass, higher efficiency of photosystem II and higher leaf nutrient content. Mycorrhizal plants also showed less drought stress symptoms, such as lower accumulation of carbohydrates under drought, and several traits at the lipid metabolism level indicating a higher drought tolerance, when compared to non-mycorrhizal plants. This study re-enforces the potential of mycorrhizal inoculation to improve cork oak forest resistance capacity to cope with coming climate change.

Keywords: mycorrhiza; drought; physiology; carbohydrates; lipids

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.14/3.2.15
Symposium 15.1 - Role of agriculture in the climate change era for achieving the Sustainable Development Goals

COPING WITH SUSTAINABILITY DEMANDS FOR VITICULTURE: BREEDING PROGRAMS AND SOIL MICROBIOTA AS PROMISING APPROACHES FOR REDUCTION OF PESTICIDE AND WATER USAGE

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Over the centuries, human development led to the domestication of natural resources with consequent losses of genetic diversity. Grapevine domestication started more than 6000 years ago and while improving important traits such as berry size and production yield, loss of biotic and abiotic stress resistance was a natural consequence. Today, grapevine is one of the most economic relevant crops with over 3.2 million hectares planted in Portugal.

In a scenario of climate change, both drought stress and emergence of diseases are major concerns. To control the major fungal diseases, synthetic fungicides are intensively applied on each growing season, leading to severe environmental and health costs. Moreover, emerging of new fungal strains with increased resistance to different active ingredients should also be taken into account. As sustainable approaches for viticulture, not only the genetic background of traditional cultivars with both environment and geographic local adaptation should be taken into account, but also breeding programs (with successful market examples like ‘Regent’ and ‘Calardis Blanc’) and the knowledge of soil microbiota may aid the definition of new viticulture trends. At the Grapevine-Pathogen Systems Lab, we are focused on the exploitation of traditional cultivars germoplasm in collaboration with the Portuguese Ampelographic field. We are also devoted to the identification of resistance mechanisms and traits for the three major fungal diseases (downy mildew, powdery mildew and grey mold). Recently in collaboration with Quinta dos Murças, Esporão, we started to look at the terroir associated microbiota and its association with soil characteristics and elemental composition. These approaches will allow us to propose guidelines for soil restoration, plant protection, disease prevention and management leading to sustainable viticulture practices.

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.14/3.2.15
Symposium 15.1 - Role of agriculture in the climate change era for achieving the Sustainable Development Goals

AGRI-INNOVATIONS TOWARDS A SUSTAINABLE CROP AND FOOD PRODUCTION

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Climate change and an increasing consumption related with the growing population, are challenging the agri-food sector to meet society's food demands, farmers and industry profit while preserving the environment and natural resources. To answer these challenges, farmers, industry, scientists and manufacturers of agricultural machinery and chemicals (fertilizers and pesticides), need to work together to improve the value chain efficiency for a future sustainable crop and food production. In Portugal, the tomato industry value chain is an example of such agri-innovations. Farmers are working together with researchers to find solutions that increase their yields while preserving natural resources and biodiversity. The industry is trying to find solutions to produce more nutritious, tastier, healthier, and more varied plant-based food, even using sub-products, such as green tomato. Manufacturers of agricultural machinery are trying to find innovative solutions to reduce the impact that professional agriculture has in the environment, while improving the efficiency of the production, by reducing the cost of production factors such as herbicides. Agricultural chemicals manufacturers are creating environmentally friendly solutions to improve productivity, by investing in microorganisms-based products. Overall, innovations created from a coalition between all the players involved in the agri-food value chain, can and will be the most effective strategy to warranty the sustainability of our food production and consumption. Thus, an outline of current and future agri-innovations will be discussed.

Keywords: agriculture innovations, agri-food sector, tomato industry, biotechnology, sustainable production

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.14/3.2.15
Symposium 15.1 - Role of agriculture in the climate change era for achieving the Sustainable Development Goals

BUILDING A SHARED UNDERSTANDING OF ADOPTION OF AGROECOLOGICAL PRACTICES: USING PARTICIPATORY MODELLING TECHNIQUES AND STAKEHOLDER GAMES

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As natural science researchers we often see stakeholder engagement as something both outside our expertise and out of our comfort zone. We are trained to make recommendations based on the best available scientific evidence, and to critically analyse the reasons for the disconnect between scientific advice to stakeholders and the adoption of the recommended practices. But we rarely confront our mental models to those held by the different stakeholders, or seek to integrate them.

In this talk, I will go over two interrelated exploratory techniques based in systems thinking: participatory modelling and stakeholder games. These two techniques can be used to bridge different understandings of adoption behaviour and engage with stakeholders, while also providing: a) data that can be used in quantitative modelling; b) opportunities for model review and validation; c) stakeholder ownership of outputs.

Case-studies from the literature and from on-going projects – from Latin America to Africa and Europe – will be examined and discussed.

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.14/3.2.15
Symposium 15.1 - Role of agriculture in the climate change era for achieving the Sustainable Development Goals

THE POTENTIAL OF INDIGENOUS LEGUMES FOR AGRICULTURAL USES IN ANGOLA

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The Leguminosae family (Fabaceae *sensu lato*) has more than 900 species in Angola, much of them are important sources of food, wood, fibers and medicines known worldwide. In Angola many native legume species are important medicinal plants and agricultural crops, making it one of the most important families of plants with economic interest in this country, however the characterization of their diversity and potential in agriculture and as medicines is still incipient. The main aim of this study is to identify and characterize the native legume species with high food potential, characterizing the main uses, used parts and main nutritional proprieties. Our study identifies 107 native taxa (3 endemics) of the family Leguminosae used as food in Angola, of which 96 have medicinal applications and 52 are used as timber. Results show that Angola communities hold a valuable knowledge of the uses of plant resources and some of the Leguminosae plants that are most used by the local populations belongs to the genus *Vigna* (subfamily is Papilionoideae), which have 153 accepted taxa worldwide, and 36 are native in Angola (i.e. 32 species and 4 subspecies). Most of these species are major crops and represent an important component of the local livelihood strategies.

Keywords: Africa; *Vigna*; Beans; nutritional proprieties; food security

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.14/3.2.15
Symposium 15.1 - Role of agriculture in the climate change era for achieving the Sustainable Development Goals

DEVELOPING SPECIES DISTRIBUTION MODELS TO SUPPORT THE SUSTAINABLE USE OF AFRICAN FORESTS: CASE-STUDIES WITH MOZAMBIQUE AND ANGOLAN TREES

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The global and local extinction of biodiversity constitute a major environmental problem that demands urgent action. In Africa, native forests are of immense value in providing for the livelihoods sources and well-being of people. However, several factors including deforestation and overexploitation pose significant threats to biodiversity. Lack of widely accessible data and the poor knowledge of occurrences and distributions of species limits our understanding of ecological processes, and our ability to use this knowledge to inform biodiversity and for conservation planning. In this communication, we will present a study focused on different forest types commonly found in tropical Africa, namely focusing on some emblematic trees from Tropical Rain Forest (e.g. Gossweilerodendron balsamiferum), Miombo Woodlands (e.g. Guibourtia coleosperma), and Mangrove forests in coastal areas (e.g. Avicennia marina and Rhizophora mucronata). Ecological modelling approaches (MaxEnt, GLM, and Random forest) were used to characterize the distribution of these trees in Angola and Mozambique. Our results allow us to identify the temperature and precipitation as the most important environmental factors for the distribution of the study tree species and the areas with the best conditions for its occurrence. We compare the produced maps of potential occurrence with the current network of protected areas. The preliminary results highlight the need to take urgent measures to protect the African forests and mangroves, where there is a significant concentration of endangered timber species threatened by deforestation and timber markets. Finally, management recommendations will be discussed in order to promote future conservation strategies to be implemented in similar forest habitats of other African countries.

Keywords: Miombo Woodlands; East African Mangrove; Ecological modelling; Deforestation; Conservation

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.16

Symposium 16.1 - Managing biological invasions and their impacts in the Anthropocene

Chair
Joana Vicente

Presenters
Joana R. Vicente, Joana Ribeiro, Nuno César De Sá, João P. Honrado and César Capinha

Alien species, and particularly those that became (or may become) invasive, represent a major challenge to policy and management in the Anthropocene. The introduction of those species mainly results from human actions, such as species trade or land management. Besides direct and indirect effects on native species and biotic communities, invasive alien species have impacts on ecosystem functioning and services, constituting a serious threat to the conservation of biodiversity and natural habitats as well as to the sustainable use of natural resources.

The importance of prevention and early detection for managing alien invasive species at appropriate scales has been highlighted in the recent European Union regulation on Invasive Alien Species (No 1143/2014). Effective approaches to improve the management of invasions at the multiple relevant scales are thus needed, not only to anticipate future invasions and their impacts on ecosystems and their services, but also to support the mitigation and adaption of such impacts in areas where invasive species are already established.

This symposium proposes to address the complex challenges associated to the multi-scale management of biological invasions and of their impacts. It welcomes studies where theoretical research is translated into more practical management strategies to deal with invasions at any relevant scale. Recent insights from remote sensing, habitat modelling, environmental genomics, and the social sciences are also opening new avenues to forecast new invasions, to assess and monitor established invaders, and to improve policy or governance mechanisms. Multidisciplinary approaches and studies with real-world applications, recommendations and solutions for managing alien species are particularly welcome!

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.16
Symposium 16.1 - Managing biological invasions and their impacts in the Anthropocene

DETECTION AND MODELLING OF PLANT INVASIONS AT REGIONAL AND LOCAL SCALES TO SUPPORT THE MANAGEMENT OF PROTECTED AREAS

João P. Honrado

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Biological invasions are a key threat to the integrity and resilience of protected areas worldwide. Detecting invasive species and predicting their future dynamics are paramount in the management of this threat. In this talk I will describe examples of our research using satellite-based detection and predictive modelling to assess plant invasions, emphasizing studies at regional and local scales in northwest Iberia. I will discuss the added-value of integrative frameworks that combine detection and modelling to deliver improved predictions of invasions and of their impacts, to estimate invasion success and dynamics, and to guide the management of invasions. Effectively managing plant invasions is especially important in protected areas due to their current and future role in biodiversity conservation and in the provision of a broad range of ecosystem services. Management efforts must include not only the control of current invasions but also the anticipation of future expansions from surrounding non-protected areas. In this regard, predictive modelling can guide targeted surveillance and early detection supported by Earth observations. Modelling and detection tools and outputs can also contribute to improve park managers' awareness on plant invasions and their potential future impacts.

Keywords: Invasive species, Management, Predictive models, Protected areas, Remote sensing

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01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.16
Symposium 16.1 - Managing biological invasions and their impacts in the Anthropocene

CAN CITIZEN SCIENCE DATA GUIDE THE SURVEILLANCE OF INVASIVE PLANTS? A MODEL-BASED TEST WITH ACACIA TREES IN PORTUGAL

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With the rapid expansion of Invasive Alien Plants (IAPs), accurate and timely distribution data is increasingly critical to successful management, which is not an easy task considering all IAPs and territories. Data collected by Citizen Science Platforms can be a useful tool, complementing professional data. This work aims to analyse if combining IAP data collected by citizens and data collected by researchers can improve the accuracy of Species Distribution Models (SDMs) and optimize surveillance efforts.

We gathered data from a Citizen Science Platform (Invasoras.pt) and from researchers on three invasive Acacia species widespread in Portugal and generated three datasets: researchers, citizens, and researchers plus citizens. The potential distribution of the species using an ensemble approach (biomod2 Rpackage) was modelled to test the effect of the different datasets on the resulting model accuracy, the selected environmental drivers of species distribution and the predicted spatial distribution.

All SDMs obtained very high accuracy, with the highest values being obtained in the models trained with researchers' data. Nevertheless, models trained with citizen data vastly increased the predicted spatial distribution. The spatial projections of the three models were further compared and ranked to identify the areas of highest surveillance priority for each species. Combining both data sources resulted in models that improve the geographic coverage, and a selection of a more meaningful set of environmental drivers.

Citizen Science platforms are a valuable tool for assisting and optimizing the surveillance of IAPs. The approach used can be useful to guide future surveillance efforts both for citizens and researchers.

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.16
Symposium 16.1 - Managing biological invasions and their impacts in the Anthropocene

THE ROLE OF BIOLOGICAL INVASIONS IN BIOTIC HOMOGENIZATION

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As the world is increasingly interconnected and transformed by humanity, the composition of species assemblages undergoes ever greater and faster changes. Our aim is to identify emerging generalities on the magnitude and geography of these changes, with particular emphasis on the role that is being played by biological invasions.

We review global trends and patterns of establishment of alien species and measure the contribution of these species to regional taxonomic diversity worldwide. Focusing mainly on insular vertebrate fauna, the role of human, environmental and geographical attributes in mediating changes to the richness of species assemblages, as well as the biological dissimilarity among them is measured and discussed. The relative importance of extirpations and biological invasions in determining current patterns of biotic homogenization is also compared.

The taxonomic diversity of alien species has distressingly high levels of prevalence in the biota of many regions worldwide. Oceanic islands in particular, are severely affected. The magnitude, emerging geography and drivers of regional biodiversity change differ considerably between taxonomic groups. Biological invasions account for significantly more of the observed changes than the extirpations of native species. Overall, our results depict an already high and increasing role of biological invasions as drivers of global biotic change.

Keywords: biodiversity change; biological invasions; extinction; globalization; islands

01/08 | 15h20
PARALLEL SYMPOSIA – SESSION VI
Room 3.2.16
Symposium 16.1 - Managing biological invasions and their impacts in the Anthropocene

TRENDS IN LEGAL AND ILLEGAL TRADE OF WILD BIRDS: A GLOBAL ASSESSMENT BASED ON EXPERT KNOWLEDGE

Joana Ribeiro*[1,2], Luís Reino[1,2], Stefan Schindler[3], Diederik Strubbe[4], Miquel Vall-llosera[5], Miguel Bastos Araújo[6-8], César Capinha[1,2], Martina Carrete[9], Sabrina Mazzoni[7], Miguel Monteiro[1,2], Francisco Moreira[1,2], Ricardo Rocha[10], José L. Tella[11], Ana Sofia Vaz[12], Joana Vicente[12], Ana Nuno[13]

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Wildlife trade is one of the world's most profitable economic activities. Birds are among the most heavily traded animals worldwide, with numerous species threatened by pet trade. Information on both legal and illegal aspects of trade and consumer demand is difficult to obtain across different countries, particularly given substantial socio-economic and cultural variations. Focusing on consumer demand in each country, we conducted a global survey among 105 international experts on bird conservation to identify expected trends, drivers and market characteristics of legal and illegal wild-caught pet bird trade. Our results suggest that future trends in legal bird trade will be mostly driven by socio-cultural motivations and intentional demand for wild-caught, rather than captive-bred birds. Bird popularity and rarity are the main factors expected to influence the choice of which bird species will be the most traded legally. Percentage of rural population was the main national-level socio-economic predictor for legal bird trade in the future. Demand for future illegal trade is expected to be driven by bird popularity and particular species identity. Experts consider illegal trade to be sustained mainly by consumers from higher socio-economic and educational backgrounds. Human population growth rate was the main national-level socio-economic predictor of illegal trade expected for the future. Legislation enforcement remains a critical issue in wildlife trade. Expanding trade networks and socio-economic changes continue to incorporate new regions into the wildlife trade. Only by investigating the multidimensional and synergistic determinants of wildlife trade can we address the consequences of bird trade on biodiversity.

Keywords: Biological invasions; CITES; Consumer behaviour; Expert elicitation; Global wildlife trade; Invasive species.

01/08 | 17h50
PARALLEL SYMPOSIA – SESSION VII
Room 3.2.13

Symposium 17 - Dynamic Energy Budget theory – A general metabolic theory for all life on Earth

Chair
Tiago Domingos

Presenters
Gonçalo M. Marques, Tiago Domingos, Marcos Mateus, Tânia Sousa and Carlos Teixeira

The Dynamic Energy Budget (DEB) theory unifies the commonalities between organisms as prescribed by the implications of energetics, which links different levels of biological organisation (cells, organisms and populations). The theory presents simple process-based rules that describe the uptake and use of energy and nutrients (substrates, food, light) and the consequences for physiological organisation throughout an organism's life cycle, including the relationships of energetics with aging and effects of toxicants. All living organisms are covered in a single quantitative framework, the predictions of which are tested against a wide variety of experimental results at the various levels of biological organisation. The theory explains many general observations, such as the body size scaling relationships of certain physiological traits or the von Bertallanfy growth curve that a great number of organisms follow. It provides a theoretical underpinning to the modeling biology at the organism level.

This symposium will highlight the fundamental principles underlining DEB theory, examples of how the theory is being applied and may be applied and the educational initiatives taking place.

01/08 | 17h50
PARALLEL SYMPOSIA – SESSION VII
Room 3.2.13
Symposium 17 - Dynamic Energy Budget theory – A general metabolic theory for all life on Earth

DEB THEORY: A UNIFIED THEORY FOR THE METABOLISM OF ORGANISMS

Tiago Domingos, Tânia Sousa

In contrast to what have been frequent statements in the ecological literature, DEB theory has shown that it is possible to obtain a unified mathematical theory for biology, similar to physical theories. At the same time, DEB has attained this aim by establishing a theory which is compatible with physical constraints, something which is frequently disregarded in biology, thus ensuring Edward Wilson's aim of consilience between the sciences.

Thermodynamic constraints must be obeyed but are not enough to build theories in biological systems. This is the underlying cause for the division between Ecosystem and Physiological Ecology, where the accounting units are energy and mass flows, and Population and Community Ecology, where the accounting unit is number of individuals.

DEB theory contributes to addressing these issues, being built from 1) the fundamental thermodynamic constraints that all processes obey mass and energy conservation but lead to entropy production, 2) a physical assumption of quite general applicability, that local flows are proportional to differences in intensive variables (and, hence, total flows are proportional to surface areas), 3) a biological assumption, that cells are metabolically very similar, independently of the organism or its size, and, 4) in a "systems theory" type of approach, an application of Occam's razor, in always choosing the simplest possible formulation of a mathematical theory (minimize the number of state variables; choose linear over non-linear functions; minimize the number of parameters).

Having condensed DEB theory in this compact definition, we then show how these fundamental assumptions lead to the strong and weak homeostasis principles, and then to partitionability of reserve dynamics and the reserve dynamics itself. With this, we obtain the von Bertalanffy growth curve and Kleiber's rule, for intra- and inter-specific comparisons.

Keywords: laws of thermodynamics; metabolism; unified theory; biodiversity; von Bertalanffy growth, Kleiber's rule

01/08 | 17h50
PARALLEL SYMPOSIA – SESSION VII
Room 3.2.13
Symposium 17 - Dynamic Energy Budget theory – A general metabolic theory for all life on Earth

STUDYING THE LIFE HISTORY OF BIRDS THROUGH THE APPLICATION OF DEB THEORY

Carlos M.G.L. Teixeira, Tânia Sousa, Tiago Domingos

The quantification of relevant metabolic processes for the life history evolution of birds has rarely been done but could help to clarify the extent to which endogenous drivers influence the variation of life history traits in this group. We sampled 40 bird species and applied the standard model of the Dynamic Energy Budget (DEB) theory to parameterise each species. Results were obtained regarding (1) the variation among DEB parameters of birds as a group, (2) deviations from expectations based on DEB body-size scaling, and (3) significant differences between groups of bird species according to phylogeny (Neognathae and Palaeognathae), migratory behaviour and development (maturity of avian neonates). The allocation fraction to soma was the DEB parameter with the lowest coefficient of variation, with birds exhibiting very high values, suggesting selective pressures driving birds towards larger investments in growth. Additional results suggest that as bird species that evolved towards smaller adult body sizes, they invest relatively higher amounts of energy, both in somatic maintenance and reproduction. The Neognathae exhibited significantly higher specific assimilation rates, allocating more energy to growth and somatic maintenance, and mobilizing energy from reserves at higher rates than the Palaeognathae. Migratory birds exhibit higher surface-specific assimilation rates, confirming the physiological demands of migratory flight. Relevant compound DEB parameters were shown to correlate significantly with the four main categories within the altricial-precocial spectrum. The DEB standard model allows us to quantify metabolic divergence between the two avian Superorders and to explore metabolic traits related to migratory behaviour and development.

Keywords: Dynamic Energy Budget (DEB) theory; metabolism; life history traits; birds; Aves

01/08 | 17h50
PARALLEL SYMPOSIA – SESSION VII
Room 3.2.13
Symposium 17 - Dynamic Energy Budget theory – A general metabolic theory for all life on Earth

THERMODYNAMICS OF LIFE IN THE CONTEXT OF DEB THEORY

Tânia Sousa, Tiago Domingos and Gonçalo M. Marques

Here, we make a brief description of the thermodynamics of life in the context of the Dynamic Energy Budget Theory. Growth, reproduction, somatic maintenance, maturation and maturity maintenance are fuelled by the exergy of resources (mass and energy) gathered from the environment. This exergy is either used for external work such as movement, accumulated as part of the organism biomass in the reproduction buffer, excreted in the form of faeces and other products, dissipated as heat or destroyed in all irreversible processes. A fraction of the exergy that is dissipated as heat has already been used for work such as internal muscle work. The amount of work (internal and external) done by the organism depends on the exergy gradient between the food and the outputs and the amount of exergy destruction (or entropy production) occurring in the organism. The strong homeostasis assumption of DEB theory that implies that the structure and the reserve have constant chemical compositions and constant thermodynamic properties (for endotherms temperature) provides a way to compute the changes in the enthalpy and in the entropy of living biomass that accompany changes in growth rate solving the problem of evaluating the thermodynamic properties of biomass as a function of the amount of reserves. Here, we use published data on Klebsiella aerogenes growing aerobically in a continuous culture to estimate the thermodynamic properties of reserve and structure including the exergy of living biomass, the internal and external work, the heat dissipated and the exergy destruction associate with metabolism.

Keywords: Dynamic Energy Budget (DEB) theory; metabolism; entropy production; thermodynamics of living systems

01/08 | 17h50
PARALLEL SYMPOSIA – SESSION VII
Room 3.2.13
Symposium 17 - Dynamic Energy Budget theory – A general metabolic theory for all life on Earth

POTENTIAL APPLICATIONS OF THE DEB MODEL IN A FINFISH AQUACULTURE

M. Mateus, A. Correia, G. M. Marques and L. Pinto

Finfish harvesting and production in aquaculture has been steadily growing over the past few years, both in quantity and value, mostly driven by the increase in human needs of fish protein. Despite this increase, most aquaculture production units are rather artisanal, especially when it comes to the management and optimization of feed given to fish to maximize their growth and reduce costs. DEB models can provide useful information in this process, by allowing to estimate fish growth as a function of environmental variables (e.g. water temperature, current speed, light radiation,etc.). This work addresses the basic notions of DEB models applied to fish growth and assesses their potential contribution to the aquaculture sector.

We have implemented a DEB model for fish (Dicentrarchus labrax) to modulate growth, by estimating energy requirement as a function of available food, water temperature and current speed. The model was developed for an aquaculture site located in Sines, Portugal. Model parameters were taken from the bibliography and values from environmental conditions came from field data.

Preliminary results show that it is possible to identify optimal ranges for environmental parameters in which growth can be maximized with an adequate amount of feed. Conversely, the model suggests that under certain environmental conditions, increase in feed will not enhance fish growth.

Keywords: Dynamic Energy Budget (DEB) theory; metabolism; finfish aquaculture; seabass; aquaculture management

01/08 | 17h50
PARALLEL SYMPOSIA – SESSION VII
Room 3.2.13
Symposium 17 - Dynamic Energy Budget theory – A general metabolic theory for all life on Earth

OPENDEBTOX: MODELLING THE EFFECTS OF TOXICANTS WITH A UNIVERSAL METABOLIC THEORY

Gonçalo M. Marques, Starrlight Augustine, Jean-Lou Dorne and Jan Baas

Dynamic Energy Budget (DEB) models have been demonstrated to be applicable for interpreting ecotoxicological effects in terms of effects on physiological processes in a variety of taxa. However, the development of DEB models for different species involves solving differential equations, implementing them into software, and parameterizing the models is not always straightforward. OpenDEBtox, a generic toxico-kinetic/toxico-dynamic (TK-TD) modelling framework based on DEB theory, has been developed in the R freeware for lethal and sub-lethal effects of chemicals and is available open source on EFSA's Knowledge junction. OpenDEBtox allows great flexibility to simulate and predict effects of single chemicals and mixtures on growth, reproduction and survival for individuals of different species. OpenDEBtox needs two types of input: 1) species specific DEB parameters describing the lifecycle of the organism 2) parameters describing the effect of the toxicant (DEBMoA and toxicity parameters). The first can be taken from the Add-my-Pet database and the latter can be taken from the purpose built DEBecotox database, which contains a summary of all available DEB-based studies in the open literature. The different DEBMoA have distinct effects on the life cycle traits of an individual organism, affecting growth and reproduction in different ways. The separation of TK and TD processes provides a tool to quantify interspecies differences, thus providing a basis for predictive modelling across taxa and chemical space. OpenDEBtox not only produces predictions at the individual level, but also predicts simple population endpoints such as growth rate and population profiles in terms of number and mass.

Keywords: Dynamic Energy Budget (DEB) theory; metabolism; ecotoxicology; open source software

01/08 | 17h50
PARALLEL SYMPOSIA – SESSION VII
Room 3.2.14/3.2.15

Symposium 15.2 - Role of agriculture in the climate change era for achieving the Sustainable Development Goals

Chair
Patrícia Vidigal and Filipa Monteiro

Presenters
Filipa Monteiro, Patrícia Vidigal, Mónica Sebastiana, Andreia Figueiredo, João Santos Silva and Joana Ferreira

To accomplish the Sustainable Development Goals (SDGs), agriculture is essential to meet these targets. The key role of agriculture adapted to climate fluctuations can contribute towards ensuring food and nutrition security by reducing losses, increasing productivity, with less dependency on production inputs, while preserving land and water biodiversity. Projections for global climate variations expect an increase of aridity, salinization, temperature fluctuations to occur sharply and frequently, and spatial and temporal distribution of rainfall to be disturbed, all of which will increase abiotic and biotic stress-related challenges to crops. Countering these challenges and to meet the food requirement for future generation (expected to reach 10 billion by 2050) we need to (1) develop and use resilient crops for mitigating adverse climatic changes; (2) build farming systems that optimize land and water availability to achieve consistent productivity; (3) adopt farming techniques towards soil conservation; (4) invest in technology and knowledge transfer to influence the creation of viable policies towards future nation-wide and worldwide sustainability. This symposium will gather scientists and stakeholders that are actively contributing for the Iberian Peninsula agriculture and the World agriculture to meet SDGs..

01/08 | 17h50
PARALLEL SYMPOSIA – SESSION VII
Room 3.2.16

Symposium 16.2 - Managing biological invasions and their impacts in the Anthropocene

Chair
Joana Vicente

Presenters
Joana R. Vicente, Joana Ribeiro, Nuno César De Sá, João P. Honrado and César Capinha

Alien species, and particularly those that became (or may become) invasive, represent a major challenge to policy and management in the Anthropocene. The introduction of those species mainly results from human actions, such as species trade or land management. Besides direct and indirect effects on native species and biotic communities, invasive alien species have impacts on ecosystem functioning and services, constituting a serious threat to the conservation of biodiversity and natural habitats as well as to the sustainable use of natural resources.

The importance of prevention and early detection for managing alien invasive species at appropriate scales has been highlighted in the recent European Union regulation on Invasive Alien Species (No 1143/2014). Effective approaches to improve the management of invasions at the multiple relevant scales are thus needed, not only to anticipate future invasions and their impacts on ecosystems and their services, but also to support the mitigation and adaption of such impacts in areas where invasive species are already established.

This symposium proposes to address the complex challenges associated to the multi-scale management of biological invasions and of their impacts. It welcomes studies where theoretical research is translated into more practical management strategies to deal with invasions at any relevant scale. Recent insights from remote sensing, habitat modelling, environmental genomics, and the social sciences are also opening new avenues to forecast new invasions, to assess and monitor established invaders, and to improve policy or governance mechanisms. Multidisciplinary approaches and studies with real-world applications, recommendations and solutions for managing alien species are particularly welcome!

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.13

Symposium 18 - A new bryophyte Red List and Checklist for Europe: A real basis for energising bryophyte conservation in Europe

Chair
Nick Hodgetts

Presenters

Nick Hodgetts, Rosalina Gabriel, Manuela Sim-Sim and César Garcia

A new European Red List for bryophytes is being published. This is a collaborative project between the European Committee for the Conservation of Bryophytes and the IUCN, with support from the EU LIFE fund. The system used for species assessment is described. x% of the European bryophyte flora is considered to be threatened. Concurrently, a new European bryophyte Checklist is being prepared, with funding from the Irish National Parks and Wildlife Service. This will include a published checklist and also a spreadsheet showing the distribution of species by country throughout Europe. It is intended that both projects will contribute to future research into bryophytes in Europe, and particularly provide a tool for their conservation.

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.13
Symposium 18 - A new bryophyte Red List and Checklist for Europe: A real basis for energising bryophyte conservation in Europe

A NEW BRYOPHYTE RED LIST AND CHECKLIST FOR EUROPE

Nick Hodgetts
Cuillin Views, Isle of Skye, UK

A new European Red List for bryophytes is being published. This is a collaborative project between the European Committee for the Conservation of Bryophytes and the IUCN, with support from the EU LIFE fund. The system used for species assessment is described. About 18% of the European bryophyte flora is considered to be threatened (Critically Endangered, Endangered or Vulnerable), with a further 8% Near Threatened and 7% Data Deficient. Only 0.4% are considered to be Extinct or Regionally Extinct. Concurrently, a new European bryophyte Checklist is being prepared, with funding from the Irish National Parks and Wildlife Service. This will include a published checklist and also a spreadsheet showing the distribution of species by country throughout Europe. It is intended that both projects will contribute to future research into bryophytes in Europe, and particularly provide a tool for their conservation.

Keywords: conservation; threatened species; species distribution; mosses; liverworts; hornworts

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.13
Symposium 18 - A new bryophyte Red List and Checklist for Europe: A real basis for energising bryophyte conservation in Europe

WHICH THREATS FACE THE MADEIRAN BRYOPHYTES? CURRENT STATUS AND FUTURE PERSPECTIVES FOLLOWING THE IUCN CRITERIA

Manuela Sim-Sim[1,2], Anabela Martins[2], César Garcia[2], Cecília Sérgio[2], Rosalina Gabriel[3] & Susana Fontinha[4]

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3 - Centre for Ecology, Evolution and Environmental Changes (cE3c) / Azorean Biodiversity Group, and University of the Azores, Faculty of Agrarian and Environmental Sciences, Department of Environmental Sciences and Engineering, Angra do Heroísmo, Açores, Portugal
4 - cE3c - Centre for Ecology, Evolution and Environmental Changes, Natural History and Systematics (NHS) Research Group/ Banco de Germoplasma ISOPlexis, Universidade da Madeira, Funchal, Portugal

In the Ibero-Macaronesian region, the Madeira Archipelago is an important biodiversity hotspot. The bryoflora of Madeira contains 538 taxa, 6 hornworts, 172 liverworts and 360 mosses. 57 are Endemic taxa (17 Madeiran endemics and 40 Macaronesian endemics) representing about 11% of all taxa. According to the latest IUCN classification, 27 taxa were considered in a threatened category.

In Madeira bryophytes occur in several habitats including the coastal areas, in the intermediate altitudinal belt (between the Laurel forest and coastal areas), in the Laurel forests and in the high mountains. It is in the laurel forest which covers 20% of the main island territory, that we can find most of the endemics growing on tree trunks and branches, freshwater habitats mainly represented by cascades, Levadas (water channels) and slopes along the Levadas, vertical walls with dripping water, stream margins and temporary ponds. With urban development, increase in tourism and agricultural activities, there has been an increase in water demand, resulting in lower flow rates in natural water courses, which is aggravated by climate change.

Future climate change might change environmental conditions and thereby lead to changes of bryophyte communities and threaten their diversity. On the one hand, this calls for the need to maintain the strict protection status of the laurel forest on Madeira and to minimize human-related disturbances. On the other hand, it suggests the implementation of species conservation programs, including ex-situ cultivations of the most threatened and in particular the endemic species as well as re-introduction approaches such as assisted migration to higher altitudes to prevent future extinctions.

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.13
Symposium 18 - A new bryophyte Red List and Checklist for Europe: A real basis for energising bryophyte conservation in Europe

AZOREAN BRYOPHYTES: IMPORTANCE, THREATS AND THEIR IUCN CONSERVATION STATUS

Rosalina Gabriel[1], Cecília Sérgio & Manuela Sim-Sim

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The Azores archipelago, set in the northern part of the Macaronesia biogeographical region, harbours more than 480 bryophyte species, about a quarter of all the bryophytes recorded in Europe, a remarkable richness, since the nine islands occupy only a small fraction of the continental area (0,02%). Moreover, bryophytes in the Azores represent an important biomass in different ecosystems, and include a number of restricted endemic species. The aim of this talk is to explore different ecosystems (Coastal habitats, Mesic areas, Cave entrances, Native forests, Aquatic habitats, Peat bogs, Semi-natural grasslands, Intensive pastures, Mountainous areas, Urban habitats, Parks and Gardens and Exotic plantation forests), in terms of richness of bryophyte species, particular threats affecting each habitat and the survival of conservation concern species according to the latest IUCN classification. Bibliographic surveys, Herbarium material and field studies were used to assess species presence and distribution on the Azorean islands. Native forests were the richest ecosystems sampled, and the ones that include more conservation concern species. However, the ranking also reflects a sampling bias towards the richest environments, sought out in bryological studies. Out of the 26 Macaronesian endemic bryophytes present in the Azores, 19 are threatened (critically endangered, endangered or vulnerable), although all of them exist in at least one protected area. Nevertheless, with global changes, such as climate change or substitution and fragmentation of land use, care should be made in order to guarantee their safeguard.

Keywords: biodiversity; richness; conservation; endemic species; mosses; liverworts; hornworts

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.13
Symposium 18 - A new bryophyte Red List and Checklist for Europe: A real basis for energising bryophyte conservation in Europe

THE CONSERVATION STATUS OF IMPORTANT PORTUGUESE BRYOPHYTE AS SUPPORT TO THE EUROPEAN RED LIST

César Garcia[1], Manuela Sim-Sim[1,2], Anabela Martins[2] & Cecília Sérgio[1]

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The major threats to plant diversity are among other impacts, pollution, intensive agriculture, invasive species increment, human disturbances related with energy production, climate changes, fire and fire suppression (increase in fire frequency/intensity).

Fires, particularly forest fires are one of the most important aspects of land use changes. It may have effects on plant communities' structure and composition, depending on the intensity, timing, interactions with other disturbances and the physical characteristics of the habitats within which it occurs. In the Mediterranean areas of Europe these fires may cause disturbances on the hydrological and erosion processes and consequently on the re-establishment of the vegetation cover. For bryophytes, the dynamics of the re-colonization can be quite different from the other plants, especially for the less abundant moss and liverwort species.

The impact of fire on the conservation of selected bryophyte species will be analyzed and discussed (severity/impact score), based on recent work developed in the aim of the European Red List of bryophytes. Examples for some taxa assessed with a high conservation status (IUCN criteria) in the European area, with small population size and limited distribution in Europe, will be presented: *Andreaea heinemannii, Anomobryum lusitanicum, Asterella africana, Bruchia vogesiaca, Dendrocryphaea lamyana, Dicranum crassifolium, Fissidens jansenii, Racomitrium hespericum, R. lamprocarpum, R. lusitanicum, Schistidium occidentale, Marsupella profunda, Hedwigia striata, Schizymenium pontevedrense*, etc. The results obtained will contribute towards meeting the biodiversity targets for 2020 and halt loss of the world's biodiversity.

Keywords: mosses; liverworts; conservation; disturbance; Europe

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.14/3.2.15

Symposium 19 - Restoring ecosystem structure and functioning to an uncertain future under global change

Chair
Alice Nunes and Cristina Branquinho

Presenters
Susana Bautista, Melanie Köbel and Helena C. Serrano

Land degradation caused by anthropogenic and natural impacts is a major problem worldwide, leading to biodiversity loss and threatening human wellbeing. Current environmental change due to climate or land use changes are additional global pressure factors affecting biological systems. The main means to counteract land degradation and to repair degraded ecosystems is through restoration. In addition, restoration plays a key role in climate change mitigation and is a major opportunity for climate change adaptation, strengthening the resilience of socio-ecological systems to climate-driven hazards.

Adopting restoration solutions based on appropriate species mix and techniques, combined with assisted regeneration and passive restoration practices, may contribute effectively to restore damaged ecosystems. Yet, uncertainties remain on how to achieve the best results in restoration, particularly under a global change scenario. Also, recovery rates are slow, restoration trajectories often unpredictable, and growing evidence suggests that the final stages of recovery are the most challenging to achieve. The main objective of this symposium is to gather restoration examples in response to different degradation causes as a basis for a more general discussion about the role of ecosystem restoration in the era of global change, and potential strategies and challenges to deal with an uncertain future.

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.14/3.2.15
Symposium 19 - Restoring ecosystem structure and functioning to an uncertain future under global change

RESTORING SPECIES-DIVERSE VEGETATION PATCHES: A NATURE-BASED SOLUTION FOR DRYLAND RESTORATION

Susana Bautista[1], Carme Bladé[2], Sonia Vega[1], Valeriia Nazarova[1]

1 - Dept. of Ecology and IMEM, University of Alicante, Spain
2 - Dept. of Evolutionary Biology, Ecology and Environmental Sciences, University of Barcelona, Spain

Strategies to restore degraded drylands and reverse biodiversity loss in a context of increasing climate-induced pressure need to consider the structure-function particularities of dryland landscapes. Restoration approaches based on creating species-diverse vegetation patches and resource-conserving spatial patterns in patchy landscapes may contribute to jointly enhance restoration success and biodiversity conservation in drylands. Using large community-scale manipulative experiments on dryland communities, with plant patches of varying species, functional composition and patch size installed ad hoc on bare, degraded slopes, we investigated how plant diversity and density within the vegetation patch modulate the performance of the introduced plants and the function and restoration potential of the target area. Our findings demonstrate that patch diversity and size largely control the recovery of drylands from degraded states. At the early stages of the restoration trajectory, increasing plant density, and thus patch size reduced to some extent individual survival and growth in the vegetation patches. However, larger and more diverse vegetation patches seem to benefit from a higher capacity for trapping and using water from rainfall and runoff. The net increase in total patch biomass with increasing patch size and diversity surpassed the increasing competition with increasing plant density within the vegetation patch, pointing to a functional complementarity of the species in the patch. Overall, the result suggest that creating vegetation patches with species that exhibit potentially complementary traits regarding resource acquisition could be a cost-effective approach for restoring degraded drylands.

Keywords: Drylands; nature-based restoration; patchy vegetation; plant diversity

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.14/3.2.15
Symposium 19 - Restoring ecosystem structure and functioning to an uncertain future under global change

IS GRAZING EXCLUSION AN EFFECTIVE MEASURE TO IMPROVE TREE REGENERATION AND PLANT FUNCTIONAL DIVERSITY IN A CORK OAK WOODLAND?

Köbel, M[1]; Listopad, C[1,2]; Príncipe, A[1]; Nunes, A[1]; Branquinho, C[1]

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Passive restoration is increasingly acknowledged as a cost-effective approach, but ecosystem recovery may be slow and context-specific. In cork oak woodlands, cattle grazing drives important community composition changes and may hamper tree regeneration, threatening the long-term sustainability of this ecosystem. Grazing exclusion may be an efficient restoration method, but the time scale associated with recovery is less clear.

In this work we studied the effects of grazing exclusion as a passive restoration approach. We assessed tree seedlings and saplings, shrub structure, compositional and functional diversity at sites with different periods of exclusion – 0, 5, 9 and 13 years of exclusion.

Our results suggest that tree regeneration, in grazed sites, is mainly limited by a deficient sapling's establishment. In the 9-years excluded plots saplings were significantly taller, suggesting that this period is optimal to guaranty the growth of young trees. Moreover, within 5 years of exclusion, shrub cover increased and remained stable thereafter, while shrub species diversity increased continuously.

Similarly to species richness, shrub functional richness increased along the chronosequence, while functional dispersion and evenness were not influenced by grazing exclusion. These results suggest that, within the timeframe studied, there was an increase in functional redundancy rather than a consistent change in shrub functional diversity.

Altogether, our study shows that grazing management may be an important tool for passive restoration, but different components of the ecosystem have different patterns of recovery.

Acknowledgements
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Keywords: Mediterranean; Passive restoration; cork oak; secondary succession; High Nature Value Farmland

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.14/3.2.15
Symposium 19 - Restoring ecosystem structure and functioning to an uncertain future under global change

CHALLENGES IN MINE ECOLOGICAL RESTORATION

Helena C. Serrano, Inês Domingues, Cláudia Mendes, Melanie Köbel, Alice Nunes, Cristina Branquinho

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Mining is a primary extractive industry that degrades the land either by superficial removal of the soil-cover or pilling of subterranean substrates and spoil-heaps. Moreover, the degradation is aggravated by the processes used to select the minerals of interest and purify them, often resulting in high concentrations of toxic metals and acid drainage, that make it even harder for plants to survive and establish. Much of the soils in these mining areas had a metalliferous character to begin with (high background values), but the disturbance from the extraction processes has destroyed most of the native plant's natural habitat. Nevertheless, it is sometimes possible to recover either some of the native species more adapted to disturbance (and use them in the restoration) or amend the disturbed substrate to allow the establishment of a plant species cover.

We present here results from experiments where contaminated soil from the surroundings of a mine was used to germinate local species adapted to disturbance, or where soil amendments were added to facilitate plant establishment (aeration, nutrients, pH), and test phytoaccumulation.

From eight native species collected in the surroundings of a contaminated area, germination in contaminated soil was achieved successfully mostly for Cistus spp., Erica sp. and Agrostis sp. The best soil amendment was due to the soil pH change, that in fact regulates bioavailability of both toxic-metals (reducing it) and nutrients (increasing it). A trade-off was observed between plant's biomass and its soil metal-phytoaccumulation ability.

Keywords: mine restoration, metals, native species, phytoestabilization, phytoaccumulation

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.14/3.2.15

Symposium 20 - Evolutionary ecology in the marine realm

Chair
Joana Robalo

Presenters
Rosa M. Chefaoui, Joana I. Robalo and Frederico Almada

In this symposium we aim to understand how different environmental and species specific characteristics conditioned the evolution of different taxa (vertebrates, invertebrates and algae) along European shores. Cues for the estimation of different scenarios in the future are also topics to discuss.

The inshore species that now occur in west Europe vary in their thermal tolerances, life-history patterns and biogeographic origins, among other factors. These factors have an important role in the explanation of diverse evolutionary patterns also related with post-glacial recolonization from Pleistocenic marine refugia. As a result, different distributional and phylogeographic patterns were observed in the past and may condition the near future under a climate change framework.

The identification of the main phylogeographic patterns and barriers, but also future scenarios in the Mediterranean and northeastern Atlantic European shores, require a multi species comparison approach and a broad knowledge of present and past ecological conditions. Unraveling these patterns may help to unlock future research that depends on basic evolutionary information.

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.14/3.2.15
Symposium 20 - Evolutionary ecology in the marine realm

DISENTANGLING ECOLOGICAL VARIABLES AFFECTING POPULATION STRUCTURE AND GENETIC CONNECTIVITY - A META-ANALYSIS OF FISH SPECIES FROM THE NORTH-EASTERN ATLANTIC

Joana I. Robalo, Ana M. Pereira, Karen Avellaneda Rodriguez, Carla Sousa-Santos, Adriana Oliveira, Beatriz Uva, Catarina Abril, Clara Rodrigues, Filipa Nascimento, Márcia Naré, Mercedes Mandim, Miguel Rolo, Raquel Henriques, Ricardo Miranda, Sara Vital, Tumbulo Bamba & Sara M. Francisco

MARE—Marine and Environmental Sciences Centre, ISPA Instituto Universitário, Rua Jardim do Tabaco 34, 1149-041 Lisboa, Portugal

Evaluating and understanding the evolutionary dynamics of divergent populations is of paramount importance for both fisheries management and conservation strategies. Despite the traditional use of genetic approaches to quantify demographic connectivity, the difficulty to distinguish contemporary from historical connectivity remains. We aim to disentangle the various ecological factors affecting population structure in marine fishes from the Northeastern Atlantic.

This work included most of the phylogeography studies available in scientific search engines, encompassing a wide geographical area and using both genetic and genomic data. To ensure consistent and directly comparable work the obtained datasets were reanalyzed with a standardized analysis of molecular variance (AMOVA). The fixation index (FST) obtained de novo were compared against several independent ecological, biogeographical and life-history variables. We did a meta-analysis using exploratory factorial followed by several regression analyses to reveal potential emerging patterns.

Despite the lack of available data for several parameters, our results refute general expectations, conventional wisdom and several papers, that PLD and early life-history traits are good predictors of population structure in marine organisms. In fact, the Type of Genetic Marker (mitochondrial, nuclear, microsatellite) and Adult Ability to Dispersal (weak, good or strong) were found to be determinant for significant FST and population structure.

These results point to the need of future intercomparable studies with larger species numbers and including marine organisms with distinct life-history traits, which would significantly enrich the present approach and have a huge potential for marine protected areas design and management.

Keywords: Population structure, Northeastern Atlantic, Ecological traits, genetics, genomics

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.14/3.2.15
Symposium 20 - Evolutionary ecology in the marine realm

CLIMATE-DRIVEN DISTRIBUTIONAL SHIFTS OF SEAGRASSES AND ALGAE: FROM PAST TO FUTURE

Rosa M. Chefaoui

The pace of climate warming is higher in the ocean than land. As a consequence, foundation species (algae and seagrasses) are suffering well documented range contractions due to ocean warming. Past marine climate conditions have also been proposed as main drivers of the current distribution of genetic structure of these species. I will give an overview of how inferring climate-driven distributional shifts and relating them to patterns of genetic diversity helps us understand the biogeographical history and the consequences of climate change.

Hindcasted and forecasted distributions of algae and seagrasses are obtained using ensembles of past and future climate scenarios. The location of cold climate refugia during the Last Glacial Maximum and predicted future loss of suitable habitat are contrasted with discrete regions identified on the basis of extant genetic diversity.

In general, the SE Mediterranean and the North Atlantic African coasts were identified as long-term persistence regions (glacial refugia), where the populations with higher genetic diversity are currently found. Under future scenarios, a net loss of suitable areas was predicted in the Mediterranean Sea, where erosion of present genetic diversity and vicariant processes can happen.

These studies emphasize that exploring past changes can help us understand how future warming can affect the distribution of marine foundation species and their genetic diversity.

02/08 | 11h00
PARALLEL SYMPOSIA – SESSION VIII
Room 3.2.14/3.2.15
Symposium 20 - Evolutionary ecology in the marine realm

RELEVANCE OF EVOLUTIONARY ECOLOGY FOR FUTURE STUDIES IN BIOTECHNOLOGY - A CASE STUDY WITH VENOMOUS FISH

Frederico Almada, Joana I. Robalo, Sara M. Francisco, Marta Araújo, Francisca Rodrigues, José Neto, Fátima Gil, Américo G. Duarte

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In recent years, research in blue biotechnology is thriving with the study of bioactive components obtained from marine organisms. Studying the diversity and evolution of an undetermined number of molecules provides a roadmap for applied studies in this field. Basic information on the evolution of different organisms and information on the selective forces that act upon these compounds has been largely overlooked. We provide an example that highlights the importance of basic research on evolutionary ecology, promoting effective predictions about the unstudied characteristics of fish venoms. The genus Scorpaena with 61 species worldwide is a diverse groups of venomous cryptic fish with at least 7 species present in the northeastern Atlantic and Mediterranean. Currently, their phylogenetic relationships have been partially addressed and nothing is known about the composition or properties of their venoms. A proteomic approach revealed a remarkable diversity in venom composition which may be related with ecological constraints and different selective pressures. Some components of these defensive cocktails are shared among species while others are exclusive from a particular species and their proteome similarities are not proportional to their phylogenetic relatedness. Their evolution also revealed unexpected, occasionally contradictory, results compared to the scarce information available in the literature. Unravelling common/exclusive venom components and evaluating their effects, will allow us to prioritize subsequent research and illustrate the potential of fundamental research in evolutionary ecology for biotechnology.

Duration: 15 min.
Support: Flying Sharks, Aquário Vasco da Gama

02/08 | 15h20
PARALLEL SYMPOSIA – SESSION IX
Room 3.2.14/3.2.15

Symposium 21 - Ecology: from communities to amazonian (agro)ecosystems

Chair
José Max B. de Oliveira Junior

Presenters
Thiago Almeida Vieira and José Max Barbosa de Oliveira Junior

The symposium seeks to promote discussions about ecology as a science in another perspective, supporting sustainable agroecosystems, as well as, as a science of interdisciplinary approach, man and environment interactions, agriculture and nature, science and technology, economy and society, and environmental impacts. Its main objective is to discuss basic fundamentals of ecology for the management of (agro)ecosystems and to relate the concepts and principles of ecology with the production activity in agroecosystems in the Amazon. The symposium is structured in the form of small presentations (approximately 10 min. each), followed by discussion. The presentations will be listed: I- the challenges of designing and managing sustainable agroecosystems in the Amazon; II- agroecosystem as a way of maintaining the socioeconomic and cultural vitality of smallholders and/or traditional peoples; and III- the possible environmental impacts of (agro)ecosystems. The fragmentation of native habitats certainly results in the loss of important natural habitats for the conservation of biodiversity. However, the occupation of the landscape by agroecosystems does not necessarily transform it into a completely inhospitable environment for all native species, on the other hand, conventional agriculture can generate numerous negative impacts on biodiversity. After the presentations, the symposium will be open for discussion among participants.

02/08 | 15h20
PARALLEL SYMPOSIA – SESSION IX
Room 3.2.14/3.2.15
Symposium 21 - Ecology: from communities to amazonian (agro)ecosystems

ECOLOGY AND SUSTAINABLE AGROECOSYSTEMS

Dr. Thiago Almeida Vieira

Universidade Federal do Oeste do Pará, Brazil/Universidade do Algarve, Portugal

The objective of this work is to discuss ecological aspects in the design of agroecosystems in the tropics, especially in the Amazon. This is a theoretical study, supported by the scientific literature. Land use, in general, starts from the felling of native vegetation, followed by the use of fire. The farmer manages this area according to your objectives: self-consumption and/or commercial. The goal will predict how land use systems will be drawn. Generally, for commercial purposes agroecosystems are less diverse, with a predominance of one or two species. When for the purposes of self-consumption, such as agroforestry homegardens, the diversity of plant and animal species increases. More diverse agroecosystems, with the presence of tree species, tend to be more sustainable, with greater possibility of conserving ecological characteristics, contributing to the production of support services, such as, soil conservation, photosynthesis and water and nutrient cycling, especially, the maintenance of habitat in this system. In this way, it is important that farmers are oriented to contribute to the diversity of species and conservation of attributes of soil and water.

Keywords: Agroecosystems design; Amazon; diversity; environmental conservation; tropics.

02/08 | 15h20
PARALLEL SYMPOSIA – SESSION IX
Room 3.2.14/3.2.15
Symposium 21 - Ecology: from communities to amazonian (agro)ecosystems

ENVIRONMENTAL IMPACTS AND (AGRO)ECOSYSTEMS

Dr. José Max Barbosa de Oliveira Junior

Universidade Federal do Oeste do Pará, Brazil/Universidade do Algarve, Portugal

The presentation aims to present and discuss the thematic environmental impacts and agroecosystems in the Amazon. A short presentation of approximately 10 minutes will be made on the following aspects: I- environmental impacts of agriculture and (agro) ecosystems in the Amazon. II - fragmentation of habitats. III- brief study of the art about studies involving (agro) ecosystems and environmental impacts in the Amazon. Tropical ecosystems face increasing anthropogenic pressures. In the last decades the Amazonian forest has been subjected to high rates of deforestation for the conversion of native forest areas to agriculture and pasture fields, since the tropical regions contain a large part of the potentially cultivable areas. The fragmentation of native habitats certainly results in the loss of important natural habitats for the conservation of biodiversity. However, the occupation of the landscape by agroecosystems does not necessarily transform it into a completely inhospitable environment for all native species; on the other hand, conventional agriculture can generate numerous negative impacts on biodiversity. After the presentation will be opened to discuss the aspects covered.

Keywords: Agriculture; Agroecosystems; Amazon; environmental changes; state of the art.

02/08 | 15h20
PARALLEL SYMPOSIA – SESSION IX
Room 3.2.16

Symposium 22 - Macro and Microevolutionary Processes in Macaronesian Plant Lineages

Chair
Mónica Moura

Presenters

Mónica Moura, Maria Romeiras, Konstantina Koutroumpa, Guilherme Roxo and Anyse Pereira

Islands are perfect spots to comprehend how the evolutionary processes takes place. In this symposium we aim to address the mechanisms that drive speciation in insular settings using case studies from the Macaronesian Region. The Macaronesian Islands (i.e. Azores, Madeira, Selvagens, Canaries and Cabo Verde), harbour biotas with exceptionally high levels of endemism, such as vascular plants, which includes some of the most important radiations in this region. Over the last decades, numerous studies have contributed to determine the phylogenetic relationships and times of origin and diversification of different endemic lineages. In this symposium we will review relevant published phylogenetic data and diversification rates retrieved within Cabo Verde plant and reptile lineages and discuss the importance of choosing appropriate phylogeny-based methods to investigate diversification dynamics on islands. We will also discuss macro and microevolutionary patterns detected within Azorean plant lineages and associated drivers of speciation. Finally, the symposium will address two of the largest radiations within Macaronesian plant lineages: (i) the Apiaceae, integrating biogeographical data and cytogenomic variation to elucidate the group's evolutionary patterns, and (ii) the taxonomically difficult genus Limonium, through an expanded molecular phylogeny with a wide sampling of Macaronesian taxa.

02/08 | 15h20
PARALLEL SYMPOSIA – SESSION IX
Room 3.2.16
Symposium 22 - Macro and Microevolutionary Processes in Macaronesian Plant Lineages

MACRO AND MICROEVOLUTIONARY PATTERNS WITHIN AZOREAN PLANT LINEAGES AND ASSOCIATED DRIVERS OF SPECIATION

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Remote and geographically wide-spanning archipelagos, such as the Azores Islands, are perfect spots to understand how colonization and lineage divergence takes place in insular environments. A considerable amount of plant molecular data is now available for the Azores, due to a boom of molecular systematics studies conducted within the last two decades. Within this context, a meta-analysis of the available data is currently missing to clarify the mechanisms behind plant evolution in this remote archipelago. Based on a thorough bibliographic review of the molecular data generated from phylogenetic and population genetic studies, our analysis envisages to detect micro and macroevolutionary patterns present in endemic Azorean plant lineages, using a multinomial distribution in a Bayesian framework. An analysis by species was conducted to understand if endemic species could be grouped into different categories according to their genetic structure in the Azores, while an analysis by island determined possible relationships between population genetic patterns of endemic species and the geological history of the archipelago. The Bayesian analysis by species retrieved six species groups and Santa Maria, São Miguel and Terceira showed significantly higher percentages of species with unique pattern in the analysis by island. Considering the results, we discuss possible drivers of speciation associated with these patterns, framed by a geographical, geological, ecological and anthropogenic setting.

Keywords: Azores; lineage divergence; endemic flora; meta-analysis; multinomial distribution

02/08 | 15h20
PARALLEL SYMPOSIA – SESSION IX
Room 3.2.16
Symposium 22 - Macro and Microevolutionary Processes in Macaronesian Plant Lineages

OC - (EEF2019-13700) - EVOLUTIONARY PROCESSES ACROSS INSULAR ENDEMIC PLANTS AND REPTILES: ADVANCES AND SHORTCOMINGS OF PHYLOGENETIC AND PHYLOGENOMIC STUDIES

Maria Romeiras Maria Romeiras (Portugal)[1,2]; Ana Rita Pena (Portugal)[2]; Tiago Menezes (Portugal)[3]; Raquel Vasconcelos (Portugal)[4]; Filipa Monteiro (Portugal)[2]; Octávio Paulo (Portugal)[2]; Mónica Moura (Portugal)[3]

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4 - CIBIO, Research Centre in Biodiversity and Genetic Resources, InBIO Associate Laboratory, Universidade do Porto, Vairão, Portugal

Over the last decades, numerous studies focused on oceanic islands have contributed to determine the phylogenetic relationships and times of origin and diversification of different endemic lineages. The Macaronesian Islands (i.e. Azores, Madeira, Selvagens, Canaries, and Cabo Verde), harbor biotas with exceptionally high levels of endemism. Within the region, the vascular plants and reptiles constitute two of the most important radiations. In this study we compare relevant published phylogenetic data and diversification rates retrieved within Cabo Verde plant and reptile lineages and discuss the importance of choosing appropriate phylogeny-based methods to investigate diversification dynamics on islands. From this selective literature-based review, we summarize the software packages used in Macaronesian studies and discuss their adequacy considering the published data to obtain well-supported phylogenies in the target groups. We further debate the importance of Next Generation Sequencing (NGS), to fill the knowledge gaps detected in Macaronesian plants and reptile evolutionary studies. Analysis of genomic data provides phylogenetic resolution for rapidly evolving species radiations, suggesting a great potential to improve the phylogenetic signal and divergence time estimates in insular lineages. The most important Macaronesian reptile radiations provide good case-studies to compare classical phylogenetic methods with new tools such as phylogenomics, revealing a high value for research on this hotspot area.

Keywords: Macaronesia, evolution, phylogenetic inference, divergence times, phylogenomics

02/08 | 15h20
PARALLEL SYMPOSIA – SESSION IX
Room 3.2.16
Symposium 22 - Macro and Microevolutionary Processes in Macaronesian Plant Lineages

OC - (EEF2019-13778) - EXPLORING THE DIVERSIFICATION OF LIMONIUM (SEA LAVENDERS) IN SPACE AND TIME

Konstantina Koutroumpa (Switzerland)[1]; Ben H. Warren (France)[1,2]; Spyros Theodoridis (Denmark)[1,3]; Mario Coiro (Switzerland)[1]; Maria M. Romeiras (Portugal)[4,5]; Ares Jiménez (Switzerland)[1]; Elena Conti (Switzerland)[1]

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Species richness varies across habitats, regions and taxonomic groups, raising long-standing questions about the ecological and evolutionary mechanisms underpinning this variation. The Mediterranean region, including Macaronesia, is one of the world's biodiversity hot spots that covers only 2% of the earth's surface, but accommodates 20% of the total plant richness. The complex geological and climatic history, and the high habitat heterogeneity (e.g. different island systems, substrates etc.) have been proposed as major drivers of diversification in the region. Here we explore the diversification and biogeography of Limonium (Plumbaginaceae), a cosmopolitan genus with ca. 600 species, 70% of which occur in the Mediterranean region and occupy variable island systems (both continental and oceanic).

We sample about one third of the species for Limonium, spanning its taxonomic and geographical variability, and several outgroup taxa. We further, use one nuclear and three chloroplast markers to infer and time calibrate the global molecular phylogeny. In addition, RAD data (10,000 loci) are obtained for 16 Canarian Limonium endemics and their close continental relatives.

Preliminary analyses place the origin of Limonium in the early Oligocene. The early diversification events for the Mediterranean clade coincide with the Messinian Salinity Crisis, while most of the speciation events are placed within the Quaternary sea-level oscillations. Macaronesian taxa diversified during the Pliocene and Pleistocene, and the archipelagos were colonized by multiple long distance dispersal events followed by within and between island diversification.

Limonium is a valuable study system in exploring drivers of diversification in insular systems.

Keywords: Macaronesia, Mediterranean region, Biogeography, Diversification, Macro- and Microevolution

02/08 | 15h20
PARALLEL SYMPOSIA – SESSION IX
Room 3.2.16
Symposium 22 - Macro and Microevolutionary Processes in Macaronesian Plant Lineages

OC - (EEF2019-13770) - INTEGRATING BIOGEOGRAPHICAL DATA AND CYTOGENOMIC VARIATION TO ELUCIDATE THE APIACEAE EVOLUTION WITHIN THE MACARONESIAN ISLANDS

Guilherme Roxo (Portugal)[1]; Mónica Moura (Portugal)[2]; Miguel Menezes De Sequeira (Portugal)[3]; Jóse Carlos Costa (Portugal)[1]; Pedro Talhinhas (Portugal)[1]; Maria Romeiras (Portugal)[1]

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The volcanic Macaronesian archipelagos (Azores, Madeira, Savagess, Canary, and Cabo Verde) are considered to form a biodiversity hotspot with large numbers of endemic species. In these islands, the family Apiaceae is represented by 35 endemic taxa, being some commonly used as food and spices due to the aromatic nature of the foliage and fruits, and also as medicinal plants. In recent years genome size analyses has been proven to be an effective method in Taxonomy, as a support tool for the detection and delimitation of plant species; and in the Evolutionary Biology to understand the mechanisms of plant genome evolution and causes of nuclear DNA content variation among species. Using flow cytometry, we analysed the genome size of more than 300 samples, covering c. 40 native species (mainland Portugal and Macaronesian archipelagos), that resulted in new data that can be used to clarify the taxonomy and the evolution of native Apiaceae taxa in. Our results revealed a tendency towards smaller nuclear DNA contents and genome sizes in insular populations, comparing with the continental ones. Moreover, some native species (e.g. Angelica lignescens, Crithmum maritimum, Melanoselinum decipiens) show some population genomic diversity. Our data also support the ancestral relationships between the genus Daucus and the endemic monotypic genera Melanoselinum and Monizia from the Madeira archipelago and the endemic genera Tornabenea from Cabo Verde. In this communication new cytogenomic results obtained will be discussed in the context of the biogeography of Macaronesian Islands.

Keywords: Endemic flora, flow cytometry, C-Value, genome size, ecology

02/08 | 15h20
PARALLEL SYMPOSIA – SESSION IX
Room 3.2.16
Symposium 22 - Macro and Microevolutionary Processes in Macaronesian Plant Lineages

EXPLORING MACARONESIAN BRASSICACEAE CHEMICAL DIVERSITY TO DECIPHER ABIOTIC STRESS TOLERANCE

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In order to adapt to the most challenging environmental conditions, plants have developed a diversity of chemical defense lines, leading to the evolution of various groups of specialized metabolites. Thus, a correlation between phylogeny and biosynthetic pathways is sometimes assumed and could offer a predictive approach enabling the formulation of hypothesis about speciation. Many studies have shown that is possible to use specialized metabolites to support molecular based phylogenies. However, this correlation is not always conclusive and there are other factors such as convergent evolution that may occur independently in taxa that are not necessarily closely related, often in response to similar environmental challenges, which can lead to incongruence between phytochemistry and phylogeny. The Brassicaceae is an important plant family that includes several well-known crops such as kale, cabbage, broccoli, Brussels sprouts, and cauliflower. These vegetables are known for their characteristic and high content of secondary metabolites such as glucosinolates and phenolic compounds widely studied for its beneficial properties. Although the economic importance of several Macaronesian native species in agriculture is undeniable, the mechanisms involved in the biosynthesis of defence and/or health-related phenolic compounds remains understudied. This study aims to identify genomic regions controlling the biosynthesis of secondary metabolites, namely glucosinolates, flavonoids and phenylpropanoids, in order to link single metabolites production to a specific environmental trigger, particularly to abiotic stress conditions, and also to stablish a relationship between phylogenetic distance and chemical diversity.

Keywords: *Diplotaxis*, Cabo Verde; glucosinolates; secondary metabolites, abiotic stress

02/08 | 17h50
PARALLEL SYMPOSIA – SESSION X
Room 3.2.14/3.2.15

Symposium 23 - Linking agricultural policies to Sustainable Development Goals: a focus on biodiversity and ecosystem services provisioning

Chair
Francisco Moreira

Presenters

Ângela Lomba, Francisco Moreira, Stefan Schindler and Clélia Sirami

The Common Agricultural Policy (CAP) is a major driver of changes in European farmland, with impacts on biodiversity and ecosystem services provisioning. This symposium aims to discuss the major implications and challenges of the proposed CAP reform post-2020 on Sustainable Development Goals, with a focus on SDG 15 (Life on Land). The first two presentations set the scene for what the proposed CAP can (or cannot) deliver. The remaining presentations address two important topics for ecologists: (i) how to use agricultural statistics information for biodiversity and ecosystem service assessment; (ii) how to maintain High Nature Value farmland in Europe. The proposed format is a set 4 of short presentations followed by discussion.

This symposium results from the project FARSYD – FARming SYstems as tool to support policies for effective conservation and management of high nature value farmlanDs (FARSYD-2011–2016—POCI-01-0145-FEDER-016664|PTDC/AAG-EC/5007/2014).

02/08 | 17h50
PARALLEL SYMPOSIA – SESSION X
Room 3.2.14/3.2.15
Symposium 23 - Linking agricultural policies to Sustainable Development Goals: a focus on biodiversity and ecosystem services provisioning

A FARMING SYSTEMS APPROACH AS A TOOL TO LINK POLICY TO BIODIVERSITY AND ECOSYSTEM SERVICES

Moreira F, Lima Santos JM, Ribeiro PF, Canadas MJ, Novais A, Lomba A

A relevant share of European agricultural areas holds significant biodiversity and ecosystem service (BES) values. These are often public goods, requiring policy mediation to safeguard provision. Therefore, linking agricultural policies with BES outcomes is a major challenge. Here, we propose the exploration of a Farming Systems (FS) approach for this purpose.

A FS typically includes farms sharing similar crop and livestock patterns, resource endowments and management practices. We gathered evidence on the potential and limitations of using FS information to infer BES outcomes.

The FS approach has a strong potential to be explored by ecologists, including: (i) acting as a key driver of BES provision, as different FS are associated with specific agricultural practices to which BES respond; (ii) management coherence, as, for all farms under a given FS, management practices with implications for BES are not independent of each other, but linked together as a “bundle”; (iii) close response to policy and other drivers, as farms operating within the same FS are expected to show similar responses to biophysical, market and policy drivers, enabling modelling and prediction; (iv) availability of EU level information on farm management, which potentiates having access to data with good spatial and temporal coverage.

Potential application of a FS approach includes: (i) the exploration of FS as indicators of BES; (ii) policy scenario analysis, (iii) agri-environment policy design. The approach has, however, limitations, including incomplete baseline information (lack of ecological data), or the lack of flexibility to cope with innovation.

Keywords: agriculture, policy, CAP, biodiversity, ecosystem services

02/08 | 17h50
PARALLEL SYMPOSIA – SESSION X
Room 3.2.14/3.2.15
Symposium 23 - Linking agricultural policies to Sustainable Development Goals: a focus on biodiversity and ecosystem services provisioning

IMPACTS OF THE COMMON AGRICULTURAL POLICY (CAP) ON LAND USE, BIODIVERSITY AND ECOSYSTEM SERVICES

Guy Pe'er, Francisco Moreira, Robert Müller, Vasileios Bontzorlos, Dagmar Clough, Sebastian Lakner, Peter Bezák, Aletta Bonn, Victoria Dietze, Bernd Hansjürgens, Janina Kleemann, Mira Kattwinkel, Angela Lomba, Gioele Passoni, Stefan Schindler, Christian Schleyer, Elisa Schütze, Jenny Schmidt, Yves Zinngrebe, Clélia Sirami

Agricultural lands comprise nearly 50% of the terrestrial area of the European Union (EU). Specific instruments of the Common Agricultural Policy (CAP) were introduced to improve environmental protection. Yet, declines in agricultural biodiversity and ecosystem services are still ongoing.

We conducted a comprehensive literature review to assess the performance of key instruments for environmental protection, i.e. agri-environment-climate measures (AECM), greening measures and cross compliance (CC), as well as direct payments.

Although literature suggests that AECM can be locally effective, their effectiveness at the EU level remains limited due to a restricted budget, low uptake by farmers, lack of spatial design, and poor implementation. Greening measures are ineffective and cost-inefficient since most farmers are either exempt or can comply with the greening requirements without any action. The CAP offers adequate support to promote organic farming, but much greater support is given to unsustainable farming systems. The protection of High Nature Value farming systems is scarce and inadequate. AECM and CC provide some support to soil protection and water quality but only low support to climate action by failing to address the most important sources of greenhouse-gas emissions.

The CAP's design and implementation poorly takes up existing knowledge and its instruments operate with little coherence or even in conflict. Moreover, the CAP only marginally addresses the EU's global ecological footprint and its contribution to land-use changes outside of Europe. As a result, the environmental performance of the CAP remains weak.

Keywords: agriculture, policy, CAP, biodiversity, ecosystem services

02/08 | 17h50
PARALLEL SYMPOSIA – SESSION X
Room 3.2.14/3.2.15
Symposium 23 - Linking agricultural policies to Sustainable Development Goals: a focus on biodiversity and ecosystem services provisioning

ACTUAL AND POTENTIAL SUPPORT OF THE COMMON AGRICULTURAL POLICY (CAP) FOR THE UN SDGs

Guy Pe'er, Yves Zinngrebe, Francisco Moreira, Clélia Sirami, Stefan Schindler, Robert Müller, Vasileios Bontzorlos, Dagmar Clough, Peter Bezák, Aletta Bonn, Bernd Hansjürgens, Angela Lomba, Stefan Möckel, Gioele Passoni, Christian Schleyer, Jenny Schmidt, and Sebastian Lakner

Sustainability is repeatedly highlighted as a key challenge in the agricultural sector, both from socio-economic and environmental perspectives. The European Commission identified the CAP as relevant for addressing thirteen SDGs. Here we aimed at estimating the potential importance of the CAP to each of the 17 SDGs.

We defined the potential relevance of the CAP to each of the 17 SDG by considering the relevance of each SDG to agricultural areas and CAP's relevance and potential to address them. To achieve a comparative ranking across SDGs, we examined all 162 targets pertaining to all SDGs, using a Likert scale: 1=low, 2=moderate, 3=high and 4=very high. This was done separately by each author, based on their knowledge of the literature and expertise. Median ranks were estimated for each target and the values were then averaged across all targets in the respective SDG. The potential relevance of the CAP to the SDG was then classified as low, moderate, high and very high based on the distribution of the 25, 50 and 75 % percentiles of these averages.

We found a high to very high potential relevance of the CAP to attain eight SDGs. These SDGs are in order of CAP relevance: (i) SDG 2 "End hunger, achieve food security and improved nutrition and promote sustainable agriculture"; (ii) SDG 15 "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss"; (iii) SDG 12 "Ensure sustainable consumption and production patterns"; (iv) SDG 13 "Take urgent action to combat climate change and its impacts"; (v) SDG 6 "Ensure availability and sustainable management of water and sanitation for all"; (vi) SDG 11 "Make cities and human settlements inclusive, safe, resilient and sustainable"; (vii) SDG 8 "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all"; and (viii) SDG 16 "Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels".

Neither the current CAP design and implementation, nor the CAP post2020 proposal of the EU appropriately develops the CAP's potential for supporting the UN SDGs. Unlocking the CAP's potential for meeting public's demand on environment and sustainability may very well proven to be an effective way of spending taxpayers' money and regaining public acceptance.

Keywords: SDGs, sustainability, policy, CAP, biodiversity, ecosystem services

02/08 | 17h50
PARALLEL SYMPOSIA – SESSION X
Room 3.2.14/3.2.15
Symposium 23 - Linking agricultural policies to Sustainable Development Goals: a focus on biodiversity and ecosystem services provisioning

RETHINKING THE FUTURE OF THE SOCIOECOLOGICAL SYSTEMS UNDERLYING HIGH NATURE VALUE FARMLANDS

Lomba A

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Farmlands represent the largest terrestrial ecosystems in the Anthropocene. When managed under low-input farming systems, farmlands are associated with diverse cultural and natural heritage around the world. Known as high nature value farmlands (HNV farmlands) in Europe, these farmlands and their underlying farming systems evolved as tightly coupled socioecological systems, and are essential to biodiversity conservation and the delivery of ecosystem services to society. However, HNV farmlands are vulnerable to socioeconomic changes, leading to either agricultural intensification or land abandonment. Here, we use scenarios to envision alternative plausible futures for HNV farmlands and discuss the related management options and expected socioecological outcomes.

Departing from an overview of the socioecological pillars underlying the value of HNV farmlands and their delivery of multiple ecosystem services to wider society, examples of high nature value farmlands worldwide are presented. Then scenarios are used to envision alternative plausible futures for HNV farmlands and discuss their implications for land management and expected socioecological outcomes.

Finally, focusing on a future where HNV farmlands are embraced as promising 'Seeds of a Good Anthropocene', requirements to guide a paradigm shift towards socially, economically and ecologically viable HNV farmlands are presented and discussed. This research is a result from FARSYD project - 'FARming SYstems as tool to support policies for effective conservation and management of high nature value farmlanDs' (POCI-01-0145-FEDER-016664- PTDC/AAG-EC/5007/2014).

Keywords: agriculture, policy, CAP, biodiversity, ecosystem services, high nature value farmlands

02/08 | 17h50
PARALLEL SYMPOSIA – SESSION X
Room 3.2.16

Symposium 24 - Long-term ecological monitoring on islands

Chair
Paulo Borges

Presenters
Paulo Borges and Rosalina Gabriel

Presently, it is widely recognized that there is an ongoing “biodiversity crisis”, which means that ecosystems and species are not coping with the current drivers of local and global environmental changes. Habitat loss in islands has occurred through direct activity of humans, such as clearing of vegetation for wood/fuel, development including housing, industrial and infrastructure; and the intensity of these impacts is dependent on population density. Furthermore, the intentional and accidental introduction of non-native invasive species has led to habitat and microhabitat degradation throughout the islands. This has eventually led to severe habitat fragmentation bringing the problems of edge effects and the genetic isolation of species, particularly to those species with specific habitat requirements or poor dispersal ability. Knowing changes in species abundance and distribution (i.e. range-size contraction and expansion) is crucial for halting biodiversity loss on islands. Obtaining long-term key information on the distribution and abundance of island native species is of paramount importance, but extremely challenging, especially for invertebrates.

In this Symposium we will discuss the implementation of long-term coordinated survey and monitoring of native island biota.

02/08 | 17h50
PARALLEL SYMPOSIA – SESSION X
Room 3.2.16
Symposium 24 - Long-term ecological monitoring on islands

GLOBAL ISLAND MONITORING SCHEME (GIMS): A PROPOSAL FOR THE LONG-TERM COORDINATED SURVEY AND MONITORING OF NATIVE ISLAND FOREST BRYOPHYTES

Rosalina Gabriel[1], Claudine Ah-Peng, Michele Aleffi, Silvia Calvo-Aranda, Márcia C. M. Coelho, Débora Henriques, Raquel Hernández-Hernández, Helena Hespanhol, Jairo Patiño, Silvia Poponessi, Juana M. Gonzalez-Mancebo, Manuela Sim-Sim, Cecília Sérgio, Alain Vanderporten, Pedro Cardoso & Paulo A.V. Borges

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Bryophytes have a long evolutionary history, are an important component of terrestrial ecosystems and assume different functions related to a high number of ecosystem services. However, their inventory and monitoring are usually quite incomplete, thus their long-term change, and the associated impacts to ecosystems, are often neglected. Being able to obtain information regarding the distribution, abundance and ecological specificity of bryophytes is an important objective in conservation, furthermore in rich and complex ecosystems such as native forests in islands. The aim of this study is to present a methodology sensitive enough to assess forest bryophyte diversity, as well as simple enough to allow replication over time, in order to provide quantitative baselines for detecting changes within island ecosystems. The Global Island Monitoring Scheme (GIMS) includes BRYOLAT as an efficient protocol to both assess and monitor forest bryophytes. The methodology includes the collection of samples from six substrata (rock, soil, humus, organic matter, bark and leaves) over an elevation gradient, of 200 m step, inside three 2m x 2 m quadrats, placed in two 10 m x 10 m plots. Results from three Azorean Islands (Pico, Terceira and Flores) show that BRYOLAT is able to recover a high proportion of the bryophytes known to the Azores, on a small fraction of sampled land, providing valuable ecological information, needed for successful long-term management and conservation of natural resources.

Keywords: Inventory and monitoring; ecosystem services, BRYOLAT protocol; mosses; liverworts; hornworts

02/08 | 17h50
PARALLEL SYMPOSIA – SESSION X
Room 3.2.16
Symposium 24 - Long-term ecological monitoring on islands

GLOBAL ISLAND MONITORING SCHEME (GIMS): A PROPOSAL FOR THE LONG-TERM COORDINATED SURVEY AND MONITORING OF NATIVE ISLAND FOREST SPIDERS

Paulo A. V. Borges

Centre for Ecology, Evolution and Environmental Changes (cE3c) / Azorean Biodiversity Group, and Univ. dos Açores–Depto de Ciências e Engenharia do Ambiente, Angra do Heroísmo, Açores, Portugal

Presently, it is widely recognized that there is an ongoing “biodiversity crisis”, which means that ecosystems and species are not coping with the current drivers of local and global environmental changes. Obtaining long-term key information on the distribution and abundance of island native species is of paramount importance, but extremely challenging, especially for invertebrates. Three standardized protocols to sample spiders are described, namely, COBRA (Conservation Oriented Biodiversity Rapid Assessment), BALA (Biodiversity of Arthropods from the Laurisilva of Azores) and SLAM (Sea, Land, and Air Malaise), and the compatibility of them to describe the diversity and the relative abundance of species are investigated. The Hill series diversity indices and the relative species abundances were calculated for nine forest sites sampled with the three protocols, and a Spearman correlative analysis was performed. The three methods yielded highly similar interpretation trends between response metrics related with species relative abundances but performed very differently when using species richness at the local site level. We propose the use of BALA or COBRA for species inventory and COBRA-Monitoring and/or SLAM for the long-term monitoring of sites. The results obtained show that if only the relative abundance of species are needed any of the three protocols can be used for long-term monitoring of forest sites in Azores and possibly in similar island forest ecosystems in Macaronesia.

Keywords: COBRA protocol; BALA protocol; SLAM protocol; Inventory and monitoring; spiders

POSTER LIST

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 1 (EEF2019-13645) - AEDES AEGYPTI: ENVIRONMENTAL INSPECTION FOR PROMOTING A SAFE WORK ENVIRONMENT IN AN OIL INDUSTRY IN BAHIA, BRAZIL

Lilian Monteiro Ferrari Viterbo (Portugal)[2]; André Santana Costa (Brazil)[1]; Diogo Guedes Vidal (Portugal)[2]; Maria Alzira Pimenta Dinis (Portugal)[2]

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Objectives: Environmental health demands multidisciplinary actions. This study relates environmental inspections to control Aedes Aegypti, the main vector for dengue, proliferation in the work environment of an oil industry in Bahia, Brazil, during 2018. Methods: Inspection technology was used to identify environmental and occupational risk factors, on a scale of 0 to 4, i.e., 0 - sites with vector-born diseases (VBD) proliferation, 1 - Suitable sites for VBD proliferation (high vegetation, accumulation of water or larvae presence) 2 - Disorganized areas and/or presence of disused or unfamiliar to the environment objects, 3 - Clean, organized areas without water accumulation, free of disused or unfamiliar to the environment objects and without sites favourable for VBD proliferation and 4 - Same as in 3, but monthly schedule of inspections. Semi-annual inspections at 66 workplaces were carried out by environmental health specialists (M = 2 h). Results: For the first and second semesters results were, respectively: indexes 0 - 32 % and 24 %, 1 - 65 % and 72 %, 2 – 2 %, 3 - 2 % and 4 - 0 %. Collective actions were carried out to treat the identified risks, namely the elimination of containers with water or larvae presence and worker awareness campaigns. The number of sites with larvae was reduced in 70.5 %. Conclusions: Preliminary results of assessments show that investing in actions to identify environmental risks in the work context has positive effects on workers' health, with the development of healthy environmental practices, contributing to global well-being.

Keywords: Environmental inspection, Vector-borne diseases, Work environment, Oil industry, Aedes aegypti

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 2 (EEF2019-13721) - MICROBIOLOGICAL PREPARATIONS FOR REDUCING RISKS OF PATHOLOGIES INDUCED BY IONIZING RADIATION

Natallia Tsimokhina (Belarus)[1]; Aleksander Nikitin (Belarus)[1]; Daniil Petrenyov (Belarus)[1]; Aliaksandr Kazlou (Belarus)[1]

1 - Institute of Radiobiology of the National Academy of Sciences of Belarus

The investigation included analysis the accumulation of the caesium-137 in a body and its excretion, studying the state of oxidative stress defense system in blood, condition of mucosa in the small intestine of rats which ingest contaminated with artificial radioisotopes feed on the background of administration of microbiological preparations.

Six-months-old laboratory rats were split into four groups. The first group was fed with uncontaminated food whole time. The other groups were gotten a feed with a high content of radioactive caesium and other artificial radioisotopes for 60 days; then for seven days, they obtained clean feed. The second group received EM-1 in addition to the food, the third group received EMX-Gold, and the fourth group received no additional products.

We analyzed a series of biochemical indicators of the animals' state, biokinetic parameters, and morphological changes in intestinal tissue.

We discovered that the addition into the diet of male rats microbiological preparations reduces cesium half-life time at 16–19%, but the differences with control are valid only at significance level 0.15. We also found, that EM has no adverse effect on intact small intestine and decrease intensity of inflammation processes in the mucous membrane of the small intestine, number of apoptotic bodies and aberrant mitosis. EM products increase antioxidative molecular protection and reduce oxidative damage of cells under long-term ingestion of food contaminated by radionuclides.

Thus, EM-1 and EMX-Gold increase speed of radioactive cesium elimination from an organism and can reduce the adverse effects of internal exposure to radiation from caesium-137.

Keywords: radioisotopes, microbiological preparation, oxidative stress

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 3 (EEF2019-13722) - EFFECT OF SULPHUR DIOXIDE AND GAMMA IRRADIATION ON THE INDUCTION OF ADENOMAS AND MORPHOFUNCTIONAL STATE OF ALVEOLAR MACROPHAGES

Alena Kadukova (Belarus)[1]; Svietlana Sushko (Belarus)[1]

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The aim of study was to assess the influence of separate and combined effect of gamma radiation and sulphur dioxide on the induction of lung adenomas and the modification of alveolar macrophage population in the *A/f* mouse; and to study the influence of the water soluble extracts of *Basidiomycetes* on the development of tumor process in the mice lung.

Methods: cytological, morphological and immunological.

A model of lung cancer in *A/f* mice is widely used in assessing the carcinogenic risk of environmental factors.

Our results show that the gamma irradiation enhances the processes of the tumor formations in the lungs of *A/f* mice.

We examined the effects of the inhalation of a sulphur oxide alone and in combination with irradiation (0.1-1.0 Gy total dose) on the morphofunctional characteristics of the alveolar macrophages population of A/f mice. It was shown that irradiation at doses of 0.1 and 1.0 Gy affect the functional activity of alveolar macrophages: the phagocyte activity decreases with respect to *Staphylococcus* aureus and increases with respect to latex particles on the 15th and 30th days after irradiation (the cells with characteristics of M2-type begin to predominate in the macrophage population).

Our data also indicated that the use of aqua extracts of *Flammulina velutipes* (Curt.:Fr.) and *Auricularia auricular-judae* (Bull.) decreases the occurrence of spontaneous and irradiation induced lung adenomas from mice.

Inhalation of sulphur dioxide changed the morphfunctional activity of the alveolar macrophages and adenomas formation of *A/f* mice on the action of gamma radiation.

Keywords: Adenomas, Macrophages, Irradiation, Sulphure dioxide, Extracts of Basidiomycetes

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 4 (EEF2019-13727) - INFLUENCE OF SODIUM NITRATE IN COMBINATION WITH THE MAGNETIC FIELD ON THE MORPHOFUNCTIONAL STATE OF MALE RATS REPRODUCTIVE SYSTEM

Alena Shubianok (Belarus)[1]; Natallia Chuyashova (Belarus)[1]

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We studied the reproductive system of male rats exposed to the magnetic field of industrial frequency (MF IF 50 Hz) and the inclusion in the diet of NaNO3 (6,75 mg/kg) both in isolation and in combination.

On the 1st and 30th day after termination of effects were studied the mass indices of testes, epididymis and seminal vesicles, the number of spermatogenic cells in the testis tissue, as well as the number of epididymal sperm and their viability.

Moderate changes have been established in the absolute and relative weight of testes, epididymis and seminal vesicles. The effect of experimental factors caused an imbalance in the distribution of spermatogenic cells of the different populations. Analysis of the number and viability of epididymal sperm showed a decrease in the studied parameters in all experimental groups. The combined effect of MF IF and the inclusion in the diet of NaNO3 cause similar changes to those found in the group of use only xenobiotic.

In the remote period (30th day) a partial restoration of the functioning of the spermatogenic epithelium, the viability of the epididymal spermatozoa, and to a greater extent their number.

The revealed changes in the reproductive system of male rats indicate significant effects of long-term exposure to MF IF and admission to the body NaNO3, which can negatively affect the fertility of animals.

Keywords: nitrates, electromagnetic field industrial frequency, reproductive system, male rats

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 5 (EEF2019-13728) - CONSEQUENCES OF LONG-TERM INFLUENCE OF ELECTROMAGNETIC RADIATION FROM MOBILE TELEPHONE (1745 MHZ) IN GENERATION OF THE MALE RATS

Natallia Chuyashova (Belarus)[1]; Raman Novikau (Belarus)[1]

1 - Institute of Radiobiology of the National Academy of Sciences of Belarus

In experiment established the long-term effects of low-intensity electromagnetic radiation from a mobile phone (EMR MP 1745 MHz, x_{pd}=7,5±0,3 μW/cm2) in the offspring of male rats from parents, one of which was either subjected to prolonged exposure investigated factor.

A change in the sex ratio of the born offspring and a decrease in their body weight has been established. Analysis of the reproductive system of the offspring of males when they reached the age of 2 and 4 months, revealed significant impairments, with the most pronounced changes found in the offspring obtained from both irradiated parents or when only the male was irradiated. These changes are manifested in the disruption of the normal functioning of the spermatogenic epithelium, namely, an intensification of the initial stage of spermatogenesis is noted, with significant inhibition at the stage of spermatid transformation. A decrease in the number of mature germ cells - spermatozoa and a pronounced deterioration of their viability. A change in the synthesis of steroid hormones, namely glucocorticoid and testosterone, was found. Observed an increase in the content corticosterone content in serum blood in male rats aged 2 months in all studied groups, which indicates the body's stress response, and the decrease in its concentration in 4-month-old animals, on the contrary, indicates the onset of the next stage of the adaptation syndrome, exhaustion. The increased secretion of testosterone, expressed in the offspring at the age of 4 months, was established.

The revealed violations indicate the transgeneration effect of exposure to EMR from MP.

Keywords: electromagnetic radiation (EMR), mobile phone (MP), spermatogenesis, testosterone, corticosterone

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 6 (EEF2019-13729) - EFFECTS OF PROLONGED EXPOSURE TO ELECTROMAGNETIC RADIATION FROM A MOBILE PHONE ON MALE RATS WISTAR

Raman Novikau (Belarus)[1]; Natallia Chuyashova (Belarus)[1]; Alena Shubianok (Belarus)[1]

1 - Institute of Radiobiology of National Academy of Sciences of Belarus

Due to the widespread use of mobile radio sources,actual is the study of the effects of this type of electromagnetic radiation on the body.The purpose of our study was to study the influences of theelectromagnetic radiation from a mobile phone(EMR MP 1745 MHz, x_{pd}=7,5±0,3 μW/cm2)on the morphofunctional state and endocrine status of male rats Wistar. Irradiation was performed 8 h / day for 90 days. The initial age of the animals is 52 days.

At the after of exposure,was held an analysis of the state of the reproductive system and in the serum, determined the level of steroid hormones.

Condition analysis of the reproductive system of experimental animals revealed significant impairments to its morphofunctional state. Inhibition of the spermatogenesis process, assessed by a decrease in the number of spermatids, has been established, which has affected the production of mature germ cells. A significant increase in the apoptotic forms of spermatozoa and a decrease in their viability was found. Revealed a statistically significant decrease in the synthesis and secretion of testosterone and a tendency to decrease the level of glucocorticoids in blood serum.

Thus, the complex of identified disorders in the morphofunctional state of the reproductive system and the synthesis of glucocorticoids in male rats indicates the inhibition of the germinative function under the influence of low-intensity EMR from MP, which may be a factor affecting the decrease in male fertility.

Keywords: electromagnetic radiation (EMR), mobile phone (MP), spermatogenesis, testosterone, corticosterone

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 7 (EEF2019-13616) - EVALUATION OF AQUATIC ENVIRONMENTS AND USE OF FISH AS BIOINDICATORS IN THE IVINHEMA RIVER FLOODPLAINS STATE PARK, BRAZIL

Silvana Santos (Brazil)[1]; Lucilene Viana (Brazil)[2]; Bruno Crispim (Brazil)[3]; Claudia Cardoso (Brazil)[1]; Sidnei Lima-Junior (Brazil)[1]

1 - Universidade Estadual de Mato Grosso do Sul;
2 - Universidade Federal do Amapá;
3 - Universidade Federal da Grande Dourados

Objectives: To analyze the environmental conditions of the Ivinhema River Floodplains State Park (PEVRI, Brazil) using fish as bioindicators of environmental quality. Methods: The concentrations of metals (Cd, Pb, Cr, Cu, Fe, and Zn) in water and river sediment and genotoxic effects on Pterodoras granulosus and Prochilodus lineatus were analyzed. The results obtained in this Conservation Unit for these two species were compared with the results of a study carried out in the Amambai River (MS, Brazil), in an area subject to human impacts. Results: We observed lower concentrations of metals in water and sediment in samples from the PEVRI compared to samples from the Amambai River ($p<0.05$). The muscle tissue of P. granulosus presented lower concentration of metals in the PEVRI ($p<0.05$). Muscle and hepatic tissue samples from P. lineatus also had lower concentrations of metals (except for cadmium in musculature) in the PEVRI ($p<0.05$). The species collected in the PEVRI did not present micronuclei occurrence. In addition, P. lineatus presented a lower index of cellular alterations in the PEVRI samples. Conclusions: It is possible to conclude that, in the Ivinhema River Floodplains State Park, the species analyzed had a lower presence of accumulated metals and a lower frequency of genotoxic biomarkers in relation to the area subject to the anthropogenic effects. However, some signs of contamination of the aquatic ecosystem of this Conservation Unit should be considered, such as the high concentration of cadmium observed in the musculature of one of the analyzed species.

Keywords: Conservation Units, Contamination, Genotoxicity, Metals

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 8 (EEF2019-13826) - AFRICAN CLAWED FROG (XENOPUS LAEVIS) AS VECTOR OF RANAVIRUS FOR NATIVE FISHES AND AMPHIBIANS

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3 - Centre for Interdisciplinary Research in Animal Health (CIISA), Faculdade de Medicina Veterinária, Universidade de Lisboa, Portugal

The African clawed frog, *Xenopus laevis* (Daudin, 1802) is an invasive species in Oeiras, Portugal. The species is known for preying on native species and for acting as a source of parasites and pathogens, as *Ranavirus*.

This project aimed to assess the role of *Xenopus* as vector of *Ranavirus* for native species in Oeiras, where this invader is being submitted to an eradication program. Our goals were to: 1) detect trends of *Ranavirus* prevalence with the *Xenopus* population decrease; 2) assess if *Ranavirus* is being transmitted to native amphibian *Pelophylax perezi* and to the critically endangered fish *Iberochondrostoma lusitanicum*.

Samples were collected from *X. laevis* (liver) captured in different years (2012-2018). Additionally, in 2018 we sampled frogs (toe-clips) and fishes (mouth swabs and fin tissue). All samples were screened for the presence of *Ranavirus* DNA through qPCR.

Ranavirus was detected in *Xenopus* every year, never reaching the 20% prevalence and not showing a real trend overtime. The infection levels were also very low, suggesting that *Xenopus* may not be playing a key role in the maintenance of *Ranavirus* in the system, and that another species may be the source of this pathogen. This is supported by the fact that *Ranavirus* was detected in *I. lusitanicum* from a site never invaded by *X. laevis*. Additionally, the prevalence in this fish was close to 50%, whereas *P. perezi* was 29%. Overall, our results suggest that co-evolution may have occurred between native species and the strain of *Ranavirus* circulating in the system.

Keywords: Pathogens, Invasive species, *Xenopus laevis*, *Iberochondrostoma lusitanicum*, *Pelophylax perezi*

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO - 9 (EEF2019-13879) - ANALYSIS OF VIRAL FEASIBILITY AND PHYSICAL-CHEMICAL PARAMETERS OF THE SEDIMENT OF THE MARGINS OF RIO CAÍ, SOUTHERN BRAZIL

Sabrina Almeida (Brazil)[1]; Rodrigo Staggmeier (Brazil)[1]; Tatiana Heck (Brazil)[1]; Brenda Viegas (Brazil)[1]; Rute Ritzel (Brazil)[1]

1 - Feevale University

The intense urbanization and lack of planning of the cities resulted in strong environmental impacts, mainly in water resources. The forms of pollution are diverse, but the specific problem of the metropolitan regions occurs through the inadequate disposal of domestic sewage and industrial waste. Microorganisms have been considered good bioindicators of environmental quality. Among them are Adenoviruses, which cause gastroenteritis in mammals through fecal-oral contagion, as well as several other complications. These viruses are waterborne, can accumulate in the sediment, and are extremely resistant to the gastrointestinal tract and the environment. The present study aims to evaluate the feasibility of the physical and chemical parameters of the superficial sediment in the low part of the Caí River Watershed (BHRC), evaluating a possible association with the abiotic factors. Viral detection collections occurred quarterly between June 2016 and March 2017, and the physico-chemical parameters during the month of September 2017. Of the 40 samples analyzed, 25% revealed the presence of HAdV and 15% demonstrate infectious potential for BAdV. The results of the physical-chemical parameters are mostly within the boundaries of the current legislation, highlighting the point P10, which has a high lead content. Within this historic, the physical-chemical profile and the biological analyzes, it was not possible to associate the pollution factors as interfering in the viral viability. However, the results show anthropic impact in the BHRC sediment, due to the lack of effluent treatment, which has an intrinsic relation in human and planetary health.

Keywords: Sediment, Viral viability, Adenovirus

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 10 (EEF2019-14109) - USING A MULTIMETRIC MACROINVERTEBRATE INDEX FOR ECOLOGICAL ASSESSMENT OF COASTAL LAKES ABOUT DIFFERENT LEVEL CONNECTIVITY WITH SEA

Martyna Bąkowska (Poland)[1]; Krystian Obolewski (Poland)[1]

1 - Department of Hydrobiology, Kaziemierz Wielki University in Bydgoszcz

The research applied a multimeter index (Lake Macroinvertebrate Index - LMI) to assess the ecological quality of Polish coastal lakes of the southern Baltic based on ecological quality (EQR), in accordance with the requirements of the Water Framework Directive. Benthic macroinvertebrates inhabiting the eulittoral and sublittoral/profundal zones were sampled for two years from 10 lakes along the entire length of the Polish coast. Additionally, the level of 18 environmental parameters was assessed, and on their basis 4 trophic indexes (TSI) were calculated for each lake. The hindcasting approach was used to establish reference conditions after minimizing human pressure. A pool of 5 candidate metrics representing diversity / wealth, sensitivity, functional features and taxonomic composition have been tested for the development of a multimetric index. Spearman's rank correlation identified six environmental parameters (lake area, mean depth, visibility, oxygen concentration and conductivity) and three human pressures (total phosphorus, nitrite nitrogen and coastal structure), which were gradually increased linear regressions against each biological metrics for the pressure-response relationship. Finally, three metrics, the number of taxa and the Shannon diversity index in the littoral and sublittoral zones and the relative share of the Chironomidae family (%) were selected as the most suitable, corresponding to eutrophication (expressed as total phosphorus and land cover in a natural way). The LMI multimeter index was the average EQR of its component metrics with a five-class ecological status system. This method assessment can be used in other lakes and coastal lagoons with different connetted level wit sea.

This study was supported by the Polish Minister of Science and Higher Education, under the program "Regional Initiative of Excellence" in 2019 - 2022 (grant No. 008/RID/2018/19).

Keywords: Water Framework Directive (WFD), Anthroporession, Benthic macroinvertebrate metrics, Hindcasting approach, Coastal ecosystems

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 11 (EEF2019-13735) - CAN A COMMON AGROCHEMICAL FUNGICIDE ALTER THE OUTCOME OF HOST-PARASITE RELATIONSHIP?

Cláudia Machado (Portugal)[1,2]; Fernanda Cássio (Portugal)[1,2]; Justyna Wolinska (Germany)[3,4]; Bruno Castro (Portugal)[1,2]

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2 - Institute of Science and Innovation for Bio-Sustainability (IB-S), University of Minho;
3 - Department of Ecosystem Research, Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB);
4 - Department of Biology, Chemistry, Pharmacy, Institute of Biology, Freie Universität Berlin

Parasites constitute important ecological and evolutionary drivers of host populations. However, both host and parasite are commonly exposed to anthropogenic contamination, which can influence disease and its spread; this pollutant x disease interplay is still poorly understood, and research is needed to improve ecosystem protection. We used an aquatic host-parasite model (Daphnia magna × Metschnikowia bicuspidata) to evaluate the effects of a widely used agrochemical fungicide, myclobutanil, on host and parasite responses, as well as on parasite prevalence. First, the effects of exposing D. magna to the fungicide were evaluated in the presence or absence of the parasite. Myclobutanil was not toxic to Daphnia between 25-200 µg/L, whereas the parasite drastically reduced life expectancy, reproductive performance and population growth rate of Daphnia. Most importantly, a clear interaction was observed between fungicide concentration and the presence of the parasite, translated in the complete suppression of infection signs from 50 µg/L upwards. This disease-suppression effect was further studied in a follow-up experiment, where the influence of exposure time (continuous, early and later application of myclobutanil) at various concentrations (≤ 50 µg/L) was tested. Results confirmed the anti-parasitic action of myclobutanil, which was highly dependent on the timing of application. The presence of myclobutanil in the most advanced phase of the infection was determinant in the interference on the sporulation of M. bicuspidata and consequent spread of transmission stages. This study showed that a common fungicide can interfere with disease spread in natural populations, although the potential ecological consequences are still unknown.

Keywords: myclobutanil, Daphnia magna × Metschnikowia bicuspidata model, disease × pollution interaction, non-target fungi

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 12 (EEF2019-13755) - ECOTOXICOLOGICAL EVALUATION OF FUNGICIDES USED IN VITICULTURE IN NON-TARGET MICROORGANISMS

Maria Da Conceição Paiva Marinho (Portugal)[1]; Bárbara Diogo (Portugal)[1]; Olga Maria Lage (Portugal)[1]; Sara Antunes (Portugal)[1]

1 - CIIMAR/FCUP

The use of fungicides poses a risk to the environment, especially if residues persist in soil or are transported to waterbodies. If this occurs, it can cause adverse effects to the health of terrestrial and aquatic ecosystems. The mode of action of fungicides is diverse and some of them are dangerous to human health and environmental non-target organisms. Understanding the effects of fungicides on these organisms is fundamental for assessing potential impacts on ecosystems. The objective of this study is to evaluate the toxicity of three fungicides (Myclobutanil, Cymoxanil and Azoxystrobin) on the bacteria Rhodopirellula rubra, Arthrobacter sp. and Pseudomonas putida, on the microalgae Raphidocelis subcapitata and on the floating plant Lemna minor. Toxicity evaluation of each fungicide was performed by an acute cell viability assay in the bacteria, 72 h growth inhibition test in R. subcapitata and 7 days growth inhibition test in L. minor. For Azoxystrobin no effect was observed in the bacteria. However, in R. rubra a decrease in cell viability was recorded after longer exposure times. As comparable results were obtained just after exposure to the Azoxystrobin solvent (acetone), the effect observed was due to this solvent. Significant growth inhibitions were recorded for R. subcapitata (EC50 = 0.063 mg/L Azoxystrobin; CI 95%: 0.050 – 0.077) and for L. minor (EC50 = 3.18 mg/L Azoxystrobin; CI 95%: 1.395 – 4.958). Comparable assays are being performed for the other fungicides. As fungicides are designed against eukaryotic species, the here presented results confirm the absence of sensibility of prokaryotes.

Keywords: Myclobutanil, Cymoxanil, Azoxystrobin, Non-target organisms, Fungicides

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

P0 – 13 (EEF2019-13768) - ECOSYSTEM SERVICES OF DITCHES ECOSYSTEMS

Ivana Kozelová (Slovakia)[1]

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Our study focuses on assessment of potential of water ditches and their catchment area to provide ecosystem services (ES). As areas of interest, we have chosen the ditches on the Podunajská nížina lowland and Východoslovenská nížina lowland, as construction of ditches affected these regions the most. However, there are notable differences between these two selected lowlands due to different soil quality, intensity of agriculture, structure of land use elements etc. Hence, there are also differences in their potential to provide various ES. Based on re-evaluation of present state of ditches we evaluated nine ES related to three main groups of ES using the Common International Classification of Ecosystem Services (CICES): Provisioning, Regulation & Maintenance and Cultural. We assessed the potential of ditches to provide ES by evaluation of landscape indicators that currently affect the use of ES either positively or negatively. We also evaluated these indicators spatially by using GIS software ILWIS 3.72. Finally, we compared potential of study areas between each other. For example, study area on Východoslovenská nížina lowland has the highest potential to provide ES Lifecycle maintenance, habitat and gene pool protection. On the contrary, it has the lowest potential for providing ES Biomass provisionin – Cultivated crops. Study area on Podunajská nížina lowland has the highest potential to provide ES Surface water for non-drinking purposes and the lowest potential to provide ES Biomass provisioning - Wild plants and their outputs.

Keywords: ILWIS, CICES, Ecosystem Services, Lowland, Water ditches

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 14 (EEF2019-13792) - ECOSYSTEM SERVICES RESEARCH IN PORTUGAL – ARE WE ON THE RIGHT TRACK?

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A detailed overview of ecosystem services studies can be very useful for evaluating the knowledge status of a wide range of ecological benefits for human well-being. Given the increasing research attention in the recent years, we aimed to assess the scientific contribution of ecosystem services research in Portugal, using a systematic review approach.

We applied research attention indexes from three global scientific databases (Web of Science, Scopus and Wiley Online Library). We selected papers including the terms “Ecosystem Services” and “Portugal” in their title, abstract or keywords. For each study, we identified the year of publication, the authors’ nationalities and the research topics. We calculated the number of published papers by the number of subject areas from each region, following the Portuguese nomenclature of territorial units for statistics (NUTS).

We found 136 papers published between 2005 to 2019 from over 30 country affiliations. The attention indexes showed that Environmental Science was the subject area with most of the research attention (~70%). We mapped many spatial differences in the allocation of research efforts among land-use covers, ecosystem service categories and geographic regions, highlighting the main scientific gaps for further studies on ecosystem services in Portugal.

According to peer-reviewed literature, our findings introduce the current knowledge status on the ecosystem services studies in Portugal. New efforts for framing ecosystem-based approaches with stakeholders’ participation are key to support conservation policies at regional and national scales

Acknowledgements
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Keywords: Ecosystem services, Geographical Information Systems, peer-reviewed literature, attention indexes, research trends

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 15 (EEF2019-14130) - NICHE SHIFTS OF AN INVASIVE PREDATOR OF NATIVE BEES: CONTRASTING PATTERNS FROM THE TWO EUROPEAN INVASION FRONTS

Luísa Gigante Carvalheiro (Portugal)[1,2]; Maria João Verdasca (Portugal)[2]; Quentin Rome (France)[3,4]; Sébastien J. Puechmaille (France)[5,6,7]; Rui Rebelo (Portugal)[2]; Hugo Rebelo (Portugal)[8,9]

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5 - Zoological Institute and Museum, University of Greifswald;
6 - School of Biology and Environmental Sciences, University College Dublin;
7 - ISEM, Univ Montpellier, CNRS, EPHE, IRD, Montpellier;
8 - CIBIO/InBIO, University of Porto, Campus Agrário Vairão;
9 - CEABN/InBIO, Universidade de Lisboa

1. The accuracy of predictions of invasive species ranges is dependent on niche similarity between invasive and native populations and on our ability to identify the niche characteristics. With this work we aimed to compare the niche dynamics of two invasive populations of *Vespa velutina*, one in central Europe and another one in the north-western Iberian Peninsula, and to identify uninvaded regions susceptible to invasion.

2. Niche dynamics and shifts of *V. velutina* were assessed by comparing the environmental niches of the native and of the two invasive populations, using climatic, topographic and land use variables. We also run reciprocal distribution models using records from both native and invasive ranges to compare model predictions and estimate which regions are at a greater risk of being invaded.

3. A niche shift was detected, especially in the population of the NW of Iberian Peninsula, where the species is living under environmental conditions different from the native niche. In central Europe, large suitable areas remain unoccupied. Surprisingly, such areas have more similar environmental conditions to the hornet's native range than the currently invaded regions.

4. The fact that both invasive populations are well established, despite being in environmentally distinct regions, indicates that *V. velutina* has a high capacity to successfully invade different environmental envelops from those existing in its native range. With no clear abiotic barriers identified, this invasive process seems to be more a question of time than of other ecological contingencies, until new regions in Europe are invaded.

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 1 - Environmental risks and health

PO – 16 (EEF2019-13720) - EFFECTS OF MOWING AND GLYPHOSATE APPLICATION ON THE COMMUNITY STRUCTURE OF SOIL ORGANISM (COLLEMBOLA)

June Wee (Korea, Republic of)[1]; Yun-Sik Lee (Korea, Republic of)[1]; Jinsol Hong (Korea, Republic of)[1]; Yongeun Kim (Korea, Republic of)[1]; Minyoung Lee (Korea, Republic of)[1]; Kijong Cho (Korea, Republic of)[1]

1 - Korea University

Glyphosate is the most widely used herbicide because of its broad-spectrum activity and effectiveness, however, little is known about adverse effects on non-target species and especially their community structure. Therefore, in this study, we investigated the effects of mowing and glyphosate application on the community structure of soil invertebrates (Collembola).

The study sites are located at the Deokso Korea University Farm (N 37° 34' 56'', E 127° 14' 8'') and Jinju Gyeongsang National University Farm (N 35° 06' 28'', E 128° 07' 09''). In 2016, for setting up the experiments, 12 plots (3 × 3 m) were established. The plots consist of 4 treatments (control, mowing, 2 mg/kg of glyphosate and 5 mg/kg of glyphosate) in 3 replicates. In April, July and October 2016, glyphosate-based herbicide was sprayed on each plot and mowing was carried out. For analyzing the community structure of Collembola, three soil core (diameter: 10 cm, depth: 10 cm) were taken. In the laboratory, Collembola were extracted using Tullgren funnel and then individuals collected in alcohol were counted and identified following identification keys.

A total of 952 (13 species) and 3505 (16 species) collembolans were identified in Deokso and Jinju, respectively. Mowing and glyphosate application affected the community structure (Diversity index and dominant species) and abundance of Collembola, but the change with sampling time was greater. This result showed that the community structure of Collembola can change even at a low concentration of glyphosate and also more study on environmental factors was needed.

Keywords: herbicide, field, ecotoxicology, soil, Diversity

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 2 - Science communication

PO – 1 (EEF2019-13585) - FOREST GIANTS: A STORY TO BE TOLD

Martina Panisi (Italy)[2]; Gabriel Oquiongo (Sao Tome and Principe)[3]; Catarina Narciso (Portugal)[1]; Vasco Pissarra (Portugal)[4]; Wilson Vieira (Portugal)[1]; Beatriz Narciso (Portugal)[5]

1 - Faculty of Sciences, University of Lisbon (FCUL);
2 - Centre for Ecology Evolution and Environmental Changes (Ce3C);
3 - Associação Monte Pico;
4 - MARE - Marine and Environmental Sciences Centre;
5 - Escola Secundária António Arroio

Forest Giants is a conservation project for the protection of the threatened endemic African giant land snail, the Obô Snail, which is rapidly declining in Sao Tome and Principe. With this project we want to highlight the importance and impact of research storytelling to bring attention to new conservation projects in the search for audience, interest and most importantly potential funding. Based upon the research of a master thesis and using modern storytelling tools – such as 1) photography, 2) video, 3) animation and 4) social media – together with interactive school lectures and debates among communities we developed a project that already has a) positive feedback from communities and schools b) international exposure c) interest from local and international media, and d) local and international partnerships with governamental institutions, NGO's and private enterprises. Hereby, we highlight the importance of storytelling to leverage the impact of conservation projects.

Keywords: Storytelling, Conservation, Science Communication, Land Snail

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 2 - Science communication

PO – 2 (EEF2019-13586) - USING SCIENCE-BASED DIALOGUE TO LINK SCIENCE AND ACTION

Alice Brites (Brazil)[1]; Gerd Sparovek (Brazil)[1]; Jean Paul Metzger (Brazil)[1]; Ricardo Rodrigues (Brazil)[1]; Paulo Tavares (Brazil)[1]; Kaline De Mello (Brazil)[1]; Paulo Mollin (Brazil)[2]

1 - University of São Paulo;
2 - University of São Carlos

Linking science and practice is crucial to develop effective environmental policies, but successful initiatives depend on overcoming diverse challenges, a process which is rarely documented. Here we present key-lessons to deal with those challenges resulting from an intense and fruitful accomplishment of a science-based stakeholder dialogue process developed for the implementation of an environmental law in Brazil. First, it is important that projects focused on the interface between science and policy have, since its beginning, a flexible research agenda and include an extensive range of stakeholders. Second, successive interactions pursuing to embrace conflict can help to build up a forthright dialogue between stakeholders. Third, building a network for data gathering and analysis can provide access to information and speeds up the usual academic research time, making possible to follow the political time of a policy establishment. Fourth, seeking the most precise and decision-making oriented information can help to improve acceptance and usage of scientific data in policy implementation. Finally, flexible researchers and funders are key elements to the success of such initiatives. Researchers need to move between the science-policy interface and feel comfortable to work with data that are not necessarily a scientific novelty. In turn, funders need to rethink their agenda, welcoming a more adaptative way of working and fostering alliances between multiple sectors. The lessons learned and reported here may help to understand these processes of co-production shedding light on what works within each context, bringing science closer to public policies and promoting better strategies for environmental conservation.

Keywords: Science-practice gap, Co-research process, Stakeholder dialogue, Enviromental conservation, Public policy

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 2 - Science communication

PO – 3 (EEF2019-13612) - HOW CITIZEN COLLECTED DATA ON ROAD-KILLED ANIMALS CAN CONTRIBUTE TO THE SDGS

Florian Heigl (Austria)[1]; Daniel Dörler (Austria)[1]

1 - University of Natural Resources and Life Sciences Vienna

Roads are fragmenting landscapes and habitats globally. In Austria alone, more than 100.000 km of roads are dissecting the country. These roads are a great challenge for many migrating animals. In Austria every 7 minutes a huntable animal is killed on a road. In 2015, more than 77.000 huntable animals were killed. Since no statistics exist that also include non-huntable animals, we currently don't know the influence of such roadkills on non-huntable wildlife. Several studies conclude that roadkills can have a significant effect on populations, especially of protected species.

Project Roadkill (www.roadkill.at/en) was founded in 2014 and collects data on road-killed vertebrates in collaboration with the public in a so-called citizen science project. Citizen science can be defined as the involvement of people outside formalized academia in scientific research. Participants report road-killed animals via smartphone apps or an online webform. The project's vision is to identify roadkill hotspots and to mitigate these hotspots together with NGOs and public authorities.

By collecting data on road-killed vertebrate species in general and species listed in the IUCN Red List in particular, and by forwarding such data to public authorities project Roadkill can contribute to the indicator of United Nations Sustainable Development Goal 15.5 and to SDG 15.9.

With the poster, we aim to present scientific results from the ongoing project, results from cooperations with NGOs and specific ways how the Roadkill project will contribute to reaching the SDGs.

Keywords: citizen science, road ecology, wildlife vehicle collisions

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 2 - Science communication

PO – 4 (EEF2019-13614) - IDENTIFICATION OF FACTORS INFLUENCING SLUG ABUNDANCES IN GARDENS BY USING A CITIZEN SCIENCE APPROACH

Daniel Dörler (Austria)[1]; Matthias Kropf (Austria)[1]; Gregor Laaha (Austria)[1]; Johann Zaller (Austria)[1]

1 - University of Natural Resources and Life Sciences, Vienna

Citizen science, the involvement of laypeople in academic research, has been shown to be a suitable method for detecting and monitoring invasive species. However, many public authorities all over Europe are still skeptical about data generated in citizen science projects, although this method offers the possibility to collect data from areas with very limited access for research: private gardens. Especially for slugs private gardens can be an important habitat. In our project we tested a citizen science approach for the first time in Austria to assess the occurrence of Arionid species in gardens in correlation with meteorological (air temperature, precipitation, global solar radiation, relative humidity) and ecological (plant diversity, earthworm activity) factors. In total, 1061 data sets from gardens from all Austrian provinces were collected over two years. The factors air temperature in spring, number of frost days in the previous winter and mean daily global solar radiation negatively affected slug numbers. Precipitation, plant diversity and earthworm activity were positively related to slug abundance in gardens. To compare the occurrence between the similar-looking native slug *A. rufus* with the invasive slug *A. vulgaris* we used a DNA-barcoding approach to analyse slug samples collected in 2014. We found that 92% of the analysed slugs belonged to *A. vulgaris* and that the native *A. rufus* could not be detected. We conclude that citizen science can be a suitable method to assess slug abundance in gardens over a wide geographical range.

Keywords: *Arion vulgaris*, *Arion lusitanicus*, Participation, Neobiota, Weather

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 2 - Science communication

PO – 5 (EEF2019-13642) - SEEKING DYNAMIC PREDICTIONS OF VESPA VELUTINA EXPANSION IN EUROPE: CALL FOR DATA

Carola Gómez-Rodríguez (Spain)[1]; A. Márcia Barbosa (Portugal)[2]; Andres Baselga (Spain)[1]

1 - University of Santiago de Compostela;
2 - none

Vespa velutina, a major predator of bees and other pollinators, was accidentally introduced into Europe and is posing a serious threat to biodiversity in this continent. Starting in May 2019, the project "Conservation of Atlantic pollination services and control of the invasive species *Vespa velutina*" (Atlantic-POSitiVE, Funded by European Union: Interreg-Atlantic) is an international effort seeking solutions to the impact and spread of *V. velutina* in Europe. Within this project, we aim to build dynamic predictive models of the invasive potential of this species, taking into account both its ecological requirements and dispersal. This will allow updating risk areas on a year-to-year basis, taking into account habitat suitability and the proximity to previously invaded areas. Occurrence data in previous years will be collected from public administrations and bibliographic sources. However, existing records may be insufficient to depict the species' current distribution and, thus, citizen science tools (e.g. www.observado.es; www.observation.org) are a great opportunity to complement these data. We are here making a call to the community of European ecologists to (i) publicise the tool for data acquisition, and (ii) to contact relevant actors (bee keeper associations, environmental bodies) for further collaboration. All data and the predictive modelling tool will be made freely available for the scientific community and the society.

Keywords: *Vespa velutina*, Species distribution models, invasions, data collection

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 3 - Freshwater ecology

PO – 1 (EEF2019-13981) - AQUATIC BIODIVERSITY AND QUALITY OF STREAMS IN CERTIFIED EUCALYPT PLANTATIONS

João Manuel Oliveira (Portugal)[1,2]; João Carlos Paulino (Portugal)[3]; Pedro Segurado (Portugal)[4]; Joana Joana Rosado (Portugal)[5]; Rui Rivaes (Portugal)[4]; Fatima Fernandes (Portugal)[2]; Pedro Serafim (Portugal)[6]; Maria Filomena Magalhães (Portugal)[1]; Maria Teresa Ferreira (Portugal)[2]

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Replacement of native forests by eucalyptus plantations has been widely recognized to have impacts in aquatic ecosystems. Although eucalypt plantations are increasingly managed in compliance with international certification systems, the extent to which forest best management practices (FBMP) may affect aquatic communities are poorly understood. Here we evaluate the biodiversity and the biological quality of streams associated with certified eucalypt plantations in Central Portugal (i.e. managed under FBMP). The study was carried out in two streams with variable flow regimes, surrounded by eucalypt plantations, but both presenting protected riparian buffer zones. We used different organisms as quality indicators, namely fish, amphibians, and macroinvertebrates, and we assessed habitat conditions in stream channel. There was considerable variation in biodiversity and water quality patterns between the two streams. The permanent stream held rich fish assemblages that included several threatened species, but still dominated by an invasive species, but amphibians were not abundant, and there was a significative presence of invasive red swamp crayfish. Habitat conditions were good, and there was a high diversity of the macroinvertebrates reflecting good water quality. In the intermittent stream, fish assemblages were close to reference conditions, and amphibians were also diverse and abundant. However, macroinvertebrate assemblages were poor, and habitat heterogeneity was lower than in the other stream. The results indicate that streams associated with certified eucalypt plantations can exhibit good biological quality and a significant biodiversity but suggest that mitigation effects associated with FBMP might be variable among assemblages and dependent on local and regional environmental contexts.

Keywords: forest certification, Eucalyptus, aquatic communities, riparian zones

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 3 - Freshwater ecology

P0 – 2 (EEF2019-13517) - THE ALGAE ENERGY PATHWAY: AN EMERGING MECHANISM FOR HETEROTROPHIC CONSUMERS TO BREAKDOWN ORGANIC MATTER IN NORTHERN PEATLANDS

Kevin Wyatt (United States of America)[1]; Allison Rober (United States of America)[1]

1 - Ball State University

The current paradigm in peatland ecology is that the organic matter inputs from plants exceeds that of decomposition, tipping the metabolic balance in favor of carbon (C) storage. We investigated an alternative hypothesis, whereby exudates released by microalgae can accelerate C losses from the surface waters of northern peatlands by stimulating dissolved organic C (DOC) decomposition in a warmer environment expected with climate change. To test this hypothesis, we evaluated the biodegradability of fen DOC in a factorial design with and without algal DOC in both ambient and elevated water temperatures during a laboratory bioassay. Decomposition rates were higher in treatments with algal DOC only than with fen DOC only, indicating that the quality of the organic matter influenced degradability. A mixture of substrates (algal DOC + fen DOC) exceeded the expected level of biodegradation by as much as 10%, and the magnitude of this effect increased to more than 15% with warming. Accelerated decomposition in the presence of algal DOC was coupled with an increase in bacterial biomass, demonstrating that enhanced metabolism was associated with a more abundant microbial community. These results present an alternative energy pathway for heterotrophic consumers to breakdown organic matter in northern peatlands. Since decomposition in peatlands is often limited by the availability of labile organic matter, this mechanism could become increasingly important as a pathway for decomposition in the surface waters of northern peatlands where algae are expected to be more abundant in conditions associated with ongoing climate change.

Keywords: carbon, decomposition, temperature

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 3 - Freshwater ecology

PO – 3 (EEF2019-13539) - BIOFILM DYNAMICS DETERMINE ECOSYSTEM RESPONSES TO CLIMATE CHANGE IN NORTHERN PEATLANDS

Allison Rober (United States of America)[1]; Kevin Wyatt (United States of America)[1]

1 - Ball State University

Northern peatlands are a critical component of the global carbon (C) cycle and their response to climate change will likely play a key role in determining future concentrations of atmospheric carbon dioxide. Current understanding of peatland food web ecology is that energy flows primarily through plant detrital pathways and that energy flow overall is constrained by a low metabolic environment and recalcitrant organic matter, which leads to organic C accumulation as peat. This understanding emphasizes bottom-up over top-down pathways of energy flow. Our research has revealed the presence of an algae-centered food web in northern peatlands, in which algae serve as an important component of the peatland C cycle by providing C subsidies to heterotrophic microorganisms at the peat surface. Unlike mosses which are resistant to grazing, algal material is rapidly transferred to consumers in peatlands. Consequently, these effects are modified by trophic interactions. Our research challenges the notion that energy flow within boreal peatlands is limited to detrital pathways and shows that algal photosynthesis fuels heterotrophic metabolism and contributes to ecosystem C fluxes. Consequently, our ability to predict future C flux from peatlands may depend on the capacity to model food web structure in response to climate change processes.

Keywords: algae, bacteria, food web

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 3 - Freshwater ecology

PO – 4 (EEF2019-13724) - PHENOTYPIC PLASTICITY OF METABOLIC SCALING: RESPONSES OF CRUSTACEANS TO TEMPERATURE AND PREDATOR CUES IN SPRING AND LAGOON ECOSYSTEMS

Vojsava Gjoni (Italy)[1]; Jeff Gring (Italy)[2]; Alberto Basset (Italy)[1]; Douglas Glazier (Italy)[3]

1 - University of Salento;
2 - Coastal Resources Inc;
3 - Juniata College

According to common belief, the body-mass scaling of metabolic rate results chiefly from intrinsic body-design constraints. However, several studies have shown that multiple ecological factors can affect metabolic scaling. The mechanistic basis of these effects is largely unknown. Consequently, we asked two major questions not yet studied. First, how much of these effects are due to physiological acclimation versus evolutionary adaptation? Second, do abiotic and biotic environmental factors have interactive effects on metabolic scaling?

To address these questions, we studied the interactive effects of temperature and predators on the ontogenetic metabolic scaling of the amphipods Gammarus minus and G. insensibilis inhabiting freshwater springs (Pennsylvania, USA) and saltwater lagoons (Italy), respectively. We assessed effects of physiological acclimation and evolutionary adaptation on metabolic scaling by exposing G. minus that had experienced numerous generations in spring habitats with and without fish predators to water with and without fish odors. We repeated these experiments at multiple temperatures for both G. minus and G. insensibilis to estimate interactive effects between temperature and predators. We estimated oxygen consumption rate, a proxy for metabolic rate, in amphipods with different sizes, using a closed respirometry system at controlled temperatures.

Temperature interacts significantly with both natural predator regime and laboratory exposure to predator cues to affect metabolic scaling in amphipods. Our results suggest that metabolic scaling is highly malleable, both in response to short-term acclimation and long-term adaptation. The interactive effects of temperature and predators also show the importance of studying effects of global warming in realistic ecological contexts.

Keywords: Amphipoda, Body-size scaling, Metabolic rate, Predation, Temperatura

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 3 - Freshwater ecology

PO – 5 (EEF2019-13764) - ECOTOXICOLOGICAL TOOLS IN ORDER TO EVALUATE THE WATER QUALITY IN RESERVOIRS

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1 - FCUP;
2 - CIIMAR / FCUP

To assess the ecological potential (EP) of artificial water bodies, the Water Framework Directive (WFD) uses specific parameters, but ignores the ecological functions of the ecosystem. This work aims to evaluate the functioning of a reservoir using conventional and ecotoxicological tools in order to evaluate the water quality, going thus beyond the WFD approach. Four sampling sites were defined in Aguieira (Portugal) reservoir and physical, chemical and biological parameters, imposed by WFD, were quantified. The results of this set of parameters showed that sites 1, 2 and 4 present moderate EP and site 3 bad EP. The macrozooplankton community and a set of ecotoxicological tests (growth inhibition of *Raphidocelis subcapitata* and *Lemna gibba* and fedding rate of *Daphnia magna* and *Daphnia longispina*) were conducted using sampled water in three conditions (without filtration - NF, filtered by 1.2 µm pore – F1, and filtered by 0.22 µm pore – F2). The macrozooplankton community, in all sites was dominated by highly efficient filtering organisms such us *Ceriodaphnia, Chydorus* and *Diaphanosoma*. A significant growth inhibition of *R. subcapitata* was recorded for all water samples, namely NF and F1. *Daphnia* spp. showed an evident feeding inhibition in the non-filtered water, more pronounced at site 3 and 4. *L. gibba* growth was not affected, however the concentration of chlorophyll a decreased in all conditions tested. Preliminary results show that the ecotoxicological tools used are in accordance with the results of WFD but provide faster results to assess the water quality and the ecosystem function.

Keywords: Ecotoxicological tools, Ecological potential, Water Framework Directive, Natural waters

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 3 - Freshwater ecology

P0 – 6 (EEF2019-13814) - PASSABILITY OF NATIVE POTAMODROMOUS FISH SPECIES THROUGH A FISH LIFT IN NORTH PORTUGAL, IN RELATION TO DIFFERENT HYDROPEAKING SCENARIOS

Daniel Mameri (Portugal)[1]; Rui Rivaes (Portugal)[1]; João Manuel Oliveira (Portugal)[1,2]; Maria Teresa Ferreira (Portugal)[1]; José Maria Santos (Portugal)[1]

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The construction of fishways is widely recognized as a suitable approach to restore longitudinal connectivity for migratory fish species. In River Lima (North Portugal), the Touvedo tailwater reservoir modulates the high flows discharged by the upstream Alto Lindoso dam and has been equipped with a fish lift to allow fish migration upstream. Using data from video-monitoring of the lift over an annual period (March 2013-February 2014), the main goal of this study is to describe movement patterns of fish in function of different flow releases from Touvedo: 5.5 m3/s when the turbines are not operating (ecological flow release), or one of two hydropeaking release schemes - 50 m3/s or 100 m3/s. Three native potamodromous fish species were considered: the Iberian barbel Luciobarbus bocagei, the Northern straight-mouth nase Pseudochondrostoma duriense and the brown trout Salmo trutta fario. Overall, cyprinids were the dominant group, with nase being the most abundant species, followed by barbel. Most seasonal nase movements took place between July and October, while those of barbel and trout occurred regularly throughout the year. Regarding environmental variables, water temperature was a significant predictor on the abundance of both nase and barbel, while for trout the mean daily flow was the most significant factor. The majority of nase movements took place during ecological flow releases, whereas for barbel and trout, most movements occurred during 50 m3/s and 100 m3/s releases, respectively. These results highlight the importance of providing an adequate flow management in hydropeaking dams when multiple potamodromous species are present.

Keywords: potamodromous fish, migration, fish lift, hydropeaking, ecological flow

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 3 - Freshwater ecology

PO – 6 (EEF2019-13987) - PRELIMINARY EVALUATION OF SATELLITE CAPABILITY FOR MONITORING CHL A IN RESERVOIRS

Giulia Sent (Italy)[1]; Andreia Tracana (Portugal)[1]; Ana Filipa Silva (Portugal)[2]; João Pedro Marques (Portugal)[2]; Esmeralda Pereira (Portugal)[2]; Ana Filipa Belo (Portugal)[2]; Carolina Sá (Portugal)[1,3]; Carlos Manuel Alexandre (Portugal)[2]; Ana C. Brito (Portugal)[1]; Vanda Brotas (Portugal)[1]; Pedro Raposo Almeida (Portugal)[2]

1 - MARE-ULisboa;
2 - MARE_UÉvora;
3 - CIMA-UAlgarve

Monitoring water quality parameters such as Chl a and their ecological effects in water reservoirs is usually achieved through field sampling programs. However, this can be labor intensive and expensive, and it is often necessary to assume that field samples, which are limited both spatially and temporally are representative of the total area of interest.

In this preliminary study, we consider the potential application of Sentinel 2 satellite data for monitoring the spatial and temporal distribution of Chl a in small reservoirs.

For this purpose, in situ data were collected monthly within the framework of the GAMEFISH project (ALT20-03-0145-FEDER-000016) in Póvoa e Meadas reservoir (Portugal) between October 2017 and January 2019, in order to evaluate coincident Sentinel 2 imagery.

For the sampling period, 5 clouds-free images over 10 days of field sampling were available for the Chl a product comparison.

Despite the small number of clouds-free images available for the sampling period, the results indicate that there is a relationship that responds to changes in Chl a concentration.

Because of this and thanks to the high temporal resolution of the Sentinel 2 MSI (5 days), remote sensing could be a powerful tool also in monitoring short-time variability of water quality parameters such as Chl a within a reservoir.

Keywords: Reservoirs, Sentinel-2, Monitoring, Phytoplankton pigments, Remote sensing

30/07 | 19h00
POSTER SESSION I
Room C6 atrium and interior Garden | Topic 4 - Eco-solutions and bio-economy

PO – 1 (EEF2019-13995) - BIO-INNOVATIVE POTENTIAL OF PORTUGUESE BEIRA INTERIOR ENDOGENOUS NATURAL RESOURCES

Cristina Galhano (Portugal)[1,2]; Inês Seabra (United States of America)[3]; Sara Barbosa (Portugal)[1]; Paula Lorenzo (Portugal)[2]; Marta Henriques (Portugal)[1,4]

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2 - Centre for Functional Ecology - Science for People & the Planet, Department of Life Sciences, University of Coimbra, Calçada Martim de Freitas, 3000-456, Coimbra, Portugal;
3 - Bioengineering Department, Lehigh University, Bethlehem, PA, United States;
4 - CERNAS – Research Centre for Natural Resources, Environment and Society, Escola Superior Agrária de Coimbra Bencanta, 3045-601 Coimbra Portugal

Essential oils (EOs) of *Helycrisium italicum* and *Thymus mastichina*, endemic plants to the Iberian Peninsula and largely spread in the Beira Interior region of Portugal, were studied in order to determine their main chemical composition and bioactive potential.

The EOs were analysed by GC-MS. The antioxidant potential was estimated using the DPPH method and expressed in terms of IC50. The acetylcholinesterase inhibitory effect (IC50) was evaluated as a nematicidal potential indicator. The herbicidal potential was assessed using a pre-emergency bioassay on the seed germination of the invasive Acacia dealbata.

The main EO compounds present in *Helycrisium italicum* were gamma-curcumene (11.82%), followed by neryl acetate (9.20%), alpha-pinene (9.10%), alpha-curcumene (8.01%), and italicene (6.05%). In *Thymus mastichina*, the compound that stood out was eucalyptol (46.30%), followed by linalool (5.96%), terpineol (5.95%), beta-pinene (3.93%), and alpha-pinene (3.04%). The antioxidant activity of the *Helycrisium italicum* EO was significantly higher than that of the *Thymus mastichina* EO, with IC50 of 17.37±0.40 and 143.43±36.81 mg/mL, respectively. The IC50 for acetylcholinesterase inhibition were 6.05±0.05 for *Helycrisium italicum* EO and 2.62±0.25 mg/mL for *Thymus mastichina* EO, indicating a lower nematicidal potential for the former. Mimosa germination was not affected by the studied EOs concentrations, nevertheless, 10% of *Helycrisium italicum* EO inhibited the radicle growth.

Further research must be envisaged to deepen the promising results of the EOs of these two plants. The development of innovative products with true added value based on endogenous natural resources will foster the valorisation of economically less favoured territories.

Keywords: Antioxidant activity, Helycrisium italicum, Thymus mastichina, Biocide, Essential Oils

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 5 - Urban sustainability

P0 – 1 (EEF2019-13732) - INTEGRATED APPROACH TO SUSTAINABLE LAND USE

Zita Izakovicova (Slovakia)[1]

1 - Institute of Landscape Ecology of Slovac Academy of Sciences

Sustainability is an essential precondition for the continued existence of human society. The issue of sustainable land use has increasing importance because of accumulated environmental problems. Approaches and definitions of sustainable land use are numerous, heterogeneous, and based on a variety of aspects. Most definitions stress that sustainable development requires socioeconomic development which respects the natural and cultural-historical resources and potential of the territory. Achieving this goal requires an integrated approach application. The integrated landscape management is based on understanding landscape as a geo-ecosystem. The geo-ecosystem encompasses a complex system of space, position, relief, and all other functionally interconnected physical landscape features of the geo-sphere where man and other organisms live and act.

The proposal for optimal land use is based on the interaction between natural capital, represented by the supply of natural regional resources and environmental conditions as well as demand represented by community need for development. The conflict between the supply of natural capital and demands lacking respect for landscape resources is an important determining factor in environmental and human problems. The integrated approach is focused on long-term rational utilization of the natural and cultural-historical resources, and the elimination of current environmental and socioeconomic problems as well as the prevention of new ones.

The poster will present an integrated approach to sustainable land use management and its application in the study area urban functional area of Trnava.

Keywords: natural, capital, ecosystem, services

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 5 - Urban sustainability

PO – 2 (EEF2019-13706) - ESTIMATION OF REGULATING ECOSYSTEM SERVICES IN URBAN AREAS

Marta Alos Orti (Estonia)[1]; Lauri Laanisto (Estonia)[1]

1 - Estonian University of Life Sciences

Rapid urban growth has a great impact on urban and peri-urban ecosystem functions and processes. As a consequence, city dwellers are facing significant problems mainly due to air pollution. The aim of the study was to assess and quantify regulating ecosystem services (ES) (i.e. air quality improvement) provided by urban vegetation in 160 urban green areas distributed among 5 European cities (Tartu, Poznan, Antwerp, Paris and Zürich).

For this purpose, we estimated the biomass of woody vegetation as a proxy of the carbon stock in the 160 study sites. We used allometric equations distinguishing between coniferous and broadleaf plant types. For estimating particulate matter (PM) accumulation, we used saturation isothermal remanent magnetization (SIRM) in order to assess the PM deposited on the bark and leaves in tree species. We sampled along transect from the centre of the sampling site to the closest pollution source.

Results show the relationship between functional diversity and ES provision in urban areas. The highest values of SMIR for the bark samples where found in Poznan (6932 μA.m2.kg-1) and Antwerp (5839 μA.m2.kg-1) while the lowest values belong to Zürich (2 μA.m2.kg-1). The same SIRM trend was found when including leaves. Urban green infrastructures are capable of removing PM from the air, but the efficiency of air pollution mitigation depends on the size and connectivity of urban green areas, thus varying also between cities. By linking woody biomass estimation and SIRM at broad scale our study provides a comprehensive assessment of the ES patterns in urban areas

Keywords: saturation isothermal remanent magnetization, plant biomass, regulating ES, urban green areas

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 5 - Urban sustainability

PO – 3 (EEF2019-13654) - URBAN EXPANSION AREAS OVERLAP WITH NATURA 2000 SITES ACROSS EUROPE

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Urban growth is considered one major component of land use change that seriously threatens ecosystem and biodiversity conservation worldwide. Urbanization is known to drive important changes in habitats and species assemblages that result in biotic homogenization. As human demand of land for settlements and infrastructures continues increasing, urbanization more and more goes beyond consolidated urban areas and their surroundings. However, most studies still focus on particular towns or metropolitan areas, while the impacts of urban sprawl into the countryside, which are likely more damaging, have been little explored so far. This study presents a comprehensive trend analysis of the degree of overlap between protected sites within the Natura 2000 network and newly developed urban areas over the last decade throughout Europe. Natura 2000 is a net of conservation priority areas that was conceived to safeguard the most valuable and threatened species and habitats all over the European territory in the long term. Accordingly, in the event of urban sprawl taking place in these sites, its impacts on nature are expected to be especially harmful. In particular, Copernicus Pan-European High Resolution Layers (HRL) of the degree of land imperviousness (i.e., sealed soil) at different time points (2006, 2009, 2012 and 2015) are intersected with the distribution of Natura 2000 protected sites across Europe. In the light of the results, trends of overlap between these areas over the last decade and the capacity of Natura 2000 network to halt ongoing urban sprawl and its associated impacts in European protected areas are assessed.

Keywords: urban sprawl, conservation priority areas, threatened species, habitats

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 5 - Urban sustainability

PO – 4 (EEF2019-13619) - HOW GARDENS AND PUBLIC PARKS ARE RESPONDING TO CITIES SOCIAL AND ENVIRONMENTAL CHALLENGES? A CASE STUDY OF PORTO, PORTUGAL

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3 - Faculty of Arts and Humanities and Institute of Sociology of the University of Porto, Porto, Portugal

Cities must be pleasant and healthy spaces able to contribute to ecosystems regeneration and bring closer Humans and Nature. According to the 11 SDG of 2030 Agenda, by 2030 should be provided universal access to safe and inclusive public green spaces. The main goal of this research aims to evaluate how the ecosystems services of gardens and public parks (GPP), in the city Porto, are responding to contemporary social and ecological challenges and, consequently, which differences are found within city socioeconomic and environmental vulnerability clusters. An evaluation grid was elaborated and applied to 25 GPP representatives of the five socioeconomic and environmental vulnerability clusters within the city (CMP, 2018; CMP, 2016; Monteiro et al., 2012). The grid is composed by 4 sections related to activities, environmental quality, facilities and security. After data collection, the statistic treatment was performed by IBM® SPSS® Statistics vs. 24.0 trough descriptive and inferential statistic analyses. Results: Preliminary results shows different capacity to improve environmental quality and respond to social and ecological challenges related to geographic location of the GPP. Beyond its environmental performance, the possibility to realize different types of activities is different according to GPP facilities. The main conclusions of this research reveal that the definition of public policies in the design and improvement of GPP must take into account the social and environmental specificities of the surrounding area. To persue the sustainable development is imperative a commitment between civil society, political decision-makers and academics because urban inequality undermines sustainability efforts.

Keywords: Urban Green Spaces, Cities, Sustainable Development, Ecology

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 6 - Sustainable agro-ecosystems

PO – 1 (EEF2019-13903) - AGRO-WASTE OR AGRO-RESOURCES? THIS IS THE QUESTION!

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3 - CERNAS – Research Centre for Natural Resources, Environment and Society

Objectives: To find potential uses for agro-industrial waste by assessing their effect on a monocotyledonous staple food, corn (Zea mays) and on a dicotyledonous invasive plant, mimosa (Acacia dealbata) seed germination and root length. This study involved students' participation through a Problem Based Learning (PBL) methodology.

Two pre-emergency bioassays were carried out in 9 cm diameter Petri dishes. The agro-industrial waste aqueous extracts tested were: coffee grounds and corn husks (tested in both bioassays), banana skin, orange skin, egg shell, sour milk and macerated orange skin - "orange skin juice" (tested in the second bioassay). Distilled water served as control. Ten seeds were distributed on a filter paper circle soaked with 2 mL of each extract. Treatments were replicated five times. Germination was determined after 96 hours and 15 days, while root length was recorded after 15 days.

Bioassay 1) the corn husk extract stimulated both corn and mimosa seeds radicle growth. Conversely, the coffee grounds extract inhibited the growth of the corn radicle. Bioassay 2) the sour milk completely inhibited corn and mimosa germination after 96 hours. The orange skin juice extract delayed the corn germination at 96 hours compared to the other extracts, but it did not affect the final germination.

The PBL methodology engaged students in the discussion of these environmental problems, making them aware of the urgency to find ecologically sustainable herbicides/fertilizers and of the circular economy importance on resources' sustainability, which is in accordance with the international Sustainable Development Goals.

Keywords: Agro-industrial waste, Bioherbicides, Biostimulants, Circular economy, Sustainability

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 6 - Sustainable agro-ecosystems

PO – 2 (EEF2019-13960) - ARE CAP SUSTAINABLE PRODUCTION MODES PROMOTING MORE SUSTAINABLE MANAGEMENT PRACTICES IN A MONTADO AREA IN THE ALENTEJO REGION OF PORTUGAL?

Carla Azeda (Portugal)[1]; Nuno Guiomar (Portugal)[2]; Sérgio Godinho (Portugal)[2]; Teresa Pinto-Correia (Portugal)[3]

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The High Nature Value (HNV) farming conceptual framework, introduced in Europe in the 1990s, established a new approach to nature conservation, based on the interconnection between the domains of ecology, agricultural sector and public policies. Highlighting the idea that low intensity farming practices often correspond to an overall biological diversity in farmland, is not aimed at classifying individual areas as HNV farmland. Rather, it intends to preserve and expand the agricultural systems of HNV in Europe through support measures, namely under the Common Agricultural Policy (CAP) and by doing so, transcends the traditional scale of preservation of restricted geographic areas to the scale of landscape management.

There are CAP agri-environment measures that support Integrated and Organic Production, considered sustainable production modes, which aim the producing of quality products, using agricultural practices that respect the balance of agro-ecosystems. Although these measures have been in place since the start of the agri-environment schemes, their effectivity in improving the overall sustainability of the farm system, is seldom addressed.This overall sustainability is particularly relevant in complex silvo-pastoral systems as the Montado in Southern Portugal, due to the close interaction between diverse components of the system.

Using an extensive cattle production system in a Montado area in the Alentejo region, Portugal, as a case study, this work assesses and discusses if the implementation of the agri-environment measures for integrated and organic production is indeed supporting more sustainable management of the system in an integrated way, and thus contributing to promoting the HNV Montados.

Keywords: HNV farming, Common Agricultural Policy, agri-environment measures, integrated production and organic production, Montado

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 6 - Sustainable agro-ecosystems

PO - 3 (EEF2019-13499) - DECREASING NITROGEN FOOTPRINT ON VINEYARD PRODUCTION

Soraia Cruz (Portugal)[1]; Cláudia Cordovil (Portugal)[1]; Cecília Rego (Portugal)[1]; Pedro Baptista (Portugal)[2]; Sónia Martins (Portugal)[3]; António Marques-Dos-Santos (Portugal)[4]

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2 - Fundação Eugénio de Almeida;
3 - Lusovini Distribuição;
4 - Reguenguinho - Sociedade Agrícola Lda

Nitrogen plays a key role in agriculture and is a crucial element for life. It is an essential nutrient in wine production because N deficiency can affect the main metabolic functions of the vine and delay the development of the aerial part and the formation of the bunch. However, if the reactive N is present in excessive amounts in the environment, it may not only reduce the production and increase pests and diseases incidence, but can be a serious problem for human health and affect all the natural compartments (soil, water and air) as well. The efficient use of N as fertilizer is the key to solve this pollution problem, while helping to avoid increased costs to the farmers. With this purpose, the “NEP” operational group (PDR2020-101-031453) is focused on developing the production of wine grapes with low nitrogen footprint and has the participation of several SMEs. Three field experiments were carried out in the grapes/wine production partners in different locations of Portugal (Viseu, Évora and Montemor-o-Novo). For each one, changes in the primary production of fresh grapes was designed without compromising production and product quality. New agricultural practices, which include fertilization and irrigation, and innovative technologies were tested to increase N use efficiency and decrease the N wine footprint. The grapes collected during the first campaign (2018), were vinified to produce a different type of wine per treatment. Soils, plants and wine were analysed for quality identification. This project emerged from the NitroPortugal H2020-TWINN-2015 (n. 692331) project previously developed.

Keywords: Agriculture, Fertilization, Nitrogen-Footprint, Vineyards, Innovation

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 6 - Sustainable agro-ecosystems

PO - 4 (EEF2019-13624) - IMPACT OF AGRO-ECOLOGICAL MEASURES ON HONEYBEE POPULATIONS, APIS MELLIFERA

Yann-David Varennes (Switzerland)[1]; Julie Hernandez (Switzerland)[2]; Alexandre Aebi (Switzerland)[3]; Vincent Dietemann (Switzerland)[4]

1 - Interjurasienne rural foundation (FRI);
2 - PhD student - University of Neuchâtel;
3 - MER in Agroecology - University of Neuchâtel;
4 - Senior Research Scientist - Swiss Bee Research Center Agroscope

Recent works have shown a decline in pollinators, which play a widely recognized role for the reproduction and productivity of wild plants and crops. The current agricultural landscape contribute to this decline due to the reduction of the quality and quantity of resources they provide to sustain pollinator populations. To mitigate these negative trends, agro-ecological measures have been implemented by governments. However, their efficiency is still unclear. In Switzerland, nine measures were recently proposed to (i) increase the nutritional offer for pollinators in an agricultural landscape generally deficient in pollen and nectar between crop blooming periods and (ii) decrease exposure to insecticides, main risk for their health. The objective of this PhD work is to assess the efficiency of these measures on the development and survival of honeybee colonies, the major managed pollinator. 300 colonies held in 30 apiaries in two cantons of Switzerland (Jura and Vaud) will be monitored over three years.

As a first step, I will characterize the landscape surrounding the 30 apiaries to determine their exposure to the agro-ecological measures and to natural food resources; I'll then determine if the honeybee colonies respond to the agro-ecological measures and evaluate if beekeeping practices, honeybee pathogens and parasites and residues of phytosanitary products influence this response.

The originality of this study comes from its large spatial and temporal scale and its close collaboration between scientists, beekeepers, farmers and policy makerset. The outcome of the integrative study will contribute to science-based policy-making towards more sustainable agricultural and apicultural practices.

Keywords: agro-ecological schemes, Apis mellifera, beekeeping, varroa, agricultural landscape and residue

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 6 - Sustainable agro-ecosystems

PO - 5 (EEF2019-13639) - PADDY-UPLAND ROTATION ENHANCE SOIL MICROBIAL DIVERSITY AND IS IMPORTANT FOR SUSTAINABLE AGRICULTURE

Ping-Fu Hou (Taiwan)[2]; Wen-Chi Chang (Taiwan)[1]

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Sustainable agriculture heavily relies on healthy soil with superior characteristics, such as divergent species and an abundant eco-friendly microbial population. Paddy-upland farming system is commonly applied in tropical agriculture. However, how paddy-upland rotation improve soil quality and fertility is still unclear. Additionally, the relationship between microbial diversity and crop diseases in the fields with paddy-upland rotation is worth exploring.

In this study, we applied next generation sequencing (NGS) technology to investigate and evaluate the soil microbiological characteristic upon three fertilizations (organic (OF), chemical (CF) or integrated (IF) fertilizer) under two rotation systems (paddy-upland (R1) or upland (R2) rotation). The experiment field is located at 22°51'28.1"N 120°30'58.4"E. The fields with three fertilization treatments were employed for each main rotation system, and well maintained for 25 years.

Based on high-throughput sequencing data, we find the microbial diversity and composition is highly determined by rotation manipulation rather than fertilizations. The soil properties of R1 and R2 show that organic fertilization significantly improve accumulation of organic matter, and increase chemical fertility in the long-term experiment. In addition, the higher organic matter and chemical element indeed harbor higher diversity of microbes, especially in R1 system. Furthermore, comparing with the rotation systems, R1 soil have higher microbial diversity than R2 does. A R1 soils have lower disease incidence than R2 soils, whenever conduct pot bioassay or field survey. Taken together from soil properties, biodiversity and disease management, paddy-upland rotation manipulation is highly recommended for sustainable agriculture.

Keywords: Paddy-upland rotation, microbial diversity, next generation sequencing

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 6 - Sustainable agro-ecosystems

PO – 7 (EEF2019-13811) - PLANT GROWTH PROMOTING BACTERIA ISOLATED FROM ACID SOILS IN THE PORTUGUESE MONTADO

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Montado is a typically Mediterranean agro-forestry-pastoral ecosystem present in the Southern Iberian Peninsula. In Portugal, about 70% of Montado soils have low fertility and are strongly acidic, with associated Mn and Al toxicities that strongly affect the growth of forage grasses and legumes. This work aimed to develop strategies to improve the performance of forage grasses in these soils. The use of soil correctives was combined with the isolation of plant growth promoting bacteria, aiming to select strains for biofertilization.

A greenhouse experiment was conducted using an Arenosol collected in Alcácer (Alentejo) to grow Lolium multiflorum, either in the presence or absence of soil correctives (dolomitic limestone and cellulosic sludge). In addition to evaluating the shoots dry mass, culturable populations of total bacteria, nitrogen-fixing bacteria and fungi in the rhizosphere were quantified. Isolated bacteria were assayed for plant growth promoting activities (auxin production, phosphate solubilization, nitrogen fixation, siderophore production, hydrolysis of cellulose). Selected isolates were tested for gnotobiotic inoculation of Arabidopsis thaliana.

The biomass of L. multiflorum increased significantly in corrected soil. Total and nitrogen-fixing bacteria also increased upon soil correction. Numbers of cultivable fungi were identical in both treatments, but differences in genera profiles were observed. About 120 bacterial isolates were obtained, many of which were positive for plant growth promoting activities, especially those originating from non-corrected soil. Two isolates were particularly effective in stimulating the growth of A. thaliana, suggesting a good potential for use as inoculants.

Funded by project ALT20-03-0145-FEDER-000039

Keywords: Acid soils, Lolium multiflorum, Montado, Plant growth promoting bacteria, Biofertilization

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 6 - Sustainable agro-ecosystems

PO - 8 (EEF2019-13932) - SELECTION OF NITROGEN FIXING BACTERIA FOR BIOFERTILIZATION OF PASTURES IN ACIDIC SOILS OF MONTADO AREAS

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Pasture legumes are among the most efficient leguminous plants in terms of nitrogen fixation and contribute to high input rates of fixed nitrogen into the soil. They increase soil fertility due their ability to establish symbiotic associations with soil microorganisms, known as rhizobia. Therefore, these symbioses are considered as a management tool to improve pasture yields, mainly in soils of the Montado ecosystem were the success of sown pastures is often reduced. This work aimed to select highly efficient nitrogen fixing bacteria (rhizobia) for future development of *Trifolium* biofertilizers adapted to acidic soils.

Bacteria were isolated from root nodules of *Trifolium subterraneum* and *T. resupinatum* grown in controlled-environment conditions and previously inoculated with soil suspensions from a field trial installed in an acidic soil (Arenosol) under Montado (Alcácer), either in the presence or absence of soil correctives (dolomitic limestone and cellulosic sludge). The genetic diversity of the isolates was assessed by REC-PCR. Selected strains were evaluated for symbiotic effectiveness and identified by 16S rDNA sequencing.

A total of 110 isolates were obtained from root nodules of both *Trifolium* species. REP-PCR fingerprinting revealed a high genetic diversity among the rhizobial natural population, mainly in treatments with soil correctives. Symbiotic effectiveness was also higher in bacteria isolated from clovers grown with soil correctives (higher plant dry weights). A group of selected strains showed a good potential for future use as biofertilizers of annual clovers and were mostly identified as *Rhizobium leguminosarum*.

Funded by project ALT20-03-0145-FEDER-000039.

Keywords: Biodiversity, Biofertilization, Nitrogen fixing bacteria, 16S rDNA

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 6 - Sustainable agro-ecosystems

PO – 9 (EEF2019-13820) - ANTAGONISM OF THE OLIVE ANTHRACNOSE'S CAUSAL AGENTS BY YEASTS

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The Mediterranean region is critically threatened by Olive Anthracnose (OA), a phytopathology that severely affects olive orchards. This disease is caused by fungi from the *Colletotrichum gloeosporioides* and *C. acutatum* species complexes. Chemical fungicides are mostly used in the control of OA. However, they are ineffective and harmful for the environment and human health. Yeasts are usually innocuous microorganisms for humans and the environment. They are known to antagonise other yeasts, bacteria and fungi, killing them or inhibiting their growth. Thus, the present work evaluates the potential of yeasts, originating from Portuguese olive trees microbiome and well-known fermentation industrial processes, against strains of *C. gloeosporioides*, *C. godetiae* and *C. nymphaeae*,originating from infected orchards in Portugal and Italy. Antagonism was assessed in co-cultures, in solid and liquid media. Fungal cell death was microscopically confirmed by staining the cells with appropriate dyes. All *Colletotrichum* sp. strains were strongly inhibited by diverse yeasts. Moreover, fungal cells were not always killed, suggesting different modes of action. *Wickerhamomyces anomalus* (formerly known as Picha anomala) were the most effective, causing the highest growth inhibition and cell death. Further work is under way to develop a protocol for *in field* application of these yeasts as biocides in the management of Olive Anthracnose in Portugal.

Keywords: Antagonism, Biological Control, Olive Anthracnose, Colletotrichum sp.

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 6 - Sustainable agro-ecosystems

PO – 10 (EEF2019-13944) - KNOWLUCI: SHEDDING LIGHT ON AN EMERGING TROPICAL ROOT KNOT NEMATODE SPECIES

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Root knot nematodes (RKN), Meloidogyne spp., have worldwide importance across the agricultural industry as they can parasitise nearly every plant species, resulting in adverse impact on the quality and yield of host crops. The tropical RKN Meloidogyne luci was recently detected associated with potato in Portugal and preliminary results suggest that this RKN species may constitute a potential problem to several agricultural crops. The expected increase of temperature due to global warming may favour an increase of M. luci population densities and/or other RKN species and their spread into Europe. In order to reach effective integrated pest management programmes to suppress M. luci development and reproduction, field and research data are required. The project KnowLuci, recently funded by FCT (POCI-01-0145-FEDER-031946|PTDC/ASP-PLA/31946/2017), sheds light on the prevalence of M. luci in key crops of Centre Portugal and will provide new knowledge about its pathogenicity and ecology. The information gathered on M. luci risk of dispersion and potential crop damage, in addition to the development of new and accurate direct methods for its molecular detection, will help defining practical strategies for its management. The accumulated scientific and novel technical knowledge generated will be of critical relevance, not only for the protection of crops known to be infected by this species in Portugal, but also in other regions where M. luci is present, contributing to more sustainable agro eco-systems.

Keywords: Diagnosis, Meloidogyne luci, Plant-parasitic nematode, Pest management.

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 6 - Sustainable agro-ecosystems

PO – 11 (EEF2019-13985) - IN SITU LOCALISATION OF FMRFAMIDE-LIKE PEPTIDE FAMILY MEMBERS OF THE ROOT LESION NEMATODE PRATYLENCHUS PENETRANS

Joana Figueiredo (Portugal)[1]; Joana M.S.Cardoso (Portugal)[1]; Ivânia Esteves (Portugal)[1]; Isabel Luci Conceição (Portugal)[1]; Isabel Abrantes (Portugal)[1]; Manuel Mota (Portugal)[2]; Paulo Vieira (Portugal)[2]

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The root lesion nematode Pratylenchus penetrans is a migratory endoparasite that causes significant damage in the roots and general decay of a wide diversity of economically important crops (e.g. potato). The development of sustainable control strategies for management of such resilient plant pathogens is crucial. A set of thirteen FMRFamide-like genes (FLP) were found to be significantly expressed in the P. penetrans transcriptome during infection of potato, Solanum tuberosum. The FLP are known to be involved in various nematode biological processes such as feeding, reproduction and locomotion, making this family of neuropeptides an appealing target for parasite control strategies. In order to elucidate the localisation of these neuropeptides in P. penetrans, in situ hybridisation was performed for xxx genes. Transcript localization for seven FLP genes revealed a diffuse staining in the nematode circumpharyngeal nerve ring towards the stylet protactor muscles. However, no specific cell bodies could be identified. A distinct expression pattern was found in three FLP genes with transcripts localized on the posterior end of the nematode ventral nerve cord. Further knowledge on the functional significance of these neuropeptides is needed to assess its practical utility for P. penetrans management.

Keywords: Pratylenchus penetrans, in situ hybridisation, neuropeptides, FMRFamide-like peptides (FLP), management

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 7 - Climate and global changes

PO – 1 (EEF2019-13853) - FOREST DIE-OFF REDUCES SOIL ORGANIC C AND N STOCKS AND THE LESS STABLE C FORMS IN A MEDITERRANEAN WOODLAND

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The Mediterranean region has been suffering, and will continue to suffer, remarkable episodes of drought-induced forest die-off. We carried out a study in a Mediterranean Quercus ilex (holm oak) woodland to assess the effect of forest die-off on the capacity of soils to store C and N, and on the quality (i.e. labile vs. stable fractions) of soil C along the soil profile (0-5 cm and 5-10 cm).

Soil samples collected under and out of the influence of holm oak trees with different defoliation degrees (10 healthy, 10 affected and 10 dead) were analyzed for total C and N concentration and stocks. Further, we isolated two soil organic matter fractions (labile and stable) with different turnover times in those soil samples by using the high gradient magnetic separation method.

We found that forest die-off negatively affected the capacity of soils to store C and N, particularly the less stable carbon. We also found that the effect of forest die-off on soilC and N contentwas more pronounced at the surfacethan at deeper soil layers, while not on soil C quality. Our results highlight the importance of considering both soil organic matter quantity and quality along the soil profile to fully understand the effects of environmental changes on the global C and N cycle.

Keywords: Quercus ilex, soil organic matter fractionation, nitrogen, carbon sequestration

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 7 - Climate and global changes

PO – 2 (EEF2019-13780) - HYDROLOGICAL IMPACTS OF LARGE FIRES AND CLIMATE CHANGE: MODELLING APPROACH USING SWAT AND SATELLITE DATA

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This work aimed to understand the hydrological impacts of future large fires and climate change on the provision of water supply and soil erosion control in Vez watershed (NW Portugal) using SWAT (Soil and Water Assessment Tool).

For this, burnt areas of a large fire in 2006 were calibrated in SWAT, including post-fire regeneration informed by satellite time-series based on NDVI (Normalized Difference Vegetation Index). Future climate projections were based in four realizations of SMHI-RCA4 regional climate model driven by four global climate models under scenarios RCP 4.5 and 8.5. Burnt areas in the future were calculated from a multiple linear regression model that used DSR (Daily Severity Index), precipitation anomaly and burnt area in the previous three years.

Future climate is expected to bring an increase in temperatures and a decrease in precipitation with marked uneven seasonal distribution in Vez watershed. This will directly influence seasonal discharge in the river, with more discharge during winter and less in spring, summer and autumn, especially in scenario RCP 4.5 for 2020-2050 compared to 1970-2000. Total burned area will moderately increase up to 30%, but a higher frequency of large fires is expected. Soil erosion that will generally increase with climate change, will be aggravated under more severe fire regime scenarios.

The understanding of fire consequences on hydrological services provision under future climate may support decision makers for choosing better options on landscape adaptation and post-fire mitigation, sustaining efforts to achieve SDG 7 – climate action and 15 – Life on Land.

Keywords: Climate change, Hydrological ecosystem services, Post-fire regeneration, Satellite products, SWAT model

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 7 - Climate and global changes

PO-4- (EEF2019-14199) - SCALE EFFECTS ON FOOD-WEB INDICATORS – IMPACTS AT BIOGEOGRAPHIC REGION LEVEL

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2 - MARE

The development and operationalization of Food-web indicators (Descriptor 4 - Food-webs) in the MSFD context faces several difficulties, such as: lack of data for relevant taxa, absence of fully operational indicators, spatially and temporally limited datasets. This work aims to improve methodologies used to assess Food-webs by identifying relevant scales for Food-web evaluation while assessing the effects of scales on GES. With focus on four indicators, developed to detect fishing pressure on food-webs - MTL, MTI, LFI and MATG - seven spatial and four temporal ranges were tested, using groundfish survey data for two Biogeographic Regions. Spatial scales were a major source of variability when compared to temporal ones. MTL and MTI (TL>3.25) results were not affected by temporal and spatial variability. MTI (TL>4) and LFI were largely explained by spatial scales, requiring more detailed scales: MTI deviance was significantly explained by ICES Rectangles while LFI by Sector/ Strata. Temporal scales explained low values of deviance for both indicators. Higher TL thresholds (TL>4) required the use of more detailed scales as communities analysed were narrower and variability increased. MATG was explained by bi-annually datasets and Sector/Strata, but deviance explained was low. Bay of Biscay and Iberian Coast data was more variability than Celtic Seas, requiring smaller size scales. To accurately extract ecosystem indicators variability, further effort is required from MSs to downsize spatial scales addressed and from the EC to improve standardization. This study identifies scales that further explain variability, improving indicators capability to distinguish natural variability from anthropogenic effects.

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 7 - Climate and global changes

PO – 5 (EEF2019-13752) - DROUGHT, INVASIVE DISPLACEMENT, AND THE CONSERVATION OF THE VULNERABLE OAK QUERCUS LUSITANICA

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Competitive displacement by invasive species and water stress due to global warming are two of the most threatening processes to vulnerable plant species. The small disjunct population of *Quercus lusitanica* in the Galician massif of Monte Pindo (NW Spain) protected as vulnerable in the Galician checklist of threatened species could be threatened by the expansion of the invasive tree *Paraserianthes lophantha*, although it is unclear if competitive exclusion would be a displacement factor, or how competitive ability would interact with reduced water availability due to global change. We hypothesized that invasive *P. lophantha* competitively displace *Q. lusitanica*, and that competitive advantages could be exacerbated under drought conditions. To test for this, we set-up an experiment testing the effect of one-to-one competition between *P. lophantha* and *Q. lusitanica* seedlings experiencing two different water regimes: control, and water limited. Measures of relative growth rate, height, leaf number, final biomass, water potential, and photosynthetic gas exchange rates of control and competition individuals were recorded on seedlings grown under common garden greenhouse conditions. Biomass records were then used to assess relative competitive ability of each species by means of Relative Interaction Indexes. Our results indicate that *P. lophantha* high seed germination and growth rates pose a serious threat to *Quercus lusitanica* disjunct population. Our work exemplify the importance of considering the interaction between climate change and the biological invasion of *P. lophantha* when assessing the potential displacement of the shrub species *Q. lusitanica*.

Keywords: Biological invasions, Threatened species, Native and introduced populations, Plant competition, Interaction indices

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 7 - Climate and global changes

PO – 6 (EEF2019-13786) - CLIMATE CHANGE IMPACT ON CROP YIELD IN ETHIOPIA: A MULTI-MODEL UNCERTAINTY ANALYSIS

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Differences in crop and climate models have been identified as source of uncertainties in the study of climate change impact. In this regard, the use of multi-model ensembles has been suggested to reduce the uncertainty. The intent of this paper is therefore, to estimate the impact of climate change on crops and quantify the source of uncertainties. A multi-model ensemble with 48 members were setup from a combination of 4-crop growth models, 3-Soil heat transfer module, 2-Soil water flow module and 2-Soil carbon and nitrogen turnover and transport module using Expert-N modeling package. Simulations were carried out for wheat and maize crop using two cultivars each for two 30-year period, i.e., 1981-2010 and 2020-2050 representing historical and future climates. Future projections were simulated using bias-corrected climate data from ten global climate models (GCMs) under representative concentration pathway (RCP) 4.5 accessed from Coordinated Regional Climate Downscaling Experiment (CORDEX). We estimated more than 40% decrease in wheat yield while the impact was not much (<5% decrease) for maize yield by 2050s relative to the baseline (1981–2010) due to climate change. In this study, the difference in crop models was identified as a major source of uncertainties compared to the differences in climate models as well as year-to-year variability. Sensitivity analysis showed that wheat yield was more sensitive to increased CO2 concentration and increased temperature than maize yield. The study highlights the use of multi-model approach and the need to design appropriate adaptation strategies particularly for wheat production.

Keywords: Ethiopia, Climate change, Crop model, Uncertainty, Multi-model

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 7 - Climate and global changes

P0 – 7 (EEF2019-13842) - ASSESSING VULNERABILITY OF SIX IBERIAN MOSS SPECIES ACROSS DIFFERENT CLIMATE CHANGE SCENARIOS.

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4 - Departamento de Biodiversidad y Conservación, Real Jardín Botánico (CSIC-RJB), Madrid, Spain.

We aim at assessing the vulnerability to climate change of six soil moss species (*Dicranum scoparium*, *Hypnum cupressiforme*, *Homalothecium aureum*, *Ptychostomum capillare*, *Tortella squarrosa* and *Syntrichia ruralis*), common in the Iberian Peninsula. We evaluate this vulnerability through the response of each species to temperature and humidity using three complementary approaches: growth chamber experiments; outdoor cultures, and species distribution models (SDMs) projected to future climate change scenarios.

Growth chamber experiments: we measure the biomass accumulation along a humidity gradient using four temperature treatments (10–25 ºC). Outdoor experiments: we register moss colonization area in three localities following an altitudinal gradient in central Spain. SDM projections: we forecast moss species distributions using an ensemble of algorithms and scenarios.

We found a contrasting behavior of the different species. For instance, *D. scoparium* shows a consistent response in the three settings: this montane species has a better performance outdoors in the coolest locality, and also with the lowest temperatures in the growth chamber. In turn, *H. aureum* and *T. squarrosa*, with a Mediterranean distribution, show similar responses in outdoor experiments, but present notably different performance patterns in growth chambers.

The contrasting response of each species, the lack of consistency of some of them in the different settings point at an uneven scaling of the effects of their physiological tolerance range on their response to changing conditions, and to possible effects of microhabitats buffering the dominant climate of an area, thus allowing their exploitation by these mosses.

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 7 - Climate and global changes

PO – 8 (EEF2019-13962) - POTENTIAL ABILITY OF ARCTIC SOILS IN DIFFERENT SUCCESSIONAL STAGES TO STORE CARBON

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Arctic soils represent an important carbon (C) sink. Carbon from litter is incorporated into the soil by the activity of soil organisms, which is, however, limited by low nutrient availability in the Arctic. This limitation may vary along a gradient of nutrient contents during the succession of arctic soils and thus may affect the rate of degradation of litter and C storage in the soil. Due to expected climate changes, the proportion of nutrient-enriched habitats may increase, and, therefore, it is important to assess their potential role in C sequestration. Thus, we focused on soil C content in soil fractions along the successional gradient.

We sampled soils at five habitats: glacier forefield, soil crust, dry tundra, wet tundra and bird cliff. Soil was subjected to size and density fractionation, resulting in 5 fractions: coarse-particulate organic matter (cPOM), two macroaggregate fractions and two microaggregate fractions. Then we determined C content in all the fractions, as well as total C (TC) and dissolved organic carbon.

C content in cPOM, macroaggregate fractions and TC increased gradually along the successional gradient. This suggests that the C content of those fractions and TC is affected by the amount of litterfall. C content in microaggregate fractions was highest in dry tundra, which shows that dry tundra has a large abundance of mesofauna producing excrements containing microaggregates.

Of all examined habitats, dry tundra has the greatest potential for C sequestration in soil because C stored in microaggregates shows a high degree of stability.

Keywords: carbon sequestration, fractionation, particulate organic matter, soil aggregate, tundra

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 7 - Climate and global changes

PO – 9 (EEF2019-13709) - INTRASPECIFIC VARIATION IN THE RESPONSES OF THE ENDEMISM IBERODES LITTORALIS SUBSP. GALLAECICA TO EXPERIMENTAL CLIMATE CHANGE

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In the context of global changes taking place is appropriate to determine how the vulnerable endemic species could be affected in the future. The objective of this work was to study how variations in climatic factors such as temperature and rainfall can affect demographic, phenological and functional traits of a species of special concern for conservation, the endemicthe endemic plant Iberodes littoralis subsp. gallaecica.". Specifically, we aimed to assess the level of intraspecific differences in these traits since this may be relevant for understanding the impact of climate change on this species.

In a plot established in Galicia (NW Spain), we tested the short-term responsiveness of five populations of I. littoralis to experimental changes in temperature and rainfall. Thirty-two subplots were assigned to represent the following climatic treatments: increased temperature, reduced rainfall, increased temperature with reduced rainfall, and control climate. We recorded demographic and phenological aspects and finally we analysed growth traits of this endemism.

We found that an increase of 2.5 ºC in temperature and the reduction of 30 % in rainfall, decrease the number and quality of seeds and the total biomass of I. littoralis. This study also demonstrated an important inter-population variability among the five populations studied.

This study suggests that the new climatic scenarios will negatively affect this species, increasing the likelihood of extinction. However, intraspecific trait variation may increase species resilience and eventually reduce the risk of extinction. The knowledge of population variability provides useful insights to design appropriate conservation strategies.

Keywords: climate change, demography, endemic plants, intraspecific variation, phenology

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 7 - Climate and global changes

PO – 10 (EEF2019-13977) - CLIMATE CHANGE IMPACT ON THE ICONIC BALKAN ENDEMIC ORCHID OPHRYS HELENAE RENZ (1928): MOVING SOUTH?

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Ophrys helenae (Renz, 1928 - Helen's Bee Orchid), is a Balkan endemic with a distribution center in Northwestern Greece, where it is locally common. It is a unique species, remarkable for its cherry-red labellum lacking a macula design. *O. helenae* is a shelter-mimic, in contrast to the characteristic sexual deception of other bee orchids. Recently, its distribution has been active and expanding east and south, with confirmed reports from East Attica and the Peloponnese. We used Species Distribution Models (SDMs), in order to explore possible future changes in the range of this species, for a timeframe of 50 years. *O. helenae* occurrence data were obtained from the most detailed database for orchids in Greece (Atlas of the Greek orchids). Geology, soil characteristics, as well as current and future climate data from three different Global Climate Models (GCMs) and two different Representative Concentration Pathway (RCPs) scenarios, were used in an ensemble framework. The resulting predictions depend strongly on the assumptions in the GCMs and RCPs, but always *O. helenae* is projected to experience considerable area changes. Moreover, in the majority of the scenarios investigated, the species is expected to become extinct in its current distribution center, and move to the southeast rather than to the north, contrary to the usual expectations. This further underlines the high variability in time and space of orchid distributions, and the need for conservation measures to adapt accordingly.

Keywords: orchids, Ophrys, orchid conservation, SDMs, Climate change

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 7 - Climate and global changes

P0 – 11 (EEF2019-13989) - SOLUBLE SUGARS FROM ACORNS OF QUERCUS ILEX SUBSP. ROTUNDIFOLIA INCREASE WITH ARIDITY

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The acorns of Quercus ilex subsp. rotundifolia are a relevant product of the montado, an important agro-forestry system in the Iberian Peninsula. The main components of acorns are carbohydrates, namely starch (ca. 60%) and soluble sugars (ca. 5-11% of sucrose, D-glucose and D-fructose). Despite Q. ilex being a species resilient in semi-arid environment, it can be affected by the decrease in water availability predicted by climate change scenarios. Thus, the aim of this study was to determine morphological and carbohydrate variation in Q. ilex subsp. rotundifolia acorns, along a spatial aridity gradient in Alentejo (Portugal), as a proxy for the temporal variations in aridity expected from climatic changes.

Acorns were collected from trees in six locations (five trees each), ranging from 682-522 mm of annual precipitation. More than eighteen acorns/tree were collected and weighted, and randomly subsampled for morphological determinations and enzymatic carbohydrate's assays.

Despite the variation in acorns from different trees at the same location, preliminary results show a tendency to heavier acorns in the locations with more precipitation: 5.0-10.4 g in Freixo (682 mm) and 4.3–7.7 g in Moura (522 mm). On the contrary, total soluble carbohydrates double with aridity (23-29 mg/g FW in Freixo; 40-59 mg/g FW in Moura), with particular significant variation in D-fructose. This can be related to the higher preference tendency for the acorns from Moura than Freixo, for human consumption, determined in a preliminary study with 60 inquiries.

Keywords: acorn, aridity, Q. ilex, soluble carbohydrates

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 8 - Marine ecology

PO – 1 (EEF2019-13871) - AQUIMAR - CONTRIBUTING TO SUSTAINABLE AQUACULTURE IN THE PORTUGUESE COASTAL WATERS

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2 - MARE-ULISBOA - Marine and Environmental Sciences Centre

Aquaculture is already responsible for roughly half of the global fish production and has been hailed has a solution to meet increasing food demands. However, there are severe negative ecological and socio-economical impacts that may arise from this growth, if not done in a sustainable way. While marine aquaculture depends on several ecosystem services and processes, it also has the potential to improve and support ecosystem services well beyond food-production. To this end, aquaculture growth must go hand-in-hand with the ecosystem natural capability, through sustainable and ecosystem-centric approaches. In Portugal, shellfish production dominates half the sector and most operations are small, yet highly concentrated, resulting in local impacts and overall low production. Nonetheless, there is high growth potential along the Portuguese coast due to its habitat diversity and good water quality. Thus, this is the ideal time to ensure its sustainability. AQUIMAR's goal is to provide technical-scientific background on the conditions of the Portuguese coastal waters needed to support and optimize the selection of potential locations for the implementation of sustainable aquaculture operations. Using historical data, satellite data and additional oceanographical missions, AQUIMAR will characterize coastal oceanographical, biological and geochemical conditions. The viability of introducing new species and the carrying capacity of each potential aquaculture location will also be assessed. Finally, an action plan towards the sustainable development of aquaculture at each location will be outlined. Collaborations will include stakeholders (e.g. aquaculture companies). AQUIMAR is expected to have a positive impact on aquaculture and promote the conservation of local ecosystems.

Keywords: aquaculture, Portuguese coastal waters, sustainability, environmental conditions

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 8 - Marine ecology

PO – 2 (EEF2019-13990) - FIELDECO FIELD ECOLOGY APPLICATION: A 1 ON 1 BETWEEN BIOLOGY AND INFORMATICS

Frederico Almada (Portugal)[1]; Diana Vieira (Portugal)[1]; Sara M. Cardoso (Portugal)[1]; Pedro Coelho (Portugal)[1]; José Cardoso (Portugal)[1]

1 - MARE - ISPA

Applications for mobile platforms and webpages to report data from field surveys are currently available for a diversity of purposes (e.g. gellyfish, marine litter). However, they are mostly focused on citizen science, requesting only a short description and a picture that must be validated by experts before that information is ready to be used. In other hand, applications available for researchers that are currently undertaking ecological surveys are either scarce, difficult to adapt to different types of studies/organisms or cannot be afforded unless funds are available from an ongoing research project. We have designed a mobile application to help us in a long-term project monitoring ichthyofauna in intertidal areas. This tool was prepared keeping three main objectives in mind: it must be open source, the workflow must be straightforward and easy to adapt to different types of ecological studies. With this app, we can: collect survey metadata, species abundances in different areas/subareas, individual biometric data, update current species list, take pictures of sampled organisms, register sex and age of each individual and automatic labelling of samples. With FieldEco we spend less time managing data, decrease or eliminate errors in the database with autocomplete and rule book functions and eliminate missing values in the database due to field work rush. Future plans exist to integrate this application with a database that provides dynamic reports in a webpage using a Python library and also perform predictive analysis with this data.

Keywords: Ecological surveys, Mobile applications, Ichthyofauna monitorization, FIsh database

31/07 | 12h10
POSTER SESSION II
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystems

PO – 3 (EEF2019-13889) - PHYTOPLANKTON COMPOSITION PATTERS IN TAGUS ESTUARY, PORTUGAL USING HPLC PHYTOPLANKTON PIGMENTS

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Tagus estuary (Portugal) is one of the largest estuaries in Europe, a example for the need for achieving the sustainable use of ecosystems, as it is by Lisbon, the capital city, and it must provide a diversity of services: Porto de Lisboa, industrial, agricultural, fisheries and tourism activities, whilst comprising a natural park. A long-term survey has been occurring since 1999 to study the phytoplankton biomass and composition and environmental parameters, as part of a monitoring program of the Central de Tratamento de Resíduos Sólidos Urbanos - S. Joao da Talha in Tagus Estuary. Several publications have been done, identifying the driving forces which control phytoplankton biomass and productivity and characterizing seasonal and interannual patterns. The present work summarizes some results from the long-term series and focuses on the last years, with the aim of evaluating patterns and ranges of chlorophyll a and HPLC in order to monitor these parameters in situ and and by satellite remote sensing. Sampling was done monthly or bimonthly during ebb tide of neap tides, in the mid and upper estuary. Physical parameters were determined and surface water was sampled for the analysis. From 1999 till early 2018, the average chlorophyll a is 3,8µgL-1. The maximum values are always during spring/summer and the minimum in winter. The results obtained showed a consistent seasonal pattern with a unimodal peak occurring in spring or early summer, diatoms being the main bloom-formers. Regarding phytoplankton composition, diatoms were the most abundant group, which is a sign of an healthy estuary.

Keywords: Monitoring program, Tagus estuary, Chlorophyll a, photosynthetic pigments, HPLC

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

P0 – 1 (EEF2019-13864) - UNCOVERING THE ASSEMBLY PROCESSES UNDERLYING THE DYNAMIC EQUILIBRIUM MODEL IN AN ARID ECOSYSTEM

Víctor Escobedo (Chile)[1]; Rodrigo Rios (Chile)[1]; Ernesto Gianoli (Chile)[1,2]

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Dynamic Equilibrium Model (DEM) proposes interactive effects between disturbance and productivity on diversity and plant invasion. Although DEM is supported for local diversity, its scope for invasion as well as its assembly processes are poorly understood. Here we used functional dispersion patterns (convergence vs. divergence), the Grimes' CSR-theory and the relative importance of species turnover (SP), intraspecific trait variability (ITV) to identify assembly processes from 30 communities, which are located along disturbance gradients caused by an endemic rodent found within three sites differing in aridity across the coastal desert of North-Central Chile.

We found interactive effects between disturbance and aridity on functional dispersion and CSR-strategies as well as on local and exotic richness. At the least-arid location, disturbance promoted functional convergence, favoured an R-strategy and increased exotic richness, whereas local diversity showed a concave relationship with disturbance. At the intermediate-arid location, disturbance decreased functional convergence, favoured an S-strategy and did not change exotic richness, whereas local richness showed a concave relationship with disturbance. At the most-arid location, disturbance reinforced convergence, conserved an S-strategy, decreased local richness and did not change exotic richness. In addition, the association between SP and ITV changed from negative to positive across sites, suggesting that disturbance reinforced habitat filtering as aridity increases.

We provide evidence that disturbance reinforces habitat filtering as aridity increases, favouring S and R strategies. We found support for DEM's expectations since intermediate level of disturbance often increases local richness as aridity increases, whereas exotic richness only increased by disturbance at low aridity.

Keywords: CSR-theory, habitat filtering, soil disturbance, arid ecosystem, plant invasions

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 2 (EEF2019-13876) - EFFECTS OF FOREST CERTIFICATION ON SHRUB AND GRASSLAND DIVERSITY OF CORK OAK WOODLANDS

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The Forest Stewardship Council (FSC) is the dominant forest certification scheme applied to cork oak (Quercus suber) woodlands in Portugal. Certified estates are required to have conservation zones for biodiversity conservation, where livestock grazing, a common land-use in cork oak woodlands, is halted or reduced.

Our main goal was to evaluate the effects of conservation zones on the plant community of a cork oak woodland, in Portugal. We compared areas delimited as conservation zones with remaining areas. We measured oak stand biometry (tree density, DBH and height, measured in 2500 m2 circular plots), shrub and herbaceous species cover, height and diversity (measured using the line- and point-intercept methods, along six 20 m long transects).

Our results showed significantly higher shrub species richness in conservation zones ($p<0.01$) but higher herbaceous species richness in non-conservation areas ($p<0.01$). Shrub cover and height were significantly higher in conservation zones ($p<0.01$) and increased with age of conservation zone establishment. Conversely, herbaceous cover was higher in non-conservation areas ($p<0.01$) but no significant differences in height were observed.

These results were mostly driven by the strong dissimilarities in species composition and structure of plant communities in conservation zones with longer period since establishment and non-conservation areas with sown pastures. In conservation zones, greater shrub cover and height may reduce herbs' cover and species richness but promote greater habitat heterogeneity. Consequently, these areas may be supporting greater biodiversity within certified estates, although effects depend on time since establishment.

Keywords: Sustainable forest management, Montado, Biodiversity, Conservation zones

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 3 (EEF2019-13669) - ASSESSMENT OF THE FUNCTION OF A MANGROVE FOREST IN RESTORATION PROCESS AS FISH NURSERY.

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Mangroves are recognized as nurseries for several fish species driven by high levels of primary production and the complex root system. The loss of ecological functions caused by anthropogenic disturbances has led to restoration efforts aimed to recovery the ecosystem´s functions. The objective of the study was to compare the function as refuge and food source of two mangrove areas (restored/reference) in the Mexican Caribbean. Fish were collected bimonthly (August 2017 – July 2018) in four sites within each area to compare the community structure (relative abundance, diversity, evenness) and function (trophic guilds). Fish species were grouped into ecological categories (estuarine, marine, and freshwater). Hydrological variables (pH, salinity, dissolved oxygen concentration and temperature) were measured. A total of 1055 organisms of 15 species were obtained in the restored area, and 785 fishes belonging to 23 species were captured in the reference site. Diversity was higher in the reference area (H'=1.95). Results show that estuarine species are the main component of the restored area (70%) while marine species were abundant in the reference area (47%). Analysis of stomach contents of common species (*Atherinomorus stipes*, *Eucinostomus gula*, *Floridichthys polyommus*, *Gambusia yucatana*, *Gerres cinereus*, *Lutjanus griseus*, *Mayaheros urophthalmus*, *Poecilia mexicana* and *Sphoeroides testudineus*) shows significant differences in diet composition among species, being more diverse in fish from the reference area. A canonical correspondence analysis identified salinity, temperature and pH as the abiotic variables relevant for species distribution. These findings suggest that shelter and feeding functions in the restored area are recovering for fishes.

Keywords: Mangrove fishes, Mexican Caribbean, Ecological functions, Trophic ecology, Mangrove restoration

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 4 (EEF2019-13776) - FOREST AND RIPARIAN LANDSCAPE CONNECTIVITY AT SUDOE SPACE– THE PROJECT CERES

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4 - Office National des Forests (ONF);
5 - Centre Regional de la Propriete Forestiere (CRPF-OCCITANIE);
6 - Fundación Interuniversitaria Fernando González Bernáldez para los Espacios Naturales (FUNGOBE);
7 - Centre Tecnologic Forestal de Catalunya (CTFC);
8 - INRA;
9 - Fundacion Centro de Servicios Y Promocion Y de su Industria de Castilla y Leon (CESEFOR);
10 - Centre Regional de la Propriete Forestiere (CRPF-NOUVELLE AQUITAINE)

CERES is an INTERREG-SUDOE project that aims to improve the overall landscape connectivity, at SUDOE space, in order to maximize biodiversity and the provision of Ecosystems Services. CERES focuses on Ecological Relevant Units (ERU), defined as key forest and riparian vegetation elements able to maintain and/or enhance the structural and functional connectivity. The project develops over distinct SUDOE matrices (vegetation types/ecoregions) and at different spatial scale of analysis (regional and local level) collecting biological and environmental data in situ and remotely. The consortium includes an international (French, Spanish and Portuguese) and multidisciplinary team, with public institutes, forest production associations, university schools and research institutes.

The project started by harmonizing the methodological framework for the structural and connectivity analysis between partners. ERUs were defined and mapped in distinct pilot projects (case-studies) using a combination of available land-use/land-cover data detailed by visual classification of World Imagery Layer (50cm of spatial resolution). ERUs were characterized based on a set of attributes: a) typology (linear vs non-linear), b) location (riparian and non-riparian), c) vegetation structure (woody and non-woody) and d) shape configuration (area/perimeter). Ants, dummy caterpillars and chiropterans were selected as key biological communities since they simultaneous provide biodiversity measures (richness and abundance) and ecosystem services (pest predation, seed dispersal and soil enrichment).

A graph theory approach will be used for the connectivity analysis while an empirical modelling approach using generalized linear models will be developed to link ERU connectivity and spatial configurations with management actions conducted in forests and riparian systems.

Keywords: Forests, Riparian forests, Landscape connectivity

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 5 (EEF2019-13288) - DIFFERENTIATION IN MICRO HABITAT USE AND FACTORS AFFECTING INTERANNUAL ABUNDANCE OF THREE CONGENERIC TENEBRIONID BEETLES IN A SEMI-ARID SCRUBLAND

Gerardo Gutiérrez (Chile)[1,2]; Ernesto Gianoli (Chile)[1]; Rodrigo S. Rios (Chile)[1]; Julio R. Gutiérrez (Chile)[2,3]; Peter L. Meserve (United States of America)[2,4]; Douglas A. Kelt (United States of America)[5]

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5 - Department of Wildlife, Fish, and Conservation Biology, University of California, Davis, USA

In a semiarid scrubland in central Chile, three endemic tenebrionid beetle species from the genus *Gyriosomus* (*G. hoppei*, *G. luczoti* and *G. freyi*) show marked variation in abundance across years, and a clear pattern of greater abundance of *G. hoppei*. These species show differential microhabitat distribution (below the shrub canopy vs. open spaces). Thus, *G. luczoti* spends more time below the canopy, *G. freyi* is found exclusively in open spaces, and although *G. hoppei* prefers open spaces, it is the more abundant species in both zones. Here we aimed at explaining those patterns of distribution and abundance. We experimentally evaluated differences in tolerance and thermal preference, estimating with these data the amplitude and overlap of thermal niches. *G. freyi* preferred higher temperatures than the others species, and *G. luczoti* was more tolerant to low temperature and less tolerant to high temperature. *G. hoppei* had an intermediate position in the thermal niche axis. Regarding patterns of interannual abundance, a multiple regression analysis showed that annual precipitation together with mean September temperature (but not herbaceous vegetation cover) were significant predictors of *Gyriosomus* species abundance. This research shows the role of (micro) climate factors for determining tenebrionid beetle distribution and abundance in arid ecosystems.

Keywords: Thermal niche, ectotherms, tenebrionids

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 6 (EEF2019-13795) - ASSESSING SPATIAL AND TEMPORAL GAPS IN THE DISTRIBUTIONAL INFORMATION ON IBERIAN MOSSES

Cristina Ronquillo (Spain)[1]; Nagore Medina (Spain)[2]; Manuel Molina-Bustamante (Spain)[2]; Vicente Mazimpaka (Spain)[2]; Joaquín Hortal (Spain)[1,3]

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3 - Centre for Ecology, Evolution and Environmental Changes (cE3c), Faculdade de Ciências, Universidade de Lisboa, Portugal

Objectives: Evaluate the spatial and temporal biases in the publicly available data on the geographic distribution of Iberian bryophytes.

We compiled and processed the species occurrence data for the phylum Bryophyta available through Biodiversity Information Systems for Spain, Portugal and Andorra. We gathered additional geospatial data for records with poorly defined locations, as well as data on the taxonomy and ecological preferences of all species. We characterized the process of inventory through temporal species accumulation curves. Then, we identified well-sampled areas using sample coverage statistics. Finally, we assessed the spatial and environmental coverage provided by the surveys through p-median analyses.

We compiled 85,006 occurrences, that were reduced to 84,736 records with adequate geospatial information for Iberian bryophytes after cleaning. The initial c. 1200 different taxa were crossed with published checklists, shortening them to 811 records for the Iberian Peninsula. Surveys were scarce until the 1970's, when a steady increase in sampling effort starts, followed by a remarkable decrease since 2007. Besides, we also detect an uneven geographical coverage of data, with a strong sampling bias towards mountains, North Portugal and most of northern and eastern Spanish coasts (specially Catalonia).

The strong decrease in sampling effort after 2007 contrasts with the large knowledge gaps in the publicly available data for Iberian mosses. Given the limited resources available for data collection it is necessary to perform sampling campaigns explicitly directed to increase information coverage at the poorly known inner plateaus and south-western Iberia.

Keywords: Bryophyta, Biodiversity Databases, Historical Information, Knowledge Gaps, Wallacean Shortfall

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 7 (EEF2019-13812) - EFFECT OF RHIZOBIAL INOCULATION AND LIGHT LIMITATION ON GROWTH AND REPRODUCTION OF FOUR LEGUMES FROM LIGHTED AND SHADED ENVIRONMENTS.

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Plants respond with a sink stimulation of photosynthesis when colonized with bacterial root symbionts, compensating costs of carbon allocation to maintain the beneficial microbes. However, constraints may arise under light limitation light excess when plants cannot regulate their photosynthesis. We hypothesize that under such conditions the costs for maintaining the symbiosis outweigh the benefits; under that scenario, the putative mutualist microbes could turn into parasites, resulting in reduced plant growth and reproduction.

We have used *Coronilla juncea* L., *Ornithopus compressus* L., *Trifolium repens* L. and *Vicia sativa* L. as experimental plants, we applied three levels of light (full light, intermediate and natural) and microbial inoculation (sterile conditions, rhizobial inoculation). We quantified plant performace in terms of height, number of branches, root and shoot and biomass, shoot:root ratio and nodules number and weight as well as generative plant traits (flowers and pods). The election of plants was based on their natural distribution with *Ornithopus compressus* and *Vicia sativa* thriving in shaded areas, whereas *Trifolium repens* and *Coronilla juncea* grow in well illuminated ones.

As expected, shaded non-inoculated plants were smaller, had less branches and total biomass, fewer flowers, and seeds than inoculated plants. However, the positive effect derived from the rhizobial symbiont was not constant and neither as effective as expected. The effect of light irradiance was more prominent in all plant species.

Our study suggests that rhizobial colonization can support plant performance under intermediate stresses, whereas strong light radiation drives the interaction to be parasitic, rather than positive for both.

Keywords: Nitrogen fixation, microorganisms, light availability

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 8 (EEF2019-13834) - EFFECTS OF THE ERADICATION OF INVASIVE MAMMALS ON THE TROPHIC NICHE WIDTH OF THE BERLENGA WALL LIZARD (PODARCIS CARBONELLI BERLENGENSIS)

Sara Nunes (Portugal)[1]; Mário Ferreira (Portugal)[2,3]; Marta Sampaio (Portugal)[2]; Ricardo Rocha (Portugal)[1]; Rui Rebelo (Portugal)[1]

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Islands are isolated systems and as result have a high percentage of endemic species, with reptiles being an important part of the terrestrial vertebrates. The main threat to the insular biodiversity is biological invasions, mostly by mammals, which alter or compete for the resources used by the native species. Conservation of insular faunas often involves the eradication of invasive mammals, after which the populations of native species tend to recover. Berlenga island was the target of a rabbit and rat eradication project. The Berlenga wall lizard, one of the island's endemics, is a generalist insectivorous species with seasonal diet variations. We aimed to characterize the variations in the trophic ecology of this lizard as result of the mammal eradication using stable isotopes. Changes in the trophic niche and the level of diet specialization were evaluated by comparing samples (tail tips) collected on the last year before the eradication (2016) and on 2018. There was an increase in the amplitude of the trophic niche in 2018, which presupposes a diet generalization. We also compared the body dimensions (SVL, head and weight) of a 2018 sample, with data from 1980. The results showed that in 2018 younger age groups were more represented than in 1980, suggesting that juveniles have a higher survival due to the removal of predatory mammals.

Keywords: isotopic analysis, island reptiles, population recovery, diet, conservation

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

P0 – 9 (EEF2019-13840) - PRELIMINARY RESULTS ON FOREST HEALTH RELATED ECOSYSTEM SERVICES PROVIDED BY RED WOOD ANTS AND INSECTIVOROUS BIRDS IN HUNGARY

Csaba Béla Eötvös (Hungary)[1]; Ágnes Fürjes-Mikó (Hungary)[1]; Csaba Gáspár (Hungary)[1]; Imola Tenorio-Baigorria (Hungary)[1]; Márton Paulin (Hungary)[1]; Sándor Csősz (Hungary)[2]; Anikó Hirka (Hungary)[1]; György Csóka (Hungary)[1]

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2 - MTA-ELTE-MTM Ecology Research Group, Budapest, Hungary

Predation is one of the most important ecological functions through its community-structuring effects. The lack of predators such as ants and birds can alter the total abundance and the diversity of the prey species. The natural control of the defoliating species is one of the most important ecosystem service from point of forest health. We conducted our study in two habitats: first where we were able to study the impacts of presence and absence of red wood ant (Formica rufa group) and second where is no natural nesting possibility for insectivorous birds such as great tit (Parus major), Eurasian blue tit (Cyanistes caeruleus) and collared flycatcher (Ficedula albicollis). Here we placed nest boxes to maximize the abundance of nesting birds artificially in contrast to the control area. We studied the abundance of the most important defoliating insect group, butterflies (Lepidoptera) with frass collecting during late spring and summer, and the abundance and the diversity of them with sticky traps from autumn until early spring. The lack of red wood ants had no significant effect on the frass amount. We found significant difference in winter moth abundances in case of lack of ants, but not in case of birds. Red wood ants are reliable predators of Lepidoptera species. In case of birds, the result can be misleading, because this was the first year when the nest boxes were on their place.

Keywords: ant, bird, forest, Lepidoptera, ecosystem services

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 10 (EEF2019-13844) - THE BIODIVERSITY OF TWO ERYCINA ORCHIDS AT CHROMOSOME SCALE

Song-Bin Chang (Taiwan)[1]

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The two reported cytotypes of Erycina pusilla were collected from Ecuador (2n = 10) and from Surinam (2n = 12) respectively. We have examined the karyotypes of the two cytotypes and the fertility test of their hybrids. We found they are in fact two difference species based on chromosome arm ratios, heterochromatin patterns, the presence of satellite chromosomes and as well as the number and location of rDNA and telomeric repeats. The different karyotypes are extensive due to multiple chromosome rearrangements. In addition, we made F1 hybrids between the parents with the two different chromosome numbers and found all hybrids are sterile. The evidence of hybrid sterility and extensively rearranged chromosomes would support the hypothesis that these two reported cytotypes are two different species even though the morphologies of vegetative and reproductive organs are indistinguishable. The further study will be conducted to clarify if two species with different chromosome numbers is associated with geographic distribution. The biodiversity of orchids can be found in such close species at chromosome scale.

Keywords: Erycina orchids, Chromosome rearrangement, Karyotype, Speciation , hybrid sterility

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 11 (EEF2019-13994) - NUTRIENTS ACQUISITION OF UNDERGROUND AND MYCOHETEROTROPHIC ORCHID POGONIOPSIS SCHENCKII (ORCHIDACEAE: VANILLOIDEAE)

Denisele Neuza Aline Flores-Borges (Brazil)[1,2]; Juliana Lischka Mayer (Brazil)[1]; Cristina Máguas (Portugal)[2]

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The Orchidaceae have great diversity and an intimate association with fungi. Fungi have an important role in the germination of Orchidaceae because of the extremely small and endospermless seeds, in this stage orchids are completely dependent on the fungus for nutrition. Adult orchids may be autotrophic and photosynthetic or mycoheterotrophic and remain totally fungal dependent for their nutrition.Among the mycoheterotrophic orchids are Pogoniopsis schenckii, endemic to the Atlantic Forest, aclorophylated, has between 8 and 15cm tall and has modified leaves in bracts. The aim was to identify the dynamics of the C and N stable isotopes in this plant. Phloem of orchids and photosynthesizing plants close to them in a radius of 2m was analyzed, as well the soil and litter of the plots in which the orchids were found. δ13C and δ15N in the samples were determined by continuous flow isotope mass spectrometry (CF-IRMS). The results were analyzed in SPSS statistical software. No significant effects were found between the amounts of C and N in the plants. The mean δ13C found in the mycoheterotrophic plants were slightly below the photosynthetic plants. For δ15N the values found exceed those commonly found in plants, this is an indication that nutrition in P. schenckiihappens in a symbiotic way from the fungus to the plant, but also by the lysis of the fungal hyphae that are inside the cells of the plants and subsequent absorption of these nutrients. Project funded by FAPESP 2015/26479-6. CAPES scholarship to first author.

Keywords: Orchidaceae, Aclorophylated plants, Fungal dependent, Terrestrial orchid, Stable isotopes

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO - 12 (EEF2019-13911) - TRANSLOCATION: A CONSERVATION TOOL TO CREATE A CORY'S SHEARWATER FIRST PEST-PROOF COLONY IN CORVO ISLAND, AZORES, PORTUGAL

Tania Pipa (Portugal)[1]; Carlos Silva (Portugal)[1]; Barbara Ambrós (Portugal)[1]; Sandra Hervías (Portugal)[1]; Nuno Oliveira (Portugal)[1]; Pedro Geraldes (Portugal)[1]; Rosemary Sigger (Portugal)[1]

1 - SPEA - Portuguese Society for the Protection of Birds

The Azores has the largest breeding population of Cory's Shearwater *Calonectris borealis* in the world which, as most of the seabird species, is very vulnerable to invasive alien species, habitat loss and light pollution. In Corvo Island, the main threat to Cory's Shearwater colonies is predation by introduced feral cats *Felis silvestris* catus and black rats *Rattus rattus* which reduce its breeding success. In 2012, artificial nests were created inside the first pest-proof fence in Europe. From 2012 to 2017, eight chicks were translocated annually to the artificial burrows to promote site imprinting. Chicks were hand-fed with a natural diet (Sardines *Sardina pilchardus*, Chub Mackerels *Scomber japonicas* and Horse mackerel *Trachurus picturatus*) and biometric measures (wing and weight) were taken from the translocated chicks and control chicks in natural burrows to compare chick growth until they fledged.

On average, 80% of the translocated chicks fledged successfully and chick growth did not differ between translocated and control chicks.

Four years after translocations, in 2016, two breeding pairs breed inside the pest-proof fence, presence of adults will increase nest occupation. We hope in the near future the young fledging from artificial nests will return to breed. However Cory's shearwater low survival rate on early stages can constrain the translocation success. On-going management will benefit Cory's Shearwater and as well other species, more threatened on the island such as the Macaronesian Shearwater *Puffinus lherminieri*, Manx Shearwater *Puffinus puffinus*, Band-rumped Storm-petrel *Hydrobates castro* and an endemic species Monteiro's Storm-petrel *Hydrobates monteiroi*.

Keywords: Calonectris borealis, seabird translocation, invasive mammals predators, seabird colony, chick growth

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 13 (EEF2019-13916) - THE EFFECT OF CONTROL MEASURES OF THE EXOTIC INVASIVE ACACIA SPECIES ON EUCALYPTUS GLOBULUS PRODUCTIVITY

Inês Mirra (Portugal)[1]; Carlos Valente (Portugal)[2]; Maria José Silva (Portugal)[3]; Cristina Antunes (Portugal)[1]; Cristina Marques (Portugal)[2]; Cristina Máguas (Portugal)[1]

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Tree invasions can cause major ecological problems, such as changing native plant community, composition and altering landscape structure. In commodity production landscapes, they may also impact vegetative growth and yield in crops. Indeed, competition for water, sunlight and nutrients is often associated with invasive species. Examples of highly competitive trees invading eucalypt plantations in Portugal are Australian acacias. Some invasive acacias have spread and altered native ecosystems, threatening the economy and ecology in affected regions. Such is the case of *A.longifolia* and *A.dealbata*, which are commonly found in the vicinity and inside of forest plantations.

This study aims to quantify the impact of two Australian *Acacia* species (*A.longifolia* and *A.dealbata*) on the productivity of *E.globulus* stands along the eucalypts acreage in Portugal. Invaded *E.globulus* stands were located along gradients of precipitation, temperature and soil conditions, and tree growth was compared after Acacia clearing was implemented.

Results indicate that the impact of *A.longifolia* was dependent on climate, whereas *A.dealbata* more consistently impacted *E.globulus* biomass independent of climate. Moreover, our findings suggest that the *E.globulus* volume and growth rate was different among the stands invaded by *A.longifolia* or *A.dealbata*. The productivity of *E. globulus* was significantly higher under both acacia species control, with increases in the order of 33% and 53% for *A.longifolia* and *A.dealbata*, respectively. Concerning the efficiency of the control measures, we observed significant differences between acacia species and forest stand age where the management actions took place.

Keywords: Invasive species impact, *Acacia longifolia* and *Acacia dealbata*, Competition, *E. globulus* plantations productivity, Forestry management

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 14 (EEF2019-13968) - ACACIA LONGIFOLIA: THE DECEIVINGLY BEAUTIFUL PLANT

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Acacia longifolia (Andrews) Willd. is an Australian leguminous species invasive worldwide, in particular in the European Mediterranean areas, South Africa, California (USA) and recently Brazil. Its invasiveness is linked to many factors, including high number of seeds, easy growth and symbiotic promiscuity with the soil's rhizobia. Additionally, *A. longifolia*'s seeds are extremely resistant, capable of remaining dormant for decades. Their germination is promoted by the heat shock caused by forest fires, which are abundant and severe in the summertime. The invasive process of *A. longifolia* is still poorly understood, and its invasion is a serious environmental threat. It is desirable that researchers, stakeholders and policy makers share information at a global scale and use *A. longifolia* as a model species to test theories and management tools. Moreover, there is a clear tendency to develop digital platforms where information can be freely available. In this project, we aim to develop an online platform to gather information regarding *A. longifolia* (e.g. distribution, molecular or phenological data, invasion control) and making it easily available. For that, we performed major fieldwork campaigns in two invaded ranges –South Africa and Brazil – in order to collect environmental data and samples to join a previous collection from the Iberian Peninsula. These samples were analyzed with microsatellites, while epigenetic studies and comparison with the native range will be performed in the future. This is an effort to bring together different fields and hopefully promote future collaborations in order to identify strategies that will prevent *A. longifolia*'s invasion.

Keywords: Invasive plant species, Acacia longifolia, Online Platform, Microsatellites

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

P0 – 15 (EEF2019-13983) - AFTER THE FIRE: WHERE DOES EUCALYPTUS GLOBULUS GO?

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1 - cE3c - Centre for Ecology, Evolution and Environmental Changes

In Portugal, the most planted forest species is the exotic *Eucalyptus globulus*. Plantation management practices can limit the natural recruitment of this species, however unmanaged plantations are very common and in these cases there may be the risk of seedling dispersion. Due to post-fire adaptations, eucalyptus can resprout from lignotuber after fire events and also present high recruitment by seeds stored on the canopy. In present days, there is a main concern related with the post-fire natural regeneration in eucalyptus stands due to the occurrence of large densities of eucalyptus seedlings in some burned areas. So far, our knowledge is scarce and it could contribute for future management proposals aiming the conservation of natural habitats and biodiversity. This work's aim is to assess the natural regeneration of *E. globulus* after fire events in different forest management conditions. This was done by evaluating seedling recruitment near plantations, using a spatial gradient of distance to plantations edge. In total, 500 plots (3 x 3 m) were sampled in Northern and Central Portugal and different characteristics were considered: plantation type (managed and unmanaged), climatic conditions (total precipitation and temperature) and fire season (late spring and autumn, 2017). Eucalyptus seedlings cover and density were counted like other site variables such as vegetation richness and cover, slope and soil properties. Overall, *E. globulus* recruitment in the adjacent areas was higher in unmanaged plantations and after the fire occurred during autumn season.

Keywords: Forest management, Fire, Exotic species

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 16 (EEF2019-13922) - SMALL-SCALE EFFECTS OF BIOTIC REFUGES ON PASTURE VEGETATION

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4 - MTA Centre for Ecological Research, Institute of Ecology and Botany;
5 - Kiskunság National Park Directorate

Positive and negative interactions co-occur in plant communities and often shifted from competitive to facilitative direction under grazing, because unpalatable plants provide a protection from grazing for other species. Nevertheless, we can also assume a competitive trade-off cost for plants that grow together with shrubs. In this study, we assessed the small-scale effects of dwarf shrubs (30–40 cm in diameter) on species density and flowering success of underneath species. Specifically, we considered three types of microsites: (i) shrub interior, (ii) edge of shrub, and (iii) open pasture. We surveyed these three types of microsites using 10 × 10 cm sized plots both in grazed and ungrazed meadow steppes, in Hungary. The highest species density was found at the edge of shrubs, both in grazed and ungrazed vegetation. Meanwhile, species density did not differ between shrub interiors and the open vegetation. In grazed vegetation, flowering success of species was higher in shrub interiors and edges than in the open pasture, but no significant trend was observed for this measure in ungrazed vegetation. Our results indicate that small-sized shrubs protect other plants from herbivores and that the edge effect plays an important role for the maintenance of high small-scale species diversity in pastures. In contrast to previous studies, we did not detect competitive effect of small-sized shrubs. Overall, our results underline the beneficial effect of biotic refuges in pastures and we suggest that retaining a sparse population of small-sized native shrubs is advantageous from a conservation point of view.

Keywords: edge effect, facilitation, grazing, plant-plant interactions, unpalatable plants

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 17 (EEF2019-13961) - INFLUENTIAL NEIGHBOURS: SEEDS OF DOMINANT SPECIES AFFECT THE GERMINATION OF COMMON GRASSLAND SPECIES

Fenesi Annamária (Romania)[1]; Kelemen Kinga (Romania)[1]; Sándor Dorottya (Romania)[1]; Ruprecht Eszter (Romania)[1]

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Germination is the prerequisite of successful establishment in plant communities. The cueing mechanism of seeds is so fine-tuned that even neighbouring seeds can affect their germination. It has been proposed that seeds of dominant species or of taxonomically related species are more likely to affect the germination of subordinate species. Therefore, we studied how seeds of dominant and subordinate grassland species affect the germination of grassland species, with a special emphasis on their taxonomic relatedness with neighbours, under optimal and stressed environmental conditions.

In a controlled experiment, three common Asteraceae species were used as target species, and two dominant species and four subordinate species as neighbouring species. We assessed the rate and speed of germination of target species with and without seed neighbours in petri dishes, under optimal water conditions or under drought stress.

Under optimal water conditions, particularly the seeds of the two dominant Poaceae species affected the germination of target species. Under drought stress, almost all neighbouring species altered the germination of two of the target species, enhancing or reducing their germination rate. We found several cases when the high density seed neighbourhood positively affected the germination of target species' seeds compared to the low density neighbourhood.

We found evidence that the status in a plant community (dominant or subordinate), but not the taxonomic relatedness influences the outcome of seed-seed interactions during germination. Under drought stress, the facilitative effect of the dominant species in high seed densities might help the recruitment of subordinate grassland species.

Keywords: seed-seed interaction, drought stress, dominant species, subordinate species, grassland

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 9 - Biodiversity and ecosystemsy

PO – 18 (EEF2019-13991) - ISO-INVA QUANTIFYING FOOD WEB DYNAMICS IN INVADED STREAM COMMUNITIES

Christos Gkenas (Portugal)[1]; Julien Cucherousset (France)[2]; Filipe Ribeiro (Portugal)[1]; Joao Gago (Portugal)[1,3]; Maria Judite Alves (Portugal)[4,5]; Joana Martelo (Portugal)[6,7]

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4 - Museu Nacional de Historia Natural e da Ciência, Universidade de Lisboa, Lisboa;
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7 - Centro de Ecologia, Alterações Ambientais e Evolução (cE3c), Faculdade de Ciências, Universidade de Lisboa, Campo Grande, 1749-016 Lisboa.

Invasive species are a key driver of global environmental change and have major negative impacts on biodiversity and ecosystem processes. Many invasive fish are functionally distinct from native fish and may generate new biotic interactions in invaded ecosystems. This may have strong impacts on the architecture of food webs, leading to trophic dispersion of food webs through increased food chain length. Here we will present the project ISO-INVA that aims to evaluate how invasive fish alter the structure of stream food webs and how environmental influences may strength their impacts. First, we will evaluate the long-term feeding relationships between museum-archived and contemporary fish specimens based on stable isotope analyses over a 30-years period. Second, we will determine and quantify changes in food web structure in contemporary assemblages along gradients of increasingly invaded fish communities and environmental change, using stable isotopes to evaluate the extent of trophic niche contraction and expansion for native and invasive species. Third, we will quantify intraspecific variation in functional traits in native and invasive species using morphological analysis to identify the functional attributes of fish that drive impacts on invaded communities. Finally, because insights into food web change are critical for the effective management of Mediterranean streams, we will spread the gained knowledge among stakeholder groups, management agencies and the general public.

Keywords: Mediterranean streams, Fish assemblages, Stable Isotope Analysis, Biotic interactions

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 10 - Land degradation and ecosystem restoration

PO – 1 (EEF2019-13862) - ECOPHYSIOLOGICAL CHARACTERIZATION OF METALLOPHYTE SPECIES CANDIDATES FOR PHYTOREMEDIATION

Inês Domingues (Portugal)[1]; Helena Serrano (Portugal)[1]; Otília Correia (Portugal)[1]

1 - Centre for Ecology, Evolution and Environmental Changes (CE3C), Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisboa

In the Iberian Pyrite Belt, the largest Iberian metalliferous area, past intense mining activities created degraded environments, with serious pollution problems. Most plant species find these environments inhospitable, but some species tolerate their high concentrations of toxic metals, therefore the adaptive strategies are highly important for these metallophyte species to thrive in metalliferous environments. This work takes selected species from contaminated sites and focus on determining their ecological and physiological fitness, thus creating knowledge for revegetation purposes and pursuing the UN's SDG15 for mining areas.

Seeds of eight species were collected from two contaminated sites and germinated in four substrates, with different contamination levels (non-contaminated, mixed, contaminated1, contaminated2). The germination rate, seedling growth and various ecophysiological parameters were recorded.

Overall, most species had higher germination in non-contaminated substrate; however, one Cistus species would not germinate at all. By preliminary NDVI analysis, the two Erica species performed better in the mixed soil and *Agrostis castellana* performed better in contaminated and mixed soils.

This work's results suggest that *A. castellana* has high germination potential in contaminated soils but shows better physiological performance in mixed substrate. The native species *E. andevalensis*, *C. ladanifer*, and *C. salviifolius* display promising potential as vegetation cover in one of the study's contaminated sites, but *A. Castellana* seems more adapted to revegetation of the other contaminated site. Further studies, still under development, will include in situ ecophysiological characterization of the species.

Keywords: Abandoned mines, Iberian Pyrite Belt, Performance, Plant cover

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 10 - Land degradation and ecosystem restoration

PO – 2 (EEF2019-13915) - REFORESTATION-ASSOCIATED CHANGES IN SOIL MICROBIAL COMMUNITY AND ITS CONTROL ON SOIL ORGANIC CARBON DYNAMICS

Chao Liang (China)[1]; Pengshuai Shao (China)[1]

1 - Institute of Applied Ecology, Chinese Academy of Sciences

Monitoring reforestation-induced changes in soil microbial community structure and its control on soil organic carbon (SOC) cycling may improve our understanding of microbe-mediated carbon transformation and our estimates of regional carbon sink capacities. Hence, the goal of this study was to examine whether soil microbial community varied among forest successional stages and further to explore how SOC was influenced by microbial involvements.

We collected soil and litter samples from five sites spanning an ecological restoration chronosequence, with average stand ages of ~20, 80, 120, 200 and ≥300 years, located in a temperate forest in the Changbai Mountain National Nature Reserve, China. We analyzed changes in soil organic matter properties by chemical and Mid-IR spectroscopy, and soil microbial parameters by 16S rRNA gene sequencing, phospholipid fatty acid and amino sugar biomarkers.

We found oligotrophic prokaryotic taxa were more common in earlier successional stages, and community diversity declined at later stages. Prokaryotic diversity was consistently higher in topsoil than subsoil. We observed generally consistent increases in microbial biomass, microbial necromass, and SOC with forest age, highlighting microbial modulation of SOC accumulation. Specifically, we observed a rapid increase in microbial necromass relative to bulk SOC in forests restored for 80-200 years, likely due to accelerated microbial turnover rates. Our results suggest reforestation serves as a long-term approach to offset CO2 emissions and enhances the capacity of soils to mitigate environmental changes by demonstrating that the microbe-derived C contributed to SOC stability.

Keywords: forest succession, microbial community, microbial necromass, biomarker, soil organic carbon

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 11 - Ecological networks

P0 – 1 (EEF2019-13622) - STUDIES ON ECOLOGICAL STABILITY OF ARTIFICIALLY AND NATURALLY RESTORED STREAMS IN KOREA USING A NETWORK APPROACH

Minyoung Lee (Korea, Republic of)[1]; June Wee (Korea, Republic of)[1]; Yongeun Kim (Korea, Republic of)[1]; Kijong Cho (Korea, Republic of)[1]

1 - Korea university

Ecological river restoration projects in Korea have been carried out focusing on urban streams. It is important for understanding restored urban streams as a new type of ecosystem in that they are closely related to humans, affecting man's own survival and their sustainable use. The purpose of this study is to investigate the ecological stability of restored streams in time and space using a network approach.

Two study sites, Cheonggye stream (CG) and Jungrang stream (JR), were selected which are the representative of artificially and naturally regulated restored streams in Seoul city. CG and JR food-webs were constructed based on biological monitoring data (2008-2017) and global biotic interactions (GloBI) data, being quantified using biomass flow. We analyzed ecological stability in time by measuring total system throughput (TST) and robustness and in space by measuring dissimilarity of pairwise networks with distance.

Robustness of CG and JR decreased and increased over time, respectively. JR had higher TST than that of CG during the entire period, indicating that JR remained larger than CG in terms of system size. Network dissimilarity in both streams increased as two networks were far apart and that of CG tended to increase more rapidly than that of JR. That means CG has low connectivity in the longitudinal dimension.

We found the naturally restored stream, JR, was still ecologically more stable than CG in time and space, but also the artificially controlled stream, CG, was quite robust and a well-operated stream.

Keywords: food-webs, urban streams, biological monitoring data, biomass flow, sustainable use

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 11 - Ecological networks

PO-2 - (EEF2019-14200) - THE IMPACT OF CLIMATE CHANGE ON THE PHENOLOGY OF PINUS PINASTER AITON. AND PINUS PINEA L. IN PORTUGAL

Mariana Ramos (Portugal)[1]; Helena Patrício (Portugal)[2]; Carla Pimentel (Portugal)[2]; Isabel Miranda (Portugal)[2]; Teresa Calvão (Portugal)[3]; Otília Correia (Portugal)[1]

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Objectives: The Portuguese forests represent almost 36% of the territory with Pinus pinaster Aiton. and Pinus pinea L. having a significant presence and influence on these unique ecosystems. Several climatic models predict that the Mediterranean region will have more frequent drought periods with higher temperatures and less precipitation, highlighting that the Iberian Peninsula could be one of the most vulnerable areas. Within this project we want to assess the effect of climate change on the morphology and phenology of this species.

Methods: The development of seasonal growth, phenology and morphological characteristics of P. pinaster and P. pinea, were monitored along a climatic gradient present in the Portuguese west coast. On the places selected, ten individuals of each species were studied and the phenological developments, the elongation of the shoot and leaf growth were systematically recorded. Additionally, three loggers iButton® temperature/humidity (DS1923) were installed to register climatic conditions at a local scale.

Results: Differences on phenology in the different studied places were found and a different timing on the evolution of the vegetative and reproductive components between the two studied species were also documented.

Conclusions: The climatic conditions seem to have an influence on the timing and development of the phenological stages, but it is crucial to continue with this monitoring for at least 2 more years. The survey of other factors, such as chemical composition of needles, are also an important future task that can explain how these species are affected by climate and how this can boost other disturbances, such as pests.

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 12 - Theoretical and evolutionary ecology

PO – 1 (EEF2019-13629) - REAL-TIME EVOLUTION UNDER CLIMATE WARMING: AN EXPERIMENTAL APPROACH IN POPULATIONS OF CONTRASTING BIOGEOGRAPHICAL HISTORY

Marta A. Santos (Portugal)[1]; Ana Santos (Portugal)[1]; Ana Sofia Quina (Portugal)[2]; Margarida Matos (Portugal)[1]; Pedro Simões (Portugal)[1]

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2 - CESAM-Ciências, Centre for Environmental and Marine Studies, Faculdade de Ciências, Universidade de Lisboa, Lisboa, Portugal.

Considering the current climate warming projections, it is crucial to understand the potential of organisms to adapt to warmer environments. Our team is now starting a detailed multi-level study of the real-time evolution of animal ectothermic populations under increasing temperatures. The main question is: "Are populations able to adapt quickly enough to increasingly warmer environments?" We will also test if populations of contrasting biogeographical history vary in their response. Specifically we will analyse, in a controlled setting, the evolution of *Drosophila subobscura* populations from two contrasting latitudes of the European cline, subjected to warming (including increases in both thermal mean and amplitude) and non-warming conditions. These populations (PT founded from Portugal and NL founded from Netherlands) have already been evolving in the lab at 18ºC for around 70 generations. The main goals are to analyse the thermal evolutionary response at the phenotypic, karyotypic and molecular levels. We here report the initial characterization of the adult performance (i.e. fecundity) of NL and PT populations at three different thermal environments (15ºC, 18ºC and 25ºC) in both the developmental and adult stage. Exposure to high temperature in the juvenile stage (but not in adults) had detrimental effects on fecundity. We also found differences in fecundity between populations when these experience lower temperatures in both juvenile and adult stages. Interestingly, in spite of the convergence between populations in their ancestral lab environment, here we found indications that differences in genetic background may be expressed when populations face new thermal environments.

Keywords: experimental evolution, climate warming, thermal adaptation, biogeographical differentiation, fecundity

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 12 - Theoretical and evolutionary ecology

PO – 2 (EEF2019-13910) - GENOME SIZES AND PHYLOGENETIC RELATIONSHIPS POINT OUT TO A RECENT DIVERGENCE OF CLOSELY RELATED SPECIES OF THE LIMONIUM VULGARE COMPLEX

Ana Róis (Portugal)[1]; Sílvia Castro (Portugal)[2]; João Loureiro (Portugal)[2]; Flávio Sádio (Austria)[3]; Laila Rhazi (Morocco)[5]; Miguel Guara-Requena (Spain)[4]; Ana Caperta (Portugal)[6]

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Cytological and genetic studies of Limonium vulgare and related species have been based on single species and specific geographical areas. In this study we investigated genome size, karyological and genetic diversity in samples from the Western Mediterranean, evaluating phylogenetic relationships among the species of this complex.

Flow cytometry was used to assess genome size on samples from natural populations of L. vulgare complex. Chromosome counts were carried out in plantlets germinated from seeds collected in the field. The internal transcribed spacer ITS1 of the nuclear rDNAs was used to determine ITS polymorphisms and the phylogenetic relationships within the complex.

Our study revealed that all species were tetraploid. Major differences were obtained in genome size, with L. narbonense having lower genome sizes than the other two species, with possible aneuploids being detected. Ten new ITS sequences from the three species were provided. Most species' populations showed unique ribotypes, with the highest ribotype diversity being observed in L. narbonense. One of the L. maritimum populations presented a closer genetic relationship with L. vulgare, whereas the other two seemed to be more related with L. narbonense.

Phylogenetic analyses corroborate that the studied species may represent a relatively early stage of divergence.

Keywords: Flow cytometry, Chromosome number, ITS nrDNA, Limonium vulgare complex, Phylogenetic relationships

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 12 - Theoretical and evolutionary ecology

PO – 3 (EEF2019-13643) - HOST PLANTS HAVE DRIVEN THE EVOLUTIONARY ORIGIN OF PREDATION-INDUCED MASQUERADE IN FLEA BEETLES (CHRYSOMELIDAE)

Yeray Folgar-Cameán (Spain)[1]; Carola Gómez-Rodríguez (Spain)[1]; Alexander S. Konstantinov (United States of America)[2]; Andrés Baselga (Spain)[1]

1 - University of Santiago de Compostela;
2 - United States Department of Agriculture

Mimicry can be associated with different evolutionary pressures affecting phytophagous insects on their host plants. The small herbivorous flea beetles (Chrysomelidae: Alticini) evolved a masquerading strategy by hiding themselves using their feeding damage. Colour and size similarities between beetles body and their leaf feeding damage may act as a defence that reduce predation by visually oriented predators. Here we analyse the evolutionary origin of this feature using the French fauna (292 species). We asked whether beetle characteristics (i.e. colour) have driven the type of damage the beetle produces or, alternatively, whether the type of leaf tissues have driven the colour of beetle species because of its propensity to being damaged in a particular way. We built a bipartite network of feeding interactions between beetle species and their host plant families. We first estimated network modules and then evaluated if the beetles within each module shared a common characteristic, colour tone or size, by comparing colour and size distributions within modules with null expectations. Feeding interactions among host plants were non-randomly distributed and highly modular. Around one third and one fourth of the modules showed significant differences in tone and size distribution, respectively, with null models. These results suggest that some plants taxa restrict the size and depth of beetle damage, driving flea beetles to evolve bodies with a closer resemblance in colour and size to their feeding damage as a result of predator-driven natural selection.

Keywords: adaptive evolution, mimicry, host plant specialization, bipartite networks

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 12 - Theoretical and evolutionary ecology

PO – 4 (EEF2019-13661) - EXAMINATION OF LIMONIUM HOMOPLOID AND HETEROPLOID CROSSES TO STUDY THE EMERGENCE OF APOMIXIS

Sofia I. R. Conceição (Portugal)[1]; Ana Sofia Róis (Portugal)[1,2]; Ana D. Caperta (Portugal)[1]

1 - Linking Landscape, Environment, Agriculture and Food (LEAF), Instituto Superior de Agronomia, Universidade de Lisboa;
2 - School of Psychology and Life Sciences, Universidade Lusófona de Humanidades e Tecnologias (ULHT)

Apomixis is a form of asexual reproduction that consists in cloning through seeds. *Limonium* species present a pollen-stigma dimorphism associated to a sporophytic self-incompatibility system linked with distinct reproductive modes. Besides, sexual and facultative apomicts, autonomous apomicts that form unreduced apomictic embryo sacs, parthenogenesis, and pollen independent autonomous endosperm formation also exist. There is evidence for cytotype distribution in the *Limonium* where the sexual *L. ovalifolium* complex occurs more significantly in the Mediterranean region whereas the apomictic *L. binervosum* complex occurs in the Atlantic coasts.

This study aims to test the emergence of apomixis in this genus. We used sexual diploid (*L. ovalifolium*) and facultative apomictic tetraploids (*L. binervosum*, *L. dodartii*) plants from a *ex situ* collection. Previously characterized for pollen–stigma dimorphisms, chromosome numbers and ploidy. F1 hybrids were produced using either plant as a female or male progenitor through crossings among diploid plants and between diploid and tetraploid plants. The progeny was examined for genome size, ploidy level, morphology and pollen-stigma combination.

Results showed a high production of viable seeds in all crossings. All diploid-tetraploid crossings presented seedlings with three and four cotyledons. Most of the progeny showed similar ploidy level as the female donor, although plants with other ploidy levels were found. Molecular progeny tests using the nrDNA ITS1-ITS2 sequence demonstrated genetic variability in the diploid offspring and, lower pollen viability percentage than their progenitors. In tetraploid -diploid crosses offspring plants exhibited very low pollen viability compared with parental plants but had more seeds with higher viability.

Keywords: apomixis, neopolyploid, Plumbaginaceae, pleiocotyly

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 12 - Theoretical and evolutionary ecology

PO – 5 (EEF2019-13695) - ECOLOGICAL NICHE DIFFERENTIATION OF THE POLYPLOID COMPLEX LINUM SUFFRUTICOSUM S.L.

Ana Afonso (Portugal)[1,2]; Erika Olmedo-Vicente (Spain)[2]; Juan Arroyo (Spain)[2]; João Loureiro (Portugal)[1]; Sílvia Castro (Portugal)[1]; Albano Figueiredo (Portugal)[3]; Sara Lopes (Portugal)[1]; Daniela Tavares (Portugal)[1]; Guillaume Papuga (France)[4]; Mariana Castro (Portugal)[1]

1 - Centre for Functional Ecology, Department of life Sciences, University of Coimbra, Portugal;
2 - Departamento de Biología Vegetal y Ecología, Universidad de Sevilla, Spain;
3 - Department of Geography and Tourism, University of Coimbra, Portugal;
4 - Center for Functional and Evolutionary Ecology, CNRS, Montpellier, France

Genome duplications bear broad-scale consequences on gene expression and developmental processes in plants, potentially leading to immediate morphological, reproductive and physiological shifts. Such processes may induce changes in ecological niche, sometimes associated with an increased tolerance in the response to environmental changes. Polyploids are often reported to occur in different environments or environments beyond the ecological tolerance of their diploid ancestors. Thus habitat segregation by niche differentiation has been suggested as a key mechanism enabling the successful establishment of polyploid lineages. *Linum suffruticosum* s.l. is a complex composed by small woody plants, distributed through the Western Mediterranean Basin, with heteromorphic populations with a self-incompatibility system. This complex has a problematic taxonomy and bears a high cytogenetic diversity, with five major cytotypes being detected. The objective of this study was to explore in detail the distribution of L. suffruticosum s.l. cytotypes and identify possible shifts in ecological requirements that might explain the current distribution patterns and possibly link it with successful establishment and spread of polyploid lineages. To accomplish this, we sampled populations throughout the entire range of distribution of the complex to determine ploidy levels using flow cytometry and chromosome counts, and niche modelling tools using edaphoclimatic variables to explore the ecological requirements of the different cytotypes. Given the wide climate distribution of the group and the potential impact of polyploidy in physiological traits and ecological tolerances, this complex provides an opportunity to discuss an ecologically-driven hypothesis to explain the successful establishment and spread of polyploids

Keywords: niche differentiation, polyploidy, ecological requirements, Mediterranean

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 12 - Theoretical and evolutionary ecology

PO – 6 (EEF2019-13822) - THE ROLE OF SELFING IN THE ESTABLISHMENT OF NEOTETRAPLOID LINEAGES OF JASIONE MARITIMA

Catarina Siopa (Portugal)[1]; João Loureiro (Portugal)[1]; Maria Celeste Dias (Portugal)[1]; Mariana Castro (Portugal)[1]; Sílvia Castro (Portugal)[1,2]

1 - Centre for Functional Ecology;
2 - Botanic Garden of the University of Coimbra

Jasione maritima is a Campanulaceae growing in dune systems and a polyploid complex bearing diploids and tetraploids, in a currently allopatric distribution. The mechanisms behind the establishment of the tetraploid are, however, unknown. We studied the role of selfing in the establishment of neotetraploids of *J. maritima*, with the use of synthesized neotetraploids, in order to evaluate the direct consequences of polyploidization. Reproductive success was measured after controlled pollinations to understand the effects of polyploidization in the selfing ability. In addition, a set of fitness parameters including physiological parameters were measured to assess the performance of the offspring obtained after selfing and outcrossing.

The results revealed that diploids and neotetraploids of *Jasione maritima* are self-incompatible. Thus, polyploidization does not seem to impact the ability to self-fertilize in the neotetraploids. When analysing the neotetraploids, the overall fitness of the offspring was lower than that of the diploids. However, in the neotetraploids, outcrossing and selfing treatment of the offspring had similar plant performances along the measured parameters.

Therefore, in the early generations, selfing may act as a reproductive assurance for neotetraploids, enabling them to produce offspring with similar fitness when compared with neotetraploids of the outcrossing treatment. However, selfing by itself is not sufficient to explain the successful establishment of the neotetraploids which most probably results from a combination of mechanisms enabling them to overcome the frequency dependent selection at initial stages.

Keywords: *Jasione maritima*, neotetraploids, plant performance, polyploidization, selfing

01/08 | 19h00
POSTER SESSION III
Room C6 atrium and interior Garden | Topic 12 - Theoretical and evolutionary ecology

P0 – 7 (EEF2019-13839) - DOES THE INVASIVE SHRUB ULEX EUROPAEUS INVEST LESS IN SPINES IN THE INTRODUCED THAN IN THE NATIVE RANGE?

Silvia Medina Villar (Chile)[1]; Ernesto Gianoli (Chile)[1]

1 - Department of Biology. College of Sciences. University of La Serena. Avenida Raúl Bitrán Nachary N° 1305, 1700000, La Serena, Chile

The Enemy Release Hypothesis (ERH) postulates that invasive species, when introduced in a new ecosystem, lose the enemies that controlled their populations in the native range. The absence of enemies allows invasive species to invest less in defense and more in growth and reproduction, thus contributing to the success in the new ecosystem. This hypothesis has been amply tested considering the release from pathogens and insect herbivores, but there is less evidence concerning release from vertebrate herbivores. *Ulex europaeus* is a spiny shrub from NW Europe and an aggressive invader in Chile. In its native range (NR) U. europaeus is consumed by several domestic and wild vertebrate herbivores, which eat young sprouts and also mature spines and twigs. However, no such enemies are known to feed on U. europaeus in its invaded range (IR). Spines are physical structures that may deter consumption of plants by vertebrate herbivores. Therefore, spines in U. europaeus are less necessary in the IR than in the NR, but their maintenance is nonetheless costly. According to the ERH, we expected to find a lower spine investment in the IR (Chile) than in the NR (Spain). We measured different traits related to spinescence on 2 branches from 10 U. europaeus individuals in 3 sites per range (Spain and Chile). Preliminary results show that U. europaeus has lower spine density and spine width:length ratio in Chile than in Spain, thus supporting ERH. Results contribute to understand the causes of the successful invasion of U. europaeus in Chile.

Keywords: exotic invasive species; gorse; herbivory

ABSTRACTS

30/07 | 11h00
PARALLEL SESSION I - T2.P1 - EMBEDDING ECOLOGICAL CONCEPTS IN SOCIETY
Room 2.2.12 | Topic 2 - Science communication (4)

OC-001 - (EEF2019-13827) - LEARNING HOW TO USE ECOLOGICAL MODELS: AN EFFECTIVE APPROACH

Afonso Dinis (Portugal)[1]; Ana Rita Teresa (Portugal)[1]; Bruno Pinto (Portugal)[1]; Gonçalo Matias (Portugal)[1]; Guilherme Pereira (Portugal)[1]; Guilherme Rebelo (Portugal)[1]; Patrícia Marques (Portugal)[1]; Vasco Valdez (Portugal)[1]; Tiago André Marques (Portugal)[2]

1 - Departamento de Biologia Animal, Faculdade de Ciências da Universidade de Lisboa;
2 - Centre for Research into Ecological and Environmental Modelling, University of St Andrews, Departamento de Biologia Animal, Centro de Estatística e Aplicações, Faculdade de Ciências, Universidade de Lisboa

Ecological modelling is fundamental for ecology, its teaching and learning processes are essential for future modelers. However, these are hard to teach, and perhaps even harder to learn. Our objectives were to explore an effective hands-on method of teaching ecological models.

We simulated in class the capture of prey by a predator under scenarios with different numbers of available prey. Prey were represented by animal-shaped pasta in a table, while students were predators. Students were divided in 9 groups and tables set with different densities. We recorded data on two hunting strategies: (1) number of tries needed to capture 1, 2 and 3 prey by lowering an open hand on the table, (2) time it took to capture 1, 2 or 3 prey by moving a finger continuously over the table. After data collection, guided by a teacher, students were invited to explore the data and fit statistical models to get answers to questions.

We describe how predator efficiency changes with prey density. Our results show how one can illustrate different ecological modelling concepts and look at a single data set to explore different perspectives and approaches in an intuitive way.

A practical approach is fundamental in the understanding of ecological modelling. Different questions can be explored with the same data, and different models can be fit to the same data. All models are wrong, but some are useful: the key is to find the best model to answer your question.

30/07 | 11h00
PARALLEL SESSION I - T2.P1 - EMBEDDING ECOLOGICAL CONCEPTS IN SOCIETY
Room 2.2.12 | Topic 2 - Science communication (4)

OC-002 - (EEF2019-13738) - ECOSYSTEM SERVICES MAPS TO IMPROVE SCIENTIFIC COMMUNICATION

Ana Genua Olmedo (Spain)[1]; Mariana Morgado (Portugal)[1]; Ana Isabel Sousa (Portugal)[1]; Olga Ameixa (Portugal)[1]; António J.A. Nogueira (Portugal)[1]; Ana Isabel Lillebø (Portugal)[1]; Heliana Teixeira (Portugal)[1]

1 - Department of Biology & CESAM, University of Aveiro, Campus de Santiago, 3810-193 Aveiro, Portugal

Ecosystem services (ES) maps are a useful tool to better communicate science in a visual format. However, ES maps associated to habitats are implicitly subject to uncertainty, and have to deal with the limitation that the ES value is under- or overrepresented. Through a sensitive/what-if analysis, we determined the impact on the outcoming ES maps under a set of assumptions, with the aim of obtaining a more realistic ES value. We simulated the maps when ES were associated to the habitats where they occur, and, when ES were associated to mobile biotic groups (i.e. biological communities that have dependencies on different habitats through their life cycle). We assumed that the habitats' potential to supply ES would change depending on these mobile biotic groups. Habitats were identified and mapped based on spatial datasets from the Natura 2000 Ria de Aveiro site following EUNIS habitats classification. Based on expert judgment, the contribution of each mobile biotic group and habitat to a given ES supply was obtained. ES assessment was underestimated when was only associated to habitats, whereas the assessment increased when was associated to both, habitats and mobile biotic groups. Moreover, the capacity to provide ES varied when the species autoecology was considered. Then, our ES assessment was compared with the results obtained in a participatory process where stakeholders prioritized ES. This study highlighted the importance of considering the connectivity of habitats with the mobile biota, involving citizen opinion, when mapping ES to find the best management of the provided services.

30/07 | 11h00
PARALLEL SESSION I - T2.P1 - EMBEDDING ECOLOGICAL CONCEPTS IN SOCIETY
Room 2.2.12 | Topic 2 - Science communication (4)

OC-003 - (EEF2019-13694) - NATURE OF SCIENCE-ENRICHED PROBLEM-BASED LEARNING ABOUT THE ECOLOGICAL NICHE CONCEPT USING A SOCIOSCIENTIFIC ISSUE

Cristina Sousa (Portugal)[1]; Isabel Chagas (Portugal)[2]

1 - Faculdade de Ciências, Universidade do Porto, Porto, Portugal;
2 - Instituto de Educação, Universidade de Lisboa, Lisboa, Portugal

Our proposal is teaching about ecological niche to promote the discussion about ecosystem dynamics, such as the competition between species and the risk of extinction of native upon the introduction of invasive species (a socioscientific issue). Since informed Nature of Science (NOS) conceptions contribute to scientific literacy we used Problem-Based Learning (PBL) enriched with NOS aspects, hands-on and minds-on activities (e.g. comparing the geographic distribution of Carpobrotus edulis and Malcolmia littorea, using Google Earth).

Research questions were the following: i) what is the importance given to the ecological niche in the Portuguese guiding documents and school textbooks? ii) what is the effect of a PBL activity in students' understandings about ecological and NOS concepts?

Guiding documents and textbooks contents about the ecological niche concept were analysed, and the impact of the educational intervention was assessed using a pre-/post-questionnaire.

Only three of nine of the textbooks adopted in 8thgrade mentioned the ecological niche concept.

Upon pre/posttest comparation, we found significant results in some of the questions about NOS and an overall increase in the frequency of correct answers about ecological concepts.

This unit seems useful for improving NOS understanding and students were able to define the niche of each species and explain that species with similar niches (e.g. invasive and native plants) are associated with inter-specific competition that may lead to the extinction of one of the species.

We also found evidences concerning the potential use of the same problem-situation with preservice teachers.

30/07 | 11h00
PARALLEL SESSION I - T2.P1 - EMBEDDING ECOLOGICAL CONCEPTS IN SOCIETY
Room 2.2.12 | Topic 2 - Science communication (4)

OC-004 - (EEF2019-13858) - RIA DE AVEIRO AS A SHOW CASE FOR NATURA 2000 SITES ECOSYSTEM-BASED MANAGEMENT

Ana Lillebø (Portugal)[1]; Heliana Teixeira (Portugal)[1]; Ana Genua (Portugal)[1]; Mariana Morgado (Portugal)[1]; Vanessa Ferreira (Portugal)[1]; António Nogueira (Portugal)[1]

1 - University of Aveiro, Department of Biology and CESAM

Ecological modelling is fundamental for ecology, its teaching and learning processes are essential for future modelers. However, these are hard to teach, and perhaps even harder to learn. Our objectives were to explore an effective hands-on method of teaching ecological models.

We simulated in class the capture of prey by a predator under scenarios with different numbers of available prey. Prey were represented by animal-shaped pasta in a table, while students were predators. Students were divided in 9 groups and tables set with different densities. We recorded data on two hunting strategies: (1) number of tries needed to capture 1, 2 and 3 prey by lowering an open hand on the table, (2) time it took to capture 1, 2 or 3 prey by moving a finger continuously over the table. After data collection, guided by a teacher, students were invited to explore the data and fit statistical models to get answers to questions.

We describe how predator efficiency changes with prey density. Our results show how one can illustrate different ecological modelling concepts and look at a single data set to explore different perspectives and approaches in an intuitive way.

A practical approach is fundamental in the understanding of ecological modelling. Different questions can be explored with the same data, and different models can be fit to the same data. All models are wrong, but some are useful: the key is to find the best model to answer your question.

30/07 | 11h00
PARALLEL SESSION I - T2.P1 - EMBEDDING ECOLOGICAL CONCEPTS IN SOCIETY
Room 2.2.12 | Topic 2 - Science communication (4)

OC-244 - (EEF2019-13894) - CLIMATE SCENARIOS: CROSSING BOUNDARIES BETWEEN NATURAL AND SOCIAL SCIENCES TO TACKLE ADAPTATION CHALLENGES

Luísa Schmidt (Portugal)[1]; Carla Gomes (Portugal)[1]

1 - Instituto de Ciências Sociais da Universidade de Lisboa

Interdisciplinary research has become widespread in face of environmental challenges, more notably climate change. The Institute of Social Sciences (University of Lisbon) has been involved in multiple interdisciplinary projects on climate adaptation. Among the most notable were “CHANGE: Changing Climate, Changing Coasts, Changing Communities” and ClimAdaPt.Local, which designed municipal adaptation strategies in Portugal.

One of the challenges of engaging stakeholders for adaptation has been the ability to design strategies tailored to local realities, through both participatory science and environmental governance. CHANGE (2010-2014) has embraced that challenge, by designing scenarios for Vagueira, Quarteira and Costa de Caparica, three vulnerable coastal areas in Portugal. Later on, ClimAdaPt.Local (2015-2017) would build on these stakeholder engagement strategies, reaching out to 26 municipalities, including the same CHANGE research sites.

Following a genuinely interdisciplinary process, both projects surpassed boundaries between social and natural sciences. CHANGE and ClimAdaPt.local had a long-lasting influence on raising awareness about climate vulnerability, while contributing to improve participation in climate-related decision-making and nurture a process of adaptive governance. From this dynamic of social change, we draw a new research agenda, aiming at reinforcing public culture around science, democratic processes and the sustainability of coastal areas.

This presentation analyses how local scenarios have challenged risk perceptions, prompting a discussion of adaptation on the coastline, a point of convergence for cultural, social and economic dynamics and values. Interdisciplinary efforts such as these will be determinant to achieve the Sustainable Development Goals, especially SDG13 – Climate Action.

30/07 | 11h00
PARALLEL SESSION I - T3.P1 - KNOWING AND MAINTAINING THE FRESHWATER BIODIVERSITY
Room 2.2.15 | Topic 3 - Freshwater ecology (5)

OC-005 - (EEF2019-13715) - COMBINING GEOSTATISTICAL AND BIOTIC INTERACTIONS MODELLING TO PREDICT AMPHIBIAN REFUGIA UNDER CRAYFISH INVASION ACROSS DENDRITIC STREAM NETWORKS

Mário Mota-Ferreira (Portugal)[1,2]; Pedro Beja (Portugal)[1,2]

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2 - CIBIO/InBio, Centro de Investigação em Biodiversidade e Recursos Genéticos, Laboratório Associado, Instituto Superior de Agronomia, Universidade de Lisboa, Tapada da Ajuda, 1349-017 Lisbon, Portugal

Biological invasions in freshwater ecosystems are a major driver of population declines and even extinctions of native species. However, native species may persist in ecological refugia that are out of reach of invader impacts due to particular environmental conditions or barriers to dispersal. Here we combine geostatistical and biotic interaction modelling to predict the distribution of refugia for amphibian species under invasion by the crayfish Procambarus clarkii and Pacifastacus leniusculus in a dendritic stream network.

We surveyed amphibian occurrence on the Sabor river basin (Northeast Portugal) in January-December 2015, at 168 sites selected using a stratified random procedure. Sampling was carried out by two observers that systematically recorded all amphibian species detected in 200 meters transects. We modelled the occurrence of each amphibian species in relation to environmental variables, the probabilities of crayfish occurrence, and spatial dependencies accounting for the topology of dendritic stream networks. Models were used to predicted the spatial distribution of potential refugia for each amphibian species under current and future scenarios of crayfish expansion.

We found that the occurrence of six out of eight amphibian species analysed were negatively influenced by either P. clarkii or P. leniusculus, or both. Our study highlights the importance of stream headwaters as key amphibian refugia under crayfish invasion. Our study can help improving conservation strategies for amphibians negatively affected by crayfish invasions, and more generally it provides a framework to identifying refugia from biological invasions in dendritic stream networks.

30/07 | 11h00
PARALLEL SESSION I - T3.P1 - KNOWING AND MAINTAINING THE FRESHWATER BIODIVERSITY
Room 2.2.15 | Topic 3 - Freshwater ecology (5)

OC-006 - (EEF2019-13692) - ASSESSING TRANSLOCATION SUCCESS OF FRESHWATER MUSSELS

Joaquim Reis (Portugal)[1]; Daniel Pires (Portugal)[2]; Liliana Benites (Portugal)[3]; Patrícia Rodrigues (Portugal)[2]

1 - MARE - Marine and Environmental Sciences Centre, Faculdade de Ciências da Universidade de Lisboa;
2 - BIOTA - Estudos e Divulgação em Ambiente, Lda.; 3 - EDP - Gestão da Produção de Energia SA, Direção de Sustentabilidade

Translocations are often seen as suitable management actions to minimize the impacts of development projects, by displacing specimens from affected to unaffected areas. We evaluated the success of the translocation of two freshwater mussel species, Unio delphinus (25472 individuals) and Potomida littoralis (2312 individuals), potentially affected by the construction of a hydropower dam that would transform lotic habitats into lentic ones.

Translocation success was evaluated by monitoring translocated individuals in two consecutive years following the action. Part of the mussels were individually marked using alphanumeric tags. Individuals were tracked by touch, snorkeling and scuba diving, measured and weighted. Data was use to estimate recapture and mortality rates, abundance, population structure and individual growth.

Overall recapture rates from the first to the second year ranged from 20% to 3% for Unio delphinus and 16% to 9% for Potomida littoralis. Local abundances were clearly higher than pre-translocations conditions in the first year, but not in the second, when higher mortality rates occurred. Generally, population structure across years was stable. Overall growth rates appeared to be similar to those known to the species.

The recapture rates for this project were within published rates for similar actions. It was considered that translocation contributed to strengthen local populations and helped overall survival during the following year drought. The results show that translocations may be useful as a minimization measure but enhances the need to incorporate extreme climatic events in the planning stage.

30/07 | 11h00
PARALLEL SESSION I - T3.P1 - KNOWING AND MAINTAINING THE FRESHWATER BIODIVERSITY
Room 2.2.15 | Topic 3 - Freshwater ecology (5)

OC-007 - (EEF2019-13809) - A TRAIT-BASED APPROACH TO UNDERSTAND THE FUNCTIONAL STRUCTURE OF BRYOPHYTE COMMUNITIES IN PORTUGUESE HEADWATER STREAMS

Juliana Monteiro (Portugal)[1]; Francisca Aguiar (Portugal)[2]; Paula Matos (Portugal)[1]; Cristiana Vieira (Portugal)[3]; Cristina Branquinho (Portugal)[1]

1 - Centre for Ecology, Evolution and Environmental Changes (cE3c); 2 - Centro de Estudos Florestais (CEF), Instituto Superior de Agronomia; 3 - Museu de História Natural e da Ciência (MHNC-UP)

Our main goals were to characterize the functional structure of bryophytes in headwater streams and identify which environmental variables drive community functional structure.

This study was conducted in headwaters within Natura 2000 Sites, in the northwest and southwest of Portugal. Data on bryophyte abundance and environmental variables were collected from 165 locations. We hypothesized that functional traits related to growth-form, life-form, reproduction, autecology, and life-strategy mediate responses to environmental conditions. We used hierarchical clustering and indicator species analyses to obtain groups of sites with similar functional structure, and Non-Metric Multidimensional Scaling to understand the relations between these groups and the main environmental gradients.

The analyses revealed six groups: saxicolous, mainly composed of species classified as rough mats, typical of rocky substrates; truly aquatic, dominated by perennial pleurocarps, usually submerged; highly-dynamic, dominated by pioneers colonizing ephemeral streams; streamside, characterized by dendroid species and thalloid liverworts, typical of stream margins; high-altitude, dominated by leafy liverworts of high altitude streams; and basophilic, dominated by tufts and bryophytes of streams with higher pH values. These groups were primarily defined by local-scale water physic-ochemical variables, followed by broad-scale gradients of climate. Particularly, the precipitation during the winter months, a good surrogate for the hydrological patterns of the studied seasonal streams, largely contributed to the segregation of these groups.

Our results highlighted the importance of hydrology as a major driver of the functional structure of bryophyte communities. Further research is needed to enlarge our knowledge on the use of indicator functional groups to monitor hydrological change.

30/07 | 11h00
PARALLEL SESSION I - T3.P1 - KNOWING AND MAINTAINING THE FRESHWATER BIODIVERSITY
Room 2.2.15 | Topic 3 - Freshwater ecology (5)

OC-008 - (EEF2019-13982) - INVERTEBRATE AND BENTHIC DIATOM DYNAMICS IN MEDITERRANEAN INTERMITTENT STREAMS OF SOUTHERN PORTUGAL

Maria Helena Novais (Portugal)[1]; Eduardo Morales (Bolivia)[1]; Alexandra Marchã Penha (Portugal)[1]; Amália Oliveira (Portugal)[2]; Eltamara Souza Da Conceição (Brazil)[3]; Manuela Morais (Portugal)[1]

1 - Instituto de Ciências da Terra, Universidade de Évora;
2 - Departamento de Biologia, Universidade de Évora;
3 - Universidade do Estado da Bahia – UNEB, Alagoinhas, Brasil

The main hypotheses of the present work are to demonstrate that diatom and invertebrate communities develop adaptations to water intermittency, benthic diatoms reflect spatial and temporal gradients, and diatoms in dry biofilm as well as carabids are good ecological quality indicators during dry conditions.

To test these hypotheses, macroinvertebrates, diatoms and carabids were sampled in 18 sites (streams) in southern Portugal from Spring 2017 to 2018, during different aquatic states (eurheic, oligorheic, arheic and hyporheic), also representing different mesohabitats (pools, flowing water and dry channel).

First results showed that sites classified as High or Good in spring were more affected by intermittency, with significant reduction in macroinvertebrate species richness, diversity and evenness. In arheic situation, a decrease in relative abundance of Trichoptera, Plecoptera and Ephemeroptera was detected, whilst Diptera, Heteroptera and Oligochaeta, more adapted to lentic conditions, increased. During the dry period, 14 carabid species were identified (e.g. Pheropsophus hispanicus, poorly known in Portugal), both in the channel and margins, including few species typical from streams, and the majority occurring in agricultural areas, cork-oak forests and shrublands. Benthic diatom assemblages and the Specific Pollution Sensitivity Index changed along spatial and temporal gradients. Differences in Ecological Quality Ratio (EQR) were only detected between pool and flowing water samples, and no differences in EQR were detected between spring 2017 and summer dry biofilm.

Our preliminary results reveal the importance of improving the assessment of intermittent streams considering the complete hydrological cycle, and integrating complementary bioindicators, as dry biofilm and carabids.

30/07 | 11h00
PARALLEL SESSION I - T3.P1 - KNOWING AND MAINTAINING THE FRESHWATER BIODIVERSITY
Room 2.2.15 | Topic 3 - Freshwater ecology (5)

OC-009 - (EEF2019-13742) - ACCUMULATION OF MICROBEAD IN FISH SPECIES OF DHANMONDI LAKE, DHAKA

Soharab Hossain (Bangladesh)[1]; Md Atiqur Rahman (Bangladesh)[2]

1 - Stamford University;
2 - Greentech Testing Company Limited

Usage and existence of plastic degrades the environment and causes effects on both humans and animals. Micro beads are solid plastic particles of less than one millimeter in their largest dimension. It used in exfoliating personal care products, toothpastes and in biomedical and health-science research. At present, micro beads found to cause water pollution and pose an environmental hazard for aquatic animals in freshwater. In addition, it is transported from aquatic animals to human through food chain. This study aims to identify the micro beads and their number of consumption's by a fish species in a specific aquatic ecosystem. This research analyze the amount of micro beads consumption by a fish species in Dhanmodhi lake of Dhaka city. There are four replications have been prepared based on the sedimentation layer after the digestion of stomach contents of the fish. There is no micro beads has been detected under microscopic analysis of the first sample i.e., upper layer of the sedimentation while 06 micro beads were found in the second replication. Moreover, there are 25 and 120 micro beads have been found in the third and bottom sediment of the digestion. This result also shows the level of micro beads pollution in the aquatic bodies that most probably connecting with surface water drainage, improper dumping of waste and micro beads contained water contamination. This study urges to conduct for more details investigation for understanding the level of micro beads in the lake water bodies of Dhaka city and fish species.

30/07 | 11h00
PARALLEL SESSION I - T4.P1 - PAINTING THE ECONOMY WITH GREEN AND BLUE
Room 2.2.14 | Topic 4 - Eco-solutions and bio-economy (3); Topic 9 - Biodiversity and ecosystems (1)

OC-010 - (EEF2019-13744) - ROLE OF FISHERIES AND AQUACULTURE ACTIVITIES IN THE NORTHWETERN REGION OF PORTUGAL FOR NATIONAL BLUE ECONOMY

Emilio Salas-Leiton (Portugal)[1,2]; Lúcia Guilhermino (Portugal)[1,2]

1 - ICBAS-UP - Institute of Biomedical Sciences of Abel Salazar of the University of Porto, Department of Populations Study, Laboratory of Ecotoxicology (ECOTOX);
2 - CIIMAR – Interdisciplinary Centre of Marine and Environmental Research of the University of Porto, Research team of Ecotoxicology, Stress Ecology and Environmental Health (ECOTOX).

Strategic guidelines and legislation were approved by Portugal from 2013 to the date, with the goal to boost the Blue Growth Strategy. The present work focused on the perception about their effectiveness to enhance the fishery and aquaculture industries in the Northwestern Region of Portugal. It was part of the European COFASP project “ECOAST - New methodologies for an ecosystem approach to spatial and temporal management of fisheries and aquaculture in coastal areas” (FCT: COFASP/0001/2015).

Questionnaires were filled by the most representative stakeholders - fishery, aquaculture, traders and researchers – to know their views on key questions. Objective indicators related to fisheries and aquaculture was complementary assessed using 6-year time series.

Fishery stakeholders considered that the existing legal framework and planning tools may be improved, whereas aquaculture consulters identified several difficulties mainly related with the access to water resources and bureaucracy. The overall fishery catches in our case study was reduced about 35 % between 2012 and 2017. Nevertheless, positive organizational changes in the Portuguese Northwestern fleet should be highlighted. The aquaculture industry in the Northwestern Region of Portugal is still very limited: no offshore and only two on-land facilities were identified. Moreover, European funds are being hardly used to create aquaculture business network in this region.

The high potential of the Northwestern Region of Portugal to significantly contribute to Blue Growth through fishery and aquaculture must be firmly exploited. The identification of potential areas for aquaculture implementation and valorization of local sea products are recommended as priority issues.

30/07 | 11h00
PARALLEL SESSION I - T4.P1 - PAINTING THE ECONOMY WITH GREEN AND BLUE
Room 2.2.14 | Topic 4 - Eco-solutions and bio-economy (3); Topic 9 - Biodiversity and ecosystems (1)

OC-011 - (EEF2019-13716) - MAPPING CULTURAL ECOSYSTEM SERVICES IN CONFLICT AREAS: CONSIDERING ATTRACTIONS AND CONSTRAINTS ACTING TRANSBOUNDARY IN THE SAHARA-SAHEL

Frederico Santarém (Portugal)[1,2]; Jarkko Saarinen (Finland)[3,4]; José Carlos Brito (Portugal)[1,2]

1 - CIBIO/InBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos da Universidade do Porto. R. Padre Armando Quintas, 7, 4485-661 Vairão, Portugal;
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3 - Geography Research Unit, University of Oulu, Finland;
4 - School of Tourism and Hospitality, University of Johannesburg, South Africa

Cultural ecosystem services (CES) derive non-material benefits to people and are being adopted worldwide to achieve the United Nations Sustainable Development Goals. Mapping CES, including recreation and ecotourism, is crucial to allocate resources efficiently, although several issues (conflict or transboundary constraints not considered) limit its usefulness in policymaking. We aimed to identify and map attraction and constraint features to CES in the Sahara-Sahel ecoregions using spatial analyses and multicriteria approaches that consider constraints playing at broad geographical scales and that are independent from participatory methods. We want to: 1) map the geographic location of concentrations of attractions and constraints to CES; and 2) quantify the importance of attractions and constraints to the overall variability in CES resources.

Georeferenced data on 21 attraction and 5 constraining features were mapped in a GIS. Indexes of overall attraction and constraint were mapped. PCA was used to identify features most related to the overall variability in CES resources.

Spatial patterns of CES revealed attractions concentrated along mountainous regions and wetlands, and constraining elements in the most impoverished areas subjected to long-term conflict.

This was the first study mapping transboundary constraints to CES at the ecoregion scale, which revealed useful in setting priorities for: 1) spatially allocate conservation resources efficiently; 2) identifying priorities for sustainable human development; and 3) informing visitors about the safest and riskiest travelling areas. We recommend regional decision-makers using these maps to understand where people can benefit from ecosystem services without being threatened by regional insecurity.

30/07 | 11h00
PARALLEL SESSION I - T4.P1 - PAINTING THE ECONOMY WITH GREEN AND BLUE
Room 2.2.14 | Topic 4 - Eco-solutions and bio-economy (3); Topic 9 - Biodiversity and ecosystems (1)

OC-012 - (EEF2019-13926) - CAN WE TRIGGER GREEN GROWTH IN URBAN-RURAL SYSTEMS? APPLYING SOCIO-ECOLOGICAL LENS TO BLUE-GREEN SOLUTIONS

Kinga Krauze (Poland)[1]

1 - European Regional Centre for Ecohydrology PAS

Circular and green economy has been recently considered by Europe and UN as a chance for sustainability of coupled human and natural systems (CHANS). That however requires policy and management strategies that consider change in different domains (e.g., ecological, socioeconomic, cultural).

Water plays important role in the process from the perspective of all domains: first it is a key to natural capital assets; second it is a resource - 'catalytic good' for energy production, industrial processes and agriculture; and third it is a product as a tap water, wastewater or sewage. Additionally the Anthropocene opened another chapter in human-water-nature interactions, of water becoming a risk to economic growth due to its scarcity and/or surplus, unequal allocation, and conflicting uses. That shifted the issue towards challenging nexus.

All the aspects are pinned together by emerging concept of Nature-Based Solutions (NBS), structurally associated with blue-green infrastructure. NBS are expected to decrease the wickedness of the problem while increasing overall robustness of CHANS. Green market emerging from NBS is to substantially empower employment and economy, whereas stimulating also innovation. Indeed, it has been reported that only in 2015 communities around the world paid nearly US$25 billion for nature-based solutions to secure reliable access to clean water. The question is if it really testifies the paradigm shift.

The paper presents resume of several studies carried in two Polish LTSER sites and analyzing readiness of CHANS to uptake the eco-solutions.

30/07 | 11h00
PARALLEL SESSION I - T4.P1 - PAINTING THE ECONOMY WITH GREEN AND BLUE
Room 2.2.14 | Topic 4 - Eco-solutions and bio-economy (3); Topic 9 - Biodiversity and ecosystems (1)

OC-013 - (EEF2019-13887) - ASSESSING ECOSYSTEM SERVICES WITH LIFE CYCLE ASSESSMENT: THE CASE OF SOWN BIODIVERSE PASTURES

Ricardo Teixeira (Portugal)[1]; Tiago Morais (Portugal)[1]; Tiago Domingos (Portugal)[1]

1 - MARETEC/LARSyS, Instituto Superior Técnico, University of Lisbon

Sown biodiverse pastures (SBP) are a high-yield grass-legume grazing system with multiple demonstrated farm-level environmental benefits such as carbon sequestration. Here, we use Life Cycle Assessment to quantify the indirect effects of beef produced in SBP on ecosystem services and biodiversity.

We used 9 life cycle impact assessment models assessing the supply chain effects of land use and land use change on the provision of multiple ecosystem services (climate change mitigation, soil biotic production potential, etc.) and 3 more on biodiversity. Activity data was collected in Alentejo. We use a consequential analysis where the effects of SBP are compared with a baseline scenario where cattle is fed in low-yield semi-natural pastures supplemented with feeds that vary in the ratio of silage to concentrate.

Each hectare of SBP installed avoids the occupation of 0.5 hectares per year for feed ingredient production. The agricultural area saved avoids, for example, soil loss, soil organic carbon depletion and loss of species. Regarding climate change mitigation, although SBP use more fertilizers and machinery, concentrate replacement with local feed avoids the emission of about 3 t CO2eq/ha even for mature SBP that are no longer sequestering carbon in soils. SBP can avoid 25% emissions from beef production per kg of live animal weight.

Most models agree that feed substitution significantly reduces the supply chain impacts of beef production. Besides the positive direct effects, SBP can partially reduce the degradation of ecosystem services caused away from the farm.

30/07 | 11h00
PARALLEL SESSION I - T6.P1 - IDENTIFYING AND SOLVING PEST-RELATED CHALLENGES
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (5)

OC-014 - (EEF2019-13739) - THE ROLE OF THE DENSITY OF FIELD MARGINS AND THE STRUCTURE OF THEIR VEGETATION ON PARASITISM RATES OF CEREAL APHIDS

Agnès Salat Moltó (Spain)[1,2]; Berta Caballero López (Spain)[3]; José Manuel Blanco Moreno (Spain)[1,2]

1 - Universitat de Barcelona;
2 - IRBio;
3 - Museu de Ciències Naturals de Barcelona

Field margins constitute a connected network of semi-natural habitats that can enhance the abundance and movement of natural enemies of agricultural pests, providing a manageable tool for farmers to promote natural biological control. The aim of this study was to analyse to which extent the density of margins and their vegetation composition in a cereal cropping landscape affected the abundances of cereal aphids and parasitism rates in the crops.

We carried our study in Gallecs (Barcelona, Spain), where we derived a map of the margin network density. We selected 40 fields along a gradient of densities and collected cereal stems at 3 m from the margin to count and identify all aphids. All parasitized aphids were isolated until the imago of parasitoids emerged and could be identified. We also characterized the vegetation of each adjacent margin to the species level and used a non-parametric multidimensional scaling technique with plant species life forms to characterize the structure of the margin vegetation.

Our results show a significant positive effect of margin density around cereal fields on parasitism rates, while aphid abundance displayed a negative tendency. Parasitism rates increased near margins dominated by annual plant species, whereas aphid abundances decreased significantly. However, margins dominated by woody vegetation benefited both aphids and their parasitoids.

Our study highlights the role of margins as effective semi-natural habitats to enhance biological control of aphids in cereal fields, but it may be necessary to consider also the vegetation structure to optimize it.

30/07 | 11h00
PARALLEL SESSION I - T6.P1 - IDENTIFYING AND SOLVING PEST-RELATED CHALLENGES
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (5)

OC-015 - (EEF2019-13745) - ECOLOGICAL INTENSIFICATION AND PEST CONTROL IN MEDITERRANEAN OAK AGRO-ECOSYSTEMS

Tara Canelo (Spain)[1]; Carlos Perez (Spain)[1]; Alvaro Gaytan (Sweden)[2]; Raul Bonal (Spain)[1]

1 - University of Extremadura;
2 - University of Stockholm

Modern societies need to produce food for an increasing population in an environmentally friendly way. Ecological intensification responds to this challenge by taking profit of the services offered by certain organisms with quantifiable effects on agroecosystems. We assessed how livestock management could contribute to reduce the numbers of the main acorn pest in Iberian oak savannas (Curculio spp. weevils), which cause important economic losses to livestock rearing.

We used GPS-tracking to assess the spatial distribution of livestock and predation on acorns containing weevil larvae. We also experimentally excluded livestock from some oaks and for three years we monitored weevil population sizes and acorn infestation rates. By last, we measured weevil gene-flow among trees to estimate insect dispersal abilities.

Oaks prematurely drop infested acorns, what favours livestock predation on larvae. Accordingly, acorn infestation rates increased when livestock were absent. Weevil dispersal range was short, with genetic isolation by distance within a range of just 200 metres.

Pig diet strongly depends on acorns, but current management does not allow pest control as they are released in oak savannas when larvae are gone. Livestock release should be advanced and rotated over the rangelands. Rotation prevents the negative effects of high long-term livestock densities and would still be effective, given that weevil poor dispersal hampers the arrival of immigrants after population drop provoked by predation. Our results provide an example of quantifiable effects of Ecological Intensification in a widespread European agroecosystem of high economic and environmental value.

30/07 | 11h00
PARALLEL SESSION I - T6.P1 - IDENTIFYING AND SOLVING PEST-RELATED CHALLENGES
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (5)

OC-017 - (EEF2019-13976) - THE USE OF SUBTILASES AS A DISEASE CONTROL APPROACH FOR GRAPEVINE DOWNY MILDEW

Joana Figueiredo (Portugal)[1,2,3]; Marta Sousa Silva (Portugal)[2,3]; Andreia Figueiredo (Portugal)[1]

1 - Biosystems & Integrative Sciences Institute (BioISI), Faculdade de Ciências da Universidade de Lisboa, Portugal;
2 - Laboratório de FTICR e Espectrometria de Massa Estrutural, Faculdade de Ciências da Universidade de Lisboa, Portugal;
3 - Centro de Química e Bioquímica, Faculdade de Ciências da Universidade de Lisboa, Portugal

Wine industry is one of the most important economic sectors in several countries. In Portugal, this industry accounts for 800 million euro of exports in 2017. Besides that, grapevine products like grapes and leaves are used for human consumption and cosmetic products. One of the main problems of modern viticulture is grapevine susceptibility to fungal pathogens, such as Plasmopara viticola, the downy mildew (DM) causing agent. This pathogen attacks whole vineyards causing berry quality reduction and significant yield losses. Nowadays, the DM control strategy is the preventive application of fungicides. In Portugal, during the grapevine season, from the leaf development to the grape harvest, around 20 pesticides for different kind of diseases are applied. These chemicals are highly harmful to human health and to the environment, so the search for alternative control methods is crucial. It is very important to fully understand the plant resistance mechanism in grapevine-pathogen interactions and find molecules in the first plant defence line.

Our previous studies have highlighted the role of subtilases in grapevine defence response to DM. Subtilases are serine proteases that present many biological functions, but its participation in biotic stress responses is poorly known. In grapevine, subtilases are differently expressed in resistant and susceptible grapevine genotypes. Therefore, subtilases' role in plant defence is an interesting topic to study which may lead to the understanding of how they can be used to improve the natural plant defences.

30/07 | 11h00
PARALLEL SESSION I - T6.P1 - IDENTIFYING AND SOLVING PEST-RELATED CHALLENGES
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (5)

OC-018 - (EEF2019-13966) - USING MODEL PLANTS TO STUDY PROTEASES INVOLVED IN PLANT-PATHOGEN INTERACTIONS

Rita B. Santos (Portugal)[1]; Andreia Figueiredo (Portugal)[1]

1 - Biosystems & Integrative Sciences Institute (BioISI)

Grapevine is one of the most important cultivated plants around the world, with high impact in the Portuguese economy. In a scenario of climate change, production yields of wine and table grape are highly affected by pathogens. In 2018, the Douro region presented production losses as June and July were abnormally rainy months promoting the spread of the downy mildew disease.

Exploitation of grapevine genetic background of Portuguese traditional varieties together with the identification of specific resistance mechanisms and traits are fundamental to promote a more sustainable production.

In plant-pathogen interaction, several protease classes have been described to play an important role, particularly associated to recognition and immune priming activation. To disclose the model of action of grapevine proteases involved in grapevine resistance, we have established a pipeline which uses the model plant *Nicotiana benthamiana*. This pipeline allows to study defence-related proteases, as well as their possible interacting proteins/substrates. With this system one can test, *in planta*, the role of proteases in defence as well as the plant response upon infection with pathogens. Several approaches can be done downstream of this pipeline, such as proteomics and gene expression. The generated knowledge allows to start drafting the models of the mechanisms of action of plant proteases in pathogen resistance. In this talk, the possibilities of this pipeline will be explored, and will be focused mainly in the grapevine-*P. viticola* interaction.

30/07 | 11h00
PARALLEL SESSION I - T7.P1 - FORESTS RESPONSES TO CLIMATE CHANGE
Room 2.3.13 | Topic 7 - Climate and global changes (4); Topic 12 - Theoretical and evolutionary ecology (1)

OC-020 - (EEF2019-13646) - PHENOTYPIC INTEGRATION OF PINUS SYLVESTRIS ALONG ITS DISTRIBUTION AREA

Raquel Benavides (Spain)[1]; Barbara Carvalho (Spain)[1]; Cristina C. Bastias (Spain)[1]; Adrián Escudero (Spain)[2]; Fernando Valladares (Spain)[1]

1 - Museo Nacional de Ciencias Naturales;
2 - Universidad Rey Juan Carlos

Analysing how plant species modify their trait expression along a diversity gradient brings insight about the role that intraspecific variability plays on adaptation and acclimation. Most studies tackling this question focus on individual trait responses to different environments. However, phenotypes are integrated expressions of multiple traits that co-vary showing the trade-offs between plant functions and processes under specific conditions. Therefore, it seems critical to consider this ingredient to disentangle the adaptive strategy of species. Here, we measured functional traits of a tree species and analyzed its covariation (integration degree) along its distribution area. In particular, we surveyed 536 *Pinus sylvestris* trees from populations along 11 different countries, and we assessed traits from three variation axes (dimensions) related to its competitive ability and the trade-off between resource use-conservation, namely plant size measures and stem and foliar traits. We explored changes in its phenotypic space throughout wide latitudinal and altitudinal gradients running correlation and network analyses, and we observed different mean trait values, as well as differences in trait integration. These results advocate the phenotypic integration as a proxy of coherence with the environment and evidence its relevance under changing scenarios.

30/07 | 11h00
PARALLEL SESSION I - T7.P1 - FORESTS RESPONSES TO CLIMATE CHANGE
Room 2.3.13 | Topic 7 - Climate and global changes (4); Topic 12 - Theoretical and evolutionary ecology (1)

OC-021 - (EEF2019-13665) - RANGE-WIDE VARIATION IN LOCAL ADAPTATION AND PHENOTYPIC PLASTICITY OF FITNESS-RELATED TRAITS IN FAGUS SYLVATICA AND THEIR IMPLICATIONS UNDER CLIMATE CHANGE

Homero Gárate-Escamilla (France)[1]; Arndt Hampe (France)[1]; Natalia Vizcaíno-Palomar (France)[1]; T. Matthew Robson (Finland)[2]; Marta Benito Garzón (France)[1]

1 - BIOGECO INRA UMR 1202 University of Bordeaux;
2 - Organismal and Evolutionary Biology (OEB), Viikki Plant Science Centre (ViPS), Faculty of Biological and Environmental Sciences, University of Helsinki

To quantify local adaptation and phenotypic plasticity of vertical and radial growth, leaf flushing and young tree survival across *Fagus sylvatica* range, to identify interactions among the different traits under current and future climate scenarios, and to estimate each trait contribution to explain the species occurrence.

We used vertical and radial growth, flushing phenology and mortality of *Fagus sylvatica* L. recorded in BeechCOSTe52 (>150,000 trees). Firstly, we performed linear mixed-effect models that related trait variation and co-variation to local adaptation (related to the planted populations' climatic origin) and phenotypic plasticity (accounting for the climate of the plantation), and we made spatial predictions under current and RCP 8.5 climates. Secondly, we combined spatial trait predictions in a linear model to explain the occurrence of the species.

The contribution of plasticity to intra-specific trait variation is always higher than that of local adaptation, suggesting that the species is less sensitive to climate change than expected; different traits constrain beech's distribution in different parts of its range: the northernmost edge is mainly delimited by flushing phenology (mostly driven by photoperiod and temperature), the southern edge by mortality (mainly driven by intolerance to drought), and the eastern edge is characterized by decreasing radial growth (mainly shaped by precipitation-related variables in our model); considering trait co-variation improved single-trait predictions.

Population responses to climate across large geographical gradients are trait-dependent, indicating that multi-trait combinations are needed to understand species' sensitivity to climate change and its variation across distribution ranges.

30/07 | 11h00
PARALLEL SESSION I - T7.P1 - FORESTS RESPONSES TO CLIMATE CHANGE
Room 2.3.13 | Topic 7 - Climate and global changes (4); Topic 12 - Theoretical and evolutionary ecology (1)

OC-022 - (EEF2019-13972) - COMBINED EFFECTS OF CLIMATE AND MANAGEMENT ON BEECH TREE VULNERABILITY AND NET ECOSYSTEM EXCHANGE ACROSS EUROPE.

Cathleen Petit (France)[1]; Hendrik Davi (France)[1]; Sylvie Oddou Muratorio (France)[1]; François Lefèvre (France)[1]; Pieter Johannes Verkerk (France)[2]

1 - INRA, UR 629 Ecologie des Forêts Méditerranéennes, URFM;
2 - European Forest Institute

The impacts of climate and global change on forests are expected to be strong, with increasing tree mortality leading to changes in forest ecosystem services. Here, we investigate how management practices and climate jointly influence the ecophysiology of European beech across Europe. We used the process-based model CASTANEA to simulate the vulnerability and Net Ecosystem Exchange (NEE) of beech trees. The vulnerability integrates the risk of mortality related to hydraulic failure, carbon starvation and late frost. Simulations were run all over Europe, with a grid of 3174 cells, each measuring 45km by 45 km. Simulation were run from 1961 to 2005 under current climate, and from 2006 to 2100 using two contrasted climate change models (CM5 and HadGEM) with two scenarios of atmospheric carbon change (RCP 4.5 and RCP 8.5). Moreover, we considered different management patterns across Europe, (i) no management over Europe, (ii) unique managements over Europe, (iii) historical management adapted to the region. With CM5 without management, we find very little evolution of the vulnerability, independently of the increase in CO2 scenario. However, we found that beech vulnerability increases in the south of Europe due to extreme stresses (frost and drought). With CM5 and unique management scenarios, we find a slight increase in the NEE across Europe. This approach allows us to explore the NEE and vulnerability changes across Europe and if the management mitigate spatial differences under several climate change scenarios.

30/07 | 11h00
PARALLEL SESSION I - T7.P1 - FORESTS RESPONSES TO CLIMATE CHANGE
Room 2.3.13 | Topic 7 - Climate and global changes (4); Topic 12 - Theoretical and evolutionary ecology (1)

OC-023 - (EEF2019-13869) - CLIMATIC AND PHYSIOLOGICAL REGULATION OF THE BIMODAL XYLEM FORMATION IN P. PINASTER SAPLINGS

Núria Garcia Forner (Portugal)[1]; Joana Vieira (Portugal)[1]; Cristina Nabais (Portugal)[1]; Ana Carvalho (Portugal)[1]; Jordi Martínez-Vilalta (Spain)[2]; Filipe Campelo (Portugal)[1]

1 - Centro de Ecologia Funcional - Department of Life Sciences, Universidade de Coimbra;
2 - CREAF - Universitat Autònoma de Barcelona, E08193 Bellaterra (Cerdanyola del Vallès), Catalonia, Spain.

Annually, trees' cambial activity and xylem formation encompass local environmental condition. At the same time, biotic stressors such as warming or drought modulate plants' behavior at species and individual level. Despite xylem formation being susceptible to carbon and water availability it is still unknown which are the key physiological variables regulating xylogenesis, and to what extent contribute to further explain the number of cells in the different phases.

Xylogenesis and physiological behavior was monitored in saplings of P. pinaster, a bimodal growth pattern species, distributed in four treatments with contrasting irrigation regimes. Xylogenesis and plants' behavior were compared between treatments and the relationship between climate, physiological behavior and the number of cells in the different phases of xylem formation was evaluated.

Xylogenesis regulation shifts from physiological to climatic control as cells formation advances to mature tracheids. While the number cambial cells was not sensitive to temperature, the number of cells in enlargement or wall thickening decreased with increasing temperatures. Enlargement was also the most susceptible phase to water availability and plants' relative water content. The second growth period of the bimodal growth pattern started when primary growth was completed and plants achieved the highest hydraulic losses of the drought period.

We demonstrate the importance of including plant physiological responses and not only climate to fully understand xylem formation in its different developmental stages. This is specially important when studying bimodal growth pattern species because the second growth period may strongly rely on the plants' internal responses.

30/07 | 11h00
PARALLEL SESSION I - T9.P1 - INSIGHTS ON LAND MANAGEMENT
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (5)

OC-024 - (EEF2019-13747) - TRADE-OFFS BETWEEN FIRE PREVENTION AND BIRD CONSERVATION UNDER FIRE-SMART LANDSCAPE MANAGEMENT SCENARIOS

Silvana Pais (Portugal)[1]; Nuria Aquilué (Spain)[2]; Lluís Brotons (Spain)[2]; Jesús Domínguez (Spain)[3]; João Honrado (Portugal)[4]; Adrián Regos (Spain)[3]

1 - Universidade do Porto - Faculdade de Ciências;
2 - CTFC-CREAF, InForest Joint Research Unit, CSIC-;
3 - Departamento de Zooloxía, Xenética e Antropoloxía Física, Universidade de Santiago de Compostela;
4 - Research Center in Biodiversity and Genetic Resources (CIBIO/InBIO), Universidade do Porto

This study aims to identify management policies, leading to more resilient or less flammable landscapes (i.e. fire-smart landscapes), for a more effective wildfire mitigation and bird conservation in the near future.

We combined fire-landscape model simulations with species distribution models to evaluate the potential effects of alternative fire and land-use management options on fire regime (burnt and suppressed area) and biodiversity (93 bird species) between 1990 and 2050 in the Gerês-Xurés Biosphere Reserve Transboundary (NW Iberian Peninsula). We envisaged 11 scenarios resulting from different fire and land-use management strategies within 4 storylines: Business-as-usual (i.e. land abandonment), High Nature Value farmlands (HNVf), Fire-Smart (i.e. gradual conversion from evergreen to deciduous forests), and HNVf + Fire-Smart.

Our fire-landscape simulations showed an increase of more than 2500 hectares annually burnt (2031-2050) compared to previous years (1990-2010) under the Business-as-usual scenario. However, policies aimed to gradually increase HNVf areas could counterbalance (2011-2030) and even reverse (2031-2050) this increasing fire risk, especially if combined with fire-smart strategies. Overall, our models predicted a decrease in the bird distribution since 1990 to nowadays, that will be stronger (with losses up to 30% for species under legal protection) under Business-as-usual and Fire-Smart scenarios. On the contrary, the initial distributional range would progressively recover in the short term (2011-2030), being practically stabilized from 2030 onward under HNVf and HNVf + Fire-Smart scenarios.

The combination of HNVf and fire-smart landscape management policies has proven to be the most desirable scenario for fire mitigation and species conservation.

30/07 | 11h00
PARALLEL SESSION I - T9.P1 - INSIGHTS ON LAND MANAGEMENT
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (5)

OC-025 - (EEF2019-13604) - LAND-USE AND RELATED PRESSURES HAVE REDUCED BIOTIC INTEGRITY MORE ON ISLANDS THAN ON MAINLANDS

Katia Sanchez-Ortiz (United Kingdom)[1]; Ricardo Gonzalez (United Kingdom)[3]; Adriana De Palma (United Kingdom)[2]; Tim Newbold (United Kingdom)[4]; Samantha Hill (United Kingdom)[5]; Jason Tylianakis (United Kingdom)[6]; Igor Lysenko (United Kingdom)[3]; Luca Börger (United Kingdom)[7]; Andy Purvis (United Kingdom)[1]

1 - Imperial College London/Natural History Museum;
2 - Natural History Museum, Department of Life Sciences;
3 - Imperial College London, Department of Life Sciences;
4 - Centre for Biodiversity and Environment Research, UCL;
5 - UN Environment World Conservation Monitoring Centre;
6 - Centre for Integrative Ecology, University of Canterbury;
7 - Department of Biosciences, University of Swansea

We test whether biotic integrity – as estimated by the Biodiversity Intactness Index (BII) – has decreased more severely on islands than mainlands. We update methods previously used to estimate BII globally (Newbold et al., 2016) to allow pressure effects to differ between islands and mainlands.

Using the PREDICTS database, we estimate BII for islands and mainlands by combining global models of how two aspects of biodiversity – overall abundance, and compositional similarity to minimally-impacted sites – have been affected by human pressures. We use these models to project high-resolution (~1km2) global maps of BII for the year 2005. We calculate average BII for island and mainland biomes, IPBES regions and biodiversity hotspots; and repeat our analyses using a richness-based version of BII.

BII on both islands and mainlands has fallen below the values proposed as safe limits across most regions, biomes and biodiversity hotspots. Average BII does not strongly differ between islands and mainlands, but richness-based BII has fallen by more on islands. It seems native species are more negatively affected by land use on islands than mainlands, and islands have seen more land conversion.

Species richness of originally present species has on average fallen by more on islands than on mainlands. Our results highlight the parlous state of biodiversity native to islands.

30/07 | 11h00
PARALLEL SESSION I - T9.P1 - INSIGHTS ON LAND MANAGEMENT
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (5)

OC-026 - (EEF2019-13678) - MANAGEMENT OF INTRODUCED MAMMALS PREFERENTIALLY BENEFITS LARGE, ENDEMIC FOREST BIRDS: A NEW ZEALAND META-ANALYSIS

Nyree Fea (New Zealand)[1]; Wayne Linklater (New Zealand)[1]; Stephen Hartley (New Zealand)[1]

1 - Centre for Biodiversity and Restoration Ecology, Victoria University of Wellington

New Zealand has lost 40-50% of its bird species over the past 1000 years, with over half of the extinctions attributed to the effects of introduced mammals. Populations of many extant forest bird species continue to be threatened by invasive mammals, namely rats, possums and mustelids. The management history of New Zealand's forests over the past fifty years presents a unique opportunity in which a varied programme of mammalian predator control has created a broad-scale replicated "management experiment" able to provide insights into the ecological forces structuring forest bird communities.

We present here the first comprehensive review of population responses of forest birds to different levels of mammal-control recorded across the breadth of New Zealand.

Data was collected from 459 population responses to different intensities of mammal management drawn from 71 sites and 20 bird species. Key life history attributes were included as covariates.

Large-bodied, endemic species consistently showed positive population-level responses to an increase in control intensity and populations of smaller, deeply endemic species responded positively only within sites receiving high intensity management. Three small, native bird species of shallow or zero endemism and three introduced species routinely declined in detections after mammal control.

Our study suggests that large or deeply endemic forest birds would decline in places where management of mammals were to cease, but also reveals three species that apparently tolerate the presence of invasive mammals and whose populations may be sensitive to competition from increases in other, larger birds.

30/07 | 11h00
PARALLEL SESSION I - T9.P1 - INSIGHTS ON LAND MANAGEMENT
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (5)

OC-027 - (EEF2019-13912) - CHANGES IN PLANT COMMUNITY COMPOSITION ALONG GRADIENTS OF LAND MANAGEMENT IN SÃO MIGUEL (AZORES)

Ângela Vieira (Portugal)[1]; Mónica Moura (Portugal)[1]; Luís Silva (Portugal)[1]

1 - CIBIO - Centro de Investigação em Biodiversidade e Recursos Genéticos InBIO – Rede de Investigação em Biodiversidade e Biologia Evolutiva

The natural vegetation in many areas of the world has been replaced by pastures and monocultures, leading to profound changes in the soil and plant communities. The Azores are ideal to model those changes, with habitats ranging from semi-natural to completely artificial found at relatively small distances. We aim to test bioindicators providing an integrated insight of the changes in soil microbial community along two gradients of land management intensity (MI) in Azorean grasslands and forests. Samples were collected along two gradients of MI: High (grassland-corn rotation or production forest), Medium (permanent grassland or exotic forest) and Low (semi-natural grassland or natural forest). Soil analyses followed standard protocols. Plant community composition and cover were assessed for three replicate plots (grassland 2x2 m, forest 5x5 m) per site, and herbarium specimens collected. So far, two sampling seasons have been conducted, Winter (W) 2018, Spring (S) 2018, in a total of 72 samples [2 ecosystems, 1 gradient, 3 rep (W), 9 rep (S)]. Two more sampling campaigns are ongoing in the same period of 2019. We applied cluster, ordination and indicator species analysis to the plant data set. The grasslands could be assembled into four groups, indicating a clear gradient from low to high MI. Some seasonal differentiation was found in the grassland -corn rotation (high MI), but not in the other two MI levels. Similar results were found for forests. These aboveground results will allow to better understand possible differences in the respective belowground microbial communities that are presently being analysed.

30/07 | 11h00
PARALLEL SESSION I - T9.P1 - INSIGHTS ON LAND MANAGEMENT
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (5)

OC-028 - (EEF2019-13685) - SPATIAL PRIORITIZATION OF MANAGEMENT ZONES WITHIN PROTECTED AREAS FOR INTEGRATION OF COMPETING OBJECTIVES.

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Protected areas in the Natura 2000 network seek to harmonise different human activities with the achievement of biodiversity conservation objectives. In many cases, protected areas lack management plans that facilitate the attainment of these multiple objectives. In this study, we present a methodology to design an management plan that allows the optimal spatial the allocation of human activities and biodiversity conservation areas to different management zones, using the Montseny Natural Park (NE, Spain) as a case study.

We used Maxent to build species distribution models from observed records of different plant and animal species within the park and its surrounding areas. According to the occurrence of species, its degree of threat and the location of different land uses (extensive farming, production forest management, etc.), we prioritized the spatial allocation of management zones within the park using Marxan to Zones. The optimization process balances the social and economic costs of limiting human activities in some zones to achieve biodiversity conservation objectives. The spatial output of Marxan identifies different zones distinguishing areas for strict conservation from areas that can support human activities while sustainably conserve biodiversity.

The capability to allocate management zones according to conservation objectives and land uses is fundamental for the design of management plans in Natura 2000 protected areas. The methodology presented here is a valuable tool to consider in this regard. A strong advantage of the innovative zoning technique presented here is its potential applicability in other protected areas.

30/07 | 15h20
PARALLEL SESSION II - T1.P1 - ON THE CONTAMINATION OF FRESHWATER RESOURCES
Room 2.2.12 | Topic 1 - Environmental risks and health (4)

OC-029 - (EEF2019-13863) - ASSEMBLY OF PHOTOGRANULES FOR WASTEWATER TREATMENT

Lukas M. Trebuch (Netherlands)[1]; Ben O. Oyserman (Netherlands)[1,2]; Marcel Janssen (Netherlands)[3]; René H. Wijffels (Netherlands)[3]; Louise E. M. Vet (Netherlands)[1]; Tânia V. Fernandes (Netherlands)[1]

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2 - Bioinformatics Group, Wageningen University;
3 - Bioprocess Engineering, Wageningen University

Photogranules are high-density microalgal-bacterial agglomerates that show great potential in wastewater treatment. Operational advantages of photogranular systems include energy use reduction, high pollutants removal rates and easy harvesting. Although promising for numerous potential biotechnological applications, the ecology of these complex phototrophic systems and the mechanisms for photogranule assembly are poorly understood. In this study we investigated the effect of hydraulic retention time (HRT) on granule formation and community assembly over a period of 148 days.

Three 1.7L photobioreactors operated in sequencing batch were inoculated with microalgae and bacteria from eutrophic and mesophilic environments. The effect of HRT (2.00, 1.00, 0.67, 0.33 days) on the various ecosystem properties such as photogranules sedimentation and density, nutrient removal, and microbial community assembly were assessed.

At each hydraulic retention time, a microbial community with excellent settling characteristics was established. A lower hydraulic retention time increased the rate at which excellent settling (95-99% separation efficiency) was achieved. This change in settling was accompanied by altered physical, chemical and biological properties of the photogranules, including its morphology (microscopic observation), density, extracellular polymeric substances (EPS) content, and microbial community structure observed through 16S/18S sequencing. Nutrient uptake rates ranged from 24.0-90.4 mgN.L-1day-1and 3.1-5.4 mgP.L-1day-1depending on the applied HRT.

A hydraulic retention time of 1 day or below promoted photogranule formation and increased the overall nutrient removal rates. Two phenomena were important for structural integrity of photogranules: 1. EPS and 2. filamentous microalgae.

30/07 | 15h20
PARALLEL SESSION II - T1.P1 - ON THE CONTAMINATION OF FRESHWATER RESOURCES
Room 2.2.12 | Topic 1 - Environmental risks and health (4)

OC-030 - (EEF2019-13600) - INTERACTIONS ON CERIUM OXIDE NANOPARTICLES WITH NATURAL BIOMOLECULES AFFECT TOXICITY FOR AQUATIC BIOTA

Camilla Della Torre (Italy)[3]; Daniela Maggioni (Italy)[1]; Valeria Di Nica (Italy)[2]; Hady Hamza (Italy)[1]; Stefano Magni (Italy)[3]; Bianca Morosetti (Italy)[3]; Lara Nigro (Italy)[3]; Giuseppe Protano (Italy)[4]; Camilla Parenti (Italy)[3]; Nicoletta Riccardi (Italy)[5]; Antonio Finizio (Italy)[2]; Andrea Binelli (Italy)[3]; Sara Villa (Italy)[2]

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5 - CNR-IRSA – Institute of Water Research, National Research Council

While societal benefits and improvements of nanotechnology are well established, several concerns have raised regarding the potential risk of nanoparticles (NPs) for the environment and human health. In the framework of a need to properly predict environmental implications of NPs, an emerging challenge is to address the complex dynamic of physicochemical and biological processes that drive NPs toxicity once they are released into natural matrices. Therefore the objective of this study was to perform an ecotoxicological evaluation of CeO2NPs with different surface modifications, representative of NPs bio-interaction with molecules naturally occurring in water environment, to identify the role of biomolecule coating on nanoceria toxicity for aquatic organisms. Ad hoc synthesis of CeO2NPs with different coating agents such as Alginate and Chitosan was performed and the NPs were fully characterized. The crustacean Daphnia magna and the bivalve Dreissena polymorpha were used as biological models to test the different ecotoxicity of the CeO2NPs. Several endpoints were evaluated at different level of biological organization such as: the imbalance of the oxidative status by the measurement of some antioxidant enzyme activities, oxidative damage, genotoxicity and behavioral responses. Overall results show that the coating with chitosan increases CeO2NPs stability in exposure media. The different coating influenced also significantly the toxic effects of CeO2NPs in species-specific way. Our findings emphasize that environmental modifications affect significantly the environmental fate and ecotoxicity of NPs.

30/07 | 15h20
PARALLEL SESSION II - T1.P1 - ON THE CONTAMINATION OF FRESHWATER RESOURCES
Room 2.2.12 | Topic 1 - Environmental risks and health (4)

OC-031 - (EEF2019-13861) - IMPACTS OF SILVER NANOPARTICLES ON FRESHWATER DETRITAL FOOD WEBS

Daniela Daniela Batista (Portugal)[1]; Cláudia Pascoal (Portugal)[1]; Fernanda Cássio (Portugal)[1]

1 - Centre of Molecular and Environmental Biology (CBMA), University of Minho

Plant litter decomposition is an ecosystem process driven mainly by microbial decomposers (aquatic fungi and bacteria) and invertebrates. These decomposers have different sensitive to various types of pollutants. We assessed the effects of silver nanoparticles (AgNPs) on the activity and diversity of microbial decomposers of plant litter in streams and also at higher trophic levels of detrital food webs by measuring the feeding activity of invertebrate shredders. To better understand the toxicity of AgNPs we examined the oxidative stress responses after exposure to the toxicant. Because physical and chemical characteristics of the stream water may affect NP properties, we evaluated the effects of AgNPs at different temperatures. Litter-associated microbial communities were exposed in microcosms to increased concentrations of AgNPs and kept for 21 days at 10°C, 16°C and at 23°C. Contaminated leaves were subsequently used to fed the invertebrate shredders Limnephilus sp. under the same temperature range. The exposure to AgNPs inhibited leaf decomposition and microbial activity and diversity, with direct impact on the food choices of the invertebrate shredder. However, environmental factors affected the responses: the increase in temperature stimulated leaf decomposition by microbial decomposers and shredders, and the activity of leaf degrading enzymes, while low temperature increased fungal biomass and diversity. This study highlights the importance of taking into consideration the physical and chemical properties and the behavior of AgNPs under different environmental conditions when assessing the potential risk of AgNPs in aquatic food webs.

30/07 | 15h20
PARALLEL SESSION II - T1.P1 - ON THE CONTAMINATION OF FRESHWATER RESOURCES
Room 2.2.12 | Topic 1 - Environmental risks and health (4)

OC-032 - (EEF2019-13832) - OMICS REVEAL DISTINCT MECHANISMS OF TOXICITY OF NANOPARTICULATE AND IONIC SILVER IN MICROBES

Diana Barros (Portugal)[1,2]; Arunava Pradhan (India)[1,2]; Pedro M Santos (Portugal)[1,2]; Cláudia Pascoal (Portugal)[1,2]; Fernanda Cássio (Portugal)[1,2]

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2 - Institute of Science and Innovation for Bio-Sustainability (IB-S), University of Minho

The mechanisms of toxicity of silver nanoparticles (AgNPs) are not clear and the role of Ag+ released from the nanoparticulated form in the overall toxicity requires further attention, especially in aquatic ecosystems where NPs will most likely end up. The impacts of AgNPs and Ag+ were assessed based on the variations in the overall proteome in i) two aquatic fungal ecotypes of Articulospora tetracladia, one isolated from a non-polluted stream (At72) and the other from a metal-polluted stream (At61), and ii) the bacterial strain Pseudomonas sp. M1 (PsM1) isolated from a metal-polluted stream. Transcriptomic responses of At72 in the same exposure conditions were also assessed to complement knowledge from proteomic responses. At72 was the most sensitive to AgNPs, whereas PsM1 was the most tolerant one. The toxicity of AgNPs was supported by data from NP characterization, which showed increased particle stability and lesser agglomeration in presence of At72 that the other microbes. Omic responses to equitoxic levels of AgNPs and Ag+ suggested different mechanisms of toxicity since distinct profiles of protein and gene expression were unveiled. Gene Ontology (GO) enrichment analysis further unravelled several biological processes and allowed to differentiate the effects of AgNPs from those of Ag+. Overall, omic approaches revealed different adaptive responses to Ag+ or AgNPs in the metabolic, energetic and stress pathways. Furthermore, the negligible amount of Ag+ released from AgNPs suggested that toxicity of AgNPs was mainly associated with the particle form.

30/07 | 15h20
PARALLEL SESSION II - T3.P2 - WATERSHED MANAGEMENT AND RESTORATION
Room 2.2.14 | Topic 3 - Freshwater ecology (3); Topic 10 - Land degradation and ecosystem restoration (1)

OC-033 - (EEF2019-13794) - HYDROPEAKING: CURRENT STATUS AND NEW INSIGHTS ON ECOLOGICAL IMPACTS MITIGATION

Miguel Moreira (Portugal)[1]; Daniel S. Hayes (Austria)[2,3]; Isabel Boavida (Portugal)[1]; António Pinheiro (Portugal)[1]

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2 - Institute of Hydrobiology and Aquatic Ecosystem Management, Department of Water, Atmosphere and Environment, University of Natural Resources and Life Sciences, Vienna (BOKU);
3 - Forest Research Center (CEF), Instituto Superior de Agronomia, University of Lisbon, Portugal

The energy-demand driven operation of storage hydropower plants causes artificial sub-daily flow fluctuations – called “hydropeaking” – in the receiving waters, which leads to quickly rising and falling river flows. As this operation scheme causes serious ecological impacts, it is imperative to establish effective mitigation measures in hydropeaking rivers. Therefore, we extensively reviewed the so far established hydropeaking mitigation targets and thresholds regarding the outputs from the scientific community as well as from national regulations and guidelines. We found that only few European countries implemented legal regulations regarding hydropeaking flow thresholds, while others present environmental legislation that can force hydropeaking mitigation constraints. Most mitigation thresholds and management recommendations in scientific literature deal with the effect of downramping on the stranding of salmonids, as well as with minimum discharges between peak-flows to avoid spawning ground desiccation. Regarding other fish species and parameters, information on mitigation targets or thresholds is scarcer or non-existent, as well as on hydropeaking mitigation case-studies. Nevertheless, the available literature indicates that multiple aspects must be considered to assure the success of mitigation measures and the respective thresholds and targets implementation, such as river morphology and species-specific ecological requirements. To assist in that process, we established an approach based on biological and hydromorphological variables for the design of mitigation targets. Furthermore, life-stage specific flow rules were developed for salmonid species by formulating a mitigation framework which can aid the protection of ecologically sensitive life cycle stages in hydropeaking rivers, while, at the same time, maintaining flexible energy production.

30/07 | 15h20
PARALLEL SESSION II - T3.P2 - WATERSHED MANAGEMENT AND RESTORATION
Room 2.2.14 | Topic 3 - Freshwater ecology (3); Topic 10 - Land degradation and ecosystem restoration (1)

OC-034 - (EEF2019-14001) - ECOLOGICAL COMPENSATION IN THE XIN'AN RIVER BASIN, CHINA

Fengran Xu (China)[1]; Chunling Zhang (China)[1]; Benqing Ruan (China)[1]; Yicheng Fu (China)[1]

1 - China Institute of Water Resources and Hydropower Research

To pay for ecological services and transboundary external effects caused by ecological conservation or exploitation, ecological compensation is being applied in China. Ecological compensation in China is related to returning farmland to lakes and forests, taxes of water resources, trades of water rights, national pilot practices in Xin'an River and Dong River, provincial practices in Beijing, Hebei, Zhejiang, Fujian, and Jiangsu.

A concept of co-conservation and sharing, which means to burden the conservation cost and share the benefit in the whole river basin, is developed to solve the difficulties with current research and implementation of ecological compensation in China. Combining with current institutions, considering effects to the externality caused by natural and artificial factors, the upstream and downstream transboundary compensation quantity calculation model is constructed based on the valuation of using extent of water quantity and pollutants receiving capacity.

Xin'an River Basin, related to two provinces in East China, is taken as the study area. The territorial scales of the co-conservation area and the benefit sharing area are determined. By analyzing the transformation of environmental protection costs and benefits between different districts and sections, the actual conservation cost could be distributed to beneficiaries based on the concept of watershed co-conservation and sharing. Compensation quantity range could be calculated, and it would be supportive for application of regional negotiation and encourage-punish mechanism.

Furthermore, a framework for co-conservation and sharing mechanism is discussed. The progress and outcome of implementation of ecological compensation in recent 10 years have been introduced.

30/07 | 15h20
PARALLEL SESSION II - T3.P2 - WATERSHED MANAGEMENT AND RESTORATION
Room 2.2.14 | Topic 3 - Freshwater ecology (3); Topic 10 - Land degradation and ecosystem restoration (1)

OC-035 - (EEF2019-14004) - COMPARING POLICY MIXES AND FRESHWATER ECOSYSTEM RESTORATION PRACTICES RESULTS IN EUROPE AND CHINA

Ana Mendes (Portugal)[1]; Jihanhua Li (China)[2]; Adam Zhang (China)[2]; Fengran Xu (China)[3]; Baiyin Baoligao (China)[3]; André Fabião (Portugal)[4]; Teresa Ferreira (Portugal)[4]; Teresa Goulão (Portugal)[5]; Chen Xiaochen (China)[2]; Piet Verdonschot (Netherlands)[6]; João Rabaça (Portugal)[4]

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2 - Tongji University, Yantze River State Key Laboratory;
3 - China Institute of Water Resources and Hydro-power Research;
4 - Instituto Superior de Agronomia, Departamento dos Recursos Naturais, Ambiente e Território;
5 - N/A; 6 - Wageningen University & Research | WUR - Wageningen Environmental Research

The objective of the present study was to evaluate current legal framework in EU and China regarding the improvement restoration of freshwater ecosystems.

This policy study combines 1) the information gathered through the compilation of scientific literature regarding restoration practices in Europe and China, 2) the results from a Worksop session held in Beijing (6th and 7th of February 2018) and 3) an online survey regarding the evaluation of restoration projects developed in Europe and China.

The diverse array of legislative pieces and obligations is set for different types of environmental problems, which is probably also a reflection of the maturation status of implementation of the several legislative pieces. The main degradation driver for restoration in Europe was the over-utilization of water resources (21.0%) and in China it was water pollution (29.4%). Another interesting aspect is that hydro-morphology restoration (28.6%) is the main restoration measure applied in the European projects surveyed, as opposed to threats removal in China (30.8%). This is probably due to the different implementation drivers in Europe and China, since the Water Framework Directive calls for the need on hydro-morphologic restoration, and in China all the main restoration drivers (1. the Three red lines of Most Stringent Water Resources Management; 2. Action Plan for Prevention and Control of Water Pollution; and 3. the Law for Prevention and Control of Water Pollution) call for pollution control and removal.

30/07 | 15h20
PARALLEL SESSION II - T5.P1 - SHARING THE CITY WITH OTHER INHABITANTS
Room 2.2.15 | Topic 5 - Urban sustainability (3)

OC-037 - (EEF2019-13750) - VEGETATED ROOFS SUPPORT ARTHROPODS ASSOCIATED WITH OPEN DRY HABITATS, BUT SHOW LITTLE BENEFITS FOR RARE SPECIES AND MAY INTRODUCE NON-NATIVES

Kukka Kyrö (Finland)[1]; Johan Kotze (Finland)[1]; Sanja Hakala (Finland)[2]; Elöd Kondorosy (Hungary)[3]; Timo Pajunen (Finland)[4]; Ferenc Vilisics (Finland)[5]; Susanna Lehvävirta (Finland)[1,6]

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3 - Department of Animal Science, Georgikon Faculty, University of Pannonia - Hungary;
4 - Finnish Museum of Natural History, Zoology unit, University of Helsinki - Finland;
5 - Freelance biologist, Helsinki - Finland; 6 - Department of Landscape Architecture, Planning and Management, Swedish University of Agricultural Sciences - Sweden

Vegetated roofs are artificial habitats that are hoped to benefit urban flora and fauna and mitigate the loss of open habitats. Yet, the characteristics of arthropod assemblages on these roofs are poorly known. To estimate the habitat value of vegetated roofs for arthropods, we vacuum sampled arthropods from different kinds of urban vegetated roofs in a boreal climate and used order to species level information together with trait data to describe the communities. We evaluated the importance of local roof characteristics on shaping the arthropod assemblages and found the effects of roof variables to vary between and within taxa, and arthropod communities to differ between sedum and forb-grass dominated roofs. The main local drivers of arthropod abundance were roof height and vegetation structure, with mainly positive effects of height and forb and litter covers and mainly negative effects of grass cover and number of plant species. Based on species data from true bugs, spiders and ants, the roofs consisted mainly of common dispersive species that are generalist feeders associated with dry open habitats or have wide habitat tolerance. According to the data we collected, vegetated roofs have little conservation benefits for rare specialists, and they may serve as a platform for introductions of non-native species.

30/07 | 15h20
PARALLEL SESSION II - T5.P1 - SHARING THE CITY WITH OTHER INHABITANTS
Room 2.2.15 | Topic 5 - Urban sustainability (3)

OC-038 - (EEF2019-13941) - URBAN POLLINATORS - SOLITARY BEES IN FREISING

Julie Weissmann (Germany)[1]; Hanno Schaefer (Germany)[1]

1 - Technical University of Munich

The project uses a holistic approach integrating pollinators, plants and people in a large town and aims to answer three main questions: 1) How important are urban habitats for applied bee conservation? 2) How relevant is bee diversity for urban fruit crop pollination? 3) How can urban citizens become involved in urban bee research?

The study was carried out in a large town in southern Germany. Occurrence data of target specialized bee species was collected on existing and newly established flower patches throughout the city. Flower visitors were recorded through systematic observations on rosaceous fruit crops flowering throughout the season. Students and citizen scientist were trained to perform pollination observations on fruit crops and search for selected target bee species.

Occurring and newly introduced food sources are used by some of the specialized and therefore particularly vulnerable bee species. The crop flower visitor community composition varied strongly throughout the season and between plant species. Participation by urban citizens in bee identification trainings was high, the contribution through observation reports was low.

We conclude that 1) cities can contribute to target species conservation for some specialized bee species; 2) an urban food security perspective highlights the importance of protecting diverse bee communities in urban environments; 3) participative approaches in urban bee research have an educational impact but taxonomic difficulties raise specific challenges for citizen scientists.

30/07 | 15h20
PARALLEL SESSION II - T5.P1 - SHARING THE CITY WITH OTHER INHABITANTS
Room 2.2.15 | Topic 5 - Urban sustainability (3)

OC-039 - (EEF2019-13958) - URBAN FOREST OF BANGKOK'S INNER ORCHARD

Vudipong Davivongs (Thailand)[1]; Sigit Arifwidodo (Thailand)[1]

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Bangkok's inner orchard, historical fruit plantation dating back to Ayudhaya period, since 1350, is currently in the west peri-urban area of Bangkok, Thailand. This orchard not only provides fresh produce to the city but also ecological benefits. Unique forest-like cultivation of mixed fruit trees growing on dikes has potential to be urban forest for the city and this has never been investigated. However, the orchard is at risk of encroachment from the urban expansion. It is necessary for sustainable cities to keep balance between development and environment.

In macro scale, several old maps and aerial photographs in different periods were collected, compared, and analyzed to identify orchard area changes using GIS software. In micro scale, five orchards were surveyed by collecting tree species, sizes, and distributions and then further analysis to identify forest coverage area using United Nations Framework Convention on Climate Change (UNFCCC) as criteria.

The results revealed orchard area largely reduced periodically by urban expansion. Forest coverage area of existing orchard confirmed potential of urban forest to the city. Old continuing orchards, consist of diverse fruit tree species and sizes, have more forest coverage area. In contrast, new orchards which has been replanted after major flood and drought disasters tend to have less forest coverage area and less diverse fruit trees on species and sizes. Although fruit tree replanting in the new orchards reflected to persistency of future urban forests, old continuing orchards should also be protected since they consist of more tree diversity in species and sizes.

30/07 | 15h20
PARALLEL SESSION II -T6.P2 - THE SOIL UNDER THE CROPS
Room 2.2.21 | Topic 1 - Environmental risks and health (1); Topic 6 - Sustainable agro-ecosystems (4)

OC-040 - (EEF2019-13670) - THE ECOLOGY OF PLANT NUTRITION

Cristina Cruz (Portugal)[1]; Ana Corrêa (Portugal)[2]; Juliana Melo (Portugal)[2]; Rodolfo Ferreira (Portugal)[2]; Ana Tenreiro (Portugal)[2]; Rogério Tenreiro (Portugal)[2]; Manuela Carolino (Portugal)[2]; Patricia Correia (Portugal)[3]; Luís Carvalho (Portugal)[3]; Teresa Dias (Portugal)[2]

1 - Faculdade de Ciências da Universidade de Lisboa; 2 - FCUL; 3 - Soilvitae

The key to healthy plants is healthy microbiomes.

1988, a microbe converting inert nitrogen into reactive ammonia was find inside the leaves of sugarcane. What a surprise! Nitrogen-fixing bacteria had until then only been found in special root structures known as nodules. This finding could explain why sugarcane needs less nitrogen fertilizer to thrive than what would be expected. This was the beginning of a new path to maximize crop yields: apart from nitrogen fixing nodules and Micorrhiza, there were other ways through which microbes could benefit plant nutrition and development.

Plants used to be regarded as individuals, but we know now that their phenotypes result from a complex multitude of genomes, known as the plant microbiome. Intriguingly, the same types of microbes keep showing up across the same plant varieties, species or even families. This is the core microbiome that is winnowed from what is a highly complex and diverse soil microbial community. Plants actively recruit microbes that can provide them with services, from nutrient sequestration to suppressing pathogen growth. A number of ‘good’ bacteria have now been linked to heightened resilience and yield in the face of drought, heat stress, salinity and plant disease. Inoculating crops with these could not only improve yields but also fight off disease without the need for chemicals or genetic modification.

In this work we review and integrate the mechanisms allowing the symbiotic functionality between plants and microbes and give hypothesis on how to boost yields by managing microorganisms.

30/07 | 15h20
PARALLEL SESSION II -T6.P2 - THE SOIL UNDER THE CROPS
Room 2.2.21 | Topic 1 - Environmental risks and health (1); Topic 6 - Sustainable agro-ecosystems (4)

OC-041 - (EEF2019-13906) - ESSENTIAL OILS STIMULATING MICROBIAL ACTIVITY

Despoina Vokou (Greece)[1]; Dimitris Chalkos (Greece)[1]

1 - Department of Ecology, School of Biology, Aristotle University of Thessaloniki, GR-54124 Thessaloniki, Greece

Essential oils are known for their antimicrobial activity. We have shown instead that soil metabolism, expressed as soil respiration, is stimulated in their presence: all essential oils and individual constituents that we examined produced similar effects. This stimulation is accompanied by an increase in abundance of the soil bacterial community and by dominance of bacteria that are able to use these secondary metabolites as a carbon and energy source. This holds true for soils from Mediterranean-type ecosystems, where aromatic plants grow, but also from others, where aromatic plants are scarce or totally absent. All effects triggered by essential oils were readily reversible in their absence. Given these positive effects on soil metabolism, we examined if aromatic plants can find use as soil amendments. For this, their leaves were mixed with soil, and tomato seeds were sown in the mixtures at 0 up to 90 days after mixing. A positive effect on tomato was repeatedly recorded when grown in soils mixed with spearmint at a rate of 4-8%. Exploration of the decomposition process showed a fast decay accompanied by an increase of sesquiterpenes at the expense of monoterpenes. Carvone, a C-10 compound, major constituent of spearmint, and inhibitory to tomato germination and growth, had almost disappeared in less than 30 days, whereas the C-15 caryophyllene increased considerably. When individual bacteria or fungi were tested, positive, negative or neutral responses were detected depending on the target organism. This selectivity of action of essential oils can find novel and important applications.

30/07 | 15h20
PARALLEL SESSION II -T6.P2 - THE SOIL UNDER THE CROPS
Room 2.2.21 | Topic 1 - Environmental risks and health (1); Topic 6 - Sustainable agro-ecosystems (4)

OC-042 - (EEF2019-13674) - NITRIC OXIDE AND AUXIN PRODUCTION ARE REQUIRED FOR THE AZOSPIRILLUM BRASILENSE-INDUCED INCREASE IN THE ROOT DENSITY OF WHEAT

Rodolfo Ferreira (Portugal)[1]; Juliana Melo (Portugal)[1]; Rogério Tenreiro (Portugal)[1]; Luis Carvalho (Portugal)[1]; Cristina Cruz (Portugal)[1]

1 - FCUL

Azospirillum is considered as one of the most important genus of plant growth promoting rhizobacteria (PGPR). It has been reported that inoculation with *Azospirillum* leads to changes in the plants root system, with increased root proliferation and consequently, an increase in root density, which enhances plants capacity to access water and nutrients, the so-called sponge effect. This work shows that nitric oxide (NO) and auxins mediate the *A. brasilense*-induced increase in the number of second order roots in wheat, without affecting the primary root structure. Those effects combine, lead to an increase in root density. Application of a NO scavenger – 2-(4- carboxyphenyl)-4,4,5,5, -tetramethylimidazoline-1-oxyl- 3-oxide (cPTIO) and an auxin scavenger – α-(p-Chlorophenoxy) isobutyric acid (PCIB), either together or separated, completely block the *A. brasilense* effect on the root system. While the application of a NO donor - sodium nitroprusside (SNP) and a synthetic auxin – Naphthaleneacetic acid (NAA), either together or separated, mimic the effect of inoculation. These effects are positive for the plant growth and development as well as for the environment. Since increasing root density is a strategy to increase nutrient and water use efficiency and therefore decrease the environmental impacts of agriculture.

30/07 | 15h20
PARALLEL SESSION II -T6.P2 - THE SOIL UNDER THE CROPS
Room 2.2.21 | Topic 1 - Environmental risks and health (1); Topic 6 - Sustainable agro-ecosystems (4)

OC-043 - (EEF2019-13965) - AGRICULTURAL VALUE OF BLACK SOLDIER FLY LARVAE INSECT FRASS AS ORGANIC FERTILIZER

Fernando Felizes (Portugal)[1]; Regina Menino (Portugal)[1]; Maria Amélia Castelo Branco (Portugal)[1]; Rui Nunes (Portugal)[2]; Daniel Murta (Portugal)[2,3,4]

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4 - CIISA, Faculty of Veterinary Medicine, University of Lisbon

FAO expects a significant increase in animal and vegetable production to cope with the world population growth. However, 75% of all the agricultural soil is already used to produce animal feed, making it difficult to achieve the needed rise in production. Thus, the use of vegetable by-products might be a solution to increase the efficiency of nutrient production. Insects appears as an opportunity to reuse such by-products, as they are easy to produce and can be reared in agricultural side streams, allowing the production of both animal feed (the larvae, after recycling of the vegetal debris) and organic fertilizer (insect frass). *Hermetia illucens*, known as Black Soldier Fly (BSF), is one of the best candidates. This is a very interesting approach, since the development of organic fertilizers, which are likely to replace chemical fertilizers currently used, is imperative. Both the recovery of organic by-products and the production of organic fertilizers will be beneficial worldwide, allowing the reintroduction of lost nutrients back into the value-chain, increasing the efficiency of natural resources use. Although organic fertilizer has been used in agriculture, there is currently a paucity of available experimental data on the evaluation of the effect of BSF larvae frass (BSFF) as a potential organic fertilizer. This study is intended to evaluate the agronomic potential of the BSFF. Within this aim, it was conducted a greenhouse experiment with ryegrass, using seven treatments of the BSFF. The ryegrass was cut every 5 weeks, weighted and chemically analyzed. In the present conditions, the results showed a positive effect caused by the use of BSFF.

Acknowledgements & Funding
The research that yielded these results was funded by PT2020 through the project POCI-01-0247-FEDER-017675: ENTOVALOR – Insects as an opportunity in residues valorization (2016-2019).

30/07 | 15h20
PARALLEL SESSION II -T6.P2 - THE SOIL UNDER THE CROPS
Room 2.2.21 | Topic 1 - Environmental risks and health (1); Topic 6 - Sustainable agro-ecosystems (4)

OC-044 - (EEF2019-13455) - IMPORTANCE OF THE CONTRIBUTION OF NITROGEN IN IRRIGATION WATER TO GROSS NITROGEN BALANCES, AND POLLUTION HOTSPOTS, IN A MEDITERRANEAN CONTEXT

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2 - Aarhus University

Our aim is twofold: (i) to quantify the nitrogen (N) input of irrigation water as it is currently unaccounted in standard methodologies of gross nitrogen balances (GNB) and (ii) to estimate the potential agricultural N-loads to groundwater bodies in mainland Portugal, an example of Mediterranean country. Irrigation water was calculated at the municipality level, for 1999 and 2009, based on irrigated areas, average nitrate levels per source (superficial and/or groundwater) and the efficiency of each irrigation system. The GNB was disaggregated into the different existing losses: (i) gaseous N losses (NH3, N2O, NOx) and (ii) N leaching losses that were estimated by calculating leaching fractions. Groundwater N-loads were calculated as the ratio of the N leached and the average aquifer recharge rates (in km3). Irrigation N was more significant locally, with maximum values of 166 and 225 kg N ha-1 and accounting for over 20% of global N-inputs in certain areas, than nationally where the N-input was 1.5 and 3.5 kg N ha-1 with a smaller importance in global N inputs (< 5%). Despite decreases in N-leaching over time (22-15 kt N), the N-loads to aquifers slightly increased (23-25 mg N L-1) derived from a reduction in rainfall and aquifer recharge (1.8-0.95 km3). We concluded that (i) irrigation N can contribute significantly to local agricultural pollution, although its importance progressively decreases with lower spatial scales and (ii) the decline in aquifer recharge rates has aggravated groundwater pollution even with optimized fertiliser practices.

30/07 | 15h20
PARALLEL SESSION II -T7.P2 - ECOSYSTEM FUNCTIONING AND STABILITY
Room 2.3.13 | Topic 7 - Climate and global changes (4)

OC-045 - (EEF2019-13923) - WOOD ANT NEST SURROUNDINGS AS NATURAL CARBON GRADIENTS IN FOREST ECOSYSTEMS – IMPLICATIONS FOR SOIL ORGANIC MATTER DECOMPOSITION AND SEQUESTRATION

Veronika Jílková (Czech Republic)[1]; Kateřina Jandová (Czech Republic)[2]; Anna Vacířová (Czech Republic)[2]; Jaroslav Kukla (Czech Republic)[2]

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2 - Institute for Environmental Studies, Charles University

Wood ants (*Formica* s. str.) forage for aphid honeydew in the nest vicinity. Honeydew is an important source of labile carbon (C) coming to the forest floor with throughfall. Therefore, we investigated whether the C input in the nest vicinity is lower than at greater distances and whether such changes have profound effects on soil organic matter decomposition and sequestration on the whole soil profile.

We established sampling points around four wood ant nests in a temperate coniferous forest at the distance of 4, 30, and 70 m. Throughfall was collected during the vegetative season and analysed for total organic C concentration. The soil from the organic (O) and two mineral (A (0-10 cm) and B (50-60 cm)) soil horizons was subjected to soil C fractionation. In addition, we carried out a one-year litter-bag decomposition experiment.

A 1.5-times smaller C input from the throughfall was detected in the nest vicinity than further from the nests. Carbon content in soil fractions decreased, whereas decomposition rate increased with the distance from the nests. However, these effects were significant only in the B horizon.

Through foraging activities, wood ants create natural C-input gradients in forest ecosystems that can be further used to investigate soil properties and processes affected by changing C input to soils which is expected due to future climate changes. As shown by our results, only the B horizon seems to be affected, which, however, might have further consequences for forest soil C storage.

30/07 | 15h20
PARALLEL SESSION II -T7.P2 - ECOSYSTEM FUNCTIONING AND STABILITY
Room 2.3.13 | Topic 7 - Climate and global changes (4)

OC-046 - (EEF2019-13851) - EFFECTS CLIMATE CHANGE ON ABOVE- AND BELOWGROUND ECOSYSTEM FEATURES AND ON GREENHOUSE GASES FLUXES

VJorge Durán (Portugal)[1]; Alexandra Rodríguez (Portugal)[1]; Laura García Velazquez (Spain)[2]; Everaldo Dos Santos (Brazil)[5]; Luciana De Almeida (Portugal)[1]; David Fangueiro (Portugal)[3]; Fernando Maestre (Spain)[4]

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2 - Pablo de Olavide University;
3 - Instituto Superior de Agronomía - Universidade de Lisboa;
4 - Rey Juan Carlos University; 5 - Instituto Federal do Paraná

Scientific evidence overwhelmingly projects climate change-driven temperature and aridity increases in many areas of the planet in coming decades. However, it is still a major scientific challenge to understand the effects these climatic changes on multiple ecosystem functions and services. We aimed to understand, under natural conditions, how changes in aridity and temperature drive changes in (i) plant cover, diversity and functional traits; (ii) soil diversity and function; and (iii) the biological feedbacks with climate change represented by the exchange of greenhouse gases (GHG) between soil and atmosphere. We selected 25 plots along an aridity gradient in the Iberian Peninsula, and intensively collected information on vegetation and soil features and functioning. To minimize the confounding effects derived from using different soils, and to better understand the mechanistic processes behind the observed results, we restricted our sampling areas to a single soil type: soils from stabilized dunes. Our results show that increases in aridity are significantly related to decreases in plant height and width and in the biotic (plant or biocrust) cover, as well as to changes in soil microbial populations, and to consistent decreases soil fertility and N and P transformation rates. Our results also show that soils from our gradient are able to maintain similar levels of GHG fluxes under different levels of soil moisture, but that projected increases in temperature are likely to result in increases in GHGs emissions.

30/07 | 15h20
PARALLEL SESSION II -T7.P2 - ECOSYSTEM FUNCTIONING AND STABILITY
Room 2.3.13 | Topic 7 - Climate and global changes (4)

OC-047 - (EEF2019-13866) - CARBON SEQUESTRATION SCENARIOS IN CONTINENTAL PORTUGAL: WHICH WAY TO GO FORWARD?

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Carbon sequestration is a climate regulation Ecosystem Service (ES) from which ecological functions and human wellbeing depend on. Aiming the carbon dioxide (CO2) mitigation, the Portuguese government created plans and strategies to accomplish the 2030 national environmental goals under international directives. Some of these impact Land Use and Land Cover (LULC) management and ES production levels. This project evaluates the impact of LULC changes on carbon sequestration using scenarios for year 2030.

The methodology for the evaluation combine geographical information systems (GIS) and InVEST tool, once they produce very effective results in this approach.

The intervention scenarios in the High case scenario show that policies effect over climate regulation produces more 8% of carbon sequestration than current policies, while the Low case scenario produces more 1%. In the Business-as-Usual approach, results indicate that current policies increase carbon sequestration in 5%. However, according to LULC trade-offs, current policies cause a loss of carbon sequestration in the territory, while the intervention scenarios causes no losses.

We contribute with a methodology to use the Portuguese land cover maps (Carta de Ocupação do Solo) to monitor carbon sequestration in Portugal. Additionally, we provide a case study which reflects how different policy options may impact the climate regulation.

Acknowledgements
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30/07 | 15h20
PARALLEL SESSION II -T7.P2 - ECOSYSTEM FUNCTIONING AND STABILITY
Room 2.3.13 | Topic 7 - Climate and global changes (4)

OC-048 - (EEF2019-13988) - HOW SURVIVAL CURVES AFFECT POPULATIONS' VULNERABILITY IN A CHANGING CLIMATE

John Maxwell Halley John Maxwell Halley (Greece)[1]; Nate Mantua (United States of America)[2]; Kyle Van Houtan (United States of America)[3]

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3 - Monterey Bay Aquarium

Climate change involves not just directional global warming but also increasing variability. Such changes will impact whole communities of organisms and the possible effects on population dynamics have raised concerns about increased extinction rates. Our study aims to examine the responses of a spectrum of organisms to environmental variability. Using a modelling approach, we examine how the shape of the survival curve affects the transmission of environmental variability into abundance fluctuations and thus exposes populations to extinction. We find that while it is often supposed that low-fecundity organisms with high parental investment will be the most vulnerable to climate change, it is really those with high fecundity and low parental investment that are likely to be sensitive to such changes. We also find that abundance variations in high fecundity populations is driven primarily by fluctuations in the survival of early life stages, the more so if those environmental changes are autocorrelated in time. We show which types of conservation actions are most appropriate for a number of real populations. While the most effective conservation actions for organisms of low fecundity is to avoid killing them, for populations with high fecundity, conservation goals should focus on protecting early life stages in hostile environments.

30/07 | 15h20
PARALLEL SESSION II -T9.P2 - FORESTS AND HIGH NATURE VALUE FARMLANDS
Room 2.4.16 | Topic 6 - Sustainable agro-ecosystems (2); Topic 9 - Biodiversity and ecosystems (2)

OC-049 - (EEF2019-13890) - HIGH NATURE VALUE FARMLAND AND FOREST AREAS IDENTIFICATION

Lubos Halada (Slovakia)[1]; Andrej Halabuk (Slovakia)[1]

1 - Institute of Landscape Ecology SAS

The aim of the paper is to highlight importance of high nature value (HNV) areas identification for biodiversity protection and sustainable use of agroecosystems and forest ecosystems. Three types of HNV Farmland are distinguished: 1) with high proportion of semi-natural vegetation; (2) with mosaic of habitats and/or land uses; (3) farmland supporting rare species or a high proportion of European or World populations. Possibly this relatively complex approach led to different approaches to practical application of this concept - we briefly illustrate them and provide example from in Slovakia. Using remote sensing data and information about distribution of important species and habitat types, the HNV Farmland was identified by multi-criteria analysis of parameters: landscape diversity, occurrence of semi-natural habitats, occurrence of selected plant and animal species and habitat types included in the annexes of the Habitats Directive.

For biodiversity indicator of HNV Forest Areas we firstly prepared lists of relevant forest habitats and species. The assessment was based on habitat and species prioritization the Habitats and Birds Directives, classification in the IUCN and European Red lists, species endemism (non-bird species) and the nature of species occurrence in the EU (birds).

The application of HNV concept to farmland and forest land represents potentially important policy tool for better targeted management decisions and measures for protection and sustainable use of cultural landscape, habitats and species of agricultural and forest ecosystems. The robust methodology and availability of solid background data are critical for sound evaluation and selection process.

30/07 | 15h20
PARALLEL SESSION II -T9.P2 - FORESTS AND HIGH NATURE VALUE FARMLANDS
Room 2.4.16 | Topic 6 - Sustainable agro-ecosystems (2); Topic 9 - Biodiversity and ecosystems (2)

OC-050 - (EEF2019-13594) - LARGE SCALE EUCALYPT PLANTATIONS ARE ASSOCIATED TO INCREASED FIRE RISK

Adolfo Cordero-Rivera (Spain)[1]

1 - Universidade de Vigo

To satisfy timber demands, forest plantations with fast growing species like pines and eucalypts, are increasing worldwide. In NW Iberia, the number of wildfires has been augmenting since the second half of the XX century, in parallel with these tree plantations. The ecological and forestry literature have analysed fire occurrence with complex models of fuel accumulation and vegetation structure, combined with no less complex climatic models to explain why this NW Iberia has such a high fire occurrence. Economists have concentrated on the relationship between income and fire. Historians, sociologists and political scientists have long ago demonstrated that several conflicts over land use and property are behind most wildfires in this region. Here I use official statistics about fire frequency and wood production to test whether fire frequency is associated to the use of pyrophytic species. I found that fire frequency in NW Spain can be predicted by the amount of eucalypt biomass accumulated in plantations. I further explore the relationships between intensive sylviculture and fire risk at a regional scale (the North of the Iberian Peninsula) and a large scale, the Mediterranean countries. NW Iberia peasants have traditionally used fire to manage their common lands, and used the same techniques to oppose forest policies implemented by Franco's dictatorship, which continued until now with little changes. The use of highly pyrophytic species like eucalypts and some pines has exacerbated this problem, as suggested by the positive correlation between eucalypt plantations and fire frequency at the local, regional and Mediterranean scales.

30/07 | 15h20
PARALLEL SESSION II -T9.P2 - FORESTS AND HIGH NATURE VALUE FARMLANDS
Room 2.4.16 | Topic 6 - Sustainable agro-ecosystems (2); Topic 9 - Biodiversity and ecosystems (2)

OC-051 - (EEF2019-13810) - SHRUB ENCROACHMENT COUPLED TO EXTREME DROUGHTS REDUCE THE FUNCTIONING AND RESILIENCE OF WATER-LIMITED ECOSYSTEMS

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Extreme droughts and shrub encroachment are major drivers of global change that can critically affect tree and ecosystem functioning and resilience. Namely, the increase in tree mortality observed worldwide has been related to overall higher frequency and severity of droughts and locally to factors such as competition with other plants species. Nevertheless, little is known about how these drivers interact and affect ecosystem functioning and resilience.

Using a 6 year (2011-2017) manipulative shrub removal experiment and the co-occurrence of drought events in a Mediterranean oak woodland, we show that the combination of native shrub encroachment and extreme droughts reduced ecosystem transpiration and the resilience of the key-stone oak tree species. We established six 25 x 25 m paired plots in a shrub (Cistus ladanifer L.) encroached Mediterranean cork-oak (*Quercus suber* L.) woodland. We measured sap flow and pre-dawn leaf water potential of trees and shrubs and soil water content.

Ecosystem transpiration was dominated by the water use of the shrub layer, which further increased after extreme droughts. Tree transpiration in shrub encroached plots declined more sharply (ca 67 ± 13 %) than in plots cleared from shrubs (ca 31 ± 11%) relative to the pre-drought year (2011). Trees in shrub encroached plots were not able to recover in the following wetter years showing lower resilience to droughts. This implies that in water-limited climates encroachment by water spending species coupled with extreme droughts may cause critical drought tolerance thresholds of trees to be surpassed leading to tree mortality and ecosystem dysfunction.

30/07 | 15h20
PARALLEL SESSION II -T9.P2 - FORESTS AND HIGH NATURE VALUE FARMLANDS
Room 2.4.16 | Topic 6 - Sustainable agro-ecosystems (2); Topic 9 - Biodiversity and ecosystems (2)

OC-052 - (EEF2019-13789) - ECOSYSTEM SERVICES AND NATURE CONSERVATION: LOOKING FOR WIN-WIN AREAS IN ALENTEJO, PORTUGAL

Lia Laporta (Portugal)[1]; Cristina Marta-Pedroso (Portugal)[1]; Tiago Domingos (Portugal)[1]

1 - MARETEC - Marine, Environemnt and Technology Center, Instituto Superior Técnico, University of Lisbon

How can we ensure the promotion of sustainable agriculture practices (SDG 2) while guaranteeing the protection of our terrestrial ecosystems (SDG 15)? As the integration of the ecosystems services (ES) concept into nature conservation planning becomes an increasingly relevant tool to address this question, there is an urge to better understand the relationship between areas where ecosystems have better ecological condition and biodiversity levels and areas where they have greater capacity of providing ES.

In this study, we present a methodological approach based on spatial statistical identification of hotspots to better integrate ES into nature conservation planning.

We first identified hotspot areas of ecosystem condition and of ecosystem services in the NUTSII region of Alentejo (Portugal), and then estimated spatial relationships (correlations and overlaps) among these areas. We also investigated if current land-use restrictions due to the establishment of protected areas are capturing these relationships.

Results show that, though forest ecosystems present highest spatial coincidence of hotspots of ecosystem services, win-win areas in Alentejo (i.e., areas where hotspots of biodiversity and hotspots of many ecosystem services coincide) are mostly present in agro-forestry ecosystems. These win-win areas are currently poorly represented in the network of protected areas analyzed and thus highly vulnerable to either intensification or abandonment.

To our knowledge, this constitutes a first insight towards an ES-inclusive approach to nature conservation planning in Alentejo, and we recommend considering a wider range of ES and accounting for potential spatial and temporal land-use changes in the future.

30/07 | 17h50
PARALELL SESSION III - T1.P2 - HUMAN EXPOSURE TO ENVIRONMENTAL RISKS
Room 2.2.12 | Topic 1 - Environmental risks and health (4); Topic 5 - Urban sustainability (1)

OC-054 - (EEF2019-13638) - THE INTERFACE BETWEEN ECOLOGICAL MODELS IN HEALTH AND SDGS 2030 AGENDA FOR THE PROMOTION OF PROFESSORS' HEALTH

Ivani Carlotto (Portugal)[1]; Maria Alzira Pimenta Dinis (Portugal)[1]

1 - University Fernando Pessoa

Objective: To identify references of ecological models in health and its interface with SDG 3 and SDG 4 of 2030 Agenda, contributing to the development of qualified actions in health promotion (HP) in higher education (HE).

Methodology: Exploratory-descriptive research, quantitative/qualitative, non-probabilistic search for convenience (n= 1400 individuals), with professors from the State of Rio Grande do Sul / Brazil, use of factorial analysis, retention of principal components, Varimax® rotation and MAXQDA®.

Findings: HP values the individual's interactions with social environments, as well as stimulating the development of qualified actions on HP professors in a holistic, sustainable and ecosystemic way. The combination of the ecosalutogenic model with the SDG 3 and SDG 4 of the 2030 Agenda allows identifying possibilities of interdisciplinary actions between these two paradigms. The results of this study point out that in addition to the HP principles usually identified in the literature, such as equity, interdisciplinarity, participation and holism, new policies related to professors have been defined. Solidarity, public trust, autonomy, resilience, well-being, global health, and environmental health/ sustainability were all positively impacted by the professor's health.

Conclusions: Integrating the ecological models of HP and SDG 3 and SDG 4 of the 2030 Agenda, allows identifying opportunities for cross-cutting interventions that support the well-being and commitment to the health of professors, developing the ecosalutogenic approach in HE. The recognition of HP as an investment is necessary to strengthen positive assets for planned actions for professors' health.

30/07 | 17h50
PARALELL SESSION III - T1.P2 - HUMAN EXPOSURE TO ENVIRONMENTAL RISKS
Room 2.2.12 | Topic 1 - Environmental risks and health (4); Topic 5 - Urban sustainability (1)

OC-055 - (EEF2019-13596) - CHEMICALS IN DAILY LIFE - AN EMERGING CONCERN IGNORED IN PORTUGAL?

Susana Fonseca (Portugal)[1]

1 - University of Lisbon - Social Sciences Institute

In the last decades, there have been regular alerts on the risks that chemical substances in day-to-day life articles pose for human health, particularly for vulnerable groups - children and women in childbearing age.

The aim of this study is to understand mothers and future mothers perception on risks related to chemicals in daily products (cosmetics, food, textiles, etc.) during pregnancy and the early months after birth.

In this presentation we aim at sharing the results of a study being conducted at the Social Sciences Institute of the University of Lisbon entitled: “Taking care of children in an uncertain and risky world – the precautionary principle among families and health professional’s practices and routines regarding chemicals in daily life”.

The study involved in depth interviews with women with different motherhood experiences, professional and social backgrounds and age group, during pregnancy and in the first year of the children´s life.

The results point to a generalized lack of awareness on the subject, not only by mothers/future mothers, but also by health professionals who rarely address such a theme with their patients and seem to depreciate any risk resulting from this daily exposure.

Therefore, it is our objective to problematize and discuss the apparent paradox of the emergence of chemicals in daily life as a fundamental health concern addressed by different institutions at the international and European level, but that at national level seem to be escaping the attention of health professionals and future mothers in a particularly vulnerable period for children.

30/07 | 17h50
PARALELL SESSION III - T1.P2 - HUMAN EXPOSURE TO ENVIRONMENTAL RISKS
Room 2.2.12 | Topic 1 - Environmental risks and health (4); Topic 5 - Urban sustainability (1)

OC-056 - (EEF2019-13907) - HUMAN HEALTH, BIODIVERSITY AND ECOSYSTEMS: VECTOR-BORNE DISEASES

A Paulo Gouveia De Almeida (Portugal)[3,4]; Maria Rosa Paiva (Portugal)[1,2]

1 - CENSE;
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3 - GHTM/Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa;
4 - CVZ/Department of Medical Virology, Faculty of Health Sciences, University of Pretoria

Many of today's environmental challenges have a systemic character with multiple causes, interdependencies, underlying drivers and associated impacts on a Global context, among which are the effects on human health.

The positive Public Health impact of natural environments is shown by various studies with significant correlations between proximity or amount of nearby green space and indices of health and longevity, irrespective of socioeconomic status.

We live in an era where vector-borne diseases (VBDs), either mosquito, tick or other, have become increasingly important, in the course of emergence or re-emergence, both in the tropical regions and low-income countries where they continue to pose a great burden on public health, but also now in developed countries, assuming a Global dimension. The reasons for this resurgence, are many and varied, whether through anthropogenic changes, socioeconomic factors, drug and insecticide-resistance, global mobility, health system deficiencies, climate change and/or the introduction of alien species of vector arthropods. Among VBDs are Malaria, Dengue, Chikungunya, Zika, and Yellow Fever, some of which have enzootic cycles, that cause occasional spillover to humans, hence called zoonosis.

The One Health concept is the realization that Human, animal and environmental health are interconnected, and that changes in one will affect the others. Biodiversity provides us with many ecosystem services, particularly of cultural ecosystem services (CES), that can't otherwise be engineered, and can also protect human health by reducing the probability of human exposure to disease agents transmitted from wildlife. The effective use of CES can provide salutogenic, i.e. health-promoting effects.

30/07 | 17h50
PARALELL SESSION III - T1.P2 - HUMAN EXPOSURE TO ENVIRONMENTAL RISKS
Room 2.2.12 | Topic 1 - Environmental risks and health (4); Topic 5 - Urban sustainability (1)

OC-057 - (EEF2019-13821) - RISK OF ANISAKID LARVAE IN THE MOST CONSUMED FISH SPECIES IN MADEIRA ARCHIPELAGO

Margarida Hermida (Portugal)[1,2]; Ilhem Hamdi (Tunisia)[3]; Sónia Costa (Portugal)[1,2]

1 - Marine and Environmental Sciences Centre (MARE);
2 - Oceanic Observatory of Madeira (OOM);
3 - University of Tunis El Manar

The aim of this study is to identify, from the fish species most consumed in Madeira, those which may pose a risk to consumers if eaten raw or undercooked, due to the presence of live anisakid nematodes in the muscle, which can accidentally infect humans (anisakiasis).

A list of the fish species most consumed in Madeira was compiled based on results of a questionnaire study carried out in Madeira archipelago. Data on anisakid nematode infection were acquired from visual inspection of 30 or more specimens of each species, or obtained from the literature when available. Fish species were then classified according to the risk of ingestion of live worms.

From the 15 species most frequently consumed in Madeira archipelago, 10 had low or negligible risk for human health from anisakid consumption. Four species were considered to present a moderate risk, but only one, Aphanopus spp., was considered to present a high risk, due to a combination of extremely high prevalence and intensity of infection by anisakid nematodes, their occurrence in the musculature, and the fish being usually sold fresh.

Scabbardfishes, Aphanopus spp., among the most frequently consumed species in Madeira, are extremely likely to be infected by anisakid nematodes, including in the flesh surrounding the visceral cavity. It is highly recommended that these species never be eaten raw or undercooked.

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30/07 | 17h50
PARALELL SESSION III - T2.P2 - SCIENCE EDUCATION AT THE SERVICE OF CONSERVATION
Room 2.4.16 | Topic 2 - Science communication (4)

OC-058 - (EEF2019-13931) - CONSTRUCTIVISM IN CONSERVATION EDUCATION

Jamie Ashton (Thailand)[1]

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The term conservation education generally refers to conservation biology, or conservation science, consisting of expert research fields doing work into how conservation practices or environmental protection or policy. However, an overlooked aspect of conservation education is public education informing communities about surrounding ecosystems and how to integrate more sustainable practices into daily life. Zoos, aquariums, museums, botanical gardens and other public spaces or organizations with conservation ties are in a unique position to educate visitors about conservation issues and inform conservation action by exposing visitors to new knowledges. Whilst there have been increasing efforts to fulfil these educational goals, they are often situated purely in the realm of what is termed 'traditional' educational frameworks in which information is conveyed in a factual, linear way via signage or poster-based information often laced with scientific language. This educational approach is susceptible to perpetrating public biases of inability to make any significant impact on conservation efforts or to alienating audiences with almost-exclusively scientific knowledges and language. This paper motivates a constructivist framework for public conservation education in order to combat these current downfalls. With constructivism's learner centred approach, organisations can involve visitors in meaning making processes when interacting with the educational experiences on offer and thus increase the possibility of instilling a sense of environmental stewardship and conservation behaviours in daily life. Furthermore, constructivist frameworks allow for the integration of diverse knowledges, involving local or indigenous knowledges alongside scientific knowledge and encouraging organisations to integrate culternomics into their outreach efforts.

30/07 | 17h50
PARALELL SESSION III - T2.P2 - SCIENCE EDUCATION AT THE SERVICE OF CONSERVATION
Room 2.4.16 | Topic 2 - Science communication (4)

OC-059 - (EEF2019-13997) - CELEBRATING THE FUNGI TO BOOST CONSERVATION

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Fungi are increasingly recognized as key players in ecosystem functioning, perhaps especially as decomposers driving biogeochemical cycles in terrestrial ecosystems. But fungi may be in trouble. Like animals and plants, fungi may be vulnerable to mass extinction. In recent years fungal conservation has gained momentum. The scientific community understands the significance of this emerging movement and is working to engage the public in a developing conservation discourse. Fungi often get bad press and are associated with rot and disease. Raising awareness of fungi, emphasize how crucially important fungi are and challenge attitudes about the fungi among the public is, therefore, paramount. We introduce the “Celebration of Fungi Day”, which aims to fight fungal blindness and shift perceptions about fungi among the general public, celebrating their importance in nature and in our lives. We share the experience that was the prefiguration of this concept, in the form of a festival that took place at the University of Coimbra in 2017. About 200 people participated in the various activities offered, including a mushroom market, brewing and gastronomy workshops, and fun hands-on activities for families. We will present an overview of what we learned from this experience through the results of an online survey, complemented with free written comments by the public. Our findings suggest the value of delivering key messages about fungi during celebration events. The presentation will include a brief overview of the results of our participation in the Participatory Budget Portugal 2018, and highlight issues and perspectives for the future.

30/07 | 17h50
PARALELL SESSION III - T2.P2 - SCIENCE EDUCATION AT THE SERVICE OF CONSERVATION
Room 2.4.16 | Topic 2 - Science communication (4)

OC-060 - (EEF2019-13664) - PARTNERS IN LEARNING AND INNOVATIVE TEACHING PRACTICES - AN APPROACH TO CONSERVATION EDUCATION

Antonieta Costa (Portugal)[1]

1 - Jardim Zoológico de Lisboa

Zoos are unique learning environments that require a tailored approach to conservation education to suit the context and purpose of the learning skills of the 21st century. In the last years Lisbon ZOO has trialled an education model that combines contemporary learning theories with emotional learning / SEAL. Just as nature is an inspiration in all sorts of visual and performing arts, environmental awareness and protection, can spark new ideas and projects! Technology has a reputation for being in opposition to the environment, but technological education doesn't have to be! People can be challenged to find ways to use new innovations with smaller ecological footprints.

Lisbon ZOO works with several Partners in learning to help develop innovative teaching practices that improve student learning outcomes and better prepare youth for life in the 21st Century. The combination between technology and educational programmes at zoos reveals to be an important strategy to engage people and to change the way they see the word around them.

This presentation will demonstrate several useful educational tools that, if used in the correct way, can become important in converting knowledge acquisition into a much more motivating and fostering educational programme and also presents the evaluation results, according to our article "Partners in learning and innovative teaching practices. An approach to conservation education to suit the context and purpose of learning skills in the 21st century: a pilot study" published in the International ZOO Yearbook, 2016

30/07 | 17h50
PARALELL SESSION III - T2.P2 - SCIENCE EDUCATION AT THE SERVICE OF CONSERVATION
Room 2.4.16 | Topic 2 - Science communication (4)

OC-061 - (EEF2019-13939) - PLAYING SCIENTIFIC GAME TO HELP THE PROTECTION OF THE MEDITERRANEAN SEA

Federica Rescio (Italy)[1]; Franca Sangiorgio (Italy)[1]; Alberto Basset (Italy)[1]

1 - University of Salento

Citizen science and information communication technology are key elements to connect science and education, expanding ecological research frontiers and public engagement. Here, we present a serious game, named Scientific Game, involving students as next generation citizens already active and also influential on main environmental challenges.

Scientific Game combines theoretical activities with ICT and requested the production of practical works related to the ecology of the seas. It includes a two-phase competition: one, offline, required students and teachers to collaborate across Europe in producing research works; the other, online, involved the participants in a serious game competition. During the first phase students develop an experimental project applying the scientific method, constructing hypotheses, determining their validity and documenting results through presentations, videos, posters or papers; in the second phase students participate in an online competition about MSFD and specific descriptors such as biodiversity, underwater noise and marine litter.

All supporting material for the Scientific Game, available on the platform (www.medcis.scientificgame.unisalento.it), can be downloaded, becoming a tool used in the context of curricular activities, independently from the competition. Good results were obtained in the previous editions of Scientific Game with twenty teams participating to the competition and interesting projects received from the schools.

30/07 | 17h50
PARALELL SESSION III - T4.P2 - LOOKING FOR SUSTAINABLE SOLUTIONS
Room 2.2.14 | Topic 4 - Eco-solutions and bio-economy (4)

OC-062 - (EEF2019-13618) - BIOLOGICAL SWIMMING POOLS - A NATURE-BASED SOLUTION

Udo Schwarzer (Portugal)[1]

1 - Bio Piscinas, Lda.

Tourism is an important component of the economy in many Mediterranean countries, but often tourism is, as well, a spoiling factor for landscape, abusing many kinds of resources. A common example is water pollution by using chlorine pools in resorts, hotels and holiday houses. This cheapest treatment has a strong impact in biodiversity as well as in contributing to the ozone layer deterioration and affects people's health.

A biological swimming pool is a Nature-based solution that approaches water and health security for bath waters from an ecosystem approach. It applies natural processes as the basis to keep pool water in optimal conditions for bath and reduces all the impacts of standard treatments at the time that contributes to maintain fresh water biodiversity by restoring aquatic ecosystems. The spread of this model among the hotels and resorts business community, would have a great impact in the short term on water consumption, pollution as well as in the reduction of CO2emissions captured by the ecosystem.

Biological pools are built ponds or lakes that mimic and recreate the ecological processes that occur in natural systems, constituting a natural engineering solution, which allows creating aquatic leisure spaces with low environmental impact. In these systems, water purification, with the objective of having quality for bathing purposes, is performed by biological filters and aquatic plants (use of ecosystem services).

Biological pools also function, on a landscape scale, as habitats that facilitate the flow of some species between different watercourses and as reservoirs of water.

30/07 | 17h50
PARALELL SESSION III - T4.P2 - LOOKING FOR SUSTAINABLE SOLUTIONS
Room 2.2.14 | Topic 4 - Eco-solutions and bio-economy (4)

OC-064 - (EEF2019-13945) - ECO-SUSTAINABLE RECOVERY OF ERGOSTEROL-RICH BIOACTIVE EXTRACTS FROM PLEUROTUS ERYNGII (DC.) QUÉL.

Taofiq Oludemi (Portugal)[1]; Ana Rita Silva (Portugal)[1]; Cristina Costa (Portugal)[2]; Joana Barros (Portugal)[2]; Inês Ferreira (Portugal)[2]; João Nunes (Portugal)[2]; Miguel Angel Prieto (Portugal)[3]; Lillian Barros (Portugal)[1]

1 - Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal;
2 - Centre Bio R&D Unit, Association BLC3 – Technology and Innovation Campus, Rua Nossa Senhora da Conceição, n2, 3405-155 Oliveira do Hospital, Portugal;
3 - Nutrition and Bromatology Group, Faculty of Food Science and Technology, University of Vigo, Ourense Campus, E32004 Ourense, Spain

Pleurotus eryngii (DC.) Quél. is widely recognized for its organoleptic qualities and health benefits, being commercially produced in great extent in Asia, Europe, and North America [1]. Depending on the size of the mushroom industry, an expressive volume (20 to 35% in weight of fresh mushrooms) of bio-residues are often discarded, even though their content in biomolecules is not necessarily compromised [2]. Hence, there are major opportunities to turn these outcomes into high-value products through the recovery of bioactive compounds, such as ergosterol rich extracts. Ergosterol, one of the main sterols in mushrooms, has been reported to be the major contributor in *P. eryngii* bio-functionalities [2]. In the present work, *P. eryngii* bio-residues (PER) and intact mushrooms (PEG) were compared for their ergosterol content. Response Surface Methodology (RSM) was applied using heat-assisted extraction methodology. The combined effect of time (10-150 min) and temperature (30-90°C) was performed using a circumscribed central composite design (CCCD), and the response criteria were extraction yield and ergosterol content using HPLC-UV. The global optimum conditions predicted by the model were 112.7 min, 90°C, and 150 min, 61.8°C for PER and PEG, respectively. Under these conditions, 190.14 and 360.58 mg of ergosterol per 100 g of dry weight sample were recovered from PER and PEG, correspondingly. Even though *P. eryngii* bio-residues presented up to 53% of PEG ergosterol yield, PER offers sustainable and economic advantages. These results confirm the enormous potential of the under-exploited P. eryingii bio-residues as a valuable source of ergosterol-rich extracts.

30/07 | 17h50
PARALELL SESSION III - T4.P2 - LOOKING FOR SUSTAINABLE SOLUTIONS
Room 2.2.14 | Topic 4 - Eco-solutions and bio-economy (4)

OC-065 - (EEF2019-14193) - CORK THREAD BY CASA GRIGI

Mónica Gonçalves (Portugal)[1]

1 - Casa Grigi

The cork thread is a unique and innovative non-fibrous double-sided product: 100% cork top, 100% cotton backing. The same has the natural color of cork and its visual aspect is very similar to jute. This thread was created to knit and to be woven into a loom. Currently, cork thread can be produced with a thickness of up to 1 mm or higher without its resistance to abrasion, fatigue and other stress associated deterioration being reduced. It is sturdy, comfortable, lightweight, washable and passable, retaining all the original and physical properties of cork.

Possible combination with other yarns, such as cotton and spandex.

Presently, there is already a technical data sheet for the “Cork Wire” product, in which all the technical characteristics are tested, including tensile strength limits, indicating the maximum tension that the thread can reach.

The cork thread has unique properties that no other thread, whether natural or artificial, has ever been able to match or exceed such as;

Malleability - elasticity and torsion resistance (which cork skin, for example, does not have) - as well as impermeability and thermal insulation. It can be washed at any temperature (unlike the cork skin that can only be washed with soap and water) and ironed (it is even advisable). Since cork is the raw material used for the production of the thread, it has the following characteristics: LIGHT / FLOATABILITY More than 50% of its volume is air, which makes it very light and floats. WATERPROOF LIQUID AND GAS Thanks to the suberin and the ceroides present in the walls of the cells, the cork is impermeable to liquids and gases. Its resistance to humidity allows it to age without rotting, since it is chemically inert. ELASTIC AND COMPRESSIBLE It is the only solid that when tightened on one side does not increase in volume in the other. It adapts to variations in temperature and pressure. EXCELLENT THERMAL AND ACOUSTIC AND VIBRATING INSULATOR Cork has a low conductivity of heat, sound and vibration. SLOW COMBUSTION Cork is a natural fire retardant: it does not flame or release toxic gases during its combustion. RESISTANCE TO FRIGHTENING Ability to absorb shocks because the cells are formed by microscopic gas pads. HYPOALERGENIC Does not absorb dust avoiding allergies COMFORTABLE Sensorial, it is a soft product to the touch, with a very characteristic, non-intrusive, slightly sweet odor. With a natural temperature very close to that of the human body, it conveys a feeling of comfort difficult to replicate with any other material.

30/07 | 17h50
PARALELL SESSION III - T6.P3 - CURRENT SCENARIOS OF AGRICULTURAL DEVELOPMENT
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4); Topic 7 - Climate and global changes (1)

OC-066 - (EEF2019-13627) - ASSESSING EUROPEAN-WIDE BIODIVERSITY-LANDSCAPE RELATIONSHIPS IN FARMLAND TO IMPROVE THE ECOLOGICAL EFFECTIVENESS OF THE COMMON AGRICULTURAL POLICY

Mario Díaz (Spain)[1]; Cristina C. Bastias (Spain)[1]; Elena D. Concepción (Spain)[1]

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Conservation tools included in the framework of the European Common Agricultural Policy (CAP) are moving from local-scale generalised approaches at EU-level (e.g. agri-environment schemes) to landscape-scale approaches at national or regional levels (e.g. conditionality, greening and eco-schemes). This change recognizes the fact that local biodiversity is most likely related to landscape complexity non-linearly, with minimum and saturation thresholds of complexity that constraints the effectiveness of local-scale conservation tools to landscapes of intermediate complexity. Further, the specific shape of these relationships and the location of thresholds along different landscape complexity gradients would surely vary among taxa and geographically depending on regional species pools. We are performing a broad-scale European study to model local biodiversity-landscape relationships along the widest possible gradients of landscape complexity. For this purpose, we are gathering geo-referenced biodiversity data (species richness) recorded in farmed fields all over Europe on the basis of a literature review with the following search criteria: (i) studies using standardized and exhaustive sampling protocols (ii) on groups whose local diversity has been extensively measured across Europe (i.e. plants, bees, birds, grasshoppers, butterflies, carabids and spiders). Moreover, we are computing standardized landscape variables in circular areas of 500 m radius around field centres from aerial photographs by means of an automatic habitat mapping classification procedure. Relationships between biodiversity and selected landscape variables will be then modelled along the whole European gradient. Results will be essential for the necessary regional adjustment of CAP policy instruments to ensure biodiversity conservation in the wider European landscapes.

30/07 | 17h50
PARALELL SESSION III - T6.P3 - CURRENT SCENARIOS OF AGRICULTURAL DEVELOPMENT
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4); Topic 7 - Climate and global changes (1)

OC-067 - (EEF2019-13804) - SUSTAINABLE DEVELOPMENT GOALS: HOW WORKING EQUIDS DELIVERS FOR DEVELOPMENT OF MOUNTAIN AREAS

João B. Rodrigues (Portugal)[1,2]; João Azevedo (Portugal)[2,3]; Andrew Judge (United Kingdom)[1]; Faith Burden (United Kingdom)[1]

1 - The Donkey Sanctuary;
2 - CIMO - Mountain Research Center;
3 - Escola Superior Agrária - Instituto Politécnico de Bragança

According to FAO-UN, there are around 300 million working animals worldwide (112 million equids), playing a fundamental role in human livelihoods through their contribution to financial, human and social capital, supporting between 300 and 600 million people globally, particularly family farmers in poor rural and mountain areas of limited income, where animals represents an extremely important source of clean and renewable energy. Indeed, working animals optimally transform the consumed biomass in energy and natural fertilizer, contribute to a sustainable management of arable lands, forests and sensitive areas, avoiding soil degradation; contribute to maintain biodiversity, reduce carbon emissions, encourage self-reliance and reduce consumption of external resources.

The use of animal energy also greatly contributes to strengthening livelihoods, access to water, and reduces the working effort of the family members, mainly women and children, contributing to increase the time available for children education and community involvement for women, raising female status, safeguarding rural social structures and family farming.

Yet their recognition remains largely neglected, with animal traction being ignored by decision and policy makers and even by civil society, which compromises a real improvement of this technology, as well as animal welfare.

In this presentation, authors analyse the use of animal traction as a means of contributing to the UN-SDGs based on evidence collected all over the world, but also the ongoing process of transformation of animal traction in Europe, based on innovative solutions supported by scientific research to increase animal welfare and to adjust it to modern agroforestry and other activities.

30/07 | 17h50
PARALELL SESSION III - T6.P3 - CURRENT SCENARIOS OF AGRICULTURAL DEVELOPMENT
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4); Topic 7 - Climate and global changes (1)

OC-068 - (EEF2019-13930) - EVALUATION AND PRESERVATION OF MONTADOS: THE CASE OF HOLM OAK IN PORTUGAL

Leonor Sucena-Paiva (Portugal)[1]; Sérgio Chozas (Portugal)[1]; Lucio Rosário (Portugal)[2]; Otília Correia (Portugal)[1]

1 - CE3C;
2 - ICNF

The Portuguese montados, and their Spanish synonym *dehesas*, are multifunctional semi-natural system with great benefits for humans in social, economic and environmental terms. These agro-forestry-pasture systems are considered as a hotspot of biodiversity. In Portugal this system occupies approximately 34% of its territory, with cork oak (*Quercus suber*) montados dominating south-western areas under Atlantic influences while holm oak (*Q. rotundifolia*) montados dominate the south-eastern areas with colder winters and hotter summers and significantly lower precipitation.

Recent studies refer a decline in holm oak montados over the past decades, due to damage caused by insects, fungal diseases and inadequate management procedures, namely overgrazing and bad forestry practices.

The main goal of this work is to evaluate the main factors that have contributed to the present vulnerability of this system on the left bank of the Guadiana River. To address this question we analyze the role of climatic and edaphic variables in holm oak performance, characterized in terms of water use efficiency and sources of N available for plant growth by using isotopic composition (δ13 and δ15N). We also study the effect of the main management models developed in our study area on tree fitness.

We found that both environmental and management practices do affect trees and, consequently, this multipurpose system. These results will provide tools to propose management strategies to contribute to the continuity of the holm oak montados.

30/07 | 17h50
PARALELL SESSION III - T6.P3 - CURRENT SCENARIOS OF AGRICULTURAL DEVELOPMENT
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4); Topic 7 - Climate and global changes (1)

OC-070 - (EEF2019-13761) - GLOBAL CHANGE-DRIVEN MODULATION OF BOTTOM-UP FORCES AND CASCADING EFFECTS ON BIOCONTROL SERVICE

Han Peng (China)[1]; Becker Christine (Germany)[2]; Sentis Arnaud (France)[3]; Rostas Michael (Germany)[4]; Desneux Nicolas (France)[5]; Lavoir Anne-Violette (France)[6]

1 - Chinese Academy of Sciences (CAS);
2 - Geisenheim University · Crop Protection;
3 - IRSTEA, Aix Marseille Univ., UMR RECOVER;
4 - Georg-August-Universität Göttingen | GAUG · Department of Crop Sciences / Agricultural Entomology;
5 - INRA Sophia Antipolis; 6 - Univ. Nice Sophia-Antipolis

Abiotic and biotic factors affect plants in various ways which in turn affect associated arthropod communities through direct and indirect interactions, following the so-called bottom-up forces mediated by plants. Several reviews have synthesized studies which examine the effects of abiotic factors on plant-arthropod interactions, mainly focusing on the soil nitrogen status (Chen et al. 2010), soil water status (Huberty and Denno 2004; Jactel et al. 2012; Erb and Lu 2013) and climate change (Cornelissen 2011; De Lucia et al. 2012). However, these studies have mostly focused on bitrophic interactions. Bottom-up forces are expected to cascade through trophic links and plant-mediated multitrophic interactions in the complex plant-arthropod food webs have received increasing research interests recently (Poelman and Dicke 2014; Becker et al. 2015, Rosenblatt & Schmitz 2016, Han et al 2018). In the context of agriculture intensification and global climate change, synthesizing the studies investigating the bottom-up effects of abiotic factors on the biocontrol service can offer valuable insights for improving the sustainability of managed ecosystems (e.g. crop production) as well as natural ecosystems (e.g. biodiversity).

Here, we review plant-mediated bottom up effects of abiotic factors in the context of agricultural intensification and climate change on arthropod community which are providing biocontrol service and highlight road maps for future studies.

30/07 | 17h50
PARALELL SESSION III - T7.P3 - SPECIES ADAPTATION AND ACCLIMATION
Room 2.3.13 | Topic 7 - Climate and global changes (3); Topic 9 - Biodiversity and ecosystems (1)

OC-071 - (EEF2019-13959) - THE INTERACTION OF GLOBAL CHANGE AND HABITAT MODIFICATION IS THREATENING LICHEN DIVERSITY

Paolo Giordani (Italy)[1]; Renato Benesperi (Italy)[2]; Elisabetta Bianchi (Italy)[2]; Gabriele Casazza (France)[3]; Alessandro Chiarucci (Italy)[4]; Lorenzo Lazzaro (Italy)[2]; Chiara Lelli (Italy)[4]; Paola Malaspina (Italy)[1]; Lorenzo Marini (Italy)[5]; Chiara Vallese (Italy)[4]; Juri Nascimbene (Italy)[4]

1 - University of Genova;
2 - University of Florence;
3 - Institut Méditerranéen de Biodiversité et d'Ecologie Marine et Continentale;
4 - Alma Mater University of Bologna; 5 - University of Padova

Rapid global change is threatening biodiversity globally, interactively exacerbating the impacts of other relevant drivers of biodiversity loss, as in the case of habitat modification associated with agriculture, e.g. causing latitudinal and elevational range shifts, compositional and functional shifts, phenology anomalies, and mismatches among species that imperil the effectiveness and stability of biological networks.

Objectives: we tested the effects of this scenario to lichens, whose poikilohydric nature determines a close relationship between eco-physiology and climatic conditions and a strong sensitivity to anthropogenic disturbance (e.g. air pollution, eutrophication, forest management).

Methods: In a number of studies across Italy, spanning climatic and anthropogenic gradients, we detected the lichen response in terms of richness loss, compositional and functional shifts, floristic homogenization, niche suitability reduction, decoupling between epiphytes and substrate.

Results and conclusions: our research indicates that global change is rapidly affecting lichen diversity in many ways, simultaneously interacting with local processes that involve habitat modification. While lichens greatly contribute to ecosystem biodiversity and functioning, being also associated to relevant ecosystem services, they are still receiving little consideration in conservation policies and hopefully our results could contribute to increase public awareness on their fate.

30/07 | 17h50
PARALELL SESSION III - T6.P3 - CURRENT SCENARIOS OF AGRICULTURAL DEVELOPMENT
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4); Topic 7 - Climate and global changes (1)

OC-072 - (EEF2019-13602) - EFFECTS OF GLOBAL CHANGE ON MOUNTAIN DUNG BEETLE DIVERSITY AND ECOSYSTEM SERVICES

Ana M. C. Santos (Portugal)[1,2]; Sandra Grzechnik (Spain)[2]; Indradatta Decastro-Arrazola (Spain)[2]; Miguel Ángel Rodríguez (Spain)[2]

1 - Centre for Ecology, Evolution and Environmental Changes (cE3c), University of Lisbon;
2 - Universidad de Alcalá, Madrid, Spain

The effects of land use and climate changes on the diversity and functioning of ecological communities and their associated services are still not fully understood. Many ecosystem services are delivered by insects, among which those performed by dung beetles stand out. They feed and breed in and under the excrement, and when burying it they contribute to soil mineralization, aeration, fertilization, etc.

Here we present an ongoing research that aims at determining how temperature increase and habitat management can affect: i) dung beetle species and trait diversity; and ii) the outcome of three ecosystem services, namely dung removal, seed dispersal and nutrient supply to the soil.

Two types of experiments were carried out, one in the laboratory, using acclimatized chambers to simulate future temperatures, and another in the field. Dung beetles were placed together with cow dung, evaluating the loss of excrement after 72 hours (dung removal). Artificial seeds were mixed in the dung, and were counted at the end of the experiment (seed dispersal). Soil samples were taken to measure nutrient concentration (soil fertilization). These three ecosystem services were measured in the field in a similar way, but comparing the differences between open areas and forested areas (that represent two thermally distinct microhabitats). Dung beetle communities were sampled in both michohabitats using pitfall traps.

Preliminary results indicate differences in diversity and functioning between microhabitats and temperature treatments. These results provide information for the development of land management and conservation policies that maximize diversity, functioning and sustainability of agro-forestry systems.

30/07 | 17h50
PARALELL SESSION III - T7.P3 - SPECIES ADAPTATION AND ACCLIMATION
Room 2.3.13 | Topic 7 - Climate and global changes (3); Topic 9 - Biodiversity and ecosystems (1)

OC-073 - (EEF2019-13662) - ENSURING ACCESS TO HIGH-QUALITY RESOURCES REDUCES THE IMPACTS OF CLIMATE CHANGE ON BEE

Denis Michez (Belgium)[1]; Alexandre Barraud (Belgium)[1]; Baptiste Martinet (Belgium)[1]; Luísa Gigante Carvalheiro (Brazil)[2,3]; Maryse Vanderplanck (Belgium)[1]

1 - University of Mons; 2 - Universidade Federal de Goiás; 3 - University of Lisboa

Pollinators are experiencing declines globally, negatively affecting the reproduction of wild plants and crop production worldwide. Well-known drivers of these declines include climatic and nutritional stresses, such as a change of dietary resources due to the degradation of habitat quality. Understanding potential synergies between these two important drivers is needed to improve predictive models of the future effects of climate change on pollinator declines. Here, bumblebee colony bioassays were used to evaluate the interactive effects of climatic stress, a reduction of dietary resource quality, and colony size. Using a total of 117 colonies, we applied a fully crossed experiment to test the effect of three dietary quality levels under three levels of climatic stress with two colony sizes. Both nutritional and climatic stress reduced colony development resulting in a lower investment in offspring production. Small colonies were much more sensitive to climatic and nutritional stresses than large ones, possibly because a higher percentage of workers helps maintain social homeostasis. Strikingly, the effects of climatic stress were far less pronounced for small colonies fed with suitable diets. Overall, our study suggests that landscape management actions that ensure access to high-quality resources could reduce the impacts of climate change on bee decline.

30/07 | 17h50
PARALELL SESSION III - T6.P3 - CURRENT SCENARIOS OF AGRICULTURAL DEVELOPMENT
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4); Topic 7 - Climate and global changes (1)

OC-074 - (EEF2019-13587) - ASSESSING THE CURRENT AND FUTURE DISTRIBUTION OF TWO PALM SPECIES (HYPHAENE CORIACEA AND PHOENIX RECLINATA) IN ZITUNDO AREA, SOUTHERN MOZAMBIQUE

Angelina Martins (Mozambique)[1]; Hugo Mabilana (Mozambique)[1]; Charlie Shackleton (South Africa)[2]

1 - Department of Biological Science, Universidade Eduardo Mondlane;
2 - Department of Environmental Science, Rhodes University

The palms Hyphaene coriacea and Phoenix reclinata, are two important non timber forest products (NTFPs) species, used in southern Mozambique to produce traditional beverages, weaving, roofing, fencing and furniture material. The present study assesses the current and future distribution of these two species, using a participatory mapping exercise and spatial distribution modelling (SDM) taking climate change scenarios into account. The participatory mapping was implemented through local village workshops to elicit local knowledge about perceptions on these palm occurrence, abundance and factors determining the occurrence. Participatory mapping results were used to build a preliminary palm distribution map used in the field survey to record occurrence locations of the two species. The presence records of the two species and 14 environmental and anthropogenic variables, were imputed in Maxent software to model the current and future habitat suitability for the species, and the factors influencing their distribution. Currently the distribution of both species were mostly confined to the eastern side of the study area, and over 90% of the area was deemed to be unsuitable or barely suitable for either species. The occurrence of both species appeared to be influenced mostly by precipitation, distance to rivers and distance to water bodies. The habitat suitability for Hyphaene coriacea was predicted to increase under future climate scenarios, while little variation was predicted for Phoenix reclinata distribution. Given the importance of these species in the local livelihoods and apparent resilience to climate change, they should be included in future local development and climate change adaptations strategies.

30/07 | 17h50
PARALELL SESSION III - T9.P3 - ZOOMING IN ON MICROBIAL ECOLOGY
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 12 - Theoretical and evolutionary ecology (1)

OC-075 - (EEF2019-13953) - REGIONAL SCALE FACTORS INFLUENCING EARLY STAGE LITTER DECOMPOSITION IN MOSO BAMBOO STANDS

Marly Orrego (Japan)[1]; Tsuyoshi Kajisa (Japan)[2]; Fuyu Tanizaki (Japan)[3]; Shin Ugawa (Japan)[2]; Akio Inoue (Japan)[4]; Shinya Koga (Japan)[1]; Tomonori Kume (Japan)[1]; Takuo Hishi (Japan)[1]; Tsutomu Enoki (Japan)[1]

1 - Kyushu University;
2 - Kagoshima University;
3 - Fukuoka Agricultural and Forestry Research Center;
4 - Kindai University

To evaluate potential litter decomposition in invasive stands of Moso bamboo (Phyllostachys edulis), we performed an experiment using two contrastable substrates (Green and Rooibos tea). We compared remaining mass after a 90-day incubation period in 13 sites distributed along southern Japan and Taiwan. Structural equation modeling analysis was used to assess the direct and indirect effects of climate, stand characteristics and soil properties on litter mass loss. On average, remaining mass of Rooibos tea (64%, SD=4.74) was higher than Green tea (28%, SD=4.20). Compared to previous global studies on decomposition using the tea bag index method, litter mass loss of this study region was higher compared to warm temperate climatic biomes. Within the climate component, precipitation had a significant direct effect on mass loss of both litter types. Thus, higher precipitation sites accounted for lower remaining mass values. On the other hand, the effect of nitrogen content of surface soil was only specific to remaining mass of Rooibos tea and was independent of the climatic condition. Although stand properties did not have a direct effect on remaining mass of substrates, they had an effect on soil properties such as litter amount and moisture content of surface soil. Our results suggest that precipitation was a significant factor controlling early stage mass loss across study sites. Moreover, soil conditions in Moso bamboo stands may also influence decomposition process at a regional scale.

30/07 | 17h50
PARALELL SESSION III - T6.P3 - CURRENT SCENARIOS OF AGRICULTURAL DEVELOPMENT
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4); Topic 7 - Climate and global changes (1)

OC-076 - (EEF2019-13689) - THE FUNGAL ENDOPHYTE COMMUNITY OF TWO ERICACEOUS DIOECIOUS SHRUBS - SHARING THE BURDEN OF REPRODUCTION

Ana Martins (Portugal)[1]; Helena Freitas (Portugal)[2]; Sofia R. Costa (Portugal)[1]

1 - CBMA - Centre of Molecular and Environmental Biology; 2 - CFE-Center for Functional Ecology

Dioecious coastal shrubs Corema album and *Corema conradii* present unbalanced reproductive efforts but show no male demographic biases, suggesting compensating mechanisms for the higher female reproductive expenditure. Our objectives were to assess the involvement of root colonization by ericoid mycorrhiza (ErM) and fungal endophyte community composition in such compensating mechanisms.

Root samples were obtained from the native range of each of the species: three populations of *C. album* in the western coast of Portugal and three populations of *C. conradii* in the coast of Nova Scotia, Canada. Root colonization by ErM was assessed in plants of either sex and in two phenological stages (fruiting and flowering) of *C. album*). Endophytic communities were characterized through ITS sequencing of culturable fungi in roots of *C. album* and *C. conradii*.

Root colonization of *C. album* by ErM showed no significant variation according to plant sex, and the composition of fungal endophyte community could not be related with host sex for either species. Plants from the same population/habitat type had similar endophyte communities. In total, 27 fungal endophyte taxa were detected in *C. album* and 19 in *C. conradii* root samples.

Neither ErM root colonization nor fungal endophyte community composition seem to relate with resource demands in *Corema* plants. But, our results suggest plants in the same area could share a common mycelial network; this could be involved in nutrient transfer from male to female plants, thus compensating the higher reproductive effort by females, and this deserves further research.

30/07 | 17h50
PARALELL SESSION III - T9.P3 - ZOOMING IN ON MICROBIAL ECOLOGY
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 12 - Theoretical and evolutionary ecology (1)

OC-077 - (EEF2019-13767) - UNRAVELLING FUNGAL DIVERSITY THROUGH UNCONVENTIONAL DNA BARCODING AND METAGENOMICS: IMPLICATIONS FOR CASHEW AGROECOSYSTEM SUSTAINABILITY IN GUINEA-BISSAU (WEST AFRICA)

Ana Rita Pena (Portugal)[1]; Inês Diniz (Portugal)[1,2,3]; Aladje Baldé (Guinea-Bissau)[4]; Maria Manuel Romeiras (Portugal)[1,3]; Dora Batista (Portugal)[1,2,3]; Filipa Monteiro (Portugal)[1,3]

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Cashew is the major agricultural commodity in Guinea-Bissau (West Africa), accounting for both smallholder income and export country revenues. Despite its socio-economic importance, the cashew agroecosystem is characterized by a monoculture regime with limited agriculture management solutions towards its sustainable production. One of the major threats posing to cashew sustainability are fungal diseases that are known to affect directly its productivity in other cashew producing countries, such as Brazil. In Guinea-Bissau, a challenging and poorly known scenario of cashew diseases urges the application of a reliable and urgent approach to assess disease predominance in cashew trees and identify the associated pathogenic fungi. As such, we have pursued a targeted mycobiome for profiling the associated fungal community and comparing its composition in different healthy and symptomatic cashew trees using metagenomics. Following this strategy, global fungal diversity was assessed by high throughput sequencing of the ITS region, and fungal diversity was determined in cashew orchards. A metagenomic pipeline was developed to identify the extant pathogen range in an uncharacterized plant disease system, under a culture-independent approach. A culture-dependent approach was also used through fungi isolation from symptomatic cashew leaves on artificial media, and by subsequent conventional DNA barcoding and phylogenetic approaches. Here, we provide the pros and cons of using both approaches with different scenarios with direct implications of the current status of cashew agroecosystem in Guinea-Bissau further showing the value of the currently available molecular methods.

30/07 | 17h50
PARALELL SESSION III - T6.P3 - CURRENT SCENARIOS OF AGRICULTURAL DEVELOPMENT
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4); Topic 7 - Climate and global changes (1)

OC-078 - (EEF2019-13701) - PLANT GEOGRAPHIC ORIGIN AND PHYLOGENY AS POTENTIAL DRIVERS OF COMMUNITY STRUCTURE IN ROOT-INHABITING FUNGI

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Root-inhabiting fungal communities, including mutualists and antagonists, influence host plant performance, and may contribute to structure plant communities. However, there is uncertainty about how root-inhabiting fungal communities are structured, and if such structure determines host plant abundance. Using Illumina MiSeq, we assessed how root-inhabiting fungal communities were structured in relation to the phylogeny and geographic origins (native vs. exotic) of their host plants in an old-field community. In addition, we took into consideration the spatial arrangements (i.e. physical locations) of the individual host plants. Furthermore, we tested if the relative abundances of pathogenic fungi and arbuscular mycorrhizal (AM) fungi could predict host plant abundances. We found that host plant phylogeny was an important factor in structuring the whole fungal community, irrespective of host plant origin. The spatial arrangements of individual host plants were a strong predictor of AM fungal community structure. Host plant phylogeny and spatial arrangements similarly affected the structure of pathogenic fungal communities. No distinct differences were observed between native and exotic plant species in fungal community characteristics, and the relative abundances of AM and pathogenic fungi were not significant predictors for observed abundances of their host plants. In conclusion, host plant phylogeny and spatial arrangements can structure naturally occurring root-inhabiting fungal communities. The absence of distinct differences in fungal community composition, including pathogens, in exotic and native plants suggests long residence times and the consequent naturalization of exotic species in the region, allowing for the establishment of similar plant–microbial interactions between native and exotic species.

30/07 | 17h50
PARALELL SESSION III - T9.P3 - ZOOMING IN ON MICROBIAL ECOLOGY
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 12 - Theoretical and evolutionary ecology (1)

OC-079 - (EEF2019-13954) - FIRE AND BIODIVERSITY DYNAMICS IN THE MOPANE ECOSYSTEM OF THE LIMPOPO NATIONAL PARK: VEGETATION AND MICROBIOME ANALYSIS IN DIFFERENT LANDSCAPES

Ivete Maquia (Portugal)[1,2,3]; Denise Brito (Portugal)[3]; Isabel Videira E Castro (Portugal)[4]; Paula Fareleira (Portugal)[4]; Ricardo Soares (Portugal)[4]; Aniceto Chaúque (Mozambique)[5]; Manuela Ferreira-Pinto (Portugal)[1]; Maria José Silva (Portugal)[1,6]; Erica Lumini (Italy)[7]; Andrea Berruti (Italy)[7]; Natasha S. Ribeiro (Mozambique)[5]; Cristina Máguas (Portugal)[8]; Ana Ribeiro (Portugal)[1,6]

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2 - TropiKMan Doctoral Program, NovaSBE;
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5 - Faculty of Agronomy and Forest Engineering, Eduardo Mondlane University;
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7 - National Research Council, Institute for Sustainable Plant Protection; 8 - Centre for Ecology, Evolution and Environmental Changes (cE3c), Faculdade de Ciências, Universidade de Lisboa (ULisboa)

Fire is an important characteristic of grassy savanna-woodland vegetation globally. The objectives of this studywere (i) to reconstruct the fire history in the mopane woodlands of Limpopo National Park (Mozambique); and (ii) to analyse the patterns of biodiversity distribution and structure.

For fire regime analysis, MODIS- and GIS-based datasets were used. Vegetation surveys were conducted in eight plots, covering two fire regimes and three landscapes (Nwambia sandveld-NS, Lebombo North-LN and Mopane shrubveld on calcrete-C). Stable isotope analysis was performed by continuous flow isotope mass spectrometry (CF-IRMS). 16rRNA sequencing and plant growth promoting activities were performed to analyse the soil microbiome. STATISTICA 12, R v3.2.0 package and PICRUSt packages were used for data analyses.

Total area burnt had a quasi-biannual pattern, with higher sizes and fire radiative power in NS, where the typically dominant legume tree Colophospermum mopane was absent. δ15N content of C. mopane leaves was higher in trees from LN than from C, particularly at higher fire frequency, while δ13C content was similar in both landscapes, higher at low fire frequency. Regardless of the landscape and fire frequency, microbial flora was rather diverse and purified bacteria showed a wide range of biological activities.

The distribution pattern of vegetation in the LNP revealed an ecosystem in equilibrium with the current fire regime, likely associated to the ability of mopane acclimation to fire and to the associated microflora.

Aknowledgements
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31/07 | 11h00
PARALLEL SESSION IV - T1.P3 - THE IMPACTS OF ANTHROPOGENIC ACTIVITIES
Room 2.2.12 | Topic 1 - Environmental risks and health (5)

OC-081 - (EEF2019-13708) - VARIATIONS OF FOREST VULNERABILITY TO FIRE ALONG SUCCESSIONAL DYNAMICS

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Risk assessment requires a good understanding of ecosystem vulnerability to disturbances. While much effort has been made to assess vulnerability components (exposure, sensitivity, and response capacity) at particular ecosystem stages, there is still a lack of context-specific studies accounting for the temporal dimension of vulnerability at long temporal scales. The goals of our study were to identify the main natural dynamics of forests poorly adapted to crown fires and to assess the variations in sensitivity and response capacity to fire along successional dynamics. In the study, we developed a method to generate chronosequences by summarizing the dynamics between consecutive surveys of permanent plots into a set of longer successional trajectories. For the stages associated with each trajectory, we calculated different variables related to sensitivity and response capacity of forests to fire and evaluated their variation along succession. Our results revealed that forest vulnerability varies differently depending on successional trajectories, which were determined by the composition and structure of their initial stages and the environmental context. Autossuccessional dynamics of pinewoods showed a relatively low sensitivity to fire, but their response capacity strongly varied with the cover of shrubs. Alternatively, diversifying trajectories showed increasing sensitivity and response capacity along succession. This study highlights the need for considering the temporal dimension of sensitivity and response capacity to disturbances as independent components of ecosystem vulnerability in both risk assessment and management.

31/07 | 11h00
PARALLEL SESSION IV - T1.P3 - THE IMPACTS OF ANTHROPOGENIC ACTIVITIES
Room 2.2.12 | Topic 1 - Environmental risks and health (5)

OC-082 - (EEF2019-14129) - LARVAE OF THE SHRIMP PALAEMON VARIANS AS A MODEL FOR EVALUATION OF BEHAVIORAL EFFECTS OF TOXICANTS

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Traditional rodent behaviour methodologies have been successfully adopted for zebrafish and other organisms that have emerged as good models for assessing effects of neuro-active drugs. In fish, these tests generally consist in exposing the organisms to a mildly stressful situation eliciting typical innate fear or anxiety-like behaviours. In this work methodologies used in zebrafish will be tested in the larval forms of the shrimp Palemon varians. In the larval stage they present active phototaxis, being attracted by light, and using thoracic appendages for swimming in the water column. The toxicity of the cypermethrin-based formulation Barrage will be tested to assess the sensitivity of behavioural parameters in this this species.
Ovigerous females of P. varians were collected at the Salina da Troncalhada transported to the laboratory, kept in aquariums at 26 °C, salinity 22 ± 1, photoperiod 12:12 (light: dark) and fed 4 times daily. Aquariums were divided in two parts with a mobile plastic net: one with shelters (pieces of PVC tube of 32 mm) that serve as refuges for ovate females, and another lit by a LED light. Newly hatched larvae cross the net into the lit part due to positive phototaxis, preventing cannibalism by mothers.
Six days old larvae were used in the behavioral tests. Larvae were individually placed in the wells of 24-well plates with 2 ml of test solution (3 replicates of 12 embryos per concentration). Concentrations of Barrage used were 0.00, 0.001, 0.003, 0.01, 0.03 µg/L and were selected based on previous tests to determine acute toxicity. After 4 days of exposure, locomotion of P. varians larvae was evaluated using the Zebrabox tracking system (ZEB 478 Viewpoint) equipped with an infrared camera of 25 frames per second.
P. varians larvae responded to a sudden switch to light with a slight increase in the swimming time which is only perceptible in the first 20 seconds. However, looking at the discriminated analysis of slow and rapid movements, it is clear that rapid movements are not common in the dark and significantly increase in the light while slow movements are observed in higher percentage in the dark and significantly decrease in the light. While the effects of Barrage are difficult to observe when looking at the total swimming time, clear evidences can be found when attending at the slow and rapid movements. The sudden transition from dark to light seems to provoke the same reaction in all concentrations in the first 20 seconds but while control seems to recover in the following 40 seconds the concentrations tested take longer to get to original movements levels. A dose dependent pattern is observed in this response.
P. varians showed a great potential to be used in behavioural assays to assess neurotoxic compounds and further work should address optimization and standardization of methodologies.
Acknowledgement - Thanks to FUNDECT for the scholarship granted to Mayara Soares (Proc. No. 23/200.755/2014) and to FCT for the scholarship granted to Inês Domingues (SFRH/BPD/90521/2012).
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31/07 | 11h00
PARALLEL SESSION IV - T1.P3 - THE IMPACTS OF ANTHROPOGENIC ACTIVITIES
Room 2.2.12 | Topic 1 - Environmental risks and health (5)

OC-083 - (EEF2019-13833) - UNDERSTANDING THE DRIVERS OF BIRD COLLISION WITH POWER LINES: WHAT WE KNOW (AND DON'T KNOW) AFTER 40 YEARS OF RESEARCH

Joana Bernardino (Portugal)[1]; Kjetil Bevanger (Norway)[2]; Rafael Barrientos (Spain)[3]; James Dwyer (United States of America)[4]; Ana Teresa Marques (Portugal)[5]; Ricardo Martins (Portugal)[1]; Jessica Shaw (South Africa)[6]; João Paulo Silva (Portugal)[1]; Francisco Moreira (Portugal)[1]

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3 - Infraestruturas de Portugal Biodiversity Chair, CIBIO/InBIO;
4 - EDM International Inc.;
5 - cE3c – Centro de Ecologia, Evolução e Alterações Ambientais;
6 - FitzPatrick Institute of African Ornithology

The collision of birds with overhead wires is a common source of mortality associated both to transmission and distribution power lines (PL). Therefore, the worldwide expansion of electricity grids may increase the conservation concerns posed by this negative interaction. We performed a systematic review of the existing literature on bird collisions with PL to: (i) assess the existing knowledge of species-specific factors (e.g. vision, morphology), site-specific factors (e.g. topography, weather conditions, and habitat features), and PL-specific factors (e.g. wire arrangement) known to contribute to increased bird collision risk; and (ii) evaluate the existing mitigation measures (e.g. PL routing, wire-marking, habitat management).

The extensive scientific research conducted over the past four decades significantly increased our understanding of avian–PL interactions. Nonetheless, bird collision events are often explained by complex interactions between bird ecology/traits and the surrounding environment, which continue to limit our ability to predict and mitigate bird collisions. More studies from Asia, Africa and South America are also needed, as addressing bird species or landscape features specific of these geographical regions will increase the overall knowledge on bird collisions. Lastly, our review showed that some existing recommendations of best practice (e.g. habitat management to change flight paths and prevent bird collisions) lack scientific evidence.

Based on these knowledge gaps, we outline suggestions for future research in three main areas: bird behaviour (e.g. further use of loggers and sensors), impact assessment (e.g. understanding the ecological drivers of mortality hotspots) and mitigation strategies (e.g. test the effectiveness of different wire-marking devices).

31/07 | 11h00
PARALLEL SESSION IV - T1.P3 - THE IMPACTS OF ANTHROPOGENIC ACTIVITIES
Room 2.2.12 | Topic 1 - Environmental risks and health (5)

OC-084 - (EEF2019-14087) - BIRD MORTALITY BY HIGH SPEED TRAINS: LESSONS FROM TWO LARGE FLAGSHIP SPECIES

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Road kill is probably the strongest impact of transport infrastructures on vertebrate populations, and knowledge of this process in high speed railways (HSR) is almost nil. We present the outstanding cases of great bustard (Otis tarda) and great owl (Bubo bubo) mortality in two 5-km stretches of a Spanish HSR. Five bustard- and 8 owl- fresh carcasses were collected after 35 weeks of monitoring along two years, together with older remains form 14 bustards and 12 owls more. Thus, relevant mortalities of both bird species happen, but their spatial patterns differ and are informative of the underlying processes driving them. Great bustard fatalities happened only in of the stretches (chi-squared $p<0.001$) even though they are only 7.8 km apart and cross very similar agrarian landscapes, and they were aggregated towards the western end and spatially aggregated there (Ripley's K $p<0.05$). Moreover, the black-spot of high bustard mortality coincided with a corridor between feeding sites evidenced by a habitat suitability model built for the species based on systematic bird censuses of the area. On the contrary, great owl mortality was distributed evenly between stretches ($p=0.655$) and scattered along them ($p>0.05$). Altogether, our results point to the local use of the infrastructure by bird species as a key factor explaining mortality in the HSR: bustards die in the railway at the points where they fly across optimizing local movements, while owls probably die during rabbit hunting along the railway itself. Implications for impact prediction, evaluation and mitigation thus differ for both species.

31/07 | 11h00
PARALLEL SESSION IV - T1.P3 - THE IMPACTS OF ANTHROPOGENIC ACTIVITIES
Room 2.2.12 | Topic 1 - Environmental risks and health (5)

OC-210 - (EEF2019-13921) - WIND FARMS INCREASE NEST PREDATION AND LEAD TO LOCAL EXTINCTIONS OF SMALL-PASSERINE POPULATIONS

Julia Gómez-Catasús (Spain)[1]; Adrián Barrero (Spain)[1]; Margarita Reverter (Spain)[1]; Daniel Bustillo-De La Rosa (Spain)[1]; Cristian Pérez-Granados (Spain)[1,2]; Juan Traba (Spain)[1,3]

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There are two knowledge gaps about the effect of wind farms on birds: 1) their demographic effects on small-sized birds are unknown; and 2) indirect impacts have been little explored. Here, we assessed the effect of wind farms on occurrence, abundance and population trends of the Dupont's lark, a threatened small passerine. Furthermore, we addressed nest predation risk in the surroundings of wind turbines associated to predator attraction.

Dupont's lark censuses were carried out from 2008 to 2016 in populations with (5) and without (9) wind farms. Population trends were estimated with the software TRIM, and we fitted a logistic and a negative binomial regression for species occurrence and abundance in 2016, respectively. Subsequently, in 2016, we placed sampling stations in populations with (7) and without (11) wind farms, comprising 9 artificial nests each. Artificial nests were monitored after twelve days exposure and a Generalized Mixed Effects model was fitted to determine the factors explaining nest predation.

Population trends were significantly more regressive in the presence than in the absence of wind farms: 21.0% vs. 5.8% average annual decline. Moreover, Dupont's lark occurrence and abundance increased with the distance to wind farms, providing a 4.5-km threshold distance. Regarding indirect drivers of such results, terrestrial predator abundance and nest predation probability increased with roads surface, a landscape alteration associated to wind farm implementation.

These works highlight the negative impact of wind farms on small-sized birds and disentangle a potential mechanism underlying the observed effects.

31/07 | 11h00
PARALLEL SESSION IV - T2.P3 - FACING SOCIO-ECOLOGICAL CHALLENGES
Room 2.4.16 | Topic 2 - Science communication (3); Topic 9 - Biodiversity and ecosystems (1)

OC-085 - (EEF2019-13667) - SOCIAL SOLUTIONS FOR CLIMATE CHANGE

Sherry Nouraini (United States of America)[1]

1 - Science Communication Journal Club

The recent IPCC Global Warming Special Report underscores the time crunch human civilization is facing to limit burning of fossil fuels and to bring the increase in global temperature under control. Climate scientists have been warning the public about the devastating consequences of global warming for nearly 50 years, yet climate change is hardly the pressing issue on the public's mind when electing political leaders or choosing their life habits. To understand the underlying reasons behind this lack of action, science and climate change communicators must learn from the vast body of literature available about social and psychological factors underlying human decision making, and learn from proven strategies for effective communication. Also, much can be learned from climate change communication efforts that have been done up to date. This presentation, based on the award-winning book Social Solutions for Climate Change, summarizes the body of literature on human moral psychology, social science, and the state of climate change communication, and offers a step by step guide for public outreach and for inspiring action on climate change.

31/07 | 11h00
PARALLEL SESSION IV - T2.P3 - FACING SOCIO-ECOLOGICAL CHALLENGES
Room 2.4.16 | Topic 2 - Science communication (3); Topic 9 - Biodiversity and ecosystems (1)

OC-086 - (EEF2019-13856) - DEBATING THE SCIENCE COMMUNICATION OF CLIMATE CHANGE AND GMO

Ana Delicado (Portugal)[1]; Roberto Falanga (Portugal)[1]; Jussara Rowland (Portugal)[1]; Isabel Mendoza (Spain)[2]; Carolina Moreno (Spain)[2]; Empar Vengut-Climent (Spain)[2]; Belén Mañoguil (Spain)[3]; Guiseppe Pellegrini (Italy)[4]; Erik Hrnčiarik (Slovakia)[5]; Krzysztof Ciapala (Poland)[6]; Carolina Llorente (Spain)[7]; Edurne Gaston (Spain)[8]; Izabela Warwas (Poland)[9]

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2 - Instituto de Polibienestar. Universitat de València;
3 - FyG Consultores;
4 - Observa Science in Society;
5 - Filozofická fakulta. Trnavská univerzita v Trnave;
6 - Danmar Computers;
7 - Universidad Pompeo Fabra;
8 - Asociación Española de Comunicación Científica;
9 - University of Łódz

In matters of a technoscientific nature, citizens and scientists do not always agree (nor sometimes scientists among themselves). Public perceptions, opinions and beliefs are not directly derived from scientific information; they go through a series of filters and mediators that affect how citizens view scientific issues. To understand how the public obtains information, builds its attitudes and make decisions on relevant topics is then crucial for engaging citizens in meaningful discussions and in decision-making.

CONCISE ("Communication role on perception and beliefs of EU Citizens about Science") is a EU funded project (H2020 SwafS) that will try to shed light on this matter by holding citizen consultations with 500 people, between September and November 2019, in five different EU countries: Italy, Poland, Portugal, Slovakia, and Spain. Thought these consultations, researchers aim at gaining a deeper insight into the public understanding of science and identify current science communication models. Hopefully, this will also reveal indicators that might help improve science communication.

This presentation will focus on the methodology that will be used to elicit citizen's opinions and beliefs about climate change and GMO within the public consultations. How to provide basic information about these topics without influencing the opinions expressed? How to manage the group discussions in order to fulfil the objectives of the research? How to address matters where there is scientific consensus (climate change) and others where disputes and controversies still abound (GMO)?

31/07 | 11h00
PARALLEL SESSION IV - T2.P3 - FACING SOCIO-ECOLOGICAL CHALLENGES
Room 2.4.16 | Topic 2 - Science communication (3); Topic 9 - Biodiversity and ecosystems (1)

OC-087 - (EEF2019-11123) - OPENING LOCKED GATES: IDENTIFYING LAND OWNERS' ATTITUDES TO KAITIAKITANGA (MĀORI ENVIRONMENTAL GUARDIANSHIP)

Corinne Bataille (New Zealand)[1]; Sanna Malinen (New Zealand)[1]; Phil O'b Lyver (New Zealand)[2]; Nigel Scott (New Zealand)[3]

1 - University of Canterbury;
2 - Manaaki Whenua Landcare Research;
3 - Te Rūnanga o Ngāi Tahu

Our research investigates land owners' attitudes, values and priorities affecting the ability of Māori (New Zealand's indigenous peoples) to practice kaitiakitanga (Māori environmental guardianship), focusing on mahinga kai (customary harvest and management of waterfowl and wetlands). Twenty five participants from two groups, Māori customary practitioners and harvesters (from the Ngāi Tahu tribe, South Island of New Zealand); and land owners (farming and non-farming), took part in semi-structured interviews. Findings suggest that farmers prioritised land 'use' (i.e. gaining an income from industrial food harvest) over environmental stewardship, or 'investment' in land and water resources (e.g. wetland restoration), compared with non-farming land owners. Waterfowl were also seen as a pest by farmers because they graze new crops and pasture. In contrast, Māori prioritised 'investment' in land and water resources (i.e. customary management) before customary 'use' (i.e. harvest of waterfowl and wetlands). The research suggests that contact and collaboration will help both farmers and Māori to work towards their own immediate goals: (1) for farmers, reducing waterfowl damage and/or fulfilling a legal requirement to protect areas of cultural importance to Māori; (2) for Māori, having access to mahinga kai sites located on, or accessible through, privately-owned land. These strategies will also contribute to other important goals: (1) for Māori, the revitalisation of kaitiakitanga and the cultural expressions (e.g. language, protocols, rituals) that accompany the practices; (2) for both groups, the creation of biodiversity and restored areas, which will serve as a legacy for future generations.

31/07 | 11h00
PARALLEL SESSION IV - T2.P3 - FACING SOCIO-ECOLOGICAL CHALLENGES
Room 2.4.16 | Topic 2 - Science communication (3); Topic 9 - Biodiversity and ecosystems (1)

OC-088 - (EEF2019-13952) - THE IMPORTANCE OF SÃO TOMÉ MANGROVES: PERCEPTIONS AND ECOSYSTEM SERVICES

Filipa Afonso (Portugal)[1]; Ana Brito (Portugal)[1,2]; Paula Chainho (Portugal)[1]; Ricardo F. De Lima (Portugal)[3,4]; Márcio Gonçalves (Sao Tome and Principe)[5,6]; Joshua A. Heumüller (Portugal)[1]; Gabriel Oquiongo (Sao Tome and Principe)[4]; Filipe Ribeiro (Portugal)[1]; Pedro M. Félix (Portugal)[1]

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2 - Departamento de Biologia Vegetal, Faculdade de Ciências da Universidade de Lisboa, Campo Grande 016, 1749-016 Lisboa, Portugal;
3 - Ce3C - Centre for Ecology, Evolution and Environmental Changes, Faculdade de Ciências da Universidade de Lisboa Campo Grande 016, 1749-016 Lisboa, Portugal;
4 - Associação Monte Pico, Monte Café, São Tomé, São Tomé e Príncipe;
5 - MARAPA, Mar, Ambiente e Pesca Sustentável Largo do Bom Sucesso, CP292, São Tomé, São Tomé e Príncipe;
6 - OIKOS, Cooperação e Desenvolvimento, Bairro Dolores nº53, Água Grande, São Tomé, São Tomé e Príncipe

The evolving study of ecosystem services (ES) set an important tool in ecosystem conservation. Environmental awareness and the valuation of sustainable activities flag its approach, especially at the level of the local population and environmental regulators. This work aims at performing a first assessment of ES in São Tomé mangrove systems, through the identification and quantification of its ES and major threats. Finally, the perception of local communities concerning these topics was also evaluated, mainly through questionnaires. The general literature review on mangroves set a baseline for comparison with the data obtained from the local communities. The overall results from the literature review on mangrove ES revealed a high number of services identified, although only a few could be quantified. The comparison between the direct observation and literature showed that not all ecosystem services were easy to identify, for both the scientific and local communities. In accordance with the results, local communities had several difficulties in recognizing mangroves, making it harder for them to acknowledge the ES provided by these systems. In spite of that, locals were able to name three types of threats to the mangroves, although 20 threats were identified from the literature. This highlights the need to work on the integration and dissemination of information, in order to increase the awareness of the local communities and authorities about the mangrove ES importance. This work is essential to ensure the sustainable management of ES, which is key for the development of regional conservation and management plans.

31/07 | 11h00
PARALLEL SESSION IV - T3.P3 - THE ROLE PLAYED BY THE FUNGI COMMUNITY
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 3 - Freshwater ecology (1); Topic 7 - Climate and global changes (1); Topic 9 - Biodiversity and ecosystems (1)

OC-090 - (EEF2019-13576) - LEAF LITTER DECOMPOSITION OF SWEET CHESTNUT IS AFFECTED MORE BY OOMYCTE INFECTION OF TREES THAN BY WATER TEMPERATURE RISE

Verónica Ferreira (Portugal)[1]; Laryssa Pazianoto (Brazil)[2]; Alejandro Solla (Spain)[3]

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2 - Programa de Pós-Graduação em Ecologia de Ambientes Aquáticos Continentais (PEA), Universidade Estadual de Maringá;
3 - Institute for Dehesa Research (INDEHESA), Ingeniería Forestal y del Medio Natural, Universidad de Extremadura

Riparian forests are increasingly subjected to a combination of disturbances. Global warming and tree diseases caused by invasive pathogens occur simultaneously in riparian systems, but their consequences on stream ecosystem functioning are unknown. We assessed the impact of Phytophthora cinnamomi infection and possible interactions with temperature on decomposition of Castanea sativa leaf litter. Microbial-driven decomposition of leaves from P. cinnamomi-infected and non-infected C. sativa trees was assessed in laboratory microcosms at two temperatures. Senescent leaves from healthy, symptomatic and highly symptomatic trees were incubated at 13 and 18°C for 64 days. Oomycete infection significantly increased polyphenolic concentration and leaf toughness and was responsible for reduced leaf decomposition and microbial respiration rates, irrespective of temperature. Aquatic hyphomycete communities differed depending on whether they were associated with leaves from healthy and symptomatic trees significantly or from highly symptomatic trees. Fungal biomass was highest at 18°C, irrespective of tree health status. None of the parameters assessed was influenced by the temperature ´ tree health status interaction, suggesting that global warming will not synergistically increase the cross-ecosystem effects caused by P. cinnamomi. Castanea sativa infection by P. cinnamomi alters the nutritional quality of leaves affecting the functioning of aquatic ecosystems. To better characterise the impact of invasive pathogenic species on stream ecosystem functioning, additional tree-pathogen systems should be assessed. Further collaboration between forest pathologists and stream ecologists is therefore recommended.

31/07 | 11h00
PARALLEL SESSION IV - T3.P3 - THE ROLE PLAYED BY THE FUNGI COMMUNITY
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 3 - Freshwater ecology (1); Topic 7 - Climate and global changes (1); Topic 9 - Biodiversity and ecosystems (1)

OC-091 - (EEF2019-13637) - GLOBAL BIODIVERSITY OF LEAF LITTER FUNGI IN STREAMS

Sahadevan Seena (Portugal)[1]; Felix Bärlocher (Canada)[2]; Olímpia Sobral (Portugal)[1]; Mark Gessner (Germany)[3]; David Dudgeon (Hong Kong)[4]; Brendan Mckie (Sweden)[5]; Eric Chauvet (France)[6]; Luz Boyero (Spain)[7]; Verónica Ferreira (Portugal)[1]; André Frainer (Norway)[8]; Andreas Bruder (New Zealand)[9]; Christoph Matthaei (New Zealand)[9]; Stefano Fenoglio (Italy)[10]; Kandikere Sridhar (India)[11]; Ricardo Albariño (Argentina)[12]; Michael Douglas (Australia)[13]; Andrea Encalada (Ecuador)[1]; Erica Garcia (Australia)[14]; Sudeep Ghate (India)[11]; Darren Giling (Germany)[3]; Vítor Gonçalves (Portugal)[15]; Tomoya Iwata (Japan)[16]; Andrea Landeira-Dabarca (Ecuador)[17]; Damien Mcmaster (Australia)[14]; Adriana Medeiros (Brazil)[18]; Josheena Naggea (Malaysia)[19]; Jesús Pozo (Spain)[7]; Pedro Raposeiro (Portugal)[15]; Christopher Swan (United States of America)[20]; Nathalie Tenkiano (Guinea)[21]; Catherine Yule (Malaysia)[19]; Manuel Graça (Portugal)[1]

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Global biodiversity patterns have been established for soil microorganisms, plants and animals. Despite the importance of freshwater aquatic ecosystems for biodiversity and biogeochemical processes, large scale patterns of freshwater fungal biodiversity are unknown. Therefore, the objective of the present study was to unravel fungal diversity and community composition, based on Illumina Miseq sequencing of communities, associated with decomposing leaf litter, stretching over a 113° latitudinal gradient of 19 stream locations on five continents. Since latitude is widely recognized as a broad climate surrogate, we hypothesised that fungal richness decreases with latitude, and would agree to the pattern described for most plants and animals. Additionally, we also investigated whether the fungal global distribution pattern, follow the well-established biogeographic realms. Standardized leaf litter colonization experiments were performed in the 19 study streams during the dry season in tropical and during autumn in temperate and subarctic streams. DNA was extracted from the leaf litter and Illumina Miseq sequencing was performed. Our results demonstrated a hump-shaped distribution pattern along the latitudinal gradient. Fungal community was structured according to thermal preferences and was not in accordance with biogeography. Furthermore, our results indicate that temperature is critical in dictating the occurrence and composition of litter-associated fungi in streams across the globe.

31/07 | 11h00
PARALLEL SESSION IV - T3.P3 - THE ROLE PLAYED BY THE FUNGI COMMUNITY
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 3 - Freshwater ecology (1); Topic 7 - Climate and global changes (1); Topic 9 - Biodiversity and ecosystems (1)

OC-092 - (EEF2019-13884) - FUNCTIONAL AND STRUCTURAL RESPONSES OF FUNGAL COMMUNITIES TO CLIMATE ACROSS IBERIAN MEDITERRANEAN STREAMS

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2 - Institute for Science and Innovation for Bio-sustainability, University of Minho;
3 - Department of Biology and Geology, University of Almería

We assessed leaf litter decomposition and fungal biodiversity in streams from four Mediterranean regions in Iberian Peninsula, namely Sierra Nevada (SN), Alcornocales (AL), Sierra Cazorla (SC) and Semiarid Lowland of Almería (SL) which are climatically, topologically and geochemically distinct to each other. At each region, a set of 4 streams were selected, in which a set of 4 leaf species were immersed for 40 days to allow fungal colonization. High-throughput sequencing and DGGE-based DNA-fingerprints (ITS2) revealed that stream fungal communities among the regions were quite diverse along varied substrates (leaf species), showing maximum similarities (~10%) between AL and SC. Within each region, the similarity among streams increased (maximum ~37%, AL). However, under mixed substrate condition (pooling DNA from all substrate types), the similarity in fungal communities among the 4 regions increased and became maximum between SN and AL (~35%). Higher similarities in fungal communities in streams were observed within each region (SN >60%; AL and CA ~40%; SL <40%). Temperature, conductivity, N-NO3– and total-N were the key factors influencing fungal community structures in streams of SL whereas for the streams of SN, the key influencing factors were thermal amplitude and P-PO4–. Leaf mass loss and fungal diversity showed negative correlations with thermal amplitude, altitude and oxygen, but positive correlations with temperature, alkalinity, conductivity and total-N. Leaf mass loss showed significant correlations with fungal diversity and evenness. Overall, our study revealed that the functional and structural responses of fungal communities from Mediterranean streams are influenced by climatic, topological and geochemical changes.

31/07 | 11h00
PARALLEL SESSION IV - T3.P3 - THE ROLE PLAYED BY THE FUNGI COMMUNITY
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 3 - Freshwater ecology (1); Topic 7 - Climate and global changes (1); Topic 9 - Biodiversity and ecosystems (1)

OC-103 - (EEF2019-13805) - INVASIVE N-FIXING ACACIA SPP. AFFECT LITTER DECOMPOSITION AND ASSOCIATED FUNGAL DECOMPOSERS IN STREAMS

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Exotic nitrogen-fixing acacia species have been invading riparian ecosystems worldwide. Forest streams are particularly vulnerable to changes in the surrounding vegetation, given the strong dependence of aquatic decomposers on litter from terrestrial origin. Here, we examined the effects of litter identity and stream type on litter decomposition and associated fungal decomposers in streams. Senescent leaves of native alder (Alnus glutinosa) and oak (Quercus robur), and of invasive acacia (Acacia melanoxylon) were enclosed in fine-mesh bags (0.5 mm) and immersed in three reference streams flowing through native deciduous forests and three streams flowing through acacia invaded forests (Serra da Lousã, Central Portugal) for 14–98 days. Alder leaves had higher microbial activity and litter decomposition probably because their high quality (soft, high N concentration) for decomposers. Acacia leaves had lower microbial activity and decomposed relatively slowly, probably because they were tough and had a thick cuticle that acted as a physical barrier for microbial colonization. Litter decomposition was faster in 'invaded' than reference streams only for alder leaves, suggesting that increased N concentrations in water stimulated the activity of microbial decomposers only on high quality leaves. Reference streams had higher fungal diversity most likely because they had a higher availability of resources to decomposers. Overall, results suggest that invasion of native riparian forests by acacia species may affect litter decomposition and the activity and diversity of associated microbial decomposers due to alterations in water chemistry and the identity and quality of leaves that enters into streams.

31/07 | 11h00
PARALLEL SESSION IV - T6.P4 - LIMITATIONS AND PERSPECTIVES IN FOOD PRODUCTION
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4)

(EEF-14198) INCREASING AGROECOSYSTEM DIVERSITY: MALVACEAE SPP. LEAVES AS A NOVEL CROP FOR HUMAN FOOD

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Local wild plants are often used as a complementary food source for indigenous societies around the globe. However, domestication of such plants as new crops for food is facing serious challenges, so in fact only a handful of new crops were domesticated for commercial use in the last decades. Several Malva and Lavatera species (Family: Malvaceae) are ruderal, nitrophilic plants that very commonly dominate field margin vegetation in Mediterranean agroecosystems. Those Malvaceae species - mainly M. nicaeensis All. and L.cretica L. - are commonly called “Hubeza” (Arabic: bread). Hubeza have an important role in the local cuisine in the Mediterranean region. Traditionally, people are harvesting and eating the green leaves fresh, boiled or fried. The goal of this project is to test the potential of M. nicaeensis and L.cretica as a potential crop for human food, establishing and testing the theory that the use of local plants can increase agro-biodiversity significantly. We hypothesize that the nutritional values of the Hubeza leaves, as well as biomass production, is competitive to other green leaves that are currently available commercially, and used in similar fashion. To test our hypothesis we compared nutritional values of wild Hubeza leaves to the nutritional values of other green leaves crops, in terms of protein content, chlorophyll concentrations, total N, P, K, Fe, Mg, Ca, and Na. We have also tested potential anti-nutrients - Nitrates. Subsequently, we examine agronomic aspects of M. nicaeensis and L.cretica cultivation. The use of native plants for agriculture is increasing biodiversity of agroecosystems, by promoting diversification of agriculture, reduction of agricultural inputs, and supporting field margins. The value of native plants, local production, and maintenance of agroecosystem biodiversity can reduce food millage and promote food diversity and agricultural resilience. Using local plants for food, may contribute to establishing the necessity of provisioning ecosystem services.

Keywords: agroecosystem diversity, agronomic barriers, Malva Silvestris, nutritional value, spinach.

31/07 | 11h00
PARALLEL SESSION IV - T6.P4 - LIMITATIONS AND PERSPECTIVES IN FOOD PRODUCTION
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4)

OC-093 - (EEF2019-13617) - AGRO-MORPHOLOGICAL AND GENETIC DIVERSITY OF FOUR PORTUGUESE COREMA ALBUM (L.) D. DON POPULATIONS

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Corema album (L.) D. Don 1830, is a dioecious shrub from the Ericaceae family, found in the coastal Atlantic dune systems and coastal pine tree forests of Iberian Peninsula with the potential to integrate the berry market, not only due to the white coloured fruits, but also for their biochemical compounds. The goals were to seek morphological and genetic variability in four white crowberry populations along the Portuguese west coast.

Eighty female plants were sampled from Monte Clérigo, Comporta, Aldeia do Meco and Dunas de Quiaios (20/population). Six plants from Meco were chosen to follow their reproductive phenology from March to August. Twenty-six morphological traits were evaluated, both from vegetative and reproductive organs, in order to compare them among populations. Fifteen morphological traits were chosen regarding their agronomical interest to perform a Principal Component Analyses and diversity was evaluated, through cluster analyses. Genetic diversity among populations was characterized by using six Inter Simple Sequence Repeats (ISSRs). Correlation between the two sets of data was sought.

Differences between plant phenology from Aldeia do Meco were found. Morphological diversity among and within populations was discovered. Morphological data did not cluster according to geographic distribution; however the same did not occur with molecular data. The comparison between the two types of data, showed a low correlation.

Regarding the agro-morphological data, each population had some trait of interest for a future pre-breeding program. Comporta and Aldeia do Meco were the populations which had greater morphological and genetic variability.

31/07 | 11h00
PARALLEL SESSION IV - T6.P4 - LIMITATIONS AND PERSPECTIVES IN FOOD PRODUCTION
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4)

OC-095 - (EEF2019-13762) - WHEAT PRODUCTION UNDER WATER AND NITROGEN LIMITED CONDITIONS: IMPACT OF CONSERVATION AGRICULTURE

Lúcia Barão (Portugal)[1]; Miguel Soares (Portugal)[2]; Gottlieb Basch (Germany)[2]

1 - cE3c and ICAAM;
2 - ICAAM

European agriculture faces the challenge of dealing with more frequent combined water and nutrient limitations in the coming decades, which will compromise crop productivity if no actions are taken. The design of novel crop genotypes and agroecosystem management innovations to improve water and nutrient (i.e. N and P) use efficiency are among the thematic lines tackled by scientists and are at the core of the H2020 project SolACE - Solutions for improving Agroecosystem and Crop Efficiency for water and nutrient use.

As part of the ongoing work of the project, we have conducted an analysis to study the effects on wheat productivity when limited by nitrogen and water availability in different pedoclimatic regions. Also, a field experiment is being conducted near Beja (Alentejo, Portugal) where four varieties of wheat are grown in rainfed and irrigation regimes and under nitrogen fertilization rates. Half of the experiment was subjected to tillage while the other one was maintained under no-till according to Conservation Agriculture principles.

Results from the literature analysis show that grain yield is affected differently by nitrogen fertilization rates along different climatic regions. In fact, higher nitrogen fertilization amounts may not result in higher yields. This highlights the necessity for site-specific management decisions. Results from the field experiment will be available in the upcoming months and the effect of no-tillage will be evaluated not only on the wheat productivity but also on the soil quality and water availability under the different limitations.

31/07 | 11h00
PARALLEL SESSION IV - T6.P4 - LIMITATIONS AND PERSPECTIVES IN FOOD PRODUCTION
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (4)

OC-096 - (EEF2019-13984) - THE BIONEMATICIDE 1,4-NAPHTHOQUINONE: RISK ANALYSES ON SEED GERMINATION AND GROWTH OF TOMATO

Sónia Chelinho (Portugal)[1]; Tiago Natal-Da-Luz (Portugal)[1]; Mara E. M. Braga (Portugal)[2]; Isabel Abrantes (Portugal)[1]; José Paulo Sousa (Portugal)[1]; Hermínio C. De Sousa (Portugal)[2]; Carla Maleita (Portugal)[1,2]

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Previous research on the extraction/assessment of natural compounds from agro-residues has revealed that 1,4-naphthoquinone (1,4-NTQ) has high nematicidal activity against root knot nematodes (RKN), *Meloidogyne* spp. These plant-parasitic nematodes are distributed worldwide and have a relevant economic impact on tomato, *Solanum lycopersicum*, production. The negative effects of 1,4-NTQ on soil non-target organisms have been documented but no information on the toxic effects of 1,4-NTQ on seed germination and growth of tomato is available. Therefore, the main objective of the present study was to evaluate the effects of 1,4-NTQ on tomato plants. Laboratory tests were performed with *S. lycopersicum* cv. BIGRAM SW F-1 and three natural soils with contrasting texture (clay, sandy and sandy-loam), with no history of pesticide contamination for the last two years, as substrate. Preliminary results showed negative effects of 1,4-NTQ at concentrations ≥96 mg/kg for the three measured endpoints (seed germination, biomass production and tomato length). The soil type seemed to have significant influence on both seed germination and plant growth, because lower values were observed in clay soil. Results also suggest that tomato has similar sensitivity against 1,4-NTQ than other non-target plants, but lower sensitivity than the one previously reported for other soil invertebrates. These data will be confirmed with the presentation of the final results of the tomato tests with the three soils. Despite this, the available results lead to suppose that the 1,4-NTQ concentration needed to reduce RKN penetration and reproduction (50 mg/Kg) may be lower than the concentrations that negatively impact tomato development.

31/07 | 11h00
PARALLEL SESSION IV - T9.P4 - DYNAMICS AT THE COMMUNITY LEVEL
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (3)

OC-097 - (EEF2019-13936) - ANTARCTIC CRYPTOGAMIC TUNDRA RESPONSES TO GLOBAL WARMING

Angelica Casanova (Chile)[1]

1 - Universidad Catolica de Temuco

In Antarctica, several long-term experiments have been carried out principally on vascular plants, but only few experiments have been performed on the cryptogamic biota, although the Antarctic polar tundra is dominated by lichen and mosses. During the last eight years we carried out several long term experiments to understand the complexity of responses of mosses and lichens to global warming and interactions with the associated terrestrial biota. We installed open top chambers (OTC) at Fildes Peninsula (King George Island, South Shetland Island Archipelago) on a moss-lichen community in order to observe and understand their functional and growing response as well as their relation with invertebrates under passive warming. We found no strong general increase in cover but species-specific responses of mosses and lichens; reproductive growth response under warming showed increased sporophyte production in some moss species; we also found larger invertebrate communities under treated mosses, with species-specific responses in composition of collembole or nematode communities. We found that lichens in general were not strongly affected by warming, but specifically, growth and nitrogen contentofPlacopsis antarctica, a cyanolichen, responded negatively. Our results indicate that responses of antarctic mosses and lichens to warming are differentiated and taxon-specific and so is their adaptation potential under the future scenario of global climate change. INACH RT2716; CONICYT-FONDECYT 1181745; US National Science Foundation (NSF) (PLR 1341742).

31/07 | 11h00
PARALLEL SESSION IV - T9.P4 - DYNAMICS AT THE COMMUNITY LEVEL
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (3)

OC-098 - (EEF2019-13787) - SEED SIZE UNDERLIES THE UNCOUPLING IN SPECIES COMPOSITION BETWEEN CANOPY AND RECRUITMENT LAYERS IN EUROPEAN FORESTS.

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Increasing evidence supports that canopy richness favours multifunctionality in European forests. Given that recruitment represents one of the main demographic bottlenecks in plant communities, the provision of similar levels of forest functioning in the future will depend on successful natural regeneration in the present. Here, we evaluated whether canopy diversity enhance recruitment (abundance and richness) by providing a more diverse seed supply and a more heterogeneous environmental context; or, alternatively, whether post-dispersal environmental filters outweigh the expected positive effects of the canopy. For this purpose, we used a comprehensive database of canopy composition and recruitment patterns in 173 permanent plots located at contrasting types of forest (from Mediterranean to boreal forests), along a canopy species richness gradient (from monoculture to mixtures up to 5 species). Despite that canopy diversity promoted a more diverse seed supply and light heterogenity, it did not translate into a richer or more abundant community of recruits. In fact, we found an important uncoupling in species compositions between recruitment and canopy layers. Our results suggested that strong post-dispersal filters mediated by an interaction between seed size and latitude drive this mismatch. Therefore, large-seeded species were over-represented in the recruitment at both extremes of the European gradient (Mediterranean and boreal forest); while the opposite occurred at intermediate latitudes. Altogether, our work shows that preserving a more diverse canopy may not ensure successful recruitment, and advocates future studies analyzing the role of post-dispersal filters on the assembly of forests to design practices aimed at favouring their natural regeneration.

31/07 | 11h00
PARALLEL SESSION IV - T9.P4 - DYNAMICS AT THE COMMUNITY LEVEL
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (3)

OC-099 - (EEF2019-13686) - CARNIVORES' PRESENCE PATTERNS IN EXOTIC EUCALYPTUS PLANTATIONS WORLDWIDE

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3 - cE3c - Centre for Ecology, Evolution and Environmental Change, Faculdade de Ciências da Universidade de Lisboa

The world's forested area has been declining throughout the last decades. However, planted forest's area is increasing, particularly exotic Eucalyptus production forests (EPF) that cover nowadays >20 million ha worldwide. This global landscape change affects native communities, especially those of higher trophic levels that are affected by bottom-up cascading effects, such as carnivores. In this study, we seek to identify what are the general traits evidenced by mammalian carnivores that manage to use Eucalyptus exotic production forests worldwide. We used five species traits (longevity, social behavior, body mass, trophic level, and locomotion mode) and conservation status as fixed factors, and study site and carnivore family as random factors in a Generalized Linear Mixed Model approach to identify the most constraining factors shaping carnivore presence in EPF. We reviewed 55 studies reporting carnivore presence in Eucalyptus plantations, which detected 42 different species, from seven families. Non-detected species in each study were those that the IUCN Red List distribution range overlapped with the study areas, but that were not detected. Our modelling procedure identified that species classified as "Least Concern" by the IUCN Red List were more likely to use Eucalyptus forests than species included in other categories, especially those considered threatened. The other traits didn't show any type of influence on carnivore's presence in Eucalyptus plantations. Such pattern confirms an impoverishment of predator's communities in disturbed environments that exclude more sensitive and more threatened species, leading to fragmentation of those predator's populations and, ultimately to their local extinction.

31/07 | 11h00
PARALLEL SESSION IV - T9.P4 - DYNAMICS AT THE COMMUNITY LEVEL
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (3)

OC-100 - (EEF2019-13668) - DRIVERS OF BUTTERFLY AND DRAGONFLY COMMUNITY CHANGE ALONG ELEVATIONAL GRADIENTS IN A MOUNTAINOUS AREA

Ana Ceia-Hasse (Portugal)[1]; Mário Boieiro (Portugal)[2]; Albano Soares (Portugal)[3]; Sandra Antunes (Portugal)[3]; Hugo Figueiredo (Portugal)[4]; Carla Rego (Portugal)[1]; Paulo Borges (Portugal)[2]; José Conde (Portugal)[4]; Artur Rm Serrano (Portugal)[5]

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3 - Tagis - Centro de Conservação das Borboletas de Portugal, Lisboa, Portugal;
4 - Centro de Interpretação da Serra da Estrela, Seia, Portugal;
5 - Centre for Ecology, Evolution and Environmental Changes (cE3c), Animal Biology Department, Faculty of Sciences, University of Lisbon, Lisbon, Portugal

This study aimed at comparing diversity patterns of butterflies and dragonflies in a mountainous protected area of high conservation value and relating them to environmental factors to understand what drives community structure in different insect groups. Butterflies and dragonflies are indicator groups and popular among the general public, and can thus be used as flagships for invertebrate conservation. Butterfly (Lepidoptera) and dragonfly (Odonata) species were visually identified during transects performed at three different altitudes (500, 1000 and 1500m) in the Serra da Estrela Natural Park in Portugal. We computed alpha and beta diversity metrics for each group, testing for differences between altitudes and using variation partition to evaluate environmental influences on beta diversity. Alpha and beta diversity differed between altitudes for both groups. Species replacement was higher than richness differences in butterflies (0.34 versus 0.22), and lower in dragonflies (0.26 versus 0.33). Climate and altitude explained 36-69% of beta diversity patterns, with climate alone explaining more variation than altitude. Pure spatial effects were more important in dragonflies than in butterflies, although spatially structured climatic effects were present in butterflies. This study suggests that different processes structure communities in the groups analyzed. Beta diversity was driven by species replacement in butterflies, and by richness differences in dragonflies. Additionally, pure spatial effects were more important in dragonflies, reflecting their strong dependency of freshwater systems. Analyzing diversity patterns and the factors explaining them can help understanding what structures communities and thus better predicting environmental change impacts on biodiversity and designing conservation strategies.

31/07 | 11h00
PARALLEL SESSION IV - T9.P4 - DYNAMICS AT THE COMMUNITY LEVEL
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (3)

OC-228 - (EEF2019-10700) - INFLUENCE OF CHANGES IN ABIOTIC CONDITIONS ON THE MIGRATION PHENOLOGY OF COMMON CRANES IN SOUTH-WESTERN EUROPE

José María Orellana (Spain)[1]; Luis Miguel Bautista (Spain)[2]; Daniel Merchán (Spain)[3]; Juan Carlos Alonso (Spain)[2]; Jesús Causapé (Spain)[1]

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3 - Universidad Pública de Navarra, Campus Arrosadia, Pamplona 31006, España.

Climate change has modified the patterns of animal phenology. We explore if trends and changes in abiotic conditions were associated to changes in the migratory phenology of Common Cranes (Grus grus) between 1973 and 2017 in Gallocanta Lagoon, an important stopover and wintering site in south-western Europe.

This work considers air temperature and rainfall as determining factors. Long-term data series of both variables were collected and validated. We also include water level of the lagoon between 1974 and 2017 as an abiotic condition.

We use weekly censuses of cranes carried out between October and March during the study period. The ordinal date (ISO-8601) of the maximum number of cranes observed in the lagoon during the pre-breeding and post-breeding migration is used as a proxy of the migration timing.

The maximum number of cranes staying in Gallocanta increased over the study period. In autumn, cranes correlate positively with water level, whereas in winter, minimum number of cranes correlates negatively. Nevertheless, the winter minimum increased from 1% up to 40% between 1973 and 2017.

In addition, spring peak occurred about 16.2 days earlier. The increasing air temperature correlate negatively with dates of both migration peaks (spring and autumn), whereas water level correlate positively in spring.

We conclude that changes in migration phenology at Gallocanta were associated to a temperature increase and variations in water level. Since climatic models predict further decreases in rainfall and higher temperatures in the area, further changes in migration phenology should be expected.

31/07 | 11h00
PARALLEL SESSION IV - T10.P1 - A CLOSER LOOK AT THE SOIL ECOSYSTEMS
Room 2.3.13 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (2); Topic 10 - Land degradation and ecosystem restoration (2)

OC-101 - (EEF2019-13946) - INVASION OF A WOODY LEGUME IN THE OLIGOTROPHIC PRIMARY DUNES: FROM STARTING IN NURSE PLANTS TO CHANGING SYSTEMIC N/P BALANCE

Florian Ulm (Portugal)[1]; Cristina Cruz (Portugal)[1]; Cristina Máguas (Portugal)[1]

1 - Centre for Ecology, Evolution and Environmental Changes

Dune systems are under increasing pressure from invasive plants and as oligotrophic systems, they are often N and P co-limited, which makes nitrogen-fixing woody legumes especially problematic. These species can act as ecosystem-engineers and change the medium to long term soil functioning completely, with detrimental effects on the native vegetation. Australian Acacia spp., are such ecosystem engineers in the Portuguese dunes and fundamentally change the ecosystem they invade, increasing soil organic matter levels, changing soil nutrient cycles and creating monospecific stands that fully replace the native vegetation.

Many of the aboveground changes occurring in this process are well known and are related to the high growth rates of this species in later invasion stages. However, it remains unclear how Acacia plants establish themselves in oligotrophic systems before they start to create large amounts of biomass. Also, while acacias introduce large amounts of carbon (C) and N into the ecosystems they invade along time, little is known about other crucial macronutrients, such as P. Lastly, litter and root mass have been suggested as major sources of belowground biomass input, however, the rhizosphere as plant-soil interface has rarely been addressed.

Here, we use Acacia longifolia as a model plant to show how it manipulates soil organic matter pools even before litter production starts to introduce organic matter. Also, we explore the relationships between N and P in biomass production and how A. longifolia exploits its phenotypic plasticity and nutrient use efficiency in order to outperform local plants, fully invading the affected ecosystem.

31/07 | 11h00
PARALLEL SESSION IV - T10.P1 - A CLOSER LOOK AT THE SOIL ECOSYSTEMS
Room 2.3.13 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (2); Topic 10 - Land degradation and ecosystem restoration (2)

OC-102 - (EEF2019-13673) - SOIL MULTIFUNCTIONALITY VALIDATES MYCORRHIZATION TRAITS AS CRITERIA FOR SELECTING NATIVE PLANT SPECIES FOR DRYLANDS' RESTORATION

Neji Mahnoudi (Tunisia)[1]; Maria Filomena Caeiro (Portugal)[2]; Mosbah Mahdhi (Portugal)[3]; Raya Abdaiem (Tunisia)[1]; Kouloud Bessadok (Tunisia)[1]; Rogério Tenreiro (Portugal)[2]; Mohamed Mars (Tunisia)[1]; Teresa Dias (Tunisia)[2]

1 - Faculté des Sciences de Gabès, Université de Gabès, Tunisie;
2 - FCUL;
3 - Center for Environmental Research and Studies, Jazan University, Jazan, Saudi Arabia

Drylands are one of the most susceptible biomes to land degradation and climate change, which has important ecological and socio-economic consequences regionally and globally. Vegetation cover in drylands is a key variable in controlling degradation, and plant species selection for restoration is moving from a biodiverse to a functional approach, ideally integrating belowground functional traits.

Our objective was to validate belowground functional traits to identify native plant species which enhance soil multifunctionality. We evaluated the effect of fourteen native herbaceous plant species on soil multifunctionality in four sites with different organic matter contents. We measured mycorrhization features, soil microbial biomass, metabolic quotient, and soil enzymatic activities .

Soil multifunctionality was highly correlated with all the analysed belowground functional traits and varied among plant species and within plant species according to the site. Bare soils and soils under a non-mycorrhizal plant species displayed the lower while soils under Fabaceae species displayed the higher multifunctionality.

Data provided strong evidence that mycorrhization is a key trait to diagnose plant species that improve soil multifunctionality because AMF form communication pathways between plants and the soil, restoring and maintaining soil fertility, influencing the microbial community and extending plant's influence in the soil. We suggest that soil multifunctionality in drylands restoration programs can be improved by management practices promoting organic matter accumulation and favouring specific native plant species. Knowledge on belowground functional networks is needed to guide restoration efforts in drylands.

31/07 | 11h00
PARALLEL SESSION IV - T10.P1 - A CLOSER LOOK AT THE SOIL ECOSYSTEMS
Room 2.3.13 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (2); Topic 10 - Land degradation and ecosystem restoration (2)

OC-104 - (EEF2019-13929) - DYNAMICS OF SOIL NITROGEN CYCLING DURING POST-AGRICULTURAL SUCCESSION IN A SUBTROPICAL KARST REGION

Dejun Li (China)[1]

1 - Institute of Subtropical Agriculture, the Chinese Academy of Sciences

Soil nitrogen (N) dynamics are crucial for ecosystem development and carbon sequestration. Nevertheless, how soil N cycling changes during post-agricultural succession in karst regions has not been well assessed so far. Here, N cycling during post-agricultural succession in the karst region of southwest China was evaluated. Bulk N content increased rapidly along a post-agricultural succession sequence including cropland, grassland, shrubland, secondary forest and primary forest. Across the sequence, soil N accumulated with an average rate of 12.4 g N/m2/yr. Soil N stock recovered to the primary forest level in about 70 years following agricultural abandonment. Nitrate concentrations increased while ammonium concentrations decreased with years following agricultural abandonment. N release from bedrock weathering was likely a potential N source in addition to atmospheric N deposition and biological N fixation. Both gross N mineralization and nitrification rates decreased initially and then increased greatly following agricultural abandonment. Gross N mineralization rate correlated significantly with protease activity, implying that the depolymerization of N-containing polymers was likely the rate-limiting step of gross N mineralization and benefited N accumulation following agricultural abandonment. Net nitrate production rate and N saturation index increased significantly from the grassland to the forest, supporting that soil N cycling likely became more open during post-agricultural succession in the karst region of southwest China. Multiple lines of evidence showed that N cycling in the karst forest was leaky, but N cycling the neighboring non-karst forest was very conservative.

31/07 | 11h00
PARALLEL SESSION IV - T10.P1 - A CLOSER LOOK AT THE SOIL ECOSYSTEMS
Room 2.3.13 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (2); Topic 10 - Land degradation and ecosystem restoration (2)

OC-105 - (EEF2019-13967) - STUDY OF BACTERIA INVOLVED IN ACACIA LONGIFOLIA NODULATION: INFLUENCE OF FIRE ON SYMBIOSIS ESTABLISHMENT

Joana Jesus (Portugal)[1]; Rogério Tenreiro (Portugal)[1,2]; Cristina Máguas (Portugal)[1,3]; Helena Trindade (Portugal)[1,4]

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3 - cE3c – Centre for Ecology, Evolution and Environmental Changes, Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisboa, Portugal.;
4 - CESAM – Centro de Estudos do Ambiente e do Mar, Faculdade de Ciências, Universidade de Lisboa, CBV, 1749-016 Lisboa, Portugal

Acacia longifolia is an invasive leguminous species that can cause a considerable damage in the ecosystems. This species, native from Australia and Tasmania, was brought to Portugal for ornamental purposes and nitrogen fixation in soils, competing with native plants for natural resources and changing the soil characteristics. The expansion of this species, in the last decades, caused an environmental impact, in particularly in the Portuguese coastal dunes. Several factors potentiate this growth, namely fires that occur frequently and promote seed germination. Furthermore, high colonization success of acacia is related to its association with nitrogen-fixing bacteria (NFB), that develop inside root nodules, where fixation occurs. These bacteria, belonging mainly to the Rhizobiaceae family are determinant in plants' growth. This study aimed at understanding how fire influence nodule development and symbiosis establishment, to identify the major microorganisms involved in early symbiosis, and what is the succession, following a fire. To perform this study, nodules from 20-60 cm long young plants of A. longifolia were collected in the field, surface sterilized and grown in YMA medium to isolate bacteria. A total of 152 bacterial isolates were obtained from 75 nodules (40 collected before a fire and 35 collected after a fire) and genomically fingerprinted by PCR amplification with GTG-5 and PH universal primers. Assessment of diversity was based on dendrograms with Pearson similarity coefficient and UPGMA. The amplification for rRNA 16S gene is underway to identify the main bacterial genus involved in symbiosis.

31/07 | 11h00
PARALLEL SESSION IV - T12.P1 - RESPONDING TO EVOLUTIONARY FORCES
Room 3.2.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 12 - Theoretical and evolutionary ecology (3)

OC-106 - (EEF2019-13830) - INDIVIDUAL RESPONSES TO CLIMATE CHANGE: REVISITING THE ECOLOGICAL MEANING OF PHENOTYPIC PLASTICITY

Fernando Valladares (Spain)[1]

1 - CSIC

Different lines of evidence suggest that divergence in plasticity plays a key role in adaptation to global environmental change. Many scientists argue that genetic variation in plastic responses to the environment (G × E) could be an important predictor of species' vulnerabilities to climate change. But there is not a general pattern among either experimental or theoretical studies. Plasticity acting at the level of the individual is considered a rapid mechanism for surviving under rapidly changing conditions. But plasticity can also retard adaptation by shifting the distribution of phenotypes in the population, shielding it from natural selection. We know that not all plastic responses are adaptive. I will illustrate some examples of ecological traps, and, for the case of plants, the paradoxical decision regarding roots that we are far from understanding and modelling. Plasticity may buy time for populations, but whether it will be enough, given the rate of environmental change, is unknown. There are emerging modelling approaches attempting to explain future changes in species distribution ranges based on phenotypic plasticity and local adaptation of fitness-related traits measured across geographical gradients. Predictions generally deliver a less alarming message than previous modelling exercises, suggesting that phenotypic plasticity could help some populations to persist under climate change. But, again, this is hampered by our understanding of the ecological meaning of plasticity. There is, thus, a need to consider the environments, traits and conditions under which plasticity could be under selection, if we are to understand phenotypic responses to rapid environmental change.

31/07 | 11h00
PARALLEL SESSION IV - T10.P1 - A CLOSER LOOK AT THE SOIL ECOSYSTEMS
Room 2.3.13 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (2); Topic 10 - Land degradation and ecosystem restoration (2)

OC-107 - (EEF2019-13859) - ENVIRONMENT AND EVOLUTIONARY HISTORY CONTROL PHYLOGENETIC TURNOVER IN ATLANTIC COASTAL WHITE-SAND PLANT COMMUNITIES

Jhonny Capichoni Massante (Estonia)[1]; Danilo Neves (Brazil)[2]; Pille Gerhold (Estonia)[1]

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2 - Department of Botany, Federal University of Minas Gerais, Belo Horizonte 31270-901, Brazil

In the light of the accelerated decline of biodiversity due to habitat loss, understanding diversity patterns is of paramount importance for conservation. The Brazilian Atlantic rainforest is a complex ecosystem which includes also coastal white-sand woodlands, i.e. restingas, of Quaternary origin. Restingas are notably distinct both floristically and environmentally, and they have suffered extensive fragmentation due to high human occupation. Despite several floristic studies, little is known about their evolutionary history. Here we use climatic and community data combined with phylogenetic analyses to test two hypotheses: (1) there will be low phylogenetic turnover at deep phylogenetic levels across restingas, indicating colonization of plant families with widespread geographic ranges across the Atlantic rainforest sensu lato (e.g. Myrtaceae) and (2) high phylogenetic turnover at shallow phylogenetic levels due to very recent speciation and lack of time to disperse out of their original region. Results revealed strong significant patterns of phylogenetic turnover across restingas. As expected, we found weak deep level phylogenetic turnover across restingas, suggesting colonization of widespread lineages. These lineages probably were prevented from further dispersal and therefore underwent local speciation, reflected by high phylogenetic turnover across restingas at shallower phylogenetic level. These results are relevant for the conservation of restingas as it shows the uniqueness of contemporary coastal ecosystems across the Atlantic rainforest. Also, the ongoing habitat loss has remarkable consequences on the evolutionary history of these ecosystems, since loss of endemic species in local communities may lead to the loss of evolutionary history unique to a particular region.

31/07 | 11h00
PARALLEL SESSION IV - T12.P1 - RESPONDING TO EVOLUTIONARY FORCES
Room 3.2.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 12 - Theoretical and evolutionary ecology (3)

OC-108 - (EEF2019-13868) - THE ROLE OF POLYPLOIDY DRIVING ECOLOGICAL DIFFERENTIATION: CYTOTYPE ECOLOGICAL PERFORMANCE AFTER RECIPROCAL TRANSPLANTS EXPLAIN ALLOPATRIC DISTRIBUTION OF A DIPLOID-TETRAPLOID COMPLEX

Sílvia Castro (Portugal)[1]; Mariana Castro (Portugal)[1]; Miguel Serrano (Spain)[2]; João Loureiro (Portugal)[1]

1 - Centre for Functional Ecology; 2 - Laboratorio de Botánica, Facultade de Farmacia, Universidade de Santiago

Polyploidy, i.e. whole genome duplication, is common in the evolution of flowering plants and a frequent process in nature. As it leads to immediate reproductive isolation, polyploidy is an important mechanism in the emergence of new species. Still, the survival of the new organism requires it to have an ecological advantage to become established. Polyploidy has been postulated to mediate ecological differentiation that enables the new cytotype to colonize areas beyond the parental populations; however, the available data is scarce, and the adaptive value of polyploidy still remains uncertain. In this study, we assess the contribution of polyploidy to ecological divergence using a reciprocal transplant experiment with the allopatric diploid-tetraploid *Jasione maritima* var. *maritima* using diploids, synthetic neotetraploids and established tetraploids and quantifying survival, plant growth and biomass. Overall, cytotypes performed better in the tetraploid range than in the diploid range. However, the survival of neotetraploids and established tetraploids was significantly higher than that of diploids over the tetraploid range, while no differences were found in total biomass. Additionally, the performance of tetraploids was lower than that of the other cytotypes over the diploid range. Altogether, our results suggest some niche differentiation among cytotypes mediated by polyploidization and, together with other mechanisms, may explain the current allopatric distribution of diploids and tetraploids. This study supports ecological differentiation as one of the factors involved with the successful establishment of neopolyploids, contributing for a better understanding of the adaptive value of polyploidy and its widespread occurrence.

31/07 | 11h00
PARALLEL SESSION IV - T10.P1 - A CLOSER LOOK AT THE SOIL ECOSYSTEMS
Room 2.3.13 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (2); Topic 10 - Land degradation and ecosystem restoration (2)

OC-109 - (EEF2019-13881) - IS ECOLOGICAL SPECIALIZATION A PATHWAY TO DISENTANGLE ENIGMATIC RADIATIONS? THE STUDY CASE OF AEONIUM (CRASSULACEAE)

Patrícia Dos Santos (Portugal)[1]; Miguel Brilhante (Portugal)[1]; Jurriaan De Vos (Switzerland)[2]; Cristina Branquinho (Portugal)[1]

1 - cE3c - Centre for Ecology, Evolution and Environmental Changes;
2 - University of Basel

Aeonium is the most biodiverse plant genus in Macaronesia. Though the process that leads to this extraordinary number of species is not understood in detail, the group is recurrently used in the literature as one of the best examples of adaptive radiation in plants.

The goal of this project is to unveil this radiation process by studying the morphological variation, life strategies and ecological preferences of the species.

We visited six out of the seven islands of the Canary islands and sampled 22 out of the 38 endemic species in the archipelago. We sampled several populations of each species, took measurements on vegetative and reproductive traits (such as leaf succulence, size, inflorescence architecture, arrangement and number of floral organs, flowering season, habit) and selected the ecological preferences for each species using SDM's. We used available phylogenies of the group to backbone the data in an evolutionary framework.

Our results show great interspecific morphological variability in vegetative and reproductive traits, and specific ecological preferences overall. Given that speciation in Aeonium was very fast and largely occurred in the same geographical boundaries, where each species explores different niches, specific morphological characters and strategies could represent environmental adaptations. This lead us to conclude that speciation in Aeonium fits in an ecological specialization process (adaptive radiation) rather than an event of explosive diversification without diverse ecological roles among closely related species. This study is likely the first to give an empirical insight on the concept of adaptive radiation in plants.

01/08 | 11h00
PARALLEL SESSION V - T1.P4 - BIOMONITORING FOR ECOSYSTEM INTEGRITY
Room 2.2.12 | Topic 1 - Environmental risks and health (5)

OC-110 - (EEF2019-13788) - MATOPIBA (BRAZIL): THE ROLE OF PRIMARY VEGETATION COVER IN REGULATING THE HYDROLOGICAL CYCLE

Paulo Silva (Brazil)[1]; Saulo Rodrigues Filho (Brazil)[1]

1 - University of Brasilia

Cerrado is the second largest biome in Brazil, covering an area of approximately 203,64 million hectare (Mha), it has the greatest biological diversity among savannas worldwide and accounts for about 30% of the national biodiversity. The biome has been the subject of an intense process of conversion of its natural vegetation cover due to agricultural expansion, particularly in the region of MATOPIBA (Maranhão, Tocantins, Piauí and Bahia). With a total area of 73,2 Mha this region integrates 4 important river basins.

This study aims to assess the role of natural vegetation cover in regulating the hydrological cycle.

To attain the proposed objective, the working methodology will consist on the analysis of the deforestation annual rates (1985-2017) and its relation with precipitation and temperature data, based on the historical pluviometric and meteorological data collected on conventional stations.

Between 1985 and 2017, the effective loss of primary vegetation was aproximately 9,40 Mha – an average rate of 290.000 ha/year.

Regarding the climatic variables the region presents an irregular distribution of precipitation with average annual rates between 800mm and 2000mm. The maximum and minimum temperatures (annual average) are respectively in the range of 32 ± 1ºC and 20 ± 2ºC.

The analysis of consistency, trend and rupture of precipitation data and maximum/minimum temperatures are being concluded.

At the conference will be presented the impact analysis of deforestation rates - long-term variations - both for regional precipitation and for maximum and minimum temperature standards.

01/08 | 11h00
PARALLEL SESSION V - T1.P4 - BIOMONITORING FOR ECOSYSTEM INTEGRITY
Room 2.2.12 | Topic 1 - Environmental risks and health (5)

OC-111 - (EEF2019-13641) - HONEY BEE DIETARY NEONICOTINOID EXPOSURE IS MEDIATED BY POLLEN COLLECTION FROM AGRICULTURAL WEEDS

Thomas Wood (Belgium)[1]; Ian Kaplan (United States of America)[2]; Yajun Zhang (United States of America)[3]; Zsofia Szendrei (United States of America)[3]

1 - University of Mons;
2 - Purdue University;
3 - Michigan State University

Neonicotinoid insecticides have been linked to bee declines. However, tracking their primary exposure route in the field has proven to be a major logistical challenge, impeding efforts to restore pollinator health in agricultural landscapes.

Using pickling cucumber (Cucumis sativus) as a model system, we quantified neonicotinoid concentrations and botanical species composition in 357 pollen samples collected from 114 commercial honey bee colonies placed along a gradient of agricultural intensity between June and September over a two-year period in Michigan, United State of America.

Neonicotinoid concentrations increased through the season, peaking at the end of August. As a result, concentrations in pollen were negatively associated with collection from woody and crop plants that flower early-mid season, and positively associated with collection from herbaceous plants that flower mid-late season. In agricultural weeds, these relationships were driven by thiamethoxam and clothianidin, but not imidacloprid. The percentage of agricultural land within 1,500 metres of the apiary was positively correlated with thiamethoxam concentration; however, this spatial relationship was far weaker than the temporal relationship caused by the flowering phenology of the plant community.

These results indicate that both plant species identity and agricultural dominance are important in determining honey bee neonicotinoid exposure through the pollen diet, but that collection from uncultivated plants associated with agriculture pose the most acute risk.

01/08 | 11h00
PARALLEL SESSION V - T1.P4 - BIOMONITORING FOR ECOSYSTEM INTEGRITY
Room 2.2.12 | Topic 1 - Environmental risks and health (5)

OC-112 - (EEF2019-13865) - TOOLS TO MEASURE AND MANAGE THE EFFECTS OF EXCESS NITROGEN IN ECOSYSTEMS

Helena Serrano (Portugal)[1]; Pedro Pinho (Portugal)[1]; Paula Matos (Portugal)[1]; Maria Alexandra Oliveira (Portugal)[1]; Melanie Kobel (Portugal)[1]; Adriana Príncipe (Portugal)[1]; Margarida Santos-Reis (Portugal)[1]; Cristina Branquinho (Portugal)[1]

1 - Centre for Ecology, Evolution and Environmental Changes (CE3C), Faculdade de Ciências, Universidade de Lisboa, 1749-016 Lisboa

Nitrogen is a key driver of environmental change due to a dual behaviour: too little is a limiting nutrient, too much is a pollutant. Reactive nitrogen (Nr) is one of the most problematic and often neglected pollutants, with impacts in all compartments: water (e.g. eutrophication), air (e.g. nitrogen oxides, NOx from combustions), green-house-gases (e.g. NOx reacting with ozone), soil (e.g. ammonia acidification) and all together affecting ecosystems and biodiversity. The aim of this work is to present the tools developed to measure and manage the effects of Nr in ecosystems.

These tools were applied in Mediterranean-woodland ecosystems (Montado), under LTER-Portugal. The tools included ecological indicators, decomposition rates, measuring concentrations and isotopic composition, coupled with trait-based biodiversity measures and atmospheric Nr-modelling.

Nationwide, we pointed the ecosystems at higher-risk of biodiversity change by Nr, crossing expert knowledge with modelled estimations of Nr concentrations. This highlighted the areas at greater risk, and the critical need for high-resolution Nr deposition models. Regionally, we estimated Nr deposition perceived by ecological indicators (lichens) and compared it to reported emissions under the European legislation for clean air. We also determined critical levels and loads of Nr for Mediterranean woodlands, in areas with high-to-low nitrogen deposition. Looking at ecosystems recovery from Nr, decomposition rates were estimated in a timescale of grazing exclusion, with slow rates/recovery determined.

In all cases, most Nr derived from high intensity agricultural areas, indicating the need for protection buffer-areas near sensitive ecosystems, and a slow ecosystems' recovery time.

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01/08 | 11h00
PARALLEL SESSION V - T1.P4 - BIOMONITORING FOR ECOSYSTEM INTEGRITY
Room 2.2.12 | Topic 1 - Environmental risks and health (5)

OC-113 - (EEF2019-13682) - CLIMATE CHANGE AND THE SPREAD OF BROWN-ROT DISEASE IN PEACH ORCHARDS: INSIGHTS FROM AN EPIDEMIOLOGICAL MODEL

Chiara Vanalli (Italy)[2]; Daniele Bevacqua (France)[1]; Renato Daniele Bevacqua (Italy)[2]; Marino Gatto (Italy)[2]

1 - UR 1115, INRA, Avignon, France;
2 - DEIB, Politecnico di Milano, Milan, Italy

Brown rot, caused by *Monilinia* spp., is a major disease of stone fruit, which can causes important economic losses. We modified a compartmental, mechanistic epidemiological model of brown-rot disease to include and discuss the role played by climatic variables. All model functions and parameters have clear biological interpretation thus permit us to formulate and test multiple competing hypotheses on the possible relationships of epidemiological dynamics with the climate. We used a model selection approach (Akaike Information Criterion) to evaluate each hypothesis in terms of support from observed data. The selected model well reproduced the observed variations in terms of both disease epidemics and resulting yield, and assumes i) infection, i.e. the probability that a fruit exposed to the pathogen progresses to the infected stage, to rely on a precipitation event and, ii) a spore death rate increasing with temperature. We used our best model to generate risk maps for brown rot disease in the Southern France under different scenarios of climate changes for various time horizons, from few decades to the end of the century. Our results reveal that the integration of epidemiology, plant physiology and meteorology do improve capability for climate change impact assessment and allow possible mitigation. Compared with other very major technological, environmental, and socioeconomic changes that are likely to affect fruit production during the near future, climate change is perhaps not the most important issue; it will, however, add complexity and uncertainty onto a system that is already difficult to manage on a sustainable basis.

01/08 | 11h00
PARALLEL SESSION V - T1.P4 - BIOMONITORING FOR ECOSYSTEM INTEGRITY
Room 2.2.12 | Topic 1 - Environmental risks and health (5)

OC-114 - (EEF2019-13825) - IMPACTS OF PESTICIDES ON BUMBLEBEE'S NUTRITIONAL INTAKE ABILITIES

Alexandre Barraud (Belgium)[1]; Benjamin Andreu (France)[2]; Denis Michez (Belgium)[1]

1 - University of Mons;
2 - Université de Montpellier

With more than 2.000 species currently recorded in Europe, bees are a highly diversified and efficient group of pollinating insects. Their decline could therefore lead to a risk for ecosystems conservation and food resources. The drivers of this decline have been well documented in Europe, specifying multiple factors such as pesticides, pathogens, poor nutrition or climate change. For pesticides, there is a lack of information regarding the impacts of such expositions related to nutrition. In fact, pesticides could affect the bees foraging abilities in different ways, including issues with proboscis extension mechanics or a diminution of the collection speed. The aim of this work was to assess the impacts of different agrochemicals on bee ability to collect nectar. For this purpose, bumblebees microcolonies were exposed for 7 days at realistic doses of one insecticide (Cyantraniliprole, 1.6 and 3.2mg/L) one fungicide (Azoxystrobin, 2.5 and 5 µg/L) and one herbicide (Glyphosate, 2.5 and 5 mg/L). Each bee was then transferred into small cages with a capillary containing 100µL of sugar solution. The whole set-up was recorded by a camera in order to assess the number of proboscis extensions per minute, the quality of the extension and the time needed to consume all the solution.

01/08 | 11h00
PARALLEL SESSION V - T3.P4 - PROMOTING THE FRESHWATER ECOSYSTEMS SERVICES
Room 2.2.14 | Topic 3 - Freshwater ecology (3)

OC-115 - (EEF2019-13829) - LIFE ON INLAND WATERS: HARMONIZING HABITAT CONSERVATION AND ECOSYSTEM SERVICES TOWARDS THE SUSTAINABLE DEVELOPMENT GOALS

Ana Paula Portela (Portugal)[1,2]; Cristiana Vieira (Portugal)[2,3]; Cláudia Carvalho-Santos (Portugal)[2,4]; João Gonçalves (Portugal)[2]; Isabelle Durance (United Kingdom)[5]; João Honrado (Portugal)[1,2]

1 - Faculdade de Ciências da Universidade do Porto (FCUP);
2 - Centro de Investigação em Biodiversidade e Recursos Genéticos (CIBIO-UP/InBIO);
3 - Museu de História Natural e da Ciência da Universidade do Porto (MHNC-UP/UPorto/PRISC);
4 - Centre of Molecular and Environmental Biology, University of Minho (CBMA);
5 - Water Research Institute, Cardiff University (WRI)

In this work, we aim to contribute to ongoing challenges in balancing human and ecological needs from freshwaters, as required by the Sustainable Development Goals' (SDG) targets, by assessing the spatial relationships between freshwater biodiversity conservation and ecosystem service (ES) provision at a regional scale.

We assessed the spatial relationships between habitats 91E0* and 3260 of the European Habitats Directive, and the potential supply of ES, in Northern Portugal hydrographic region. We modelled (i) the two habitat types distribution with an SDM framework and (ii) assessed the potential supply of the surface water and soil retention ES. The spatial association between both habitat types and ES was analysed through overlap and correlation metrics, identifying potential locations for river protection and restoration.

Our results highlight the regional importance of mountainous areas in the provision of freshwater ES and the conservation of freshwater habitats. We have also identified other potential locations for the protection of freshwater habitats and ES along major watercourses of the study area. In addition, potential locations for habitat restoration and improvement of soil retention services were identified along watercourses in agricultural areas.

Our approach illustrates the synergies and limitations that can arise between ecosystem services approaches and biodiversity conservation in river management. The protection and restoration of riparian forests and stream macrophytes presents several opportunities for the conservation of protected habitats, improvement of ecological status and provision of ES. Similar approaches may contribute to ongoing efforts to achieve the targets of the SDG 15 – Life on Land.

01/08 | 11h00
PARALLEL SESSION V - T3.P4 - PROMOTING THE FRESHWATER ECOSYSTEMS SERVICES
Room 2.2.14 | Topic 3 - Freshwater ecology (3)

OC-116 - (EEF2019-13651) - FRESHWATER REGULATION ECOSYSTEM SERVICES IN URDAIBAI´S RESERVE BIOSPHERE: AN INTEGRATED APPROACH

Leire Méndez-Fernández (Spain)[1,2]; Beatriz Fernández De Manuel (Spain)[1,2]; Lorena Peña (Spain)[1,2]; Miren Onaindia (Spain)[1,2]

1 - Dept. Plant Biology & Ecology;
2 - University of the Basque Country (UPV/EHU)

A resilient and sustainable society requires healthy ecosystems, as essential providers of ecosystem services (ES). Aquatic ecosystems are key ecosystem to provide multiple ecosystems services, including provision, regulation and maintenance and cultural ones. In the case of freshwater ecosystems, there is a need of application of an ES mapping framework in an integrated manner at the river basin scale. The objective was to assess regulating ES in a small catchment and to provide an integrative assessment. The evaluation was carried out the Oka River Basin, a small catchment of 220 km2 situated in the Basque Country (north Spain). Additionally, this basin it is a designated protected area, the Urdaibai´s Biosphere Reserve. Three relevant ES were evaluated within the river systems: habitat maintenance and quality, nutrient depuration and invasive species control. Several indicators that determine ecological status where obtained from the developed indexes and metrics within the Water Framework Directive (EC, 2000). Other indicators are proposed by the authors using GIS databases available in the study area to assess the main biophysical characteristics of the rivers. ES were mapped and evaluated, and a final integration is provided for the whole river basin. The results showed that several pressures and impacts and land use practices may compromise the ES delivery in studied rivers. This type of work it is of high relevance to attain sustainability in fluvial ecosystems, taking into account the multifunctionality of the rivers, which are key elements for a coherent green/blue infrastructure network in the territory.

01/08 | 11h00
PARALLEL SESSION V - T3.P4 - PROMOTING THE FRESHWATER ECOSYSTEMS SERVICES
Room 2.2.14 | Topic 3 - Freshwater ecology (3)

OC-117 - (EEF2019-13671) - ADDRESSING CONNECTIVITY BETWEEN LOCAL BIODIVERSITY HOTSPOTS IN FRESHWATER ECOSYSTEMS

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Mountain rock pools in Mauritania are crucial for local biodiversity, holding multiple endemic and threatened species. These rock pools act as ecological refugia during dry periods, when the majority of rivers and floodplains are reduced or completely dry, leaving mountain rock pools isolated. In the raining season, they are connected through seasonal rivers and floodplains, which allow dispersal and gene flow between populations. Identifying the set of rock pools which best represents occurring species and facilitate connectivity between them is crucial to biodiversity conservation and persistence. We aim to: 1) identify the set of most important mountain rock pools for the preservation of water-dependent species and 2) identify the main corridors that ensure species movements between those areas.

We used software Marxan to identify priority areas for conservation for freshwater species in a region comprising the major mountains of Mauritania. We mapped temporal connectivity in two ways: 1) river network connectivity – we used the normalized difference water index to identify areas with continuous aquatic habitat within subcatchments; 2) wetland connectivity – we identified areas suitable for species movements between floodplains.

Our results provided a visual representation of the priority areas for conservation among Mauritanian mountains and the connectivity pathways that help maintain ecological processes and species movements.

The definition of priority areas for conservation in Mauritanian mountains and the understanding of the dispersal pathways through rivers will contribute to the protection and persistence of endemic and threatened species of freshwater biodiversity in an arid region.

01/08 | 11h00
PARALLEL SESSION V - T3.P4 - PROMOTING THE FRESHWATER ECOSYSTEMS SERVICES
Room 2.2.14 | Topic 3 - Freshwater ecology (3)

OC-089 - (EEF2019-13874) - FACING ANTHROPOGENIC SELECTIVE PRESSURES: A MULTIGENERATIONAL EVOLUTION EXPERIMENT WITH A HOST-PARASITE MODEL AND THE FUNGICIDE TEBUCONAZOLE

Ana Patrícia Cuco (Portugal)[1,2,3]; Joana Isabel Santos (Portugal)[1,2]; Nelson Abrantes (Portugal)[2,4]; Fernando Gonçalves (Portugal)[1,2]; Justyna Wolinska (Germany)[5,6]; Bruno Branco Castro (Portugal)[3]

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The main goal of this study was to determine if multigenerational exposure to the fungicide tebuconazole can lead to adaptation of the microparasitic yeast *Metschnikowia bicuspidata*. *A Daphnia magna-M. bicuspidata* model system was selected because tebuconazole is toxic to the yeast, leading to an anti-parasitic effect at environmentally-realistic concentrations. Infected *D. magna* cultures were reared under control conditions (no tebuconazole exposure) or were challenged with low tebuconazole concentrations for four generations of the parasite (evolution experiment). The performance of naive and evolved lineages was assessed after the evolution experiment, and was re-assessed after removal of this selective pressure during two parasite generations (reset experiment). During the evolution experiment, parasite prevalence and spore load decreased and survivorship of the infected hosts increased with increasing tebuconazole concentrations. After the multigenerational exposure to tebuconazole, the performance of naive (reared in control conditions) and evolved (reared in 3.65 µg l-1 of tebuconazole) *M. bicuspidata* lineages demonstrated a cumulative negative effect of tebuconazole (i.e., evolved parasite lineages performed worse when compared to naive lineages). After the reset experiment, the underperformance of the evolved *M. bicuspidata* lineages was reversed, demonstrating that costs of prolonged exposure to tebuconazole were transient and therefore phenotypic. In conclusion, *M. bicuspidata* did not reveal potential for rapid evolution to this fungicide; instead, long term exposure to tebuconazole was hazardous to this microparasitic yeast at environmentally-realistic concentrations, which can affect its ecological role as modulator of host population dynamics and genetic diversity.

01/08 | 11h00
PARALLEL SESSION V - T8.P1 - CONSERVING MARINE RESOURCES
Room 2.2.21 | Topic 8 - Marine ecology (4); Topic 9 - Biodiversity and ecosystems (1)

OC-118 - (EEF2019-13824) - GENETIC AND MORPHOLOGICAL VARIABILITY IN MEDITERRANEAN PARAZOANTHUS (CNIDARIA, HEXACORALLIA, ZOANTHARIA): EVIDENCE FOR A COMPLEX OF SPECIES

Marco Abbiati (Italy)[1]; Federica Costantini (Italy)[1]; Adriana Villamor (Italy)[1]; Lorenzo Signorini (Italy)[1]

1 - University of Bologna

Cnidaria exhibit a large morphological variability, and genetic investigations can help to resolve taxonomic uncertainty and to reveal intra- and inter-specific patterns of population structure. The zoanthid *Parazoanthus axinellae* is a common species inhabiting the Mediterranean and the North Eastern Atlantic biogenic reefs. In the northwestern Mediterranean two morphotypes (*P. axinellae muelleri* and *P. axinellae liguricus*), differing in size, color and preferred substrate, are found in sympatry, whereas only one morphotypes occurs elsewhere. COI and ITS sequence polymorphism have been used to assess: 1) the genetic structure of *P. axinellae* populations; 2) the genetic divergence between morphotypes, and 3) the phylogenetic history of Parazoanthidae. Specimens of *P. axinellae* were sampled in 10 location from the Gulf of Lions to the Adriatic seas. Small genetic diversity was found using both markers. A small but consistent differentiation in the mitochondrial COI sequences between morphotypes was detected, much larger compared to the hypervariable nuclear region. Differences between morphotypes were comparable to differences observed between other pairs of *Parazoanthus* species inhabiting in sympatry. Surprisingly, *P. axinellae liguricus* seems more similar to sequences from the southeastern Pacific species, whereas *P. axinellae muelleriis* more related to other Atlantic species. These findings might indicate that the two morphotypes are in realty two different species. Further data on morphology and reproduction could help to fully clarify this ambiguity. The use of higher numbers of genome-wide markers seems necessary to properly describe population genetics and phylogeographic patterns of this worldwide distributed group of species.

01/08 | 11h00
PARALLEL SESSION V - T8.P1 - CONSERVING MARINE RESOURCES
Room 2.2.21 | Topic 8 - Marine ecology (4); Topic 9 - Biodiversity and ecosystems (1)

OC-119 - (EEF2019-13992) - TAXONOMIC AND FUNCTIONAL FISH DIVERSITY IN MANGROVES OF THE SÃO TOMÉ ISLAND (GULF OF GUINEA)

Joshua Heumüller (Portugal)[1]; Filipa Afonso (Portugal)[1]; Ana Brito (Portugal)[1,2]; Paula Chainho (Portugal)[1]; Márcio Gonçalves (Sao Tome and Principe)[3,6]; Ricardo Lima (Portugal)[4,5]; Gabriel Oquiongo (Sao Tome and Principe)[5]; Filipe Ribeiro (Portugal)[1]; Pedro Félix (Portugal)[1]

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3 - MARAPA - Mar, Ambiente e Pesca Sustentável;
4 - CE3C - Centre for Ecology, Evolution and Environmental Changes;
5 - Associação Monte Pico;
6 - OIKOS - Cooperação e Desenvolvimento

Mangroves are highly productive ecosystems and support coastal fisheries, serving as spawning, nursery and feeding grounds for fish species. Functional diversity is calculated by grouping species according to their functional traits. A higher number of functional groups promotes functional diversity, boosting ecosystem functioning and stability.

The main goal of this study was to determine the taxonomic and functional diversity of fish assemblages in four mangroves of São Tomé island: Malanza, Praia das Conchas, Angolares and Diogo Nunes. All mangroves had distinct sizes, geomorphologies, hydrological dynamism and levels of human disturbance. Fish assemblages were sampled during the rainy (Malanza and Praia das Conchas) and dry season (all mangroves), using a multi-habitat sampling methodology.

We identified 34 fish species occurring at São Tomé mangroves. Malanza had the highest taxonomic richness, with 18 species occurring in the dry season and 19 in the rainy season, while other mangroves had similar richness, with 10 species in Angolares and 11 in Diogo Nunes and Praia das Conchas in the rainy season. Seasonal variability appears to influence species composition and functional diversity, with a higher variability in small systems like Praia das Conchas where richness dropped from 11 to 1 species while in Malanza, the largest mangrove, diversity maintained but community composition changed. Our results indicate a high ecological integrity of Malanza, which preserved a high functional diversity throughout seasons, while smaller systems, like Praia das Conchas and Diogo Nunes, complement this functional diversity, playing a key role in maintaining the islands overall fish assemblage.

01/08 | 11h00
PARALLEL SESSION V - T8.P1 - CONSERVING MARINE RESOURCES
Room 2.2.21 | Topic 8 - Marine ecology (4); Topic 9 - Biodiversity and ecosystems (1)

OC-120 - (EEF2019-13980) - REPRODUCTIVE CYCLE OF A NE – ATLANTIC HOLOTHURIA TUBULOSA POPULATION: REGIONAL VARIATIONS REQUIRE REGIONAL CARE

Francisco Henriques Lauer De Azevedo E Silva (Portugal)[1]; Tomás Da Fonseca Simões (Portugal)[1]; Eliana Filipa Santos Venâncio (Portugal)[2]; João Noronha Gamito Trigo De Sousa (Portugal)[2]; Ana Pombo (Portugal)[2]; Ana Brito (Portugal)[1]; Pedro Miguel Emídio Félix (Portugal)[1]

1 - MARE - Marine and Environmental Sciences Centre, ULisboa;
2 - MARE - Marine and Environmental Sciences Centre, IPleiria

Sea cucumbers have keystone ecological functions in marine ecosystems, as nutrient recycling agents and helping buffer local ocean acidification. Strong demand for these echinoderms led to the overexploitation of natural stocks. Therefore, sea cucumber harvesting is expanding to different areas, where new species are being targeted. Establishing sustainable fisheries management plans for sea cucumbers is crucial to prevent drastic populations decline that could harm entire ecosystems. Understanding the major reproductive characteristics is a key element to construct suitable fishing management plans and as a planning tool for aquaculture.

To study the reproductive cycle of *H. tubulosa*, monthly samples of 30 individuals were collected (from Jan/2018). Sea cucumbers were immediately individualized, guaranteeing no loss of eviscerated material. Individual parameters were registered, including total length, total wet weight, gutted weight and gonad weight. The gonadosomatic index (GSI) was determined and length-weight relationships were estimated.

The Gompertz model was the best fit for the length-weight relationship. Length-weight relationships show negative allometric growth. Reproductive cycle results showed *H. tubulosa* matured earlier when comparing with results from Mediterranean populations, with a GSI peaking during late Spring / early Summer. Also, gutted weight decreased before spawning season indicating seasonal variations of the allometric coefficient.

These results provide an important contribution to this species conservation, granting us the mechanisms to establish suitable fishing regulations and aquaculture development, as a means to reduce anthropogenic pressure on natural stocks and plan restocking programs. Also, fisheries' regional management is the best way to ensure an effective protection of these holothurians.

01/08 | 11h00
PARALLEL SESSION V - T8.P1 - CONSERVING MARINE RESOURCES
Room 2.2.21 | Topic 8 - Marine ecology (4); Topic 9 - Biodiversity and ecosystems (1)

OC-121 - (EEF2019-13974) - HOLOTHURIA FORSKALI: A MARINE RESOURCE WORTH PROTECTING

Tomás Da Fonseca Simões (Portugal)[1]; Joao Noronha Gamito Trigo De Sousa (Portugal)[2]; Francisco Henriques Lauer De Azevedo E Silva (Portugal)[1]; Eliana Filipa Santos Venâncio (Portugal)[2]; Andreia Isabel Gamito Raposo (Portugal)[2]; Ana Margarida Violante Pombo (Portugal)[2]; Ana Cristina Florindo Brito (Portugal)[1]; Pedro Miguel Emídio Félix (Portugal)[1]

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The sea cucumber is a soft-bodied Echinoderm, from the Class Holothuroidea, widely distributed and with an important role in marine ecosystems. Commonly used as delicacy in SE-Asia, its increasing demand has led to stocks over-exploitation, currently reaching Mediterranean and NE-Atlantic species. The collection of data from newly traded species is of the utmost importance, to prevent significant impacts on the populations.

This work aims to develop knowledge on the ecology of *Holothuria forskali* in the NE-Atlantic, as well as its reproductive biology. Thus, contributing to develop tools aiming for the species conservation, through stock management policies.

Animal length and abundance data obtained from each of the 16 sampling stations, located in the Arrábida coast (Portugal), were collected through visual census, in replicated transects, over an annual cycle (2018-2019). Environmental data were also collected, along with geomorphological parameters and tidal influence. To determine the species reproductive cycle, 30 individuals were monthly collected for gonad histological analysis.

Preliminary results showed that, although with a preference for rocky reefs, *H. forskali* shows a heterogeneous distribution, with higher abundances in sheltered areas. However, within coastal habitats 86,9% of all individuals were found in rocky substrate and 13,1% in sandy areas. The species showed a reproductive peak during the autumn months in this NE-Atlantic area, representing a different reproductive timing when compared to the Adriatic Sea,

This work will contribute to the establishment of appropriate management strategies, promoting the preservation of natural populations.

01/08 | 11h00
PARALLEL SESSION V - T8.P1 - CONSERVING MARINE RESOURCES
Room 2.2.21 | Topic 8 - Marine ecology (4); Topic 9 - Biodiversity and ecosystems (1)

OC-122 - (EEF2019-13843) - BOAT NOISE IMPACTS MATING BEHAVIOUR IN A VOCAL FISH

Manuel Vieira (Portugal)[1,2,3]; Paulo J. Fonseca (Portugal)[1,2,3]; Ana Zuazu (Portugal)[3]; Ana F. Lopes (Portugal)[4]; M. Clara P. Amorim (Portugal)[3,4]

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2 - cE3c - Centre for Ecology, Evolution and Environmental Changes;
3 - Faculdade de Ciências, Universidade de Lisboa, Portugal;
4 - MARE – Marine and Environmental Sciences Centre, ISPA-Instituto Universitário, Lisboa

Underwater man-made noise has been increasing during the last decades, altering soundscapes throughout most aquatic environments. In estuarine shallow waters one of the most prevalent sources of underwater noise are motorboats and ferries. In this study we compared the effect of boat noise and ambient noise playback on the calling activity of the Lusitanian toadfish males (*Halobatrachus didactylus*), a species that relies on advertisement calls for mate attraction.

Two sets of 12 concrete nests that toadfish males occupy spontaneously, were exposed for a fortnight to either control (playback of geophony soundscape sound) or playback of boat noise in the Tagus estuary (Portugal). Noise treatment mimicked the passage of 10 ferries and of 4 small boats per hour during 18 hours, similar to what fish experience in Tagus estuary. Each nest was passively acoustically monitored during the experimental period using an automatic recognition methodology based on the Hidden Markov Model to recognize Lusitanian toadfish vocalizations.

Although both playbacks had similar amplitude, we found that calling rate significantly decreased in males exposed to boat noise both during and outside the playback period.

These results suggest that exposure to anthropogenic noise may impact reproduction in vocal fish. Ongoing investigation is addressing how boat noise impacts reproductive success and the development of toadfish early-life stages

01/08 | 11h00
PARALLEL SESSION V - T9.P5 - BIODIVERSITY IN AGROECOSYSTEMS
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 10 - Land degradation and ecosystem restoration (1)

OC-123 - (EEF2019-13956) - AGRARIAN INTENSIFICATION REDUCES FOOD AVAILABILITY FOR A THREATENED SPECIES: THE DUPONT´S LARK CASE

Margarita Reverter (Spain)[1]; Julia Gómez-Catasús (Spain)[1]; Adrián Barrero (Spain)[1]; Juan Traba (Spain)[1,2]

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2 - Centro de Investigación en Biodiversidad y Cambio Global (CIBC-UAM)

We present results from two studies aiming to: i) estimate the effect of crops on the space use by Dupont´s lark; and ii) evaluate the effect of crops on habitat quality (food availability and vegetation structure) for the same species.

During all seasons of 2016 and 2017, bird censuses were carried out. We located four transects of 2 km length crossing preferred use areas for the species. Microhabitat sampling stations were located inside each crop, and at increasing distances from the edge (1, 10 and 50 m) (N = 28 sampling stations).

According to the first objective, the probability of finding a Dupont's lark territory increases with the distance to crops, reaching its maximum around 200 - 300 meters. Habitat quality alteration associated to agrarian intensification could help to explain the observed effects. Indeed, biomass of hypogeous arthropods significantly decreased when distance from crops was lower than 50 m. In addition, the intensity of space use by Dupont´s lark was positively related to the hypogeous arthropod biomass.

To sum up, these results suggest negative effects of crops on the species, which might be shaped both by the crop itself and by its effect on hypogeous arthropods abundance. These results also highlight the existence of a negative buffer of at least 10-50 m around cultivated areas, which have critical consequences on the optimal habitat available for the species.

01/08 | 11h00
PARALLEL SESSION V - T8.P1 - CONSERVING MARINE RESOURCES
Room 2.2.21 | Topic 8 - Marine ecology (4); Topic 9 - Biodiversity and ecosystems (1)

OC-124 - (EEF2019-13713) - DOES GRAZING AFFECT GROUND-FORAGING BIRDS IN MEDITERRANEAN AGROFORESTRY SYSTEMS?

Ana I Leal (Portugal)[1,2]; Marta Acácio (United Kingdom)[3]; Christoph Fj Meyer (United Kingdom)[4]; Ana. Rainho (Portugal)[1]; Jorge M Palmeirim (Portugal)[1]

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2 - Centro de Ecologia Aplicada "Professor Baeta Neves" (CEABN/ InBio), School of Agriculture, Universidade de Lisboa;
3 - School of Environmental Sciences, University of East Anglia, Norwich, UK;
4 - School of Environmental and Life Sciences, University of Salford, Manchester, UK

Our overall objective was to investigate how grazing affects wintering birds feeding on the ground in Mediterranean agroforestry systems, contributing to knowledge required for a science-based management of these valuable ecosystems.

We carried out an experiment in a wooded grassland in Portugal, whereby grazing was controlled in 12 purposely fenced two-hectare plots submitted to three different grazing regimes: no grazing, 3 sheep/ha, 15 sheep/ha. In all plots we quantified ground habitat features, food abundance and intensity of use by ground-foraging birds.

We found that almost all birds prefer to forage in patches with short ground vegetation and high food abundance. Measurements of these parameters showed that grazing shortens vegetation but decreases food availability, and thus has opposing effects on important determinants of habitat suitability. Bird responses to grazing were mediated by their foraging strategies. Species whose foraging style involves longer displacements on the ground benefited from grazing, presumably because they gain from reduction in vegetation clutter. Species with other strategies, did not respond, or were negatively affected by grazing.

Although birds can forage under a broad range of grazing levels, some showed clear preferences along the gradient of grazing intensity. In general, grazing should be maintained at low levels, but enough to increase the area occupied by patches of short vegetation in which birds prefer to forage. Thus, at moderate levels, grazing can be a valuable management tool to promote winter bird habitat quality in Mediterranean agroforestry systems, while increasing economic value of these threatened landscapes.

01/08 | 11h00
PARALLEL SESSION V - T9.P5 - BIODIVERSITY IN AGROECOSYSTEMS
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 10 - Land degradation and ecosystem restoration (1)

OC-125 - (EEF2019-13609) - BIODIVERSITY-MEDIATED BENEFITS FOR CROP PRODUCTION

Matteo Dainese (Italy)[1]; Emily A. Martin (Germany)[2]; Ingolf Steffan-Dewenter (Germany)[2]

1 - Eurac Research;
2 - University of Würzburg

Human land use threatens global biodiversity and compromises multiple ecosystem functions critical to food production. Whether crop yield-related ecosystem services can be maintained by few abundant species or rely on high richness remains unclear. Using a global database from from 1,475 fields around the world, we partition the relative importance of abundance and species richness for pollination, biological pest control and final yields in the context of on-going land-use change. Pollinator and enemy richness directly support ecosystem services independent of abundance. In addition, by quantifying landscape simplification as an increase in the area of cropland around the local fields - a fundamental indicator of human impact on land - we show that up to 50% of the negative effects of landscape simplification on ecosystem service is due to a loss of richness of service-providing organisms. We further demonstrate cascading effects of landscape simplification that lead to lower richness of service-providing organisms, and reduced crop production. Our results demonstrate the undesirable consequences of landscape simplification for the provision of ecosystem services, through its negative effects on biodiversity. Maintaining the biodiversity of ecosystem service providers is therefore vital to sustain the flow of key agroecosystem benefits to society.

01/08 | 11h00
PARALLEL SESSION V - T8.P1 - CONSERVING MARINE RESOURCES
Room 2.2.21 | Topic 8 - Marine ecology (4); Topic 9 - Biodiversity and ecosystems (1)

OC-126 - (EEF2019-13896) - ANTAGONISTIC EFFECTS OF HUMAN MANAGEMENT ON SPECIES AND TRAIT DIVERSITY OF MEDITERRANEAN ARABLE PLANT COMMUNITIES - IMPLICATIONS TO THEIR CONSERVATION

Ana Júlia Pereira (Portugal)[1]; Miguel Porto (Portugal)[2]; Adelaide Clemente (Portugal)[1]; Otília Correia (Portugal)[1]

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Human management plays a central role in the assembly of plant communities associated to Mediterranean agroecosystems, and often is considered a promoter of taxonomic diversity, but at the same time it moderates functional diversity. Regular disturbance by ploughing, for instance, enhances plant community diversity, but apparently constrains community trait diversity, which could in turn interfere with community dynamics, including dispersal and colonization abilities.

The objective of this work is to study the effects of human management on the species and trait diversity of plant communities associated to olive grove agroecosystems, in particular, the effect of ploughing, grazing and land abandonment. We hypothesized that ploughing drives seed trait convergence of plant communities, favoring species with limited dispersal abilities, yet, on the contrary, increasing species diversity.

Our study system comprises the olive groves on basic soils of Southern Portugal. Sampling plots were regularly laid out over a 600x600m grid. In each plot, 15 sampling units (1m2) were sampled and plant species were recorded. Functional traits related to dispersal and colonization abilities were measured or compiled.

We modelled the trait syndromes of plant communities as a function of management type, in order to test if human management is filtering out certain trait combinations. Then, we tested if species and trait differences between communities of different samples increased with spatial discontinuity between samples, and whether this effect differs among management types. Results are then discussed in the context of their implications to the long term conservation of these communities so dependent on human management.

01/08 | 11h00
PARALLEL SESSION V - T9.P5 - BIODIVERSITY IN AGROECOSYSTEMS
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 10 - Land degradation and ecosystem restoration (1)

OC-127 - (EEF2019-13748) - EFFECTS OF OLIVE FARM INTENSIFICATION ON PHYTOPHAGOUS INSECTS AND THEIR NATURAL ENEMIES

Sasha Vasconcelos (Portugal)[1,2,3]; Sílvia Pina (Portugal)[1,2]; Nereida Melguizo-Ruiz (Portugal)[1,4]; Sónia Ferreira (Portugal)[1]; Pedro Sousa (Portugal)[1]; Bruno Silva (Portugal)[1,4]; Gerardo Jiménez-Navarro (Portugal)[1,4]; Mattias Jonsson (Sweden)[3]; Ruben Heleno (Portugal)[5]; José Herrera (Portugal)[1,4]; Francisco Moreira (Portugal)[1,2]; Pedro Beja (Portugal)[1,2]

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5 - Centre for Functional Ecology, Department of Life Sciences, University of Coimbra, Calçada Martin de Freitas, Coimbra 3000-456, Portugal

Olive farms are progressively expanding in the Mediterranean region, and many have undergone a process of management intensification in recent years. Traditional farming systems involving little or no agrochemical input are rapidly giving way to intensive regimes with very high agrochemical application. However, in spite of this ongoing process of intensification, little is known of its consequences for biodiversity and associated ecosystem services, such as natural pest control. To address this issue, we compared the abundance of phytophagous insects and their arthropod natural enemies (predators and parasitoid wasps) across olive farms under different levels of management intensity, ranging from organic to superintensive regimes. Sampling was carried out in southern Portugal. Fifty-three sampling points within 34 olive farms were visited in Spring, Summer and Autumn 2017, and canopy arthropods were vacuum-sampled. Preliminary results revealed significant declines in the abundance of phytophagous insects and parasitoid wasps, whereas predator abundance did not vary across management regimes. Furthermore, farms with slow ripening and drought-tolerant olive varieties and greater amounts of herbaceous understory, typical of traditional systems, were associated with higher abundance of phytophages and lower abundance of predators.

01/08 | 11h00
PARALLEL SESSION V - T9.P6 - SEARCHING FOR VARIABLES AND MODELS
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (4); Topic 12 - Theoretical and evolutionary ecology (1)

OC-131 - (EEF2019-13828) - HARNESSING BIODIVERSITY DATA SOURCES TO INFORM ESSENTIAL BIODIVERSITY VARIABLES

Vânia Proença (Portugal)[1]; Laura Jane Martin (United States of America)[2]; Henrique Miguel Pereira (Germany)[3,5,6]; Miguel Fernandez (Germany)[3,4]; Louise Mcrae (United Kingdom)[7]; Jayne Belnap (United States of America)[8]; Monika Böhm (United Kingdom)[7]; Neil Brummitt (United Kingdom)[9]; Jaime García-Moreno (Netherlands)[10]; Richard D. Gregory (United Kingdom)[11]; João Pradinho Honrado (Portugal)[6,12]; Norbert Jürgens (Germany)[13]; Michael Opige (Uganda)[14]; Dirk S. Schmeller (Germany)[15,16]; Patrícia Tiago (Portugal)[17]; Chris A.M. Van Swaay (Netherlands)[18]

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4 - Instituto de Ecología, Universidad Mayor de San Andrés;
5 - Institute of Biology, Martin Luther University Halle-Wittenberg;
6 - CIBIO/InBIO - Rede de Investigação em Biodiversidade e Biologia Evolutiva;
7 - Institute of Zoology, Zoological Society of London;
8 - U. S. Geological Survey, Southwest Biological Science Center;
9 - Department of Life Sciences, Natural History Museum;
10 - ESiLi Consulting;
11 - RSPB Centre for Conservation Science;
12 - Faculdade de Ciências, Universidade do Porto;
13 - Biodiversity, Evolution and Ecology (BEE), Biocenter Klein Flottbek, University of Hamburg;
14 - Nature Uganda, The East Africa Natural History Society;
15 - Helmholtz Center for Environmental Research, UFZ, Department of Conservation Biology;
16 - ECOLAB, Université de Toulouse, UPS, INPT;
17 - Centre for Ecology, Evolution and Environmental Changes (CE3C), Faculdade de Ciências, Universidade de Lisboa;
18 - Dutch Butterfly Conservation

Essential Biodiversity Variables (EBV) are state variables that stand between primary observations (raw data) and indicators of biodiversity change. EBV datasets may combine primary observations from a single or multiple sources, thus promoting data integration and complementarity, and harnessing their use in biodiversity monitoring. Data sources can be grouped into four types: extensive and intensive monitoring schemes, ecological field studies and satellite remote sensing. However, because data sources differ in their geographic, temporal and spatial coverage, developing representative EBV datasets requires first an understanding of sources' features and potential biases, and second strategies to compensate for identified gaps. As an example, two subsets of the population abundance dataset informing a key indicator of global biodiversity, the Living Planet Index (LPI), are analyzed: terrestrial birds (4406 time series of 1025 species between 1900-2013) and terrestrial mammals (2229 time series of 438 species, between 1900-2014). Results show that long-term monitoring schemes are still scarce outside of Europe and North America, and mainly available for bird populations. Concurrently, short-term ecological field studies constitute an alternative and globally distributed source population abundance data. Moreover, ecological field studies deliver a great part of the available time series of mammal population abundance and are important to complement bird monitoring data. This example illustrates both the potential of EBV datasets for biodiversity data mobilization but also the need to enhance data accessibility and integration, through data harmonization and modeling efforts, and to establish new monitoring programs to address critical data gaps.

01/08 | 11h00
PARALLEL SESSION V - T9.P6 - SEARCHING FOR VARIABLES AND MODELS
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (4); Topic 12 - Theoretical and evolutionary ecology (1)

OC-128 - (EEF2019-13679) - ESTIMATING THE CONTRIBUTION OF THE ENVIRONMENT TO DETERMINING SPECIES AND DIVERSITY DISTRIBUTIONS

Duarte Viana (Germany)[1]; Alienor Jeliazkov (Germany)[1]; Petr Keil (Germany)[1]

1 - German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig

This study aimed at comparing the performance of different statistical methods to estimating the contribution of the environment to explaining variation in the occurrence and abundance of co-occurring species while accounting for spatial correlation. We compared the performance of four families of statistical methods – distance-based regression, constrained ordination, generalised linear models and tree-based machine learning. We first used a simple process-based simulation model of community assembly to generate data defined according to known processes, namely the strength of the niche and neutral processes. Then we applied the different statistical methods to infer multi-species-environment relationships (MSERs) and compared their performance in partitioning the environmental and spatial fractions of variation. Our results indicate that tree-based methods are in general the most reliable, namely random forest methods. The latter were able to recreate the true trends of the data, though considerable deviations were still observed. Although in general the remaining methods performed relatively worse, they can still be used under specific circumstances, in particular when sample sizes are large enough and the breadth of the environmental response of each species is not too narrow. While random forest can be universally used, generalised linear models and constrained ordination should be used when explicit biological hypotheses are to be tested, as long as the mentioned conditions apply. The use of a general and simple method will contribute towards comparable results across studies, spatial scales and regions.

01/08 | 11h00
PARALLEL SESSION V - T9.P5 - BIODIVERSITY IN AGROECOSYSTEMS
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 10 - Land degradation and ecosystem restoration (1)

OC-129 - (EEF2019-13691) - OPTIMIZING TROPHIC-BASED REWILDING IN EUROPE UNDER CLIMATE CHANGE: WHERE TO INTRODUCE WHICH SPECIES?

Diogo Alagador (Portugal)[1]; Miguel Bastos Araújo (Portugal)[1]; Miguel Bastos Araújo (Spain)[2]; Miguel Bastos Araújo (Denmark)[3]

1 - CIBIO, University Évora;
2 - National Museum of Natural Sciences, CSIC, Madrid;
3 - Center for Macroecology, Evolution and Climate, University of Copenhagen

In Europe, a new conservation narrative is emerging to help restore ecosystems and biodiversity with a reduced human management: rewilding. This is a strategy that uses species' introductions to restore top-down trophic cascades to promote self-regulating ecosystems. Rewilding recognizes that ecosystems change and therefore goals need to be defined in terms of trajectories rather than endpoints. Ongoing climate change brings higher dynamism and complexity to the control of these rewilding systems. Here we analyze the potential effectiveness of rewilding in Europe up to 2050, under climate change. We focus on predictions of suitable climatic regions for mammal and bird species, in particular within protected, low disturbed areas of distinct sizes (100, 500 and 1000km2). Based on a simplified trophic classification (apex-predators, medium-sized carnivores, large/medium-sized herbivores and engineering species) and distribution modelling, we obtained an overview of the trophic structure in those regions at current-time and 2050, under plausible climate change scenarios. The regions likely to present severe trophic reshuffling were highlighted. We used an optimization protocol to identify for those regions the species whose introduction or replenishment will best replicate trophic patterns at current-time. Our results showed that trophic turnover was most evident in northern regions, with high depletion rates of apex-predators and large-herbivores. In general, from the pool of 40 species considered, most introductions imply eight-to-ten species (depending of climate scenario) of different trophic classes. These results offer a contribution to European States to undertake effective rewilding at long-term to meet the UN Sustainability Goals 13.2, 15.1 and 15.5.

01/08 | 11h00
PARALLEL SESSION V - T9.P5 - BIODIVERSITY IN AGROECOSYSTEMS
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 10 - Land degradation and ecosystem restoration (1)

OC-130 - (EEF2019-13924) - SPECIES DISTRIBUTION MODELS HAVE GOOD SPATIAL TRANSFERABILITY: A GLOBAL OVERVIEW

Chunlong Liu (Germany)[1]; Christian Wolter (Germany)[1]; Jonathan Jeschke (Germany)[1]

1 - Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin, Germany

Assessing spatial transferability is a crucial premise of applying species distribution models (SDMs) to predict the pattern of biodiversity across time and space. Determining the transferability and exploring the responsible mechanisms is thus of great importance to predict the future species distribution in new ranges and under changing climates. Current researches on model transferability focus on different taxa, regions and model settings, without giving a consistent pattern. To fill this knowledge gap, we reviewed all studies assessing the spatial transferability of SDMs for alien species using the approach of both literature review and meta-analysis. We found most studies (> 87.6%) focus on terrestrial systems and SDMs calibrated in the native range have a good transferability in the introduced range, which is supported by both literature review (>80% species) and meta-analysis (significantly better than random projections). SDMs developed using ensemble and machine learning techniques have much higher transferability than Maxent, which is most widely used across studies. Three taxonomic groups with best transferability are all vertebrates (i.e. freshwater fish, mammal, and bird). The transferability is highest for species native in Europe, introduced globally and unintentionally. Our study demonstrates that SDMs are a useful tool to predict the potential distribution of alien species.

01/08 | 11h00
PARALLEL SESSION V - T9.P5 - BIODIVERSITY IN AGROECOSYSTEMS
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 10 - Land degradation and ecosystem restoration (1)

OC-255 - (EEF2019-13872) - 7 OUT OF 17, ATTENDING INVASIVE SPECIES, IS A GOOD WAY TO ACHIEVE THE ODS

Georgia Born-Schmidt (Mexico)[1]; Jordi Jordi Parpal Servole (Mexico)[1]; Viviana Reyes Gómez (Mexico)[2]

1 - United Nation Development Program (UNDP) – National Commission for the knowledge and use of Biodiversity (CONABIO),;
2 - National Commission for the knowledge and use of Biodiversity (CONABIO)

Invasive alien species (IAS) affect natural and managed ecosystem as well as animal and human health and infrastructure. However, the threat they pose is still underestimated, especially in conjunction with other drivers of change such as climate and land use change. Tackling the problem IAS pose contributes directly or indirectly to advances in a variety of the 17 Sustainable Development Goals (IDS), not just goal 14 and 15. Given the transversal nature of the problem, the involvement of government and private stakeholder is critical. Recognizing this the Mexican government is executing the multi-stakeholder project “Enhancing National Capacities to Manage Invasive Alien Species (IAS) by implementing the National Strategy on IAS”, under a GEF grant and implemented by UNDP since 2014. The project is carrying out actions at the national level as well as in 15 pilot sites. It is collaborating with 16 institutions - mostly governmental- but also NGOs and academia. The result is a rather remarkable cooperation of environmental sector agencies agriculture, aquaculture, and forestry agencies. A suite of other sectors is also involved. The project has been establishing a continuous dialog with the public and a wide range of stakeholders through several means of communication. To reduce the spread of IAS in Mexico the private sector, government and private stakeholder have to be onboard and need to understand the positive impact the actions will have on their businesses and well-being.

01/08 | 11h00
PARALLEL SESSION V - T12.P2 - DIVERSITY AND STRATEGICAL OUTCOMES
Room 2.4.16 | Topic 12 - Theoretical and evolutionary ecology (4)

OC-133 - (EEF2019-13690) - INTERACTIVE EFFECTS OF ACTIVITY AND TEMPERATURE ON ONTOGENETIC METABOLIC SCALING

Douglas Glazier (United States of America)[1]

1 - Juniata College

A common belief is that the body-mass scaling of metabolic rate is the result of intrinsic (physical) constraints related to body design. However, recently many studies have shown that extrinsic (ecological) factors significantly affect the slopes and elevations of metabolic scaling relationships, both within and among species. One of these factors is ambient temperature (*T*), but its influence on the intraspecific (ontogenetic) scaling slope (*b*) of metabolic rate varies widely. I tested whether the metabolic-level boundaries hypothesis (MLBH) explains some of this variation. The MLBH predicts that *b* should correlate negatively with *T* for resting metabolism, but show variable associations (from negative to positive) for metabolism measured during varying levels of locomotor activity. As predicted, sedentary species of ectothermic animals and plants mostly show negative associations between b and *T*, whereas mobile species exhibiting various levels of activity during metabolic measurements show varied associations. A similar difference occurs between teleost fish species exhibiting no activity versus varying levels of activity. These results show that intrinsic and extrinsic factors (e.g., activity and ambient temperature, respectively) can interactively affect metabolic scaling. Metabolic scaling is highly malleable, and not the simple result of universal physical constraints.

01/08 | 11h00
PARALLEL SESSION V - T9.P5 - BIODIVERSITY IN AGROECOSYSTEMS
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 10 - Land degradation and ecosystem restoration (1)

OC-134 - (EEF2019-13802) - THE END OF A LICHEN RELATIONSHIP: HOW THE MYCOBIONT SURVIVES WITHOUT THE PHOTOBIONT

Silvana Munzi (Portugal)[1]; Catarina Gouveia (Portugal)[1]; Cristina Cruz (Portugal)[1]

1 - Centre for Ecology, Evolution and Environmental Changes

Although lichens are one of the most famous examples of symbiosis, many authors tend to consider them as a form of controlled parasitism, mainly due to observation of parasitic behaviors of the mycobiont in re-synthesis experiments with incompatible algae. Moreover, saprophytism is a form for the mycobiont to supply carbon in case of insufficient production by the algal partner in nature. Accordingly, we hypothesized that facultative saprophytism in the mycobiont can be stimulated by the death of the photobiont: deprived of its carbon source, the fungus could survive for some time degrading the algal cells and feeding on them. In a laboratory experiment, the photobionts of *Xanthoria parietina* and *Parmotrema hypoleucinum* were either killed or inhibited through application of herbicide or incubation in the dark, respectively, to induce starvation in the fungus. Measures of vitality indexes in both the lichen partners and of extracellular enzymatic activity in the mycobiont did not indicate a shift to saprotrophic lifestyle in the lichen fungus after a month in the experimental conditions. However, our results showed a functional supply of degrading extracellular enzymes in the mycobionts of the two lichen species, each one with a unique profile. This suggests that, in certain conditions, parasitic/saprophytic modes of nutrition can be relevant for the sustenance of the mycobiont or even of the lichen association.

01/08 | 11h00
PARALLEL SESSION V - T12.P2 - DIVERSITY AND STRATEGICAL OUTCOMES
Room 2.4.16 | Topic 12 - Theoretical and evolutionary ecology (4)

OC-135 - (EEF2019-13919) - HOST AND HABITAT SPECIALIZATION OF AVIAN BLOOD PARASITES WITHIN AN OCEANIC ISLAND

Claire Loiseau (Portugal)[1]; Sandra Reis (Portugal)[1]; Rita Covas (Portugal)[1]; Claire Doutrelant (France)[2]; Martim Melo (Portugal)[1]

1 - CIBIO;
2 - CEFE-CNRS

Specialist and generalist strategies might be seen as extremes along a continuum. As an example, evolutionary relationships of avian blood parasites have revealed that several lineages of malaria exhibit extreme generalist host-parasitism strategies, other lineages appear to have been constrained to certain host species, while most of them present intermediate host specificity. Because oceanic islands present peculiar characteristics, such as a lower species diversity, they provide a simplification of many aspects of ecology. Here, we used an insular context (i) to investigate ecological and evolutionary factors that drive host specificity of avian blood parasites and (ii) to test the Taxon Cycle hypothesis described by Wilson EO, which correspond to sequential phases of expansion and contraction of the ranges of species. Widespread taxa (i.e. generalist species) should occupy lowland habitats, and contracting taxa (i.e. specialist species) should exhibit reduced ranges and occupied interior habitats. On São Tomé Island, we sampled avian hosts in open and closed plantations as well as pristine forest, from sea level to 1600m. We screened them for blood parasites and preliminary data suggest that the assembly of parasite communities in São Tomé Island matches the taxon cycle hypothesis: we found that generalist parasite lineages were the most successful island colonizers, and were the most prevalent lineages in the insular bird community. With time, divergence from the mainland relatives accumulates and leads to the evolution of island endemics, which are characterized by an increase in host specificity, becoming narrow specialists, which we found in our system.

01/08 | 11h00
PARALLEL SESSION V - T9.P5 - BIODIVERSITY IN AGROECOSYSTEMS
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 10 - Land degradation and ecosystem restoration (1)

OC-136 - (EEF2019-13943) - PRE-DISPERSAL SEED PREDATION AND REPRODUCTION STRATEGY AFFECT GENETIC DIVERSITY IN RANGE-EXPANDING TREE POPULATIONS

Violette Doublet (France)1; Lionel Roques (France)[1]; Etienne K Klein (France)[1]; François Lefèvre (France)[1]; Thomas Boivin (France)[1]

1 - Institut national de la recherche agronomique - INRA PACA Avignon

Ecological and evolutionary processes involved in population expansions are key drivers of the ability of organisms to colonize and persist in novel territories. Long-lived sessile organisms such as trees may be more exposed species facing such colonization and adaptation issues. The environmental factors affecting both reproductive and dispersal capacities, and more specifically biotic interactions, are acknowledged to have a strong influence on expansion success, but their demo-genetic implications in expanding tree populations remain an understudied body of theory.

Here, we contribute towards filling this gap using a theoretical approach based on a mathematical model, to describe the impact of pre-dispersal seed predators on the spatio-temporal evolution of genetic structure within tree expanding populations displaying highly variable (masting species) or consistent (non-masting species) interannual seed production.

Our theory shows that pre-dispersal seed predation induces an Allee effect at the front of expansion that enables the maintenance of a higher tree genetic diversity, as compared to a situation where the seed predators are absent. Interestingly, masting tends to buffer such seed predation-induced Allee effect, which results in lower overall genetic diversity in the expanding population than in the non-masting population. Furthermore, simulations also shows that these demo-genetic consequences of seed predation are enhanced by fat-tailed distributions of seed dispersal.

This theoretical approach provides novel insights on the effects of biotic interactions on tree population dynamics, calling specifically for more consideration of their demo-genetic implications in mechanistic and process-based approaches of expanding populations in broader contexts.

01/08 | 15h20
PARALLEL SESSION VI - T2.P4 - CONNECTING WITH PEOPLE
Room 2.2.12 | Topic 2 - Science communication (4)

OC-137 - (EEF2019-13597) - MONITORING AND MAPPING SOIL QUALITY THROUGH CITIZEN SCIENCE

Sofia Oliveira (Portugal)[1]; Joana Pereira (Portugal)[2]; Paulo Santos (Portugal)[1,3]; Ruth Pereira (Portugal)[1,3,4]

1 - CIIMAR - Interdisciplinary Centre of Marine and Environmental Research;
2 - CESAM - Centre for Environmental and Marine Studies, University of Aveiro;
3 - Faculty of Sciences - University of Porto; 4 - GreenUPorto - Sustainable Agrifood Production Research Centre

Despite its importance, most European citizens never heard about Natura 2000. Plus, ongoing management and monitoring efforts are insufficient to reach the targets of EU 2020 biodiversity strategy. The current research intended to assess whether citizen science can raise awareness about Natura 2000, while gathering relevant data on soil quality, which is an important factor when considering biodiversity and ecosystem services conservation. For that purpose, a citizen science protocol was prepared addressing soil quality and a questionnaire was developed to assess changes in participants regarding awareness, knowledge and attitudes towards Natura 2000 and biodiversity. The activity targets both the general public and schools (5th,6th and 8th grade). Briefly, participants are asked to perform simple tasks where they have to evaluate numerous physical, chemical and biological parameters. For instance, organic matter content is assessed through a simple colour chart and pH is determined with universal pH strips. At the end, the participants obtain a score that reflects the quality of the soil analysed. This allows participants to perceive the measures that may be needed to improve the quality of soils, while providing the authors relevant data to roughly identify and map degraded soils throughout the Portuguese territory. The next step in this research is to implement the activity and to assess its impact through pre and post-tests, which will take place during spring and early summer. The preliminary results will be presented at the conference. Ultimately, it is expected that this citizen science initiative can enhance the performance of Natura 2000.

01/08 | 15h20
PARALLEL SESSION VI - T2.P4 - CONNECTING WITH PEOPLE
Room 2.2.12 | Topic 2 - Science communication (4)

OC-138 - (EEF2019-13648) - EXPERIENCING ECOSYSTEM SERVICES

Johannes Rüdisser (Austria)[1]; Sarah Kerle (Austria)[1]; Ulrike Tappeiner (Austria)[1]

1 - Department of Ecology, University of Innsbruck

Ecosystem services describe goods and benefits humans receive from ecosystems. The science communication project *Experiencing Ecosystem Services*, aimed to communicate the concept behind ecosystem services in a comprehensive way to a broader public using simple interactive and experience-oriented methods and tools.

The project built upon the results of two former research projects on land use changes and related effects on ecosystem services in mountain regions and was executed by applying a participatory and iterative approach involving landscape ecologists engaged in ecosystem service research, stakeholder, and end user.

The educational walk was implemented in two complementary ways: as a stationary trail and as a guided tour. The stationary trail can be explored individually and interactively using a freely available audio guide for smartphones or a printed booklet. It includes 11 different stations dealing with landscape ecology in general, and relevant ecosystem services in the European Alps in specific. The guided tour is conducted by trained and instructed nature guides using a tool-kit specifically developed for this purpose and can be realized nearly everywhere in the cultural landscape of the European Alps.

The applied conceptual design to implement the world's first educational walk dealing with ecosystem services in the Alps (www.oekosystemleistung.org) allowed addressing and reaching very different target groups in an effective and cost saving way. Cooperation with a regional environmental education organisation, the tourism association, and the regional environmental authority of the state guarantees the sustainable and long lasting use of the developed materials and tours.

01/08 | 15h20
PARALLEL SESSION VI - T2.P4 - CONNECTING WITH PEOPLE
Room 2.2.12 | Topic 2 - Science communication (4)

OC-139 - (EEF2019-13950) - KIDS DIVE, DISCOVER THE OCEAN

Diana Vieira (Portugal)[1,2]; Tassiana Malzone (Portugal)[2]; Francisca Rodrigues (Portugal)[2]; Pedro Duarte-Coelho (Portugal)[1,2]; Frederico Almada (Portugal)[1,2]

1 - MARE - Marine Environmental Sciences Centre;
2 - ISPA - Instituto Universitário

Kids Dive is a 100% practical educational project on ocean literacy that targets 8 to 17 years old children. Each edition involves 60 students and includes four days of activities that can be extended with the deliverables that are shared with the student's teachers. This program is unique as it includes a diving experience that unveils a barrier represented by the surface of the sea, that does not allow us to look into the biodiversity and also the threats currently present in all marine ecosystems. The main difficulty organising Kids Dive was to bridge the gap between underwater activities and the workshops on "Marine biodiversity" and "Unplastify the sea" that are offered simultaneously. Among others, scubadiving activities highlight the fact that plastics are not perceived the same way when underwater and that pristine habitats are as important for marine organisms as forests are for terrestrial species. This educational program is complemented by a visit to a local marine protected area, a third day visiting a public aquarium and a final day attending the National Geographic Summit. A 5-10 minutes documentary is produced in each edition allowing the students to share their experience in their school. A pilot experience with 5 schools from the municipalities of Cascais and Sintra, provided very promising results with students applying to environmental awards and organising school summits. The efficiency of Kids Dive changing behaviours and engaging students in activities related to the protection of marine ecosystems and habitats should be evaluated in the future.

01/08 | 11h00
PARALLEL SESSION V - T9.P5 - BIODIVERSITY IN AGROECOSYSTEMS
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4); Topic 10 - Land degradation and ecosystem restoration (1)

OC-140 - (EEF2019-14090) - BREAKING THE WALLS: CIÊNCIA VIVA PROMOTES LEARNING OUTSIDE THE CLASSROOM

Gisela Gaio-Oliveira (Portugal)[1]

1 - Ciência Viva

Everybody has the right to access quality science education and to feel the joy of discovery, regardless their age, gender or socioeconomic status. Although we are living in an era of great scientific evolution, there is still many people that never had the opportunity to see by themselves how the scientific process is developed and how the knowledge is built, from just curiosity and a great will of discovery.

Science centres play a huge role in the democratization of scientific culture, building bridges between citizens and science, the scientific processes and scientists themselves. The cooperation with schools is therefore of great importance and science centres should work together with teachers to find strategies that promote students' contact with real contexts, making them recognize the importance of science and to understand how science is linked to their lives, and not limited to the classroom or school space or stuck inside the textbooks. Learning outside of the classroom stimulate students' motivation, critical thinking and creativity, at the same time that allows students to improve their learning skills, academic achievements and their attitudes towards the environment.

Since its creation in 1996, Ciência Viva, the Portuguese Agency for Scientific and Technological Culture, promotes public awareness of science and technology, focusing in science education (schools) and public awareness of science (citizens), throughout a national network of 20 interactive science centres, run in collaboration with universities and local authorities. In the last years, Ciência Viva is actively promoting learning outside the classroom, helping teachers from all school levels to take their students outside the classroom and to explore Botany, Zoology, Geology, among other scientific areas, in the schoolyards or in the surroundings of the schools.

In this way Ciência Viva intends to give an important contribute to promote learning in real-life, practical contexts, helping students to become more aware of the importance of biodiversity and environmental sustainability, which definitely contributes to increase their respect for the environment.

01/08 | 15h20
PARALLEL SESSION VI - T2.P4 - CONNECTING WITH PEOPLE
Room 2.2.12 | Topic 2 - Science communication (4)

OC-139 - (EEF2019-13950) - KIDS DIVE, DISCOVER THE OCEAN

Diana Vieira (Portugal)[1,2]; Tassiana Malzone (Portugal)[2]; Francisca Rodrigues (Portugal)[2]; Pedro Duarte-Coelho (Portugal)[1,2]; Frederico Almada (Portugal)[1,2]

1 - MARE - Marine Environmental Sciences Centre;
2 - ISPA - Instituto Universitário

Kids Dive is a 100% practical educational project on ocean literacy that targets 8 to 17 years old children. Each edition involves 60 students and includes four days of activities that can be extended with the deliverables that are shared with the student's teachers. This program is unique as it includes a diving experience that unveils a barrier represented by the surface of the sea, that does not allow us to look into the biodiversity and also the threats currently present in all marine ecosystems. The main difficulty organising Kids Dive was to bridge the gap between underwater activities and the workshops on "Marine biodiversity" and "Unplastify the sea" that are offered simultaneously. Among others, scubadiving activities highlight the fact that plastics are not perceived the same way when underwater and that pristine habitats are as important for marine organisms as forests are for terrestrial species. This educational program is complemented by a visit to a local marine protected area, a third day visiting a public aquarium and a final day attending the National Geographic Summit. A 5-10 minutes documentary is produced in each edition allowing the students to share their experience in their school. A pilot experience with 5 schools from the municipalities of Cascais and Sintra, provided very promising results with students applying to environmental awards and organising school summits. The efficiency of Kids Dive changing behaviours and engaging students in activities related to the protection of marine ecosystems and habitats should be evaluated in the future.

01/08 | 15h20
PARALLEL SESSION VI - T5.P2 - LIVING UNDER URBAN ENVIRONMENTAL STRESSORS
Room 2.2.14 | Topic 5 - Urban sustainability (4)

OC-141 - (EEF2019-13697) - HOW ENVIRONMENTAL STRESSORS AFFECT THE OZONE UPTAKE BY URBAN AND PERI-URBAN FORESTS IN THE METROPOLITAN CITY OF ROME.

Lina Fusaro (Italy)[1]; Simone Mereu (Italy)[2,3]; Elisabetta Salvatori (Italy)[1]; Elena Agliari (Italy)[4,5]; Silvano Fares (Italy)[6]; Fausto Manes (Italy)[1]

1 - Department of Environmental Biology, Sapienza University of Rome, P.le Aldo Moro, 5, 00185 Rome, Italy;
2 - Impacts on Agriculture, Forests and Natural Ecosystems (IAFES) Division, CMCC, Euro-Mediterranean Center on Climate Change, Sassari, Italy;
3 - Department of Science for Nature and Environmental Resources (DipNET), University of Sassari, Sassari, Italy;
4 - Department of Mathematics, Sapienza University of Rome, P.le Aldo Moro, 5, 00185 Rome, Italy;
5 - Istituto Nazionale di Alta Matematica (GNFM-INdAM), Rome, Italy;
6 - Council for Agricultural Research and Economics (CREA), Research Centre for Forestry and Wood, Viale Santa Margherita 80, 52100 Arezzo, Italy

An integrated approach was applied for quantifying how the efficiency of urban (UF) and peri-urban (PF) forests in ameliorating air quality through stomatal uptake of ozone (O3) is affected by stressors. Both forests are dominated by Quercus ilex L., chosen as target species for its large distribution in natural ecosystems and widespread use in urban contexts in the Mediterranean Basin.

Functional and structural traits were assessed through field campaigns and then used to parametrize a process-based model GOTILWA+, that was ran to derive canopy conductance (GC) and O3 fluxes (FO3). Fictitious simulations of Gc were ran for estimating how much of the differences in FO3 between the two forests are influenced by environmental stressors or management activities (irrigation practice). Fourier transform method was used to analyze how environmental conditions influence canopy transpiration.

The results highlighted that the inter-annual variation of gas exchanges are mostly linked to drought in PF, and related to high vapor pressure deficit and air temperature in UF. The main drivers of the performance in O3 uptake are the trend of O3 concentration, physiological response to environment conditions, stand structure as tree density and canopy features. The irrigation practice adopted in UF seems not be able to counteract the detrimental effects of urban heat island on GC that leads to a decrease of FO3 in spring months.

Considering the high demand for air quality improvement in our cities, a reliable estimate of O3 uptake could enhance the capability to manage and prioritize intervention on key green infrastructures.

01/08 | 15h20
PARALLEL SESSION VI - T5.P2 - LIVING UNDER URBAN ENVIRONMENTAL STRESSORS
Room 2.2.14 | Topic 5 - Urban sustainability (4)

OC-142 - (EEF2019-13718) - A STEP FORWARD TO PROVIDE UNIVERSAL MEASURES OF ENVIRONMENTAL QUALITY IN CITIES USING ECOLOGICAL INDICATORS

Natália Koch (Brazil)[1]; Pedro Pinho (Portugal)[2]; Paula Matos (Portugal)[2]; Cristina Branquinho (Portugal)[2]; Marcos Kitaura (Brazil)[1]; Thiago Barbosa (Brazil)[1]; Adriano Spielmann (Brazil)[1]

1 - Programa de Pós-Graduação em Biologia Vegetal, Universidade Federal de Mato Grosso do Sul;
2 - cE3c-Centre for Ecology, Evolution and Environmental Changes, Faculdade de Ciências da Universidade de Lisboa

Metrics of lichen diversity are widely used as ecological indicators for the effects of environmental changes. In cities, lichens are increasingly used to assess environmental quality, but each region of the world tends to use specific methods to measure lichen biodiversity. The question if different methods can provide the same results is critical to make the use of lichens universal. Thus, the objective of our work is to test the relationship between two methods: the Brazilian and the European. Both methods aim at measuring the abundance of species in tree trunks and calculate metrics of species richness and composition. This was tested in different areas of a city in the center-east Brazil. The same park trees were sampled, and the differences between the methods were tested through linear regression analyses – to compare lichen species richness; and non-parametric ordination (NMDS) and a multi-response permutation procedure (MRPP) – to compare species composition. A total of 62 lichen species were identified, with average lichen species richness per tree of 17 for the Brazilian Method and 15 for the European one. Per tree the species richness was very significantly correlated ($R2 = 0.89$; $P = 0.0001$), and so was species composition ($P = 0.0001$). The results suggest that both methods are comparable in relation to lichen species richness and composition. So, either method can be used to evaluate lichen communities in urban environments, and thus making lichens a more universal tool to measure environmental changes in cities, contributing to create more livable cities.

01/08 | 15h20
PARALLEL SESSION VI - T5.P2 - LIVING UNDER URBAN ENVIRONMENTAL STRESSORS
Room 2.2.14 | Topic 5 - Urban sustainability (4)

OC-172 - (EEF2019-13743) - NOVEL URBAN ECOSYSTEMS IN THE ANTHROPOCENE: OPPORTUNITIES TO URBAN SUSTAINABILITY.

Catarina Patoilo Teixeira (Portugal)[1]; Cláudia Oliveira Fernandes (Portugal)[1]

1 - CIBIO-InBIO, Research Center in Biodiversity and Genetic Resources, University of Porto, Department of Geosciences, Environment and Spatial Planning, School of Sciences of the University of Porto

Human-induced environmental changes have been irreversibly transforming ecosystems (directly through land use change and the introduction of species from other regions and indirectly through climate change and pollution), and even originating a new geological epoch: the Anthropocene. Consequently, unprecedented assemblages of species are emerging around the globe, forming Novel Ecosystems. The effects of the Anthropocene will negatively impact the green structure of cities that are indispensable for the quality of life and health of the population. Novel Ecosystems in cities (i.e. Novel Urban Ecosystems) have unique and unexpected abiotic and biotic conditions, raising concern among the scientific community but also creating opportunities for future research.

A literature review was conducted to understand Novel Ecosystems and to identify gaps in current knowledge about the concept, and to suggest future research opportunities regarding urban adaptation to climate change. A literature search using the keyword “Novel Ecosystems” collected a group of references (journal articles and books), that were classified and analyzed according to the scope of this review.

Results revealed that this concept is recent, yet over the last 20 years research has collected relevant findings. Novel combinations of species are already surviving and thriving in the harsh conditions of cities, which suggests that they may be pre-adapted to current and future urban climates, offering models for urban adaptation to climate change. This way, knowledge gathered in this review allowed to reflect on the role that NUE will likely play promoting solutions to sustainable and resilient urban environments.

01/08 | 15h20
PARALLEL SESSION VI - T7.P4 - ADAPTING TO DROUGHT
Room 2.4.16 | Topic 7 - Climate and global changes (5)

OC-145 - (EEF2019-13610) - FOREST DYNAMICS AFTER DROUGHT-INDUCED MORTALITY WORLDWIDE

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Drought-induced forest mortality has been recently documented worldwide in all biomes and affecting different plant types. This phenomenon is relevant since drought events are forecasted to increase in frequency and intensity as a consequence of global climate change. But there is scarce knowledge on the consequences of forest mortality events, which are largely due to changes in dominant species. Through a collaborative initiative we assess the patterns of short-term species replacement in temperate forests worldwide (N = 131 sites) in relation to: species features, the site bioclimatic characteristics, and past management and disturbance legacies. Self-replacement occurred in ~45% of cases, being dominant in only ~30% of cases. In contrast, no replacement by woody vegetation - suggesting a forest collapse - was observed in ~10% of the sites. Self-replacement occurred across the whole considered bioclimatic range and was higher in forests dominated by resprouting species. Mesic forests generally shifted towards more xeric communities, with replacing tree and shrub species living in drier conditions. Shifts towards more mesic communities occurred through multiple pathways, including successional trajectories. Past management and biotic interactions influenced replacement patterns, since shrubs tended to replace trees under high management intensity and when fungi and other pathogens acted as co-driver of tree mortality. Self-replacement also diminished with past burning and thinning activities but was not significantly determined by biotic disturbances. This global-scale study reveals current patterns of forest dynamics driven by mortality events, in which short-term changes in composition are envisaged, largely associated to past legacies and species availability.

01/08 | 15h20
PARALLEL SESSION VI - T5.P2 - LIVING UNDER URBAN ENVIRONMENTAL STRESSORS
Room 2.2.14 | Topic 5 - Urban sustainability (4)

OC-146 - (EEF2019-13703) - IN A MEDITERRANEAN ECOSYSTEM DROUGHT SEVERELY CONSTRAINS GROWTH BY REDUCING GROWING SEASON LENGTH BUT NITROGEN RESORPTION EFFICIENCY INCREASES

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Mediterranean ecosystems are hotspots for climate change, as the highest impacts are forecasted for the Mediterranean region, mainly by more frequent and intense severe droughts. Plant phenology is a good indicator of species' responses to climate change. We compared spring phenology of cork oak trees (Quercus suber), an evergreen species, over two contrasting years, including the most severe drought (2005) since records exist. We evaluated the timing, duration, and intensity of vegetative phenophases in spring (budburst, shoot and trunk growth, and leaf senescence) and assessed the nitrogen resorption efficiency (NRE) from senescent to green leaves. The temperature was the main driver for budburst. Nevertheless, water had a main role constraining all the other phenophases, by strongly reducing the growing season length (-48 %) and consequently tree growth. Basal area increment was the most affected growth variable (-36 %). Shoot elongation was also reduced (-21 %). Nitrogen concentrations in green and senescent leaves were affected by drought and NRE increased remarkably (+22%). Our results highlight the importance of studying different phenological metrics to improve our understanding of ecosystems responses to climate change. Water availability was the main driver of spring growth in this Mediterranean ecosystem. A higher NRE in response to drought appears to be an adaptive trait that mitigates the limitation in nitrogen uptake during drought and contributes to improve tree fitness in the short-term, but will probably exert a negative feedback on the nitrogen cycle in the long-term which might affect the ecosystem functioning under the forecasted droughts.

01/08 | 15h20
PARALLEL SESSION VI - T7.P4 - ADAPTING TO DROUGHT
Room 2.4.16 | Topic 7 - Climate and global changes (5)

OC-147 - (EEF2019-13867) - RESISTANCE AND RESILIENCE RESPONSES OF TWO CO-EXISTING RIPARIAN TREE SPECIES TO RECURRENT DROUGHT EVENTS IN SOUTHERN EUROPE

Inês Marques (Portugal)[1]; Filipe Campelo (Portugal)[2]; Rui Rivaes (Portugal)[1]; António Albuquerque (Portugal)[1,3]; Maria Teresa Ferreira (Portugal)[1]; Patrícia Maria Rodríguez-González (Portugal)[1]

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3 - Ecofield, Monitorizações, Estudos e Projectos, LDA, Carcavelos, Portugal

Changes in rainfall seasonality and increase in drought events frequency in the Mediterranean region are climate change consequences that can alter vegetation physiological responses and adaptive capacity. Mediterranean riparian ecosystems are of special concern due to their ecological importance and sensitivity to environmental disturbances. This has motivated the study of riparian vegetation growth responses to past environmental disturbances, which can help predict vegetation dynamics in projected climate change scenarios. This study intends to compare resistance and resilience growth responses to drought events between two riparian tree species with distinct ecological preferences.

Growth patterns of Alnus glutinosa and *Fraxinus angustifolia* in a Southern Portuguese river basin were analyzed and their responses to recurrent severe and extreme droughts was evaluated. Resistance and resilience were calculated from radial growth and correlated with local (discharge) and regional environmental conditions (rainfall, minimum temperature and Standardized Precipitation Evapotranspiration Index). An analysis of variance was performed between species for all drought events.

Species ecological preferences shaped the importance of local and regional conditions to resistance and resilience. Overall, regional conditions influenced more resistance for both species whilst, resilience was more related with local conditions for *A. glutinosa* and to regional for *F. angustifolia*. Distinct growth responses were visible by species for less severe drought events and common responses of resistance and resilience were observed for the extreme drought event.

Further research should be performed regarding the genotypic and phenotypic traits connected to resistance and resilience in stressful environmental conditions.

01/08 | 15h20
PARALLEL SESSION VI - T5.P2 - LIVING UNDER URBAN ENVIRONMENTAL STRESSORS
Room 2.2.14 | Topic 5 - Urban sustainability (4)

OC-148 - (EEF2019-13699) - FUNCTIONING AND RESILIENCE OF MEDITERRANEAN CORK OAK ECOSYSTEMS UNDER RECURRENT EXTREME DROUGHTS AND PLANT INVASION

Simon Haberstroh (Germany)[1]; Raquel Lobo-Do-Vale (Portugal)[2]; Maria C. Caldeira (Portugal)[2]; Maren Dubbert (Germany)[1]; Christiane Werner (Germany)[1]

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With our study, we aim to gain a comprehensive knowledge of the underlying mechanisms of recurrent extreme droughts, shrub invasion and their cumulative effects in a Mediterranean ecosystem. To this end, an open savannah-type cork oak (*Quercus suber*) ecosystem invaded by the native shrub *Cistus ladanifer* was chosen in Portugal. We installed rainout shelter (30 %) in an uninvaded and invaded cork-oak stand, supplemented by control plots, in December 2017. Measurements of water and carbon fluxes of trees (n = 36), shrubs (n = 18) and the ecosystem in total will allow to unravel species-specific responses and competition effects under recurrent extreme droughts. We aim to determine the stress tolerance and critical thresholds of physiological functioning for both species as well as for the entire ecosystem.

The first year of measurements was dominated by a wet and cold spring, which was followed by a drought period from July to October. Due to the heavy spring rainfall, no significant effects could be observed between treatments. However, a species-specific behaviour was evident. Pre-dawn leaf water potentials (ΨPD) of *C. ladanifer* decreased from -0.57±0.03 MPa to -3.46±0.05 MPa in the drought period. On the other hand, ΨPD of Q. suber did not fall below -1.48±0.06 MPa in any treatment. Ecosystem transpiration was clearly dominated by shrubs with maximum sap flow rates (8.8 ± 0.8 m^3 m-2 day-1) over three-fold higher than those of trees. These differences clearly point towards two distinctly different drought adaptation strategies of the investigated species.

01/08 | 15h20
PARALLEL SESSION VI - T7.P4 - ADAPTING TO DROUGHT
Room 2.4.16 | Topic 7 - Climate and global changes (5)

OC-149 - (EEF2019-13769) - ASSESSING THE IMPORTANCE OF A PROLONGED DRY SEASON AND NITROGEN DEPOSITION ON MEDITERRANEAN GRASSLAND FUNCTIONING.

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3 - Centre for Applied Ecology "Prof. Baeta Neves" (CEABN-InBIO), School of Agriculture, University of Lisbon, Lisbon, Portugal

Mediterranean annual grasslands host high biodiversity values and provide important ecosystem services. In these ecosystems, first autumn rains regulate the onset of germination and of ecosystem processes as CO2 and water fluxes. Climate change scenarios project altered precipitation patterns, such as prolonged dry season into the autumn, while simultaneously nitrogen (N) deposition is increasing globally. However, how these drivers will interact to affect Mediterranean grassland productivity, diversity, phenology or CO2 and water fluxes is still unclear.

Using a greenhouse experiment, we subjected the seedbank of an annual Mediterranean grassland to three levels of delay in first autumn rains: 0 days (i.e. no delay), 50 days and 100 days crossed with two levels of N deposition: no N and N addition.

At the peak of the growing season, drought treatments affected negatively productivity, through a reduction of the growing season duration and accumulated growing degree days. The timing of autumn rains had a large impact on vegetation composition, with relative abundance forbs, the dominant functional group in our grasslands, being negatively affected by the drought treatments. Drought delayed phenological maturity of our grassland community, decreasing significantly the number of individuals with mature flowers and with fruits or seeds. N addition did not affect grassland productivity, diversity or phenology. However, N addition attenuated the negative of the effects of a delayed onset of the rain season on NEE, Reco and GPP.

Our results anticipate important effects of interacting global change drivers on Mediterranean grassland functioning.

01/08 | 15h20
PARALLEL SESSION VI - T9.P7 - AN OVERVIEW OF ECOSYSTEM SERVICES
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-150 - (EEF2019-13973) - PLANT BIODIVERSITY REGULATION OF THE MICROCLIMATE IN WEST AFRICAN SAVANNAS

Nicholas Moret (Germany)[1]; Christian Borgemeister (Germany)[1]; Jan Henning Sommer (Germany)[1]; Maximilian Weigend (Germany)[2]

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2 - Nees Institut for biodiversity of plants, University of Bonn

Climate is a major determinant of the vegetation composing an ecosystem. However, at a local level the vegetation can in turn affect the microclimate, creating a local feedback loop. Global climate change may threaten biodiversity and affect its ability to regulate the microclimate, undermining this often under-studied ecosystem function. This work aims at understanding these vegetation effects on the microclimate in the West African savanna, and in particular identifying which aspect of the vegetation (species richness, biodiversity, community composition, or green cover/biomass) is most correlated with a microclimate regulation effect.

We measured the variations of the microclimate (temperature and relative humidity) on various savanna sites in Burkina Faso, ranging from open shrub savanna to covered gallery forests. The 28 observation sites, which form a gradient of disturbance intensity: Nazinga (national reserve) – Bontioli (regional reserve) – Dano (rural area), were monitored from 2014 to 2017.

The analysis of the variations of the microclimate shows that higher biodiversity generates a buffering effect, decreasing the speed of temperature and humidity variations and reducing their diurnal range. On the other hand, green cover and biomass have an amplifying effect: accelerating temperature and humidity variation and increasing the diurnal range. These results are corroborated by the negative correlation between biodiversity indices and green cover/biomass in the observed sites. This underline the importance of plant diversity in the savanna ecosystem equilibrium which is, in West Africa, under pressure from climate change and deforestation for agricultural purposes.

01/08 | 15h20
PARALLEL SESSION VI - T9.P7 - AN OVERVIEW OF ECOSYSTEM SERVICES
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-151 - (EEF2019-13949) - WILL SECONDARY FORESTS SUSTAIN ECOSYSTEM SERVICES IN THE BRAZILIAN AMAZON? BIODIVERSITY AND ECOSYSTEM FUNCTIONING IN NOVEL LANDSCAPES USING DUNG BEETLES

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2 - University of Taquari Valley - Univates; 3 - University of Trás-os-Montes e Alto Douro

Ongoing agricultural expansion in the Brazilian Amazon is creating novel landscapes, dominated by anthropogenic ecosystems, predicted to influence its exceptional biodiversity and ecosystems services delivery. In the present study, the functional diversity of dung beetles (Scarabaeidae, Scarabaeinae) was monitored within an ecosystem disturbance gradient, including diverse types of primary forests, secondary forests, agriculture and pastures. Functional diversity presented a decreasing trend in line with increasing disturbance. Dung beetles were smaller in pastures and agriculture and dominated by non-specialized traits. Additionally pristine ecosystems included unique traits, namely tunnelers and forest mammals' specialists. Dung beetles functional diversity change was unswervingly linked with ecological (e.g. diversity of plants species, diversity mammal species, decomposition rates, among others) and environmental conditions (e.g. temperature, humidity, wind speed) and could be associated with each ecosystem. The obtained results confirm the possibility of using the functional diversity of dung beetles to assess the ecological status of ecosystems in the Brazilian Amazon. We highlight the indication of recovery of biodiversity and ecosystem services in secondary forests with 15 years or more after disturbance. This finding demonstrates the importance of maintaining and/or creating a network of patches of secondary forests in the novel landscapes of the Brazilian Amazon for biodiversity conservation and ecosystem services delivery.

01/08 | 15h20
PARALLEL SESSION VI - T9.P7 - AN OVERVIEW OF ECOSYSTEM SERVICES
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-152 - (EEF2019-13749) - UNGULATES AFFECT ECOSYSTEM FUNCTIONING AND MEDIATE TRADE-OFFS BETWEEN BIODIVERSITY AND ECOSYSTEM SERVICES IN MEDITERRANEAN OAK WOODLANDS

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2 - Forest Research Centre, School of Agriculture, University of Lisbon;
3 - Fore

Ungulate herbivores are expanding in numbers and geographical range. By consuming plant biomass, ungulate herbivores modify plant species composition and may negatively affect tree regeneration. Through effects on vegetation, ungulate herbivores affect biodiversity, ecosystem functioning and may mediate ecosystem services trade-offs. Here we describe a long-term (over 14 years) browsing and grazing exclusion experiment assessing the effects of wildungulates (red deer Cervus elaphus and fallow deer Dama dama) on plant diversity, ecosystem functioning and ecosystem services in Mediterranean oak woodlands.

We established five blocks of paired fenced (deer exclusion) and unfenced plots (25m x 25m each) in an evergreen oak woodland of southern Portugal, where red and fallow deer occur. we measured grassland diversity periodically (pin-point quadrat method), shrub biomass (destructive sampling and phytovolume estimates) and litter decomposition (litter bag approach) in fenced and unfenced plots.

Deer halted shrub encroachment into the ecosystem and, through reduction of the competitive shrub cover, increased diversity of the grassland understory. Through changes in plant species composition deer also induced increased soil moisture and temperature which accelerated rates of litter decomposition and nutrient cycling. Additionally, by reducing shrub cover, deer decreased the aboveground carbon stocks but also the probabibilityof severe wildfires to occur.

By preventing severe wildfires, deer enhances adult oak survival and may benefit long-term carbon storage. Ecosystem management decisions, including those related to ungulate ecology and management should consider potential effects of ungulates on biodiversity and ecosystem services trade-offs.

01/08 | 15h20
PARALLEL SESSION VI - T9.P7 - AN OVERVIEW OF ECOSYSTEM SERVICES
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-153 - (EEF2019-13951) - ANT-MEDIATED ECOSYSTEM SERVICES AND DISSERVICES IN INVADED HABITATS

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The total number of ants on Earth has been estimated at 10 quadrillion. By altering soil composition, influencing crop productivity, accounting for pollination, seed dispersal and pest and disease control, Formicidae are major players in shaping ecological communities and ecosystems. Ants are involved in all types of ecosystem services (ES), howeverecosystem disservices (EDS), the outcomes of which lead to biodiversity loss, decrease of the ecosystem resilience and/or stability, can also be generated. In invaded habitats, ants quickly integrate new food webs comprising alien species. A study was conducted in a wooded ecosystem located in the Peninsula of Setúbal, bearing native and exotic flora species, which was partially invaded by six different species of Australian acacias. The main objective of the study was to record interactions taking place between native ants and the alien acacias by quantifying relevant spatial and temporal parameters related to seed dispersal. Ant species richness and eveness were found to be higher in non-invaded habitats than in invaded ones. Most of the interactions observed between ants and acacias should be considered mutualistic, since several ant species translocated acacia seeds to their nests over considerable distances. One species, considered as typically scavenger, apparently removed the aril underground and afterwards discarded the seeds without the elaiosome. It was concluded that native ant species acted as dispersers of the Australian acacias and constituted seed banks of the alien invasor, clearly originating visible, to some extent quantifiable, disservices to this wooded ecosystem.

01/08 | 15h20
PARALLEL SESSION VI - T9.P7 - AN OVERVIEW OF ECOSYSTEM SERVICES
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-154 - (EEF2019-13886) - GEOCACHING: ASSESSING CULTURAL ECOSYSTEM SERVICES THROUGH CROWDSOURCING DATA

Inês Teixeira Do Rosário (Portugal)[1]; Rui Rebelo (Portugal)[1]; Paulo Cardoso (Portugal)[2]; Pedro Segurado (Portugal)[3]; Ricardo Nogueira Mendes (Portugal)[4]; Margarida Santos-Reis (Portugal)[1]

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Geocaching, an outdoor game that uses Global Positioning System (GPS) enabled devices to find hidden containers (geocaches) in certain locations, has been seldom used as a data source to assess Cultural Ecosystem Services (CES). However, contrary to other crowdsourcing databases, geocaching allows to associate particular experiences and sentiment perceptions to accurate locations. Furthermore, databases generated by geocachers provide an ideal case to compare revealed preferences (the frequency of visits to a specific geocache) with stated preferences (a posteriori evaluation of each location). We tested the relevance of geocaching databases as CES indicators using a large dataset of geocaches spread across continental Portugal, over eight land-use classes. We found that site visitation frequency was related with its availability, showing no revealed preference towards any land use. However, site evaluations by geocachers, measured either through the number of words describing the experience, the number of photos taken, or the number of votes for “favourite geocaches”, showed marked differences in their stated preferences, with higher appreciation for open land uses in general, and montado in particular, especially when compared to other forested landscapes. Sentiment analysis preformed on the texts written by geocachers revealed their feelings throughout the different landscapes. Our results exposed the potential for using geocaching as a CES indicator.

01/08 | 15h20
PARALLEL SESSION VI - T9.P8 - CONNECTING LANDSCAPE AND ECOLOGY
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-155 - (EEF2019-13857) - RECONNECTING WILDER LANDSCAPES IN EUROPE

Néstor Fernández (Germany)[1]; Aurora Torres (Germany)[1]; Laetitia M. Navarro (Germany)[1]; Andrea Perino (Germany)[1]; Henrique M. Pereira (Germany)[1]

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The escalating and widespread impacts of human activities on biodiversity and ecosystems challenges the effectiveness of the conservation policies currently implemented, thus calling for the adoption of more ambitious approaches for large-scale biodiversity protection and restoration. Rewilding is emerging in recent years as an audacious conservation proposition that pursues the recovery of self-sustained ecosystems while tapping into opportunities for reconciling nature restoration in socio-ecological systems. Rewilding focuses on the recovery of trophic interactions, natural disturbance dynamics and ecological connectivity as three key components determining the ecological integrity of ecosystems. Building on this process-oriented definition of rewilding we will present a novel assessment of the ecological integrity of European landscapes and analyse opportunities for restoring ecological processes while reconnecting landscapes with high biodiversity value. We mapped biodiversity degradation and the degree of human control on ecosystem processes across Europe by combining different indicators of trophic downgrading, landscape fragmentation, and the human control of natural disturbance regimes. The results were used to identify possible configurations of connected networks of priority areas for rewilding that also consider European and global conservation goals and integrate expert opinion from conservation organizations. Ultimately, we will a European map of rewilding potential in support of Aichi target 15, SDG 15 and the European green and blue infrastructure goals. Furthermore, the framework presented here will accommodate conservation objectives at multiple spatial scales and across a broad “wildness” gradient determined by different socio-ecological contexts.

01/08 | 15h20
PARALLEL SESSION VI - T9.P8 - CONNECTING LANDSCAPE AND ECOLOGY
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-156 - (EEF2019-13854) - THE RELATIVE CONTRIBUTION OF LOCAL AND REGIONAL FACTORS SHAPING COASTAL DUNE PLANT COMMUNITIES

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The aim of this research was to study the relative contribution of regional and local factors shaping coastal dune plant communities. Coastal dune vegetation is exposed to harsh environmental factors that filter the community, being a unique ecological model to conduct studies along climatic gradients and to understand the importance of local environmental factors to the community composition structure. We sampled the perennial vascular plants and soil characteristics in secondary dune of 33 sites along the Atlantic Coast of the Iberian Peninsula, in transects parallels to the coastline.We also considered a set of climatic, micro-topographical, soil, land use cover and disturbance variables, acting at different scales. The geographical structure of the species composition were described using ordination analysis, and then the relative contribution of the most important abiotic factors driving plant communities were assessed.Community structure´s variation were modeled and characterized in relation with the most important environmental drivers. We found that local factors as soil and topographical characteristics like elevation and distance to sea are more important than climatic gradients to shape coastal dune plant communities.The results also show that decreasing aridity implied an increase in species richness, but only in arid sites where water is considered a limited resource.Even distributed along a wide climatic gradient, coastal dune plant communities are more responsive to local factors, mainly related with soil nutrient deficiency or high salinity levels. Our findings highlight the importance of environmental filters for the local communities´ assembly.

01/08 | 15h20
PARALLEL SESSION VI - T9.P8 - CONNECTING LANDSCAPE AND ECOLOGY
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-157 - (EEF2019-13726) - SCIENTIFIC BASE OF SELECTED LANDSCAPE-ECOLOGICAL MAIN-STREAM THEMES

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The changes in our environment reached an extent that they became a character of notorious social and political themes, although they have nature-scientific base,. This development influenced also the governance of the science. These themes became also main-stream, as well as fashionable research fields, with corresponding moral, political and financial support. To these main-stream themes surely belong the climatic changes and ecosystem services, which became also key-words for many applications for research support. The presented paper deals with the landscape-ecological scientific background of these themes. The study of both phenomenon is based on the exploration of the properties and processes in the landscape as an integrated system, so the base scientific approach for the research work of both should be the same – namely the complex research of geosystem, and, as second step, the applied interpretation of gained results towards the core of the themes. The problem resides in the question what is the ability of scientific institutions and teams to deal with these themes with scientific profoundness, and, which aspects may sidle out of scientific criteria, taking into account intensive public order and high expectations.

01/08 | 15h20
PARALLEL SESSION VI - T9.P8 - CONNECTING LANDSCAPE AND ECOLOGY
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-158 - (EEF2019-13688) - STARTING TO ACCOUNT FOR PHYLOGENY IN THE NUMERICAL CLASSIFICATION OF VEGETATION. A CASE-STUDY ON THE WOODY FORMATIONS OF MACARONESIA

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Objectives: Answer: 1) can co-occurrence and phylogenetic resemblance among taxa be simultaneously integrated into a composite numerical framework so that ecological classification expresses both? 2) Specifically, how accounting for phylogenetic similarity, among vicariant *taxa*, comes to ameliorate vegetation classifications? 3) Is Macaronesia's woody vegetation a good paradigm to trial phylogenetic-informed classification?

Location: The whole of Macaronesia: the Azores, Madeira, Canaries and Cape Verde archipelagos.

Methods: I used alongside both i) co-occurrence-only and ii) phylogenetic Bray-Curtis similarity indexes to feed classification algorithms: Ward´s agglomerative clustering and isopam divisive classification. Phylogenetic distance for ii) is cophenetic distance among taxa, expressed as divergence time, from a phylogenetic tree. The tree was obtained by grafting subtrees from DNA sequence alignments of Rcbl, ITS, and MatK, into a megaphylogeny.

Results: In the partitioning of similarity co-occurrence vs. phylogeny, the latter dominates. Comparative differences in final classification issue, viz. in inter- and intra-group structure. As groups in both classifications may be equated to zonal vegetation, alternative arrangements of such appear. In general, zonal vegetation classes are specific to each archipelago if accounting for co-occurrence-only. Conversely, larger units spanning several archipelagos appear when phylogeny is simultaneously accounted for.

Conclusions: I emphasize the need to incorporate phylogeny in the definition of formal vegetation units. Community-level classification now expresses balanced phylogeny and co-occurrence. On the other hand, high-rank units express vegetation synvicariance equating to biogeographical units (*phytochoria*).

01/08 | 15h20
PARALLEL SESSION VI - T9.P8 - CONNECTING LANDSCAPE AND ECOLOGY
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-159 - (EEF2019-13777) - OPEN-ACCESS SATELLITE IMAGERY AND SPECIES OCCURRENCE DATA TO DESCRIBE BIRD DIVERSITY PATTERNS IN MEDITERRANEAN RURAL LANDSCAPES

Inês Ribeiro (Portugal)[1]; Pere Serra (Spain)[2]; Jorge Palma (Portugal)[1]; Cristina Domingo-Marimon (Spain)[3]; Xavier Pons (Spain)[2]; Tiago Domingos (Portugal)[1]; Vânia Proença (Portugal)[1]

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3 - Grumets Research Group, CREAF, Universitat Autònoma de Barcelona

In a time of fast environmental change, the assessment of biodiversity response at simultaneously fine spatial resolutions and large spatial extents is needed but limited by operational trade-offs and costs, thus calling for the development of cost-effective and expedite approaches. Open-access data may contribute towards that goal. We test the use of NDVI texture variables, derived from Landsat images, and species occurrence data, assembled from GBIF, to investigate the relative importance of variables of habitat extent and structure as indicators of bird community richness and dissimilarity in the Alentejo region (Portugal). After controlling for data quality, our dataset of bird occurrences included data from 78 species (7858 observations) in 40 landscape-sized cells. We used generalized linear models and generalized dissimilarity models to investigate the patterns of species richness and community dissimilarity. Results show that, at the landscape scale, forest bird richness is better indicated by the availability of tree cover, in the overall landscape, than by the extent or structure of the forest habitats. Open-land birds also respond more to landscape structure, namely to the spatial grain and to the presence of perennial elements. Moreover, structure variables were more important than climate variables or geographic distance to explain community dissimilarity patterns at the regional scale. Overall, summer imagery, when perennial vegetation is more discernible, is particularly suited to measure vegetation structure, while spring imagery appears to be useful to monitor vegetation within open-land habitats. Finally, this study illustrates the potential of open-access data to inform large scale biodiversity monitoring.

01/08 | 15h20
PARALLEL SESSION VI - T10.P2 - SETTING THE FIRST STEPS
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (3)

OC-160 - (EEF2019-13588) - ALLELOPATHIC EFFECTS OF AQUEOUS EXTRACT OF LANTANA CAMARA L. ON SEED GERMINATION OF AFZELIA QUANZENSIS

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Lantana camara, a potentially invasive plant, is one of the most toxic weeds in the world. The leaf, seed and root extracts release allelochemicals, mainly aromatic alkaloids and phenolic compounds, which can interfere with seed germination and the growth of native species, threatening biodiversity. No previous studies have been done on seed germination of Afzelia quanzensis, an important woody specie with high commercial value occurring naturally at Maputo Special Reserve in Mozambique, which is used for building, making plywood and furniture, and also to improve soil fertilization in agro-forest practices. This study is aimed at evaluating the allelopathic potential of L. Camara leaves in the germination of A. quanzensis. For that, seeds of A. quanzensis where placed in petri dishes and were irrigated with different concentrations of aqueous extracts of L. camara leaf at 25%, 50%, 75% and 100%. The leaf aqueous extract of L. camara showed significant inhibitory activity on the percentage and velocity of seed germination of A. quanzensis. The percentage and velocity of seed germination decreased with an increase in the concentration of aqueous leaf extracts. The maximum and minimum inhibitory values were obtained in 100% and 10% extract concentrations respectively. The mean time of germination was only affected negatively when 100% of extract was used. The results indicate that aqueous leaf extracts of L. camara exert an allelopathic effect on the A. quanzensis native species of the Maputo Special Reserve, making them a factor to be considered when studying the regeneration of vegetation in these areas.

01/08 | 15h20
PARALLEL SESSION VI - T10.P2 - SETTING THE FIRST STEPS
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (3)

OC-161 - (EEF2019-13698) - ASSESSING SEED GERMINATION OF IBERIAN ENDEMISMS TO ENHANCE PLANT CONSERVATION ON LINEAR INFRASTRUCTURES

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2 - ICAAM- Instituto de Ciências Agrárias Mediterrânicas (Universidade de Évora, Ap. 94, 7002-554 Évora, Portugal)

The increasing number of roads around the world and the accumulation of their negative impacts on wildlife turns these infrastructures into one of the major driving factor of biodiversity loss. Native plants, particularly endemic or threatened species, can be promoted by seeding them in road corridors; however, germination requirements for most of these species are unknown, hampering this task. We tried to fill this gap of essential information for six Iberian endemisms suitable to use for vegetation promotion at road corridors - *Digitalis thapsi*, *Ferula communis* subsp. *catalaunica*, *Linaria amethystea* subsp. *amethystea*, *Pterocephalidium diandrum*, *Sanguisorba hybrida* and *Silene scabriflora* subsp. *scabriflora*.

To establish germination protocols for ex-situ conservation actions, the seed germination dynamics were analysed. Three germination conditions were used to simulate autumn, winter and spring. Seeds were tested either without pre-treatment or submitted to cold stratification. Seeds of *S. hybrida* and *P. diandrum* were additionally tested with a scarification treatment.

All the species reached their better germination performance (maximum germination and lower germination mean time) at autumn conditions (15/10ºC; 8/16 hours). At these conditions and for seeds without pre-treatment, the species *D. thapsi*, *S. scabriflora* and *P. diandrum* had high germination rates (over 80%) and the species *F. communis*, *L. amethystea* and *S. hybrida* reached germination rates between 30% and 60%.

In conclusion, although more knowledge about the germination requirements of *S. hybrida* is still required, for all the other Iberian endemisms germination speed and percentage was suitable to their use aimed at native plants reinforcement on linear infrastructures.

01/08 | 15h20
PARALLEL SESSION VI - T10.P2 - SETTING THE FIRST STEPS
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (3)

OC-162 - (EEF2019-13905) - DEVELOPMENT OF SEED TRANSFER ZONES FOR RESTORATION IN HUNGARY, COMBINING BIOGEOGRAPHICAL INFORMATION AND THE MULTIPLE POTENTIAL VEGETATION MODEL.

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The transfer of seeds for restoration purposes should be strictly controlled in spatial terms in order to avoid the introduction of non-adapted ecotypes and genetic pollution. When information on species-specific empirical data is absent, the combination of the multiple natural potential vegetation model (MPNV) and biogeographical knowledge can be used as a proxy. The objectives of this study were: the development of seed transfer zones (STZ), evaluation of their accuracy and comparison with the current legislation based on administrative regions.

The borders of the medium scale units of three biogeographic maps were used for the geometries: based on vegetation, flora and landscape regions of Hungary. These maps were intersected and resulting polygons were filled with MPNV data of habitat probabilities and clustered, obtaining seven regions that can be used as STZ. Also the three biogeographic maps were clustered and used to test the accuracy of the resulting STZ map, which was then compared to that of the administrative regions.

The main result was the elaboration of the STZ map that could replace the current legislation using administrative regions. The overlapping rate of the clustered biogeographic maps with STZ was much higher (59.7%) than with the administrative regions (33.4%).

When information is absent regarding the genetic variability of species, high resolution potential vegetation probability data and biogeographical maps providing the geometries of polygons should be combined. The method is recommended for seed zones delineation for multiple herbaceous species. The modification of the current legislation is suggested.

01/08 | 15h20
PARALLEL SESSION VI - T10.P2 - SETTING THE FIRST STEPS
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (3)

OC-163 - (EEF2019-13970) - ASSESSING THE ROLE OF MACRO AND MICROCLIMATE ON HOLM OAK GERMINATION AND ESTABLISHMENT IN MEDITERRANEAN DRYLANDS

João Serafim (Portugal)[1]; Melanie Köbel (Portugal)[1]; Adriana Príncipe (Portugal)[1]; Pedro Pinho (Portugal)[1,2]; Cristina Branquinho (Portugal)[1]; Otilia Correia (Portugal)[1]; Alice Nunes (Portugal)[1]

1 - Centre for Ecology, Evolution and Environmental Changes;
2 - CERENA- Centro de Recursos Naturais e Ambiente

In Mediterranean drylands, Holm oak (*Quercus ilex* subsp. *rotundifolia*) is a key species well adapted to dry conditions, which are expected to intensify in the near future. Although it is a good candidate to be used in (re)afforestation to combat desertification and adapt to climate change, its plantation is not always successful.

Here, we study the effect of climate (macro and microclimate) on the germination and survival of Holm oak. We used Potential Solar Radiation (PSR) calculated by ArcGIS as a proxy of microclimate conditions, e.g. between northern and southern facing slopes. We collected acorns from Holm oak woodlands in 6 sites distributed along an aridity gradient in southern Portugal (different macroclimate provenances) and also from contrasting microclimates (low and high PSR) on the wettest and driest sites of the gradient. All acorns were characterized biometrically. The acorns from the 6 different provenances were set to germinate under similar greenhouse conditions. Acorns from contrasting microclimates were, additionally, set to germinate in the field under their original microclimate conditions, and under opposite conditions.

We found that macroclimatic and microclimatic acorn provenances influence acorn size and germination: acorns from drier and Sun exposed provenances are bigger and have higher germination rate. Seedlings growing under lower PSR tended to have a higher survival rate, regardless of acorn provenance. We concluded that to increase (re)afforestation success, the provenance of Holm oak acorns should be taken into account, and also that Holm oak is more likely to successfully establish in areas with low PSR.

01/08 | 15h20
PARALLEL SESSION VI - T12.P3 - SHAPING SPECIES BIOGEOGRAPHY
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 12 - Theoretical and evolutionary ecology (3)

OC-164 - (EEF2019-10682) - THE GLOBAL MOSAIC OF REPRODUCTIVE ISOLATION OF AN INVASIVE WEED

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1 - University of Coimbra

Invasive species represent an excellent model to study the incipient stages of allopatric speciation because they occur across separate geographical areas and can rapidly evolve in the new areas they were introduced. Different geographic regions are likely to experience different selection pressures and depending on the strength of the selective forces and the patterns of gene flow, populations may start to become reproductively isolated. Using the invasive C. solstitialis, we conducted experimental intra and inter-regional crosses between native (Spain and Turkey) and non-native (Argentina, Chile, California and Australia) populations in a common greenhouse experiment to assess F1 seed set based on different pollen sources. We tested for reproductive isolation among regions by comparing the seed ovule ratios (S:O) of the intra-regional crosses with the S:O ratio of the inter-regional crosses. Our results showed that i) native Spanish populations benefited the most from admixture with non-native plants, resulting in a 44-70% seed-set increase, ii) seed production decreased with 41% respectively 22% in non-native Argentina and California when treated with pollen from the native Spain, and iii) most non-natives experienced significant seed-set reductions ranging between 14-50% when crossed with other non-native populations. This suggest an asymmetrical response to inter-regional gene flow, with individuals from some non-native regions showing significant but incomplete degrees of reproductive isolation to pollen originating from other native and non-native ranges, and some native ranges displaying a substantial increase in fertility when receiving pollen from C. solstitialis non-native ranges.

01/08 | 15h20
PARALLEL SESSION VI - T12.P3 - SHAPING SPECIES BIOGEOGRAPHY
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 12 - Theoretical and evolutionary ecology (3)

OC-165 - (EEF2019-13754) - ECOLOGICAL DIVERGENCE CONTRIBUTES TO THE ALLOPATRIC DISTRIBUTION OF A DIPLOID-TETRAPLOID COMPLEX

Mariana Castro (Portugal)[1]; João Loureiro (Portugal)[1]; Albano Figueiredo (Portugal)[2]; Miguel Serrano (Spain)[3]; Brian Husband (Canada)[4]; Sílvia Castro (Portugal)[1,5]

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2 - Departamento de Geografia, Faculdade de Letras, Universidade de Coimbra;
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4 - Department of Integrative Biology, University of Guelph;
5 - Botanic Garden of the University of Coimbra

Polyploidization is tightly correlated with flowering plants evolution. Knowing the cryptic diversity within polyploid complexes and its geographic distribution in nature is the first step to unravel the ecological consequences of polyploidization and the processes involved in successful establishment and spread of polyploids. Morphological and/or physiological shifts can provide the opportunity to neopolyploid to colonize new or broader environmental habitats when compared with its progenitors. *Jasione maritima* (Duby) Merino is a polyploid complex comprising two varieties: *J. maritima* var. *maritima* and *J. maritima* var. *sabularia*. In this study, we investigated the occurrence of different ploidy levels, accessed cytotype distribution patterns and explored the ecological preferences of each cytotype in *J. maritima*. For this, we performed a large-scale cytotype screening over the contact zone between each variety. Additionally, niche modelling tools using field data and bibliographic sources, coupled with climatic and habitat variables were performed assessing environmental requirements of each cytotype. Three entities were detected: diploids and tetraploids of *J. maritima* var. *maritima* and tetraploids of *J. maritima* var. *sabularia*. The absence of mixed-ploidy populations, together with an allopatric distribution and specific environmentally suitable habitats of each entity might suggest that polyploidization could have provided an advantage to tetraploids, enabling them to colonize southern areas, even if other factors could be involved in the establishment and spread of this cytotype. Moreover, the more similar environmental conditions shared by cytotypes of *J. maritima* var. *maritima* when compared with the tetraploids of *J. maritima* var. *sabularia* may suggest different origins of the tetraploids.

01/08 | 15h20
PARALLEL SESSION VI - T12.P3 - SHAPING SPECIES BIOGEOGRAPHY
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 12 - Theoretical and evolutionary ecology (3)

OC-166 - (EEF2019-13882) - THE INFLORESCENCE HEIGHT AS AN APPROACH TO EXPLAIN SPECIES DISTRIBUTION OF AEONIUM GENUS IN TENERIFE (CANARY ISLANDS)

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2 - LEAF - Linking Landscape, Environment, Agriculture and Food, School of Agriculture (ISA), University of Lisbon

Aeonium (Crassulaceae) is a rosette-forming plant genus that has diversified in the Canary Islands into different life-forms and survival strategies, occupying several habitat types. Tenerife is the largest island of the archipelago and holds the greatest number of *Aeonium* species, some with more restricted ecological preferences (specialists) and others with more ubiquitous distributions (generalists). Reproductive traits are intrinsically associated with the plants' life-form. Some *Aeonium* species are perennial monocarpic with single rosettes, growing for several years until flowering and die. Polycarpic species are typically subshrubs provided by various rosettes, setting flower several times during their lifetime. This implies different investments between vegetative and reproductive traits. Given that *Aeonium* seed mass and size is a very conservative feature among all species, and thus comparable, we focused on seed number and inflorescence height as the major characters that drive seed dispersal in this genus. This study aims at relating inflorescence size and seed number of five *Aeonium* species endemic to Tenerife with different life-forms (monocarpic and polycarpic), comprising specialists and generalists, with their natural distributions.

We measured several reproductive traits (inflorescence height, number of flowers, flower size and seed number) and vegetative traits (rosette number and total plant height). For the analysis of the species distribution we used field observations, literature descriptions and online database resources. The results of this work suggest that species that invest in taller inflorescences and more reproductive units have wider distributions and a more generalistic behaviour.

01/08 | 17h50
PARALLEL SESSION VII - T5.P3 - TOWARDS MORE SUSTAINABLE GREEN CITIES
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 5 - Urban sustainability (2); Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (1)

OC-168 - (EEF2019-13704) - MAPPING GREEN INFRASTRUCTURE TOWARDS SDG 15: INTEGRATING BIODIVERSITY, CONNECTIVITY AND ECOSYSTEM SERVICES INTO LANDSCAPE PLANNING DECISIONS

Erica Honeck (Switzerland)[1]; Arthur Sanguet (Switzerland)[1]; Loreto Urbina (Switzerland)[2]; Nicolas Wyler (Switzerland)[3]; Pascal Martin (Switzerland)[3]; Benjamin Guinaudeau (Switzerland)[1]; Martin Schlaepfer (Switzerland)[1]; Bertrand Von Arx (Switzerland)[1]; Anthony Lehmann (Switzerland)[1]

1 - University of Geneva;
2 - HEPIA - Haute école du paysage, d'ingénierie et d'architecture;
3 - Conservatory and Botanical Garden of the city of Geneva

In Switzerland, the implementation of a functional Green Infrastructure (GI) network by 2040 is stated as one of the central objectives of the Swiss Biodiversity Strategy adopted as a law in 2017. In 2018, the canton of Geneva has also established a roadmap for biodiversity conservation, which includes the operationalization of a GI framework. There is no consensus on the method to map GI, and the concept has been interpreted and used in various ways in the scientific literature. Our objective is to define and implement a GI mapping framework as part of the state and national biodiversity strategy.

Our approach is based on the assessment of three GI "pillars" - species distributions, ecological connectivity and ecosystem services - using modelling and GIS tools. The pillars are then integrated into the final GI map using spatial prioritization methods with the Zonation software.

We are currently applying our GI framework to the canton of Geneva, Switzerland, to optimize and harmonize the integration of biodiversity and ecosystem services in landscape planning. Results from the spatial prioritization enable us to identify the optimal expansion scenario of existing protected areas to meet the 17% set by the Aichi Targets and beyond.

The proposed GI mapping framework can be used as a policy tool to promote the multifunctional use of landscapes, and integrate natural values in spatial planning. A GI map would support land management planners avoid potential conflicts when an environmental concern is brought up after the start of a development project.

01/08 | 17h50
PARALLEL SESSION VII - T5.P3 - TOWARDS MORE SUSTAINABLE GREEN CITIES
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 5 - Urban sustainability (2); Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (1)

OC-169 - (EEF2019-13819) - GOVERNANCE OF GREEN INFRASTRUCTURES: THEORY AND PRACTICE IN THE METROPOLITAN AREA OF LISBON, PORTUGAL

Isabel Loupa Ramos (Portugal)[1]; Pedro Janela Pinto (Portugal)[1]

1 - IST/University of Lisbon

Since 1999 Municipal Land-use Plans in Portugal must include Green Infrastructure (GI) mapping (the Municipal Ecological Structure). Earlier plans did not include this element, and several municipalities have yet to conclude a revision after the Law was enacted. While the spatial continuity of ecological systems is highlighted in legislation, the practical aspects of its implementation, at the municipal scale, still warrant further study.

We analyzed examples from the Metropolitan Area of Lisbon, where the metropolitan GI strategy spans the border between adjoining municipalities to understand how/if the governance model in place dealt with the issue of preserving continuity across jurisdictions and across scales.

We interviewed experts and stakeholders from municipal and regional planning structures, and compared how well continuity was addressed where one, both, or none, of the adjoining municipalities had mapped municipal GI.

The local governance structure has been encouraged to promote intermunicipal cooperation, especially after the passing of the new Planning Law of 2015. Nevertheless, intermunicipal collaboration within the Metropolitan Area is still mostly reserved to the implementation of specific projects, and not necessarily present in the process of municipal planning. While municipalities demonstrate the will to comply with regional level GI strategy while transposing it into municipal plans, harmonization across municipal borders is still mostly absent, despite common objective criteria and types of ecosystem included. On a positive note, municipalities communication channels opened by intermunicipal cooperation in specific projects could encourage future collaboration on the preservation of continuity across municipal borders and compliance with regional GI strategy.

01/08 | 17h50
PARALLEL SESSION VII - T5.P3 - TOWARDS MORE SUSTAINABLE GREEN CITIES
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 5 - Urban sustainability (2); Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (1)

OC-170 - (EEF2019-13877) - A MULTI-SCALE PLANNING TOOL TOWARDS A GREEN INFRASTRUCTURE: THE NATIONAL ECOLOGICAL NETWORK TO MAINLAND PORTUGAL

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Embedded in the Sustainable Development Goals (SDG) there is an urgent need to protect natural value through planning system (SGD 13.2), integrating landscape scale in national and regional planning (SDG 11A). Despite the progress in preserving species and ecosystems (SDG 15), the multiple changes in landscape character and fragmentation remain serious concerns. The changes are loss of biodiversity, decline of ecosystems quality and services, and increase of natural hazards.

In this context, the concept of the landscape is considered as a multifunctional dynamic resource to which a wide range of ecosystem services are associated (EEA, 2015). Within this, Ecological Network (EN) assumed a holistic view of land-use planning and biodiversity conservation (Magalhães et al. 2007) as the core of a wider Green Infrastructure (GI) framework.

The main goal of this study is to present a National Ecological Network (NEN) map for mainland Portugal and consistently detailed at regional (Lisbon Metropolitan Area) and municipal (Lisbon) levels. The NEN mapping method established the theoretical framework of the GI, by identifying and mapping the most valuable and sensitive areas that guarantee ecosystem functioning. The NEN map integrates, in a single framework, the physical and biological systems, with a 25-meter spatial resolution, showing that the existing protected areas are insufficient to ensure landscape ecological balance and connectivity.

This study contributes to clarify the importance of ecologically based tool towards a sustainable planning at various scales. It represents the first attempt to map Portuguese EN, and addresses the lack of mapping and inconsistent EN criteria.

01/08 | 17h50
PARALLEL SESSION VII - T5.P3 - TOWARDS MORE SUSTAINABLE GREEN CITIES
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 5 - Urban sustainability (2); Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (1)

OC-171 - (EEF2019-13684) - SCENARIOS FOR FUTURE ECOSYSTEM SERVICE TRADE-OFFS IN LISBON

Thomas Elliot (Luxembourg)[1,2]; Vânia Proença (Portugal)[2]; Javier Babí Almenar (Luxembourg)[1,3,4]; Benedetto Rugani (Luxembourg)[1]

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3 - Institute of Molecular Sciences, University of Bordeaux;
4 - Department of Civil, Environmental and Mechanical Engineering, University of Trento

As urbanisation increases land uses in cities change, influencing the supply of ecosystem services (ES). We investigate changes in urban ES supply using a predictive model to support urban planning strategies. We deployed a cellular automata land use change (LUC) model coupled with population dynamics and applied the model to a case study in Lisbon, Portugal.

The LUC model considered 16 land uses and 9 ES. Each of these land use classes is linked to a capacity to supply each of the 9 ES. These ES are linked to population dynamics by taking a coupled human and natural systems (CHANS) approach. The model is spatially-specific over a square grid matrix of 500 metres resolution allowing LUC, ES and population results to be reported at city and neighbourhood levels.

The model was then used to predict the LUC in Lisbon for the years 2020, 2025, and 2030 for three scenarios. The scenarios are: business as usual; population growth; and green spaces expansion.

Lisbon's ES capacities for each scenario were assessed by comparing the historical years' and the predicted years' ES capacities, and the trade-offs between them. The spatial results were used to analyse citywide and locally specific ES changes. The analysis permitted a better understanding of gains and losses between different ES for different locations within the city, and the changes in accessibility to those ES.

Urban planning strategies can be tailored to optimise the spatial allocation of land uses and optimise trade-offs between ES supplies to target specific challenges.

01/08 | 17h50
PARALLEL SESSION VII - T8.P2 - NEW PARADIGMS IN MARINE GOVERNANCE
Room 2.2.12 | Topic 1 - Environmental risks and health (1); Topic 8 - Marine ecology (3)

OC-173 - (EEF2019-13634) - HARNESSING INDIVIDUAL AND COLLECTIVE ACTION TOWARDS EMPOWERED MARINE CONSERVATION: DETERMINANTS AND IMPLICATIONS

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Calls for community involvement in marine conservation recognize the role local communities can play in terms of driving change, championing for sustainable practices and leading interventions that consider local needs and priorities. Empowerment must, thus, be an integral part of the process facilitating implementation of these measures. However, little attention has been paid to understanding what drives individual and community empowerment. This study identifies key determinants of empowerment towards marine conservation, and provides a better understanding of implications for resource management. Using small-scale fisheries and marine conservation in the island of Príncipe (São Tomé and Príncipe, Gulf of Guinea) as a case study, we undertook 14 focus group discussions and household surveys (N=869 respondents) with fishers and fish traders. We developed a framework to assess potential linkages among poverty, resource use and respondents' perceived individual and collective ability to influence marine protection. We found that perceived state enforcement of fishing laws, collective influence, freedom of choice and action and condition of marine environment were key variables for understanding variation in respondents' perceived individual ability to influence marine conservation. When assessing perceptions about potential management measures, creating no-fishing areas and raising environmental awareness were particularly supported by those with higher empowerment levels. This information is essential for addressing factors that facilitate empowerment as well as laying robust foundations for co-management of natural resources. These findings are particularly relevant given the key role of communities as enforcers of regulations and supporters of management measures in face of limited state capacity and enforcement.

01/08 | 17h50
PARALLEL SESSION VII - T5.P3 - TOWARDS MORE SUSTAINABLE GREEN CITIES
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 5 - Urban sustainability (2); Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (1)

OC-174 - (EEF2019-13870) - ARE MPAS WORKING FOR TOP PREDATORS? AN ISLAND WIDE ASSESSMENT OF JAMAICA'S SHARK POPULATIONS

Fabian Kyne (Jamaica)[1]; Bradley Peterson (United States of America)[2]; Stephen Heck (United States of America)[2]; Karl Aiken (Jamaica)[1]; Mark Bond (United States of America)[3]

1 - University of the West Indies;
2 - Stony Brook University;
3 - Florida International University

Elasmobranchs (sharks and batoids) are integral to marine ecosystems. They play an important role in virtually all marine trophic webs; regulating prey populations, modifying community structure and serving as ecological indicators of ocean health. Jamaica has had a long history of overexploitation of marine resources and shark populations have declined significantly as a result. Overfishing of reef fish has also reduced the availability of prey for sharks, while the harvesting of juveniles and habitat loss due to coastal development and expansion of human populations has exacerbated the effects of decades of overfishing. However, since 2010, significant steps have been made with the establishment of seventeen no-take Marine Protected Areas (MPAs). Our objective was to assess the relative abundance and distribution of elasmobranch populations associated throughout the national MPA network. Data was collected using a series of Baited Remote Underwater Video (BRUV) surveys across the north coast, at locations in Negril, St Ann, St Mary, Portland and the offshore banks of the Pedro Cays between 2017-2018. Results showed that increases in elasmobranch diversity and abundance were observed with increased distance away from population centres. Although large predators were limited at north coast sites, the Pedro Cays surveys exhibited significant diversity and relative abundance of sharks including nurse, reef, blacknose and tiger sharks. This indicates that lifeboats of shark diversity still exist in Jamaica. The presence of these top apex predators bodes well for future recovery and substantiates the need for more effective conservation strategies and policy to protect this critical resource.

01/08 | 17h50
PARALLEL SESSION VII - T8.P2 - NEW PARADIGMS IN MARINE GOVERNANCE
Room 2.2.12 | Topic 1 - Environmental risks and health (1); Topic 8 - Marine ecology (3)

OC-175 - (EEF2019-13895) - AN OVERVIEW OF ECOLOGICAL STATUS AND VULNERABILITY OF THE NORTHWEST PORTUGUESE COAST

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1 - University of Porto: ICBAS and CIIMAR

Coastal ecosystems are among the most impacted areas in the world. With the increasing anthropogenic pressures, there is an urgent need to identify areas of priority protection regarding biological and other resources.

The main objective was to assess the ecological status and vulnerability of selected NW Portuguese coastal ecosystems, identifying the water bodies at risk and contributing to develop a spatial planning for a more effective management of human activities and natural resources protection.

Data on environmental contaminants resulting from anthropogenic activities, the contribution of other human pressures (e.g. shipping routes, harbours, marinas) and ecosystem components (biological data) from selected areas of the NW Portuguese Coast were used to assess the ecological status and included in the vulnerability analyses. The mapping of spatial and thematic data was carried out in Geographic Information System environment. The pressures from human activities were converted to impacts and represented as total scores of cumulative impacts allowing the identification of vulnerable areas.

Present findings can assist the decision-makers in coastal vulnerability management, especially on the adverse biological effects from multiple chemical contamination arising from human diffuse emissions and point sources. Overall results highlight the critical need for a sustainable use of coastal ecosystem services, as an integral component of The Water Framework Directive (WFD), also contributing for the European Marine Spatial Planning (EMP) (Directive 2014/89/EU). This work was carried out in the scope of the European ECOAST project, Portuguese component funded by FCT (COFASP/0001/2015).

01/08 | 17h50
PARALLEL SESSION VII - T5.P3 - TOWARDS MORE SUSTAINABLE GREEN CITIES
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 5 - Urban sustainability (2); Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (1)

OC-176 - (EEF2019-13993) - TEMPORAL AND SPATIAL DISTRIBUTION OF MICROPLASTICS IN SUBTIDAL SEDIMENTS AND SEAWATER SURFACE AT A PORTUGUESE COASTAL AREA

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Understanding microplastics (MP) distribution in the marine environment is not only crucial to assess the availability of such particles to be ingested by wild marine organisms, but also to support realistic simulations of environmental conditions at laboratory experimental trials.

The strong anthropogenic pressure from Sesimbra and Setúbal municipalities on the coastal area nearby, with multiple industries, fishing and tourism activities, makes a relevant case study for microplastics pollution research.

Temporal and spatial distribution of microplastics were assessed for the first time along the Sado estuary and the Professor Luiz Saldanha Marine Park, from July 2018 to February 2019, at the sea surface and on seabed.

Samples from 30 min neuston tows (335 µm mesh size) and sediment samples collected with a Petite Ponar grab were obtained monthly, at six stations located ca 5 km apart from each other, at the 5 m isobath. Aliquots of both types of samples were fixated in 70% ethanol, to ensure calculations of MP:neuston and MP:meiobenthos ratios. MP extraction from neuston and sediment samples followed independent protocols, with different size ranges (335µm-5mm and 38µm-5mm, respectively).

Samples are still being processed but preliminary results show that microplastics abundance tends to decrease in stations further away from to the Sado estuary. While fibers and fragments prevailed in neuston samples, most of microplastics found in sediments were fibers, as previously found by other authors, showing that sediments act as sinks for these particles.

01/08 | 17h50
PARALLEL SESSION VII - T8.P2 - NEW PARADIGMS IN MARINE GOVERNANCE
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4)

OC-177 - (EEF2019-13666) - BODY SIZE SHIFTS IN WILD BEES

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Body size clines have been widely explained by the Bergmann's rule (i.e. larger individuals in colder conditions) in homeothermic vertebrates. However, there is no general consensus in poikilotherms organisms particularly in insects. Among them, bees are a highly diverse pollinators group with high economic and ecological value. Nevertheless, no comprehensive studies of species assemblages at a phylogenetically larger scale have been carried out even if it could identify the traits and the ecological conditions that generate different patterns of latitudinal size variation. Moreover, there is a huge information gap about their body size changes during last century and the mechanisms behind these shifts, although loss of functional traits can negatively impact species communities. We thus assessed the body size shifts at both spatial and temporal scales. We first investigated body size variation at continental scale and at community level among 615 bee species. While we validated this rule among many families (e.g. several solitary bee families), there are some notable exceptions (e.g. bumblebees), which follow the converse Bergmann's rule, with bigger individuals at higher temperature. Then we assessed body size shifts during the last century among six bumblebee species. We studied bumblebees sampled during the last century in two geographical areas (i.e. Belgium and northern Scandinavia, above Arctic circle). We highlighted that bumblebee body size of each species increased in Belgium over the last century, while it remains stable above the Arctic Circle. Selective pressures, mechanisms and climatic conditions that generate those trends will be discussed.

01/08 | 17h50
PARALLEL SESSION VII - T5.P3 - TOWARDS MORE SUSTAINABLE GREEN CITIES
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 5 - Urban sustainability (2); Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (1)

OC-178 - (EEF2019-13837) - A NOVEL MISTLETOE-COLUMNAR CACTI-STEMBORER INTERACTION PROMOTES SUITABLE HABITATS FOR ARTHROPODS IN SEMIARID CHILE

Patricia Guerra (Chile)1; Rodrigo Ríos (Chile)[1]

1 - Universidad de La Serena

Mistletoes weaken host plants making them more susceptible to insect attack. However, herbivore insects, such as stem-borers, create new and suitable habitats for arthropods to live and/or refuge, thus playing an important role in the structure of arthropod communities. Field observations showed that the larvae of the stem-borer weevil, Apion sp., preferentially bore spines of the columnar cacti, Echinopsis chiloensis, parasitized with the mistletoe, Tristerix aphyllus, in comparison to non-parasitized cacti (density: 30±3.8/400cm2 and 7.7±2.4/400cm2, respectively). Once weevil abandons the areoles, the chambers are re-colonized by other arthropods. We aimed: 1) to identify the community of arthropods that re-colonize the chambers of E. chiloensis, and 2) to evaluate the effect mistletoe removal from cacti on the community of arthropods. We identified the arthropods in 90 chambers of parasitized and non-parasitized cacti. Besides, we selected 22 parasitized and 11 non-parasitized cacti respectively and removed the mistletoe from half of the parasitized ones. Our results showed that 40% of the chambers were occupied by the stem-borer larvae (one per spine), 12.5% by spiders, 20% by molts and 19.5% were empty. A higher number of Camponotus morosus, a nectar robbing ant of mistletoe flowers, were found prowling or visiting chambers of parasitized cacti (5.2±0.4 ants) in comparison to non-parasitized cacti (3.0±0.5 ants). The removal experiment suggests a negative feedback in the mistletoe-cacti interaction because mistletoe weakens cacti, making them more susceptible to the stem-borer weevil, which in turn create new foraging places for C. morosus that negatively affect the mistletoe.

01/08 | 17h50
PARALLEL SESSION VII - T8.P2 - NEW PARADIGMS IN MARINE GOVERNANCE
Room 2.2.15 | Topic 9 - Biodiversity and ecosystems (4)

OC-179 - (EEF2019-13644) - METABARCODING UNVEILS THE ROLE OF TROPHIC INTERACTIONS IN BIODIVERSITY PATTERNS OF LEAF BEETLES

Carola Gómez-Rodríguez (Spain)[1]; Adrian Castro-Insua (Spain)[1]; Kirsten E. Miller (Sweden)[2]; Andres Baselga (Spain)[1]; Alfried P. Vogler (United Kingdom)[3]

1 - Universidade de Santiago de Compostela;
2 - Swedish University of Agricultural Sciences;
3 - Imperial College and Natural History Museum

Understanding the processes driving biodiversity patterns is one of the most fundamental aims of ecologists. In the case of herbivorous species, the composition of species assemblages may be determined by the distribution of their host plants, a factor that is rarely accounted for due to difficulties in establishing host choice using traditional techniques when many species and localities are studied simultaneously. However, molecular methods such as metabarcoding of gut contents offer great opportunities for the characterization of such trophic interactions. Here we follow a metabarcoding approach to uncover the diet of full leaf beetles (Chrysomelidae) assemblages along a latitudinal gradient in the Iberian Peninsula. Leaf beetles in each locality were identified to species level by an expert taxonomist (total number of specimen ca. 4500). PCR amplification of the plant DNA (trnL intron) in beetle guts was conducted at the beetle assemblage level by pooling DNA extracts of all beetle specimens collected in the same locality (n=20) before PCR amplification. “Nested-tagging” was used to preserve sample identity while also pooling several samples into a single cost-effective Illumina run. Raw reads were quality-filtered before clustering for Operational Taxonomic Units (OTUs) delimitation. These plant OTUs, representing the trophic niche at the assemblage-level, were tested as predictors of species turnover in leaf beetle assemblages. Our results show that abundant host plants can be recovered through metabarcoding of whole leaf beetle assemblages and that this biotic layer contributes to our understanding of leaf beetle beta diversity patterns.

01/08 | 17h50
PARALLEL SESSION VII - T5.P3 - TOWARDS MORE SUSTAINABLE GREEN CITIES
Room 2.2.14 | Topic 1 - Environmental risks and health (1); Topic 5 - Urban sustainability (2); Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (1)

OC-180 - (EEF2019-13710) - INFLUENCE OF LANDSCAPE HOMOGENIZATION ON THE LOCAL DIVERSITY OF SPIDERS IN EUCALYPT PLANTATIONS SETTLED IN A GRASSLAND ECOSYSTEM

Carolina Pinto (Argentina)[1]; Maria Isabel Bellocq (Argentina)[1]; Julieta Filloy (Argentina)[1]

1 - Dep. Ecología, Genética y Evolución, Universidad de Buenos Aires, Argentina – IEGEBA, CONICET

Grassland ecosystems traditionally replaced by agricultural and livestock fields have also currently being replaced by commercial tree plantations. To develop effective management strategies given the increasing extensions of forest landscapes in this biome, it is necessary to determine the best landscape arrangement that promotes native biodiversity. The objective of this study was to analyze the response of the diversity of spiders to the landscape homogenization due to commercial tree plantation. The study was conducted in the Pampean ecoregion of Argentina (Entre Rios province), originally dominated by grasslands. We selected seven areas of 5x5 km as landscape units, centered on a mature plantation of Eucalyptus sp. (sample site). Landscape units had increasing tree plantation cover, from 20% to 100%. At each sample site, spiders were collected using pitfall traps and garden-vacuum (G-vac) during one spring and summer. To account for the landscape homogenization due to the forest plantations we estimated the Shannon's Diversity Index within each landscape unit. We analyzed the relationship between Spider Richness and Abundance (response variables) and the Shannon's Diversity (explanatory variable) using generalized linear models. In total 290 individuals were captured belonging to 15 families and 45 species. Both the species richness and spider abundance responded positively to Shannon's Diversity. Our study shows that the diversity of spider assemblages in eucalypt plantations at the local scale is positively associated with the maintenance of a variety of land uses in the landscape, as they could act as a source of species.

01/08 | 17h50
PARALLEL SESSION VII - T9.P10 - DEEPENING OUR KNOWLEDGE ON THE ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-181 - (EEF2019-13801) - CONSUMER FOOD WEBS CONTRIBUTE TO CORE AND INTEGRATIVE DOMAINS OF RESEARCH ON BIODIVERSITY AND ECOSYSTEM FUNCTIONING

Jes Hines (Germany)[1]

1 - German Centre for Integrative Biodiversity Research (iDiv)

Over the last several decades, an academic conversation about biodiversity and ecosystem functioning (BEF) has emerged. Here we use a keyword co-occurrence analysis to characterize and review almost three decades of research on focused on these terms. We find that the rapidly growing literature has developed in four core research domains. Our analysis shows that food webs in aquatic and agricultural landscapes serve as integrative topics connecting divisions in scientific discussion surrounding BEF experiments and science policy. We discuss the key developments and constraints that define the role of food webs and consumer-driven processes in this research field. Because consumer species in higher trophic levels of food webs are highly sensitive to environmental variation, there is great concern that these species will suffer from biodiversity declines. At the same time, interactions among species in complex food webs drive many ecosystem functions that provide multiple benefits to humans, such as pollination, natural pest control, and decomposition of organic matter. Therefore, it is likely that food web research will be pushed to the forefront of future research priorities for biodiversity and ecosystem functioning.

01/08 | 17h50
PARALLEL SESSION VII - T9.P10 - DEEPENING OUR KNOWLEDGE ON THE ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-182 - (EEF2019-13696) - CRYPTIC TROPHIC CASCADES IN MULTI-SPECIES SYSTEMS: PREDATOR EFFECTS ON ECOSYSTEM STOICHIOMETRY

Elizabeth Le Roux (South Africa)[1]; Laura Van Veenhuisen (Netherlands)[2]; Graham Kerley (South Africa)[1]; Joris Cromsigt (Sweden)[3]

1 - Nelson Mandela University; 2 - Utrecht University; 3 - Swedish University of Agricultural Science

Trophic cascades are seldom convincingly shown in complex multi-species systems where prey vary in vulnerability to predators. For example, we recently showed that while prey species' selective use of the "landscape of fear" lead to heterogenous faecal nutrient accumulation, less vulnerable species smooth out this imbalance by depositing faecal nutrients more evenly across the landscape. Thus in speciose systems, contrasting responses to predators could disrupt the potential for trophic cascades.

However, while species diversity afford a system a certain degree of functional redundancy (where the actions of one species is buffered by the actions of another), species are not functionally equivalent on every level. Allometric scaling of stoichiometric requirements suggests that larger species' dung may be qualitatively different from that of smaller species and that they may be distinct in which nutrients they deposit.

Here we present a series of results from several studies conducted in Hluhluwe-iMfolozi Park (South Africa), explicitly exploring how predators alter consumer-driven nutrient distribution. We demonstrate an allometric gradient in herbivore dung stoichiometry and show how landscape-scale differences in "who defecates where" lead to park-wide differential distribution of faecal nitrogen and phosphorus. We show how predation risk determines which herbivore species are responsible for faecal nutrient deposition and thereby the N:P ratio of the waste deposited and that this correlates predictably with plant community stoichiometry. Thus, in species-rich systems, trophic cascades may be more complex than merely the conventional suppression of plant biomass, yet still bring about change that has the potential to structure ecosystems.

01/08 | 17h50
PARALLEL SESSION VII - T9.P10 - DEEPENING OUR KNOWLEDGE ON THE ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-184 - (EEF2019-13873) - UNDERSTANDING THE INTERPLAY OF ENVIRONMENTAL RESPONSES AND SPECIES INTERACTIONS IN DETERMINING COEXISTENCE AT DIFFERENT SCALES

Joaquín Hortal (Spain)[1]; Nagore G. Medina (Spain)[2]; Pedro Aragón (Spain)[1]; Cristina Branquinho (Portugal)[3]; Joaquín Calatayud (Sweden)[4]; Sergio Chozas (Portugal)[3]; Sara Magalhães (Portugal)[3]; Paulo De Marco Júnior (Brazil)[5]

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2 - Departamento de Biología (Botánica), Facultad de Ciencias, Universidad Autónoma de Madrid, Spain;
3 - Centre for Ecology, Evolution and Environmental Changes (cE3c), Faculdade de Ciências, Universidade de Lisboa, Portugal;
4 - Integrated Science Lab (IceLab), Umeå University, Sweden;
5 - Departamento de Ecologia, Instituto de Ciências Biológicas, Universidade Federal de Goiás, Goiânia, Brazil

Understanding the nature and dynamics of ecological communities is a key question in ecology. Evidence points to communities functioning both as relatively deterministic structures shaped by predictable local interactions, or highly dynamic entities determined by the environmentally-driven spatial dynamics of species. We seek understanding the role of both interactions and environmental requirements on species coexistence across scales. To do this, we assess the effects of two aspects of the niche concept (i.e. abiotic conditions and biotic interactions) in different systems. We assess the responses of moss species using experiments –both placed in the field along a climatic gradient, and under the controlled conditions of a growth chamber– to study how neutral competitive interactions and responses to environmental conditions determine species occurrence and local success. We also conduct detailed field work on dune xerophytic plant communities, assessing the effects of positive and negative interactions (i.e. facilitation and competition) on the distribution and local co-occurrence of species. Further, we use macroecological analyses and ecological niche models to study how climatic suitability and coexistence with other species determine the local success of each species. Finally, we develop theoretical models based on existing theory on the dynamics of local communities, metacommunities and species' geographic ranges. These models are parameterized based on the aforementioned study systems, with the aim to obtain realistic outcomes from the stochastic simulations. The results of empirical analyses and theoretical models will be used to assess the scaling of different ecological processes.

01/08 | 17h50
PARALLEL SESSION VII - T9.P10 - DEEPENING OUR KNOWLEDGE ON THE ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-185 - (EEF2019-13849) - DRIVERS OF MAMMAL RICHNESS, ABUNDANCE AND OCCUPANCY IN A LANDSCAPE COMPOSED BY EUCALYPTUS PLANTATIONS, SAVANNAS AND FOREST PATCHES

Tony Enrique Noriega Piña (Brazil)[1]; William Douglas Carvalho (Brazil)[1]; Luís Miguel Do Carmo Rosalino (Portugal)[2]; Renato Richard Hilário (Brazil)[1]

1 - Federal University of Amapá;
2 - Universidade de Lisboa

We evaluated the effects of vegetation structure and landscape composition on large and medium-sized mammal´s richness, abundance, and occupancy patterns in an Amazonian landscape composed by eucalyptus plantations, savannas, and native forest patches. Based on line transects and camera traps surveys, we detected 17 mammal species from 8 orders. Eight species were registered within eucalyptus plantations. Mammal richness and diversity were similar between the three environments, and species turnover was the main mechanism promoting beta diversity in the landscape. Based on a Generalized Linear and Mixed Model approaches and Redundancy Analysis we detected that mammals were more likely to be registered in eucalyptus plantations, in homogeneous areas, in sites with fewer roads, and with larger proportions of natural environments. Primates, Carnivora, Rodentia and Pilosa are found mostly away from the savannas, while Cingulata, Artiodactyla, and Perissodactyla are mostly found away from forests. Primates, Carnivora, and Rodentia were also associated with taller vegetation. Didelphimorphia was registered mostly in heterogeneous areas. Eucalyptus plantations immersed in a landscape containing significant patches of savanna and forests can maintain part of the biodiversity of that landscape, although the plantations alone may not be enough to support populations of most mammal species. Indeed, eucalyptus plantations, savannas, and forest patches have a complementary role in mammal richness and occupancy patterns. Since distinct drivers influence occupancy patterns of different taxonomic groups, the existence of areas with distinct characteristics in the same landscape will favor higher total biodiversity.

01/08 | 17h50
PARALLEL SESSION VII - T10.P3 - REGAINING LAND STRUCTURE AND FUNCTION
Room 2.3.13 | Topic 7 - Climate and global changes (1); Topic 10 - Land degradation and ecosystem restoration (4)

OC-186 - (EEF2019-13683) - FOREST-STEPPE RECONSTRUCTION AS AN ALTERNATIVE TO LANDSCAPING IN INDUSTRIAL AREAS

Melinda Halassy (Hungary)[1]; Anikó Csecserits (Hungary)[1]; Gergely Kovacsics-Vári (Hungary)[2]; Anna Kövendi-Jakó (Hungary)[1]; Katalin Török (Hungary)[1]

1 - MTA Centre for Ecological Research, Institute of Ecology and Botany;
2 - University of Szeged, Department of Ecology

Our objectives were to reconstruct forest-steppe in an industrial area and to evaluate the impact of background factors on early tree survival.

The study area is situated at the factory of the LEGO Group, Nyíregyháza in the acidic inland sand dune region of Nyírség, NE Hungary, Europe. Over 16,000 undercut 1-2 year old samplings of 11 tree and 12 shrub species were planted in patches in November 2014 and 2015 at ca. 20 % of the industrial restoration area. We used the gardeners' approach and specific plans were created for each woody patch within the restored grassland. Tree and shrub survival was counted for all samplings in all patches in the summer of 2015 and 2016. From the factors possibly influencing survival, the following background variables were sampled: soil properties, meteorological data, elevation, grassland restoration method and the height and coverage of herbaceous vegetation.

Survival rates ranged from 0-71% for the different species. There were no significant differences in tree survival according to grassland introduction practices or vegetation height, but herbaceous cover and litter accumulation negatively correlated with tree survival based on detrended correspondence analysis (DCA). From the abiotic factors, 2015 summer drought was responsible for die out, and lower pH, higher electrical conductivity and higher soil plasticity (KA) of the soil positively correlated with tree survival.

The reconstruction of native park-like habitats is a viable alternative to landscaping in industrial areas that can counteract land degradation and increase green infrastructure connectivity.

01/08 | 17h50
PARALLEL SESSION VII - T9.P10 - DEEPENING OUR KNOWLEDGE ON THE ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-187 - (EEF2019-13635) - LONG-TERM EFFECT OF MANAGEMENT TO REPLACE INVASIVE TREE PLANTATIONS WITH PANNONIAN SAND GRASSLAND

Bruna Reis (Hungary)[1,2]; Anna Kövendi-Jakó (Hungary)[3]; Katalin Szitár (Hungary)[3]; Katalin Török (Hungary)3; Melinda Halassy (Hungary)[3]

1 - ELTE-;
2 - Eötvös Loránd University;
3 - Centre for Ecological Research

We studied the long-term effect of mowing on the recovery of Pannonian sand steppe after elimination of an invasive species, black locust (Robinia pseudo-acacia).

Three Robinia stands of ca. 1 ha, located in the sand area of Kiskunság, Hungary, were clear cut in the winter of 1994-1995 and GARLON 4E was applied on tree trunks to control re-sprouting. The three stands were chosen in different landscape context: varying from no grassland propagule limitation to no propagule availability (Izsák, Fülöpháza, Bugac). Mowing was used to support sand grassland recovery twice a year in 1995-2001 in six 10 m by 10 m parcels and its success was compared to unmown control and semi-natural reference. Vegetation was sampled in June and August yearly in 1995-1999 in all sites and re-sampled six times until 2017 only in two.

Treatment's trajectory is moving in the same direction and its closer to reference than control's trajectory according to PCoA analysis. A dense shrub cover was developed in unmown areas, achieving 60.6% cover by 2017 in Fülöpháza. Mowing resulted in a greater relative cover of target species compared to control, mainly in sites with propagule availability, but it's still different from reference. Treated plots were not resistant to invasion principally in sites with lower propagule availability, achieving ~30% invasive cover by 2017 in Fülöpháza.

The long-term monitoring revealed that mowing assisted the restoration of Pannonian sand grasslands, but further management (e.g. seeding) is needed to increase the similarity with reference sites.

01/08 | 17h50
PARALLEL SESSION VII - T10.P3 - REGAINING LAND STRUCTURE AND FUNCTION
Room 2.3.13 | Topic 7 - Climate and global changes (1); Topic 10 - Land degradation and ecosystem restoration (4)

OC-189 - (EEF2019-13687) - RESTORATION UNDERGROUND: CONTEXT-DEPENDENT EFFECTS OF THREATENED DIGGING MAMMALS ON SOIL FUNCTIONS

Orsi Decker (Australia)[1]; Heloise Gibb (Australia)[1]; David Eldridge (Australia)[2]; Eleonora Decker (Australia)[3]; Steve Leonard (Australia)[1]

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2 - University of New South Wales, Sydney, Australia;
3 - Hawkesbury Institute for the Environment, Western Sydney University, Sydney, Australia

Species extinctions alter ecosystem services, and the magnitude of this impact is likely to change according to species' functions and environmental characteristics. Native digging mammals play important roles in maintaining soil functions globally. However, the restoration potential of reintroducing digging mammals to reserves is unclear because the impact of the mammals on soil functions has not been tested across environmental gradients. We examined the effects of digging mammals on various soil processes across a large rainfall gradient in Australia (between 170 - 880 mm pa.) using paired sites with native digging mammals present and absent. Our study showed that the impacts of digging mammals on soil functioning are context-dependent. Microbial communities were affected by mammals in semi-arid systems but remained similar in temperate areas. Microbial functions, however, were greater with digging mammal activity regardless of climate. Soil available carbon and nitrogen were elevated in reintroduction areas in the arid and semi-arid sites and soil carbon was distributed by the mammals in every system. Decomposition rates varied with digging mammal activity depending on rainfall patterns. Our study suggests that native digging mammals have a landscape-scale impact on soil functions, but the overall effects vary with productivity (rainfall). The context of digging mammal reintroduction is thus likely to be critical in determining their effectiveness in restoring soil functions. Soil disturbance by native mammals might aid degraded soils and agricultural lands, providing a potential means of buffering extreme climate events in a changing world.

01/08 | 17h50
PARALLEL SESSION VII - T9.P10 - DEEPENING OUR KNOWLEDGE ON THE ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (4)

OC-190 - (EEF2019-13817) - CLIMATE CHANGE-DRIVEN EFFECTS ON COASTAL SOILS AND ADJACENT AQUATIC SYSTEMS: ASSESSMENT OF SALINIZATION, TEMPERATURE AND MOISTURE

Sonia Chelinho (Portugal)[1]; Ceri-Anne Laureyssens (Belgium)[2]; Rui Ribeiro (Portugal)[1]; José Paulo Sousa (Portugal)[1]; Matilde Moreira-Santos (Portugal)[1]

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2 - Hogeschool Gent, Faculteit Mens en Welzijn, Campus Vesalius, Keramiekstraat 80 - 9000 Gent, Belgium

Portugal is particularly threatened by climate changes, namely extreme drought and flood events, thus also soil salinization (seawater intrusion or flooding by sea level rise). The present study aims to evaluate effects of soil salinization in combination with extreme temperatures and moisture conditions, directly on soil ecosystems and indirectly on freshwater systems, via salt movements through the soil-water pathway. Two tests were setup with seawater contaminated soils (previously derived EC20 and EC50 values for *Folsomia candida* (Collembola): (1) the 28-d reproduction of *F. candida* under two temperatures (20, 25 °C) and three moistures (35, 50, 70% of the soil water-holding-capacity [WHC]); (2) a 42-d community test in microcosms with three collembolans (*F. candida*, *Sinella curvisetta, Protaphorura fimata*), one mite (*Hypoapsis aculeifer*), one enchytraeid (*Enchytraeus crypticus*) and one plant (*Solanum lycopersicum*) exposed to four moistures (35, 50, 70, 100% of WHC). To evaluate aquatic effects, eluates were prepared with soil from microcosms to assess: 72-h *Raphidocelis subcapitata* (microalga) growth, 48-h *Brachionus calyciflorus* (rotifer) population growth and 24-h *Daphnia magna* feeding. Results showed *F. candida* was significantly affected by both salinity (depended on temperature/moisture) and moisture (depended on salinity). In the microcosms, the most salinity sensitive species were *F. candida*, *S. curviseta* and *S. lycopersicum*; moisture also directly affected the collembolans and indirectly the tomato plant. No toxicity was found for aquatic organisms. Results are discussed in light of the impacts of soil salinization on the soil habitat function, provoking potential imbalances on their ecosystem functions, and potentially on adjacent aquatic systems.

01/08 | 17h50
PARALLEL SESSION VII - T12.P4 - INNOVATIVE METHODS AND APPROACHES
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (2); Topic 12 - Theoretical and evolutionary ecology (2)

OC-191 - (EEF2019-13798) - GENETIC CONSEQUENCES OF SOCIAL STRUCTURE IN THE GOLDEN-CROWNED SIFAKA

Bárbara Parreira (Portugal)[1]; Erwan Quéméré (France)[2]; Cécile Vanpé (France)[3]; Inês Carvalho (Portugal)[1]; Lounès Chikhi (France)[1,4]

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3 - Unité Prédateurs et Animaux Déprédateurs, Office National de la Chasse et de la Faune Sauvage;
4 - EDB, Université de Toulouse Midi-Pyrénées, CNRS

Many mammalian species form social groups with kinship structure where individuals interact with familiar conspecifics during most of their lives. Social groups are far from being sparse aggregations; within social groups individuals cooperate and mate according to complex strategies. Yet, population geneticists have tended to ignore social structure. The traditional genetic approach envisions social groups as relatively small and isolated units of related individuals, and thus many group-living species are believed to be subjected to significant genetic drift, inbreeding and inbreeding-depression effects within social units. This is the case of many studies on lemur species where genetic data are typically analysed under a deme-based approach even though other studies have demonstrated the importance of social structure and identified various mating systems. Here, we investigate inbreeding in an endangered sifaka lemur species (Propithecus tattersalli) restricted to a small region in Northern Madagascar. We measure inbreeding (FIS) at different scales of population structure: social groups, sampling sites and forest patches. Empirically, we found high levels of outbreeding within social groups which can be interpreted as a consequence of inbreeding-avoidance strategies to prevent inbreeding-depression effects. By using simulation framework developed in our group, we simulate social groups without incorporating active inbreeding-avoidance behaviours. Under this model, we show that sifakas are expected to show high levels of genotypic diversity (outbreeding), even though we do not model explicit inbreeding-avoidance behaviours. This suggests that demonstrating the existence of active inbreeding-avoidance mechanisms may be more difficult than usually assumed.

01/08 | 17h50
PARALLEL SESSION VII - T12.P4 - INNOVATIVE METHODS AND APPROACHES
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (2); Topic 12 - Theoretical and evolutionary ecology (2)

OC-192 - (EEF2019-13658) - EXTREME VALUE THEORY AS A TOOL TO STUDY BIODIVERSITY PATTERNS

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Here we suggest that the asymptotic theorems of extreme value theory provide a theoretical framework to the study the species accumulation curves, the endemic species accumulation curve and other biodiversity scaling patterns. In fact, to determine the number of species as area size increases – the so-called species accumulation curve - what matters is to find the first individual of each species. On the other hand, to find out how many species go extinct as a function of the size of the area cleared – the so-called endemic species accumulation curve - what matters is to find the last individual. Therefore, given an area with S species, this sampling scheme leads to S points for the minimum distances and S for the maximum distances, whose analysis of these extremes falls within the realm of extreme value theory. Here we show preliminary results of the application of statistics of extremes to species richness to data on tropical trees collected in a 50ha plot in Barro Colorado Island, Panama, and show the resulting "species accumulation curves" (based on the minima) and the "endemic accumulation curves" (based on the maxima).

01/08 | 17h50
PARALLEL SESSION VII - T12.P4 - INNOVATIVE METHODS AND APPROACHES
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (2); Topic 12 - Theoretical and evolutionary ecology (2)

OC-193 - (EEF2019-13957) - A NEW APPROACH TO UNCOVER SPECIES INTERACTIONS FROM THEIR CO-DISTRIBUTION

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Species distribution is driven by the suitability of the abiotic environment, interspecific interactions and dispersal mechanisms. Improving our understanding of the relative importance of these processes is of major importance to anticipate the effect of global changes on biodiversity. We aim to infer the habitat preferences and interspecific interactions that led to the observed co-occurrence of multiple species. To this purpose, we propose a conditional probabilistic model of interspecific interactions that separates the response of a species to other species from its effects on them, allowing the modeling of asymmetric interactions. We incorporate the interaction model into a habitat suitability model and jointly fit both. We evaluate the predictive power of the model and its ability to infer ecological interactions on communities simulated from given assembly processes. We find that the model successfully recovers competition and facilitation. Besides, in contrary to existing approaches, it is able to capture asymmetric interactions such as commensalism and amensalism. However, it performs less well on trophic interactions which are confounded with facilitation as consumers and their resources should naturally cohabitate. Moreover, the method learns latent distributed representations of species called embeddings that can be related to specific functional traits. These embeddings are useful to explore groups of species with similar biotic niches. In conclusion, we present a promising interaction inference approach at the intersection of biogeography, community ecology and functional ecology. Future work should be directed towards integration of prior knowledge on species functional roles and phylogeny to guide inference of this co-occurrence-based models.

01/08 | 17h50
PARALLEL SESSION VII - T12.P4 - INNOVATIVE METHODS AND APPROACHES
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (2); Topic 12 - Theoretical and evolutionary ecology (2)

OC-194 - (EEF2019-13774) - NEXT GENERATION CONSERVATION: PRESERVING THE CONTINUUM OF LIFE IN SPACE AND TIME

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5 - Museo Nacional de Ciencias Naturales de Madrid

Conservation prioritization approaches generally overlook the hierarchical and dynamic structure of diversity along evolutionary time and space. Often, spatial data on inter- and intra-specific diversity within a region are unavailable, necessitating the use of surrogates. However, that requires understanding how the hierarchical levels of biodiversity are structured in space, and the dynamic evolutionary and ecological processes that shaped those patterns. We aimed at developing a general framework to identify priority conservation areas, optimized to preserve biodiversity at different evolutionary levels, while accounting for spatial dynamics under climate change.

We focused on the diversity of amphibian species occurring in the Iberian Peninsula at three hierarchical levels: inter-specific, specific and intra-specific. For each level, we a) analyzed how diversity is currently structured in space; b) tested historical hypotheses about the underlying drivers of diversity; c) predicted how the structure will change under future climate change scenarios; and d) tested the efficiency of ecological variables and species-level diversity as surrogates for identifying priority conservation areas at other levels of diversity.

Both species-level diversity and ecological variables are poor surrogates for diversity at the inter- and intra-specific levels. Species distributions are likely to shift in the future but different levels of diversity will respond in very dissimilar ways.

It is very challenging to employ a general prioritization framework based solely on ecological variables and species distributions. Future directions should aim to generate and curate available genomic data for multiple species and regions, and make them publically available.

02/08 | 11h00
PARALLEL SESSION VIII - T7.P5 - CREATING ECO-TECHNOLOGICAL TOOLS
Room 2.2.12 | Topic 7 - Climate and global changes (5)

OC-195 - (EEF2019-13836) - RAPID SHIFTS IN LICHEN TRAIT DIVERSITY DUE TO RECENT CHANGES IN CLIMATE REINFORCE THEIR POTENTIAL AS CLIMATE CHANGE ECOLOGICAL INDICATORS

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To use lichens as indicators of climate change, we need to understand if recent climatic shifts are inducing changes in lichen diversity. This was our objective. For that, we used lichen diversity collected over 20 years at a five-years interval (1994 to 2015) in 22 sampling sites in Southern Portugal. Several taxonomic (species richness, Shannon's diversity index, inverse Simpson) and trait-based metrics (functional structure and functional diversity indices) based on two traits were tested. A set of 22 climate variables representing range, seasonal and annual variation of temperature and precipitation, annual mean relative humidity and the number of days with relative humidity higher than 95% were calculated. Changes over time and with climatic shifts were assessed using generalized linear models (GLMs).

Lichen taxonomic metrics did not significantly change over time. Conversely, a functional turnover was observed for some functional groups, functional diversity indices based on abundance increased over this period and the functional structure of some functional groups changed also significantly over time. These temporal shifts were strongly related to subtle changes in climate, namely to an increase in average relative air humidity and the number of days with relative air humidity higher than 95%. Results confirm that lichens can be sensitive ecological indicators of climate change and highlight the importance of looking beyond taxonomic metrics to track the effects of climate change. Future works should try to understand if they could work as early warning systems, signalling changes before other ecosystem components.

02/08 | 11h00
PARALLEL SESSION VIII - T7.P5 - CREATING ECO-TECHNOLOGICAL TOOLS
Room 2.2.12 | Topic 7 - Climate and global changes (5)

OC-196 - (EEF2019-13860) - DETECTION OF DROUGHT INDUCED CHANGES IN AQUATIC ECOSYSTEMS ACROSS BIOGEOGRAPHIC GRADIENTS – A COMPARISON BETWEEN EDNA AND CONVENTIONAL APPROACHES

Catia Lúcio Pereira (Portugal)[1,2]; Katarzyna Sroczynska (Portugal)[2]; Andreu Castillo-Escrivà (Portugal)[2]; Miguel Matias (Spain)[2,3]; Tom Gilbert (Denmark)[4]; Miguel Araújo (Spain)[1,2,3]

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4 - Centre for GeoGenetics, Section for Evolutionary Genomics, University of Copenhagen

Climate change is a major driver of environmental change in natural ecosystems. Developing predictions of its effects on biodiversity requires a deep understanding of communities' composition and species distributions. Taxonomical inventories and assessment of geographical distribution of species based on environmental DNA (eDNA) have been shown to improve detection capability, taxonomic resolution and cost-effectiveness when compared to conventional methods. In this study, we conducted high-resolution biodiversity surveys across biogeographic gradients, ranging from semi-arid to alpine environments, using the IberianPonds Network. Field surveys combined eDNA metabarcoding and morphological-based identification approaches. Different markers were used to amplify DNA from lower (producers) to higher (macroinvertebrates) levels of the food web. Also, organisms were collected with conventional methods (e.g., plankton nets, kick-net), and were identified and enumerated under the microscope. Preliminary results indicate that regions with greater environmental filters, such as higher temperatures that lead to periods of drought, have lower number of species than temperate environments. Overall, eDNA metabarcoding was more efficient detecting drought induced changes in the communities than morphological-based approaches. These results will be used to correlate patterns of species turnover within and between regions with key ecosystem functions (e.g., productivity, greenhouse gas emissions). Increasing the resolution of biodiversity surveys is crucial to improve predictions of climate change effects on biodiversity and their associated ecosystem services.

02/08 | 11h00
PARALLEL SESSION VIII - T7.P5 - CREATING ECO-TECHNOLOGICAL TOOLS
Room 2.2.12 | Topic 7 - Climate and global changes (5)

OC-197 - (EEF2019-14094) - ACORNS AS PROXIES TO QUERCUS ADAPTATION RESPONSE TO INCREASED DROUGHT UNDER CLIMATE CHANGE

Carla Alegria (Portugal)[1]; Cristina Antunes (Portugal)[1]; Tatiana Oliveira (Portugal)[1]; Catarina Costa (Portugal)[1]; Anabela Silva (Portugal)[2]; Adelaide Clemente (Portugal)[1]; Sérgio Chozas (Portugal)[1]; Manuela Giovanetti (Portugal)[1]; Cristina Máguas (Portugal)[1]

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2 - Plant Functional Genomics Unit, Biossystems & Integrative Sciences Institute (BioISI), Faculdade de Ciências, Universidade de Lisboa

Seeds have become an extremely important tool to study plant response to climate change and thus could be used as a proxy for complex spatio-temporal interactions between vegetation and the environment. Plant investment in seeds could be influenced by respective adaptation to water stress and environmental variables. Quercus suber (QS) and Q. rotundifolia (QR) characterize Alentejo's semi-arid landscape. Acorn samples of QR and QS were collected from 28 study sites along an aridity gradient (AI) to evaluate possible correlations between seed isotopic signatures and morphological traits with climatic variables (long- and short-term). From acorns morphologic characterization, significant differences were found between Quercus species regarding weight, length and diameter. Such differences were also associated with a different chemical composition (total sugars, lipids and protein contents) in the case of QR. d18O vs. AI and d18O vs. length correlations suggest that long-term climatic variables influence seed development and water source uptake and/or transpired water. No differences in acorn d15N and d13C values were found between Quercus species. Considering the opposing correlations found between d15N vs. AI and d15N vs. length, it is evident that acorns are a good proxy to access integrative effects of long-term annual climatic changes in trees response to an aridity gradient. The negative correlation of d13C vs. weight, suggests that the greater the water stress the higher the plants' investment in its seed size. Acorns are sensitive to climate change, thus revealing differences in Quercus "local adaptation" to drought conditions along an aridity gradient.

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02/08 | 11h00
PARALLEL SESSION VIII - T7.P5 - CREATING ECO-TECHNOLOGICAL TOOLS
Room 2.2.12 | Topic 7 - Climate and global changes (5)

OC-198 - (EEF2019-13631) - NEW INSIGHTS ON ADAPTATION AND POPULATION STRUCTURE OF CORK OAK USING GENOTYPING BY SEQUENCING

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2 - Department of Biology, CESAM, University of Aveiro, Aveiro, Portugal; 3 - Department of Cell Biology, University of Brasilia, Brazil

Species respond to global climatic changes in a local context. Understanding this process, including its speed and intensity is paramount due to the pace at which such changes are currently occurring. Tree species are particularly interesting to study in this regard due to their long generation times, sedentarism, and ecological and economic importance. Quercus suber L. is an evergreen forest tree species of the Fagaceae family with an essentially Western Mediterranean distribution. Despite frequent assessments of the species' evolutionary history, large-scale genetic studies have mostly relied on plastidial markers, whereas nuclear markers have been used on studies with locally focused sampling strategies. In this work, "Genotyping by Sequencing" (GBS) is used to derive 1,996 SNP markers to assess the species' evolutionary history from a nuclear DNA perspective, gain insights on how local adaptation is shaping the species' genetic background, and to forecast how Q. suber may respond to global climatic changes from a genetic perspective. Results reveal (1) an essentially unstructured species, where (2) a balance between gene flow and local adaptation keeps the species' gene pool somewhat homogeneous across its distribution, but still allowing (3) variation clines for the individuals to cope with local conditions. "Risk of Non-Adaptedness" (RONA) analyses, suggest that for the considered variables and most sampled locations, (4) the cork oak should not require large shifts in allele frequencies to survive the predicted climatic changes. With the implementation presented in this work, the RONA can now also be easily assessed for other organisms.

02/08 | 11h00
PARALLEL SESSION VIII - T7.P5 - CREATING ECO-TECHNOLOGICAL TOOLS
Room 2.2.12 | Topic 7 - Climate and global changes (5)

OC-199 - (EEF2019-13740) - RESPONSE OF LICHEN AND MOSS TISSUE TRAITS TO SIMULATED CLIMATE CHANGE: INSIGHTS FROM DRYLAND BIOCRUSTS

Laura Concostrina-Zubiri (Spain)[1]; Enrique Valencia (Spain)[1]; Fernando T. Maestre (Spain)[1]

1 - Universidad Rey Juan Carlos

Scientists and policy-makers are in a constant search for integrative, cost-effective indicators of ecological change to monitor trends in global change drivers and predict their impacts on ecosystems. Recent research has shown promising results for the combined use of isotope and nutrient composition in biocrust-lichens and mosses as indicators of changes in climate and atmospheric pollution. However, few species have been investigated in a systematic way, except for boreal regions. Moreover, most of the previous work carried out to date is observational, while experimental studies are still scarce. In this work, we evaluated δ13C, δ15N and total C and N in four biocrust-lichen species typical from drylands subjected to a manipulative experiment to simulate climate change including three factors: i) biocrust species; *Buellia zoharyi*, *Diploschistes diacapsis*, *Psora decipiens* and *Squamarina lentigera*, ii) warming; control vs. 2-3 °C temperature increase using open-top chambers, and iii) warming+reduced precipitation; control vs. 2-3 °C temperature increase+30% rainfall reduction using passive rainout shelters. Our results showed that isotope composition and C and N values were, overall, highly species-specific. For example, δ15N, C and N of *P. decipiens* almost doubled those of *D. diacapsis*. Also, warming and warming+reduced precipitation treatments increased δ15N in *S. lentigera* and decreased δ13C in *B. zoharyi*. Additionally, simulated climate change treatments exacerbated and diluted differences between species depending on the trait on focus. These findings support the promising application of biocrust tissue traits as ecological indicators of climate change and reveal potential implications to soil composition and functioning in drylands.

02/08 | 11h00
PARALLEL SESSION VIII - T6.P5 - (BIO)DIVERSE AND SUSTAINABLE PRACTICES
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (5)

OC-200 - (EEF2019-13649) - ROCK OUTCROPS: NATURE-BASED SOLUTIONS TO PROMOTE HETEROGENEITY IN OAK WOOD PASTURES

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In the last decades, a declining trend in biodiversity has been registered worldwide. Given these emergent threats, there is growing recognition that Nature-based Solutions (NbS), i.e. the restoration, sustainable management and protection of natural or modified ecosystems, constitute cost-effective means to safeguard biodiversity and ecosystem functioning.

Agroforestry systems have been identified as a promising land-use generating socio-economic benefits and supporting biodiversity. The montado is an agroforestry system dominant in the southern Iberian Peninsula. When adequately managed, these cork (*Quercus suber* L.) and holm (*Q. rotundifolia* Lam.) oak wood pastures support high levels of biodiversity while combining a wide range of goods and ecosystem services. Despite its relevance, lack of economic incentives to management is leading to mismanagement or abandonment of *montado*, inducing its homogenization and compromising its habitat heterogeneity and its potential to hold biodiversity. Therefore, it is important to understand the role of landscape elements in enhancing the ecological diversity of *montado*. This includes rock outcrops, rock island-like formations that are not cleared due to its rocky nature and where grazing and farming activities are limited.

We analyzed the role of rock outcrops in plant species composition and functional diversity in *montados*. We found that these elements greatly increase montado biodiversity. Moreover, this increase did not compromise the economic productivity of montados since even very small outcrops significantly increase both compositional and functional diversities. In conclusion, our results indicated that rock outcrops may constitute relevant NbS in *montado*, adding habitat heterogeneity and increasing its capacity to support biodiversity.

02/08 | 11h00
PARALLEL SESSION VIII - T6.P5 - (BIO)DIVERSE AND SUSTAINABLE PRACTICES
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (5)

OC-201 - (EEF2019-13595) - IMPACT OF HONEY BEE DENSITY ON CROP YIELD: A META-ANALYSIS

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There is increasing recognition that pollination deficits are limiting crop yields worldwide. However, management strategies for optimal pollination are still unclear for most crops. Current management focuses on providing high densities of honey bees, but recommended densities are highly variable, even within single crops and varieties.

We performed an extensive literature search to record honey-bee densities and crop productivity. Effect sizes represented the difference in crop productivity between the two most extreme levels of honey-bee densities. Surprisingly, out of 795 reviewed studies, only 22 analysed the effect of at least two levels of honey-bee densities on crop productivity. Thus, most recommendations for crop pollination management are not based on proper experimental designs.

We found that both colony density and visitation rates increased all the productivity variables. However, effects were non-linear for visitation rates, suggesting that there is an optimum beyond which more honey bees are not beneficial for crop productivity. Effect sizes for visitation rates were greater than those for colony densities, suggesting that visitation rates are a more direct measure of the pollination process. Moreover, the benefits from honey-bee pollination varies according to the crop biology.

Synthesis. Despite the importance of honey bee pollination, there is a lack of studies designed for finding such an optimum level of crop pollination. Our analyses further suggest that visitation rates could be used as a proxy to guide management recommendations such as colony density and spatial arrangement, even if data on the relation between colony density and visitation rates are still lacking.

02/08 | 11h00
PARALLEL SESSION VIII - T6.P5 - (BIO)DIVERSE AND SUSTAINABLE PRACTICES
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (5)

OC-202 - (EEF2019-13621) - ECOLOGICAL AND EVOLUTIONARY STUDIES OF ENTOMOFAUNA FOR SUSTAINABLE MANAGEMENT IN AN ORGANIC VINEYARD AGROECOSYSTEM

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3 - LEAF, Instituto Superior de Agronomia, Universidade de Lisboa;
4 - Esporao SA

Sustainable farming depends on the maintenance of balance within the ecosystems, namely by promoting diversified habitats around or within crops to enhance beneficial organisms that control potential pests and diseases. Understanding this diversity and the role of landscape composition in the distribution and dispersal of pests and beneficial insects, as well as their adaptation and evolutionary potential, can be addressed at the molecular level, facilitated by the current technology of DNA mass sequencing. We are applying, in the vineyard agroecosystem of Herdade do Esporão (Alentejo, Portugal), ecological and evolutionary approaches, namely landscape ecology and landscape genomics studies, to understand fine-scale spatial and temporal variation in insect communities (pests, vectors of plant disease, natural enemies and pollinators), and associate them with environmental variation. Our aims are: 1) to model the vulnerability of vineyard plots and olive groves, identifying the variables influencing pest and vector prevalence and dispersal, and 2) to assess landscape quality based on diversity of target beneficial insect groups, identifying variables that can then be controlled in the management practices. Several high throughput genetic and genomic tools will be applied and developed, namely a metabarcoding platform to assess the diversity of target insects. Special focus is given to Auchenorrhyncha (suborder of Hemiptera), a group that includes leafhopper pests of vineyards and spittlebugs potential vectors of the plant pathogen *Xylella fastidiosa* Wells et al.. Taxonomic identification based on morphological characteristics and subsequent DNA sequencing is allowing to build a curated molecular database for this important group of species.

02/08 | 11h00
PARALLEL SESSION VIII - T6.P5 - (BIO)DIVERSE AND SUSTAINABLE PRACTICES
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (5)

OC-203 - (EEF2019-13458) - ECO-EVOLUTIONARY AGRICULTURE: A STUDY IN CROP ROTATIONS

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1 - Max Planck Institute for Evolutionary Biology

Since its origins, thousands of years ago, agriculture has been challenged by the presence of evolving plant pathogens. Current practices, facing the challenge of food supply in a fast-growing population, have started relying on computational tools to design efficient prospective planning. However, such approaches often neglect how ecology and evolution affect pathogen growth. Here, we present a methodology for developing cultivation strategies which studies how pathogens evolve depending on crop rotation patterns. Initially, the model focuses on cash and cover crop types and uses multi-criteria optimisation to integrate crop yield, soil quality and pest control. By using host-pathogen population dynamics, it predicts which rotation sequences are more robust to the infection. Subsequently, the application of pesticides in the field is considered: this leads to the analysis of pathogen resistance evolution and the estimation of strategy costs. With these results, the best rotation patterns are re-evaluated to minimise costs, and importantly, pesticide use. Overall, the model provides new insights on sustainable agricultural practices, as a novel application of mathematical biology tools.

02/08 | 11h00
PARALLEL SESSION VIII - T6.P5 - (BIO)DIVERSE AND SUSTAINABLE PRACTICES
Room 2.2.15 | Topic 6 - Sustainable agro-ecosystems (5)

OC-204 - (EEF2019-13823) - ON THE CONTRIBUTION OF SATELLITE EARTH OBSERVATION TO GRASSLANDS SUSTAINABLE MANAGEMENT

Sofia Cerasoli (Portugal)[1]; Joana Faria (Portugal)[1]; Carla Nogueira (Portugal)[1]; Mitja Ferlan (Slovenia)[2]; Klemen Eler (Slovenia)[3]; Giorgio Alberti (Italy)[4]; Alessandro Peressotti (Italy)[4]; Maria C. Caldeira (Portugal)[1]; Koffi Noumonvi (Slovenia)[2]; Manuel Campagnolo (Portugal)[1]

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In the actual climate change context, seasonal changes in precipitation and temperature are largely unpredictable. In annual grasslands, changes in climate seasonality can have large impact on phenology and biodiversity with major consequences on productivity. The adoption of remotely sensed observations for monitoring the impact of climate change on Gross Primary Productivity (GPP) can provide useful information allowing timely decisions on the use of resources in support of sustainable management.

We report results from two experiments in which optical measurements have been adopted to estimate GPP in grasslands.

The two sites represent different climate regions: Mediterranean (central Portugal) and sub-Mediterranean (southwest Slovenia). In both the experiments, the objective was to identify a set of vegetation indices to optimize a GPP model.

In-situ gas exchange and eddy covariance measurements were used to estimate GPP. The performance of sets of different spectral bands and vegetation indices retrieved from in-situ and remote platforms were compared.

At both sites, the Normalized Difference Vegetation Index (NDVI) index showed a general good performance in estimating GPP; however, both experiments evidenced the importance to consider also others vegetation indices, including bands reflecting changes in the vegetation water content (SWIR region).

Digital maps showing spatial and temporal GPP variability are proposed as a cost-effective practical application of the study.

Altogether, results evidence the potential of spectral information retrieved from satellite platforms for monitoring grasslands and improve GPP estimates in support of a sustainable management, while contributing to increase our knowledge on grassland responses to climate change.

02/08 | 11h00
PARALLEL SESSION VIII - T8.P3 - MARINE MICROALGAE COMMUNITIES
Room 2.2.14 | Topic 8 - Marine ecology (2); Topic 9 - Biodiversity and ecosystems (2)

OC-205 - (EEF2019-13847) - PHYTOPLANKTON COMMUNITY DIVERSITY EXPLAINED BY A BOTTOM UP MECHANISM INVOLVING ALLELOPATHY

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The high diversity found in phytoplankton communities intrigued ecologists since Hutchinson's *Paradox*. Theoretical and empirical developments elucidated mechanisms that could explain this diversity. Among them was proposed allelopathy. The role of allelopathy was suggested with theoretical models, but only recently was demonstrated in experimental two-species systems, confirming the theoretical prediction that intermediate levels of allelopathy could promote diversity. The aim of this work is to demonstrate if this principle holds for field communities, driven to equilibrium in laboratory culture.

A phytoplankton community was extracted from a freshwater pond and cultured in continuous cultures with three different nitrogen concentrations, being nitrogen the limiting resource for growth. The allelopathic cyanobacteria *Phormidium* sp. was inoculated in two replicates of each nitrogen concentration. One replicate of each nitrogen concentration was left as control. Previous works demonstrated that allelochemical production is linked to nitrogen availability in this species, so the three nitrogen concentrations represented low, intermediate and high strengths of allelopathy. The eukaryotic phytoplankton community was followed by microscopic counts until equilibrium.

After 75 days, communities were dominated by a reduced set of species, more than expected by classic resource competition theory. The intermediate concentration of nitrogen with presence of *Phormidium* showed higher diversity than the extreme concentrations and also than the control with intermediate concentration.

These results suggest that more mechanisms than just competition for nitrogen must be involved to explain the observed diversity. Also, the effect of the allelopathic species, at intermediate nitrogen concentration, promotes community diversity.

02/08 | 11h00
PARALLEL SESSION VIII - T8.P3 - MARINE MICROALGAE COMMUNITIES
Room 2.2.14 | Topic 8 - Marine ecology (2); Topic 9 - Biodiversity and ecosystems (2)

OC-206 - (EEF2019-13940) - PHYTOPLANKTON COMMUNITIES AND HAB SPECIES: ONE-YEAR OBSERVATIONS FROM TWO SHELTERED BAYS

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3 - CCMAR – Centro de Ciências do Mar, Universidade do Algarve;
4 - Departamento de Biologia Vegetal, Faculdade de Ciências, Universidade de Lisboa

Several studies suggest that phytoplankton can accumulate in upwelling shadow areas where offshore advection is weaker. This study aims to characterize the phytoplankton assemblages in two Portuguese sheltered bays and relate them with the main meteorological and oceanographic (MetOc) drivers. The relationship between the dynamics of dominant Harmful Algal species (HABs) and the local processes was also studied. The study was conducted during 2015 in Lisbon and Lagos Bays, located on the upwelling shadow of Cape Roca and Cape São Vicente, respectively. *In situ* surface temperature data and fortnightly water samples were collected to analyze the phytoplankton community. From satellite and model-derived products, several MetOc data were extracted. Multivariate analyses of phytoplankton community structure were performed using PRIMER-E with PERMANOVA add-on software. The results show some similarities between the Bays, like a bimodal pattern in phytoplankton biomass, phytoplankton concentration maxima associated with high diatom abundances in spring/summer, high relative abundance of dinoflagellates in late-summer/autumn and of coccolithophores during late-winter/early-spring. However, contrasting temporal distributions of some phytoplankton groups were found. In Lagos, dinoflagellates were also abundant during winter and, in Lisbon, coccolithophores were frequent all year round. The phytoplankton community structure showed significant statistical differences between the Bays and between seasons, suggesting that different seasons can be defined to each Bay. Differences in HAB species/groups were also observed. A higher number of HABs, higher abundances and a longer period of occurrence characterized Lagos Bay, indicating that MetOc conditions were more favorable to HABs in this Bay.

02/08 | 11h00
PARALLEL SESSION VIII - T8.P3 - MARINE MICROALGAE COMMUNITIES
Room 2.2.14 | Topic 8 - Marine ecology (2); Topic 9 - Biodiversity and ecosystems (2)

OC-207 - (EEF2019-13606) - TIDAL INFLUENCE ON THE PHYTOPLANKTON COMMUNITY OF TAGUS ESTUARY

Rui Cereja (Portugal)[1]; Joana Cruz (Portugal)[1]; Ana Brito (Portugal)[1]; Marta Rodrigues (Portugal)[2]; Vanda Brotas (Portugal)[1]

1 - MARE - Marine and Ennvironmental Science Centre;
2 - Laboratório Nacional de Engenharia Civil

Estuaries are highly variable systems and the most productive ecosystems in the world. Phytoplankton is a major contributor to the high productivity, rapidly responding to changes in the environment. Understanding such responses is key to assess water quality and to predict how these communities will evolve under climate change scenarios. Thus, the objective of our work was to analyse the effect of tidal cycles on the phytoplankton community in the Tagus estuary. Chlorophyll a was quantified as a proxy of phytoplankton biomass and the relative abundance of phytoplankton groups was evaluated through HPLC-CHEMTAX. Water temperature, pH, salinity, dissolved nutrients, suspended matter and light extinction coefficient were also measured. Sampling was performed weekly during one year at two sampling stations in the mid (Barreiro) and lower (Alcântara) areas of the estuary. To this point, chlorophyll concentrations ranged from 0.41 to 8.56 µg/L, with higher concentrations in Barreiro. Tides influenced both chlorophyll a concentration and community composition, presenting higher relative abundance of diatoms during high tides. The highest nutrient concentrations were observed at Alcântara, especially during low tides, due to the proximity of a water treatment station outlet. Tagus estuary is dominated by diatoms, with around 90% relative abundance during blooms, being chlorophytes the second most important group. Analysing the preliminary data, it is possible to observe that the most important driving forces explaining phytoplankton biomass were salinity and pH, strongly related to tidal cycles, and air temperature, solar radiation and light extinction coefficient, linked with the seasonal cycle.

02/08 | 11h00
PARALLEL SESSION VIII - T8.P3 - MARINE MICROALGAE COMMUNITIES
Room 2.2.14 | Topic 8 - Marine ecology (2); Topic 9 - Biodiversity and ecosystems (2)

OC-208 - (EEF2019-13948) - COCCOLITHOPHORES AS POTENTIAL MARINE RESOURCE FOR SUSTAINABLE AQUACULTURE

Bernardo Vicente (Portugal)[1,2]; Tamára Santos (Portugal)[3]; Ricardo São João (Portugal)[4,5]; Luísa Rodrigues (Portugal)[1]; Hugo Pereira (Portugal)[3]; João Varela (Portugal)[3]; Ana Tenreiro (Portugal)[2,6]; Ana Amorim (Portugal)[1,2]

1 - MARE - Marine and Environmental Sciences Centre, University of Lisbon, Portugal;
2 - Department of Plant Biology, Faculty of Sciences of University of Lisbon, Portugal;
3 - CCMAR - Centre of Marine Sciences, University of Algarve, Faro, Portugal;
4 - Center of Statistics and Applications of University of Lisbon, Portugal;
5 - Department of Computer Science and Quantitative Methods, School of Management and Technology, Polytechnic Institute of Santarém, Portugal;
6 - BioISI - BioSystems and Integrative Sciences Institute, Faculdade de Ciências da Universidade de Lisboa, Portugal

Coccolithus braarudii (holococcolith) and *Emiliana huxleyi* (heterococcolith) were isolated from Portuguese coastal waters and domesticated under laboratory conditions with the objective of providing strains with high potential for the production of high value products for aquaculture and biotechnology.

The growth patterns and photophysiology of the two species were investigated under controlled conditions, (19±1°C, 12:12 Light: Dark, 115 µmol photons m-2 s-1) using pulse amplitude modulated fluorometry (PAM), and the different growth phases characterized by flow cytometry (cell size, complexity, chlorophyll a autofluorescence and lipid content). The biochemical and nutritional profile of the studied species was assessed by elemental analyses, gravimetric quantification of total lipids and the fatty acid profile determined by gas chromatography coupled with mass spectrometry.

The growth rate of *C. braarudii* was on average 69.5% higher (0.76d-1) when compared with *E. huxleyi* (0.44d-1) ($P=0.005$). Results from biochemical analyses revealed that this strain of *C. braarudii* has high protein and lipid content, 34.6% and 22.1% of total dry weight, respectively. The fatty acid (FA) profile was mainly composed of ω-3 PUFA, 64.1% total FA, with high levels of DHA and EPA. *E. huxleyi* revealed lower ($P<0.001$) protein and lipid contents and a fatty acid profile rich in DHA but poor in EPA.

Finding alternative sources to ω-3 PUFA from wild fish is currently a major challenge for aquaculture. Given the cell size, high growth rate and nutritional quality, *C. braarudii* is a promising candidate for microalgae-based diets in aquaculture, particularly of larval stages, thus contributing to sustainable aquaculture practices.

02/08 | 11h00
PARALLEL SESSION VIII - T9.P11 - UNDER ANTHROPOGENIC PRESSURES
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-209 - (EEF2019-13925) - ROADS AS OVERLOOKED DRIVERS OF CHANGE IN BIRD COMMUNITIES

Fernando Ascensão (Portugal)[1,2]; Eloy Revilla (Spain)[2]; Henrique M. Pereira (Germany)[1,3]

1 - CIBIO - Research Center in Biodiversity and Genetic Resources;
2 - Estación Biológica de Doñana (EBD-CSIC), Spain;
3 - German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig

We sought to understand if roads have a major role in changing animal communities, using birds as model organisms.

In a continental-scale analysis, incorporating 750 species and > 30.000 point counts, we assessed for different land cover classes how road density affects the species richness and the community dissimilarity, after controlling for variability due to environment and methodological factors. We further analysed which traits of birds are favoured when inhabiting road surroundings.

Overall, we detected a decrease in species richness related to increasing road density, except for broad-leaved forests, in which richness increases with increasing road density. On the other hand, roads have a mixed effect in community dissimilarity, ranging from increasing the difference to homogenization of sites, depending on the land cover classes. Finally, we found evidences that species foraging on the ground, with a specialized diet (insectivores) and with larger body sizes tend to avoid areas with higher road densities.

Our study shows that roads are agents of change of bird communities, which is likely to have important consequences for population long-term viability, as well for important ecosystem services delivered by these species, namely pest control.

02/08 | 11h00
PARALLEL SESSION VIII - T9.P11 - UNDER ANTHROPOGENIC PRESSURES
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-211 - (EEF2019-14000) - EVALUATING IMPACTS OF RECREATIONAL TRAILS IN THE AZOREAN NATIVE FORESTS

Rui Miguel Dos Santos Mendes Carvalho (Portugal)[1]; Pedro Cardoso (Portugal)[2]; Artur Gil (Portugal)[1]; Paulo Borges (Portugal)[1]

1 - cE3c – Azorean Biodiversity Group, Azores University, Portugal;
2 - Finnish Museum of Natural History, University of Helsinki, Helsinki, Finland

Nature trails are currently the infrastructures that allow local populations and tourists to visit the most valuable and representative natural heritage in the Azores archipelago. In this archipelago, the trail network covers the endemic-rich mountain native forests, bogs and lava fields, all of which are not only rare (covering 4% of the original area) but extremely sensitive to physical and biotic disturbance.

Presently, Azorean park managers and other regional decision makers lack the necessary tools to understand and evaluate the impact of touristic recreational activities on current and long-term ecosystem integrity. To understand the main drivers of change on ecological processes putatively caused by recreational disturbance, we developed and applied methodologies do monitor changes to the plant and arthropod communitiess. 2) Performed a manipulative experiment designed to measure the efficiency of different trail building and maintenance techniques on helping minimize ecological impacts in the specific conditions of the Azorean native forest; 3) Performed a manipulative experiment that allowed to know precisely the shifts in taxonomical and functional characteristics caused by trampling

We present the results of a series of COBRA spider monitoring protocols applied in 5 trails distributed by 2 islands. We discuss how and under which conditions recreational use affected these communities, and how based on this use-effect interaction and together with the manipulative experiment results, we can model the recreational use– ecological impact relation using an Agent Based Modelling framework.

02/08 | 11h00
PARALLEL SESSION VIII - T9.P11 - UNDER ANTHROPOGENIC PRESSURES
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-212 - (EEF2019-13334) - THE IMPACT OF HISTORIC LAND-CLEARING ON THE FIRE-RESPONSE OF AN ENDANGERED BIRD SPECIES

Simon Verdon (Australia)[1]; Michael F Clarke (Australia)[1]; Simon J Watson (Australia)[1]

1 - La Trobe University

Land-clearing for agriculture often focuses on fertile areas, with many nature reserves confined to less fertile areas. It is well known that this bias in land-clearing can cause widespread declines in birds. However, that the legacy of land-clearing can alter our perception of species' fire-responses is a novel concept.

In Australia, widespread land-clearing during the 20th century removed fertile areas that were important for many bird species. I present data on the endangered mallee emu-wren Stipiturus mallee, which is a fire-specialist species. I show that across most of its range today, the mallee emu-wren is a "mid-successional specialist", meaning it prefers vegetation with 40-70 years-since-fire. However, in a small number of fertile areas that were never cleared, the mallee emu-wren occupies a much broader range of fire-ages (25-120 years-since-fire). I show that prior to land-clearing, fertile areas were common and would have supported most of the global mallee emu-wren population.

By favouring fertile areas during historic clearing, we have pushed the mallee emu-wren towards a novel fire-response characterised by mallee emu-wrens occupying a site for only 30 years, rather than for 100 years. This discovery explains why a dispersal-limited species like the mallee emu-wren has a fire-response that requires frequent dispersal to access new habitat with an appropriate fire-age. Historically this species would have had much lower dispersal requirements due to the longevity of habitat. I ask how many species globally have fire-responses today that are the result of modern landscape transformations rather than a continuation of their historic fire-responses.

02/08 | 11h00
PARALLEL SESSION VIII - T9.P11 - UNDER ANTHROPOGENIC PRESSURES
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-251 - (EEF2019-13680) - ARMED CONFLICTS AND WILDLIFE DECLINE: CHALLENGES AND RECOMMENDATIONS FOR EFFECTIVE CONSERVATION POLICY IN THE SAHARA-SAHEL

Jose Carlos Brito (Portugal)[1]

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Increasing conflicts and social insecurity are expected to accelerate biodiversity decline and escalate illegal wildlife killing. Sahara-Sahel megafauna has experienced recent continuous decline due to unsustainable hunting pressure. We aim at: 1) mapping the spatial and temporal occurrence of conflicts and other threatening factors in the Sahara-Sahel; 2) contrasting these factors with the distribution of threatened large vertebrates; 3) analysing population trends in three large vertebrates; and 4) identifying the key policy players needed to effectively reduce wildlife-related conflicts and making recommendations for conservation practitioners.

Georeferenced data on conflict events, accessibility, human populated places, and natural resource exploitation were mapped. Trend data on local population size of Addax and on illegal off-take of Dorcas gazelle and African savannah elephant were analysed.

Regional escalating conflict (565% growth since 2011) is hastening population decline in areas that were formerly refugia for megafauna. Addax population has collapsed in Niger and illegal killing of Dorcas gazelle in Libya and elephant in Mali have increased. Without conservation action, the unique and iconic biodiversity of Earth's largest desert will be forever lost.

We recommend: 1) establishing strong commitments for change in global attitude towards nature; 2) engraining a culture of environmental responsibility among all stakeholders; 3) fostering environmental awareness to drive societal change; 4) reinforcing regional security and firearms control; and 5) implementing local research and wildlife monitoring schemes. We identify relevant international partners needed to tackle these challenges and to make strong policy change for biodiversity conservation and regional stability.

02/08 | 11h00
PARALLEL SESSION VIII - T11.P1 - POLLINATORS ROLE IN ECOSYSTEMS
Room 2.3.13 | Topic 1 - Environmental risks and health (1); Topic 11 - Ecological networks (3)

OC-214 - (EEF2019-13636) - THE EFFECT OF TRAITS AND ISOLATION ON INDIVIDUAL--BASED POLLINATION NETWORKS OF THE ISLAND ENDEMIC ECHIUM CANDICANS

Ricardo Costa (Portugal)[1]; Ana Ceia-Hasse (Portugal)[2]; Carla Rego (Portugal)[2]; Andreia Penado (Portugal)[2]; Rui Rebelo (Portugal)[1]; Mário Boieiro (Portugal)[3]

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2 - Centre for Ecology, Evolution and Environmental Changes (cE3c), Azorean Biodiversity Group, Faculty of Sciences, University of Lisbon, Lisbon, Portugal;
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Generalist plants are an important food resource for pollinators and support diverse communities that ensure the pollination of other conspecific and heterospecific plants. However, many pollinator communities still remain to be properly assessed, that poses a challenge to the conservation of rare island endemic plants. Therefore, we studied the daytime visitor community of the Madeiran endemic *Echium candicans*, as well as the community of potential pollinators that occurred and visited other plants in its vicinity.

For 10-minute periods, during July 2018, we recorded the abundance and diversity of flower-visitors on 25 plants between 10:00 a.m. and 4:00 p.m. For each plant we characterized its morphological traits (flower quantity, plant and inflorescence size) and proximity to conspecifics. We assessed the community of potential visitors with a combination of both pan-traps (each cluster with blue, yellow and white) and transects sampled for 10-minute periods.

Several insects and a lizard species (*Teira dugesii*) visited *E. candicans*. The most abundant visitors were bumblebees (*Bombus ruderatus*, *B. terrestris*), bees (*Apis mellifera*, *Amegilla quadrifasciata* and *Lasioglossum* sp.), the hoverfly *Eristalis tenax* and the endemic butterfly *Hipparchia madeirensis*. Visitors were more abundant on plants closer together, with bigger inflorescences or a higher number of flowers. In contrast with the high abundance of Apidae (Hymenoptera) and *H. madeirensis*, other species like the bee Halictus frontalis were rarely observed on *E. candicans*, despite being abundant.

This study highlights the important ecological role of this endemic plant, being a critical resource for many flower visitors.

02/08 | 11h00
PARALLEL SESSION VIII - T11.P1 - POLLINATORS ROLE IN ECOSYSTEMS
Room 2.3.13 | Topic 1 - Environmental risks and health (1); Topic 11 - Ecological networks (3)

OC-215 - (EEF2019-13784) - IMPACT OF OZONE ON THE PERCEPTION OF OLFACTORY SIGNAL BY GENERALIST POLLINATORS

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Although generalist bee species such as bumblebees are able to forage on a wide range of plant species, they do not show equivalent development on all pollen. Host-plant recognition is then of primary importance. While bumblebees use visual cues to find their preferred hosts, plant volatiles also play an important role in attraction and discrimination. Actually olfactory signal is a primary cue that influences the bumblebee's flower decision and reduces uncertainty regarding visual cues. In the current context of global changes, increased levels of atmospheric pollutants, such as ozone, could affect volatile perception by bumblebees impacting the plant-pollinator chemical communication and threatening the plant-pollinator network. To investigate the effects of ozone on the perception of floral volatiles by Bombus terrestris foragers, electrophysiological experiments were carried out using electroantennogram recordings. In order to simulate a peak of ozone, naïve foragers were exposed to ozone at a given concentration (i.e. 0, 80, 120 or 200 ppb) for 60 min or 180 min. Following the exposition, the responses of bumblebee antennae were measured for different concentrations (i.e. 0.1, 1, 10 and 100 µg/µL) of three synthetic volatile organic compounds mimicking compounds generally found in floral scents (i.e. (–)-linalool, benzaldehyde and nonanal). Our results show that ozone exposition affects volatiles perception by bumblebees but that this effect depends on the ozone exposure (i.e., concentration and duration) as well as on the volatile compound and its concentration. These results indicate that such impact can affect plant-bumblebee interactions, interfering with both host detection and attraction.

02/08 | 11h00
PARALLEL SESSION VIII - T11.P1 - POLLINATORS ROLE IN ECOSYSTEMS
Room 2.3.13 | Topic 1 - Environmental risks and health (1); Topic 11 - Ecological networks (3)

OC-216 - (EEF2019-13751) - USING POLLINATION NETWORKS FOR SUSTAINABLE PROVISIONING OF MULTIPLE ECOSYSTEM SERVICES IN AGRICULTURAL LANDSCAPES

Isabel Marques (Portugal)[1]; David Draper (Portugal)[3]; Maria Santos (Mexico)[2]; Octavio S. Paulo (Mexico)[1]

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3 - 1. cE3c - Centro de Ecologia, Evolução e Alterações Ambientais. Faculdade de Ciências, Universidade de Lisboa. 1749-016. Lisboa Portugal. 2. UBC Botanical Garden & Centre for Plant Research, University of British Columbia, , Vancouver, BC, V6T 1Z4 Canada.

Pollination by animals, primarily bees, remains an essential step in the production of many crops but wild pollinators are in decline. Much of our modern agricultural production is based in cultivating monocultures with vast plantations of a single crop. Here we quantified the effects that monoculture crops might have on pollination networks.

In 2013 and 2014, during the peak of the flowering season, we collected data on visitation interactions to flowering plants in six different Portuguese farming systems: montado, Pine, Eucalyptus, rice field farming, traditional olive plantations and intensive olive farming. We built a bimodal plant-pollinator network for each of the six studied systems.

Pollination networks revealed a strong decline in pollination services in monoculture crops, being particularly significant in monoculture systems as Eucalyptus and Pine forests. A strong decline was also revealed in intensive olive farming when compared to traditional olive plantations.

This data show that the modern agricultural landscape has become a challenge for pollination services. So where does this leave us? Recognizing the importance of pollinators as an agricultural input is a first step to promote eco-sustainable solutions, as we will discuss in this talk. With effective training, farmers can not only contribute to the conservation of pollinators but also gain a profit from pollination networks in their farms. The direct value of the global animal-mediated pollination is worth €153 billion, which is lost in modern agricultural landscapes if no action is taken to promote sustainable practices.

02/08 | 11h00
PARALLEL SESSION VIII - T11.P1 - POLLINATORS ROLE IN ECOSYSTEMS
Room 2.3.13 | Topic 1 - Environmental risks and health (1); Topic 11 - Ecological networks (3)

OC-217 - (EEF2019-14191) - HOW TO INTEGRATE PUBLIC PERCEPTION OF NATURE INTO SCIENTIFIC QUESTIONS: PLANT-POLLINATOR NETWORKS IN A BOTANICAL GARDEN

Manuela Giovanetti (Portugal)[1]; Claudia Giuliani (Italy)[2,3]; Gelsomina Fico (Italy)[2,3]; Daniela Lupi (Italy)[4]

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3 - Ghirardi Botanic Garden, Department of Pharmaceutical Sciences, University of Milan;
4 - Department of Food, Environmental and Nutritional Sciences, University of Milan

Rarely public concerns are integrated into nature-related researches. The way citizens interface distance from nature is strongly influenced by direct experience (i.e. gardening activities or outdoor activities) and knowledge (tv and school programs). Can we tackle scientific questions while also taking into account public perception of nature? The Ghirardi Botanical Garden excellently worked as a repository of artificially-created plant biodiversity to address public concerns emerging from social enquiries. We first surveyed existing literature on social studies related to public perception of nature. Then we used these findings to address emerging concerns, by newly planned scientific investigations. Finally, we transferred information through a travelling exhibition.

One main concern we found in literature highlighted that appreciation of exotic plants, as the ones frequently planted in gardens, is related to the impact they may have on the surrounding 'natural' environment. Therefore, we recorded the existing networks between native and exotic flowers and local insect pollinators. Another study highlighted that scientific results need to link everyday individual experience. An experience common to a wide public is growing aromatic plants, in pots or gardens. Therefore, we investigated pollination modes and pollinator behaviours of the renown Salvia species, native and exotic, largely used in cuisine and gardening. Data refer to plant-pollinator networks, pollinators' foraging behaviour and outreach activities. Results have a double value: deepen knowledge on plant-insect networks and respond to public apprehension. Life- and social sciences do often progress on parallel lines, while results in one could advance investigation in the other.

02/08 | 15h20
PARALLEL SESSION IX - T7.P6 - BUILDING MODELS AND SCENARIOS
Room 2.2.12 | Topic 7 - Climate and global changes (4)

OC-218 - (EEF2019-13955) - REGIONAL-SCALE HETEROGENEITY IN LONG-TERM TRENDS OF COASTAL PRIMARY PRODUCTIVITY ALONG THE HUMBOLDT UPWELLING ECOSYSTEM: THE COMPLEXITY OF CLIMATE FLUCTUATIONS

Nicolas Weidberg (Norway)[1]; Jessica Bonicelli (Chile)[2]; Andres Ospina (Spain)[3]; Christopher Aiken (Chile)[4]; Mario Barahona (Chile)[4]; Bernardo Broitman (Chile)[5]; Sergio Navarrete (Chile)[4]

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4 - Pontificia Universidad Catolica de Chile;
5 - Centro de Estudios Avanzados en Zonas Áridas

Regional-scale oceanographic models predict that the well-documented global warming of the oceans may not occur or even reverse direction in the coastal zone of the major eastern boundary ecosystems, the most productive marine ecosystems of the planet. There, the equatorward winds that drive the upwelling of deep, cold, nutrient-rich waters may increase as a result of the increased land-sea pressure gradients, producing a general cooling of coastal surface waters (SST). Empirical evidence with available long-term SST time series provides mixed support for such effect in some, but not all upwelling ecosystems. In this study, we examined long-term time series for the period 2002-2016 of wind, SST and, especially, chlorophyll-a along the central Chilean coast between 26 and 36°S, and from the inner-shelf to the oceanic transition. Our results demonstrate the existence of strong long-term trends in upwelling winds and productivity, and much weaker long-term trends in SST. But, remarkably, these trends were heterogeneous latitudinally, reversing direction across a well-known latitudinal discontinuity in thermal conditions and coastal ecological assemblages at 32°S. North of this latitude, upwelling winds and primary production increased weakly but significantly over the 14yr period. At the southern end of the region, upwelling winds have weakened which has apparently resulted in a sharp decrease on coastal water productivity during spring months. These patterns are generally consistent with the poleward expansion of the Southeastern Pacific Anticyclone beyond the 32°S discontinuity, which may weaken and strengthen upwelling at equatorwads and poleward sections of the Humboldt upwelling ecosystem, respectively.

02/08 | 15h20
PARALLEL SESSION IX - T7.P6 - BUILDING MODELS AND SCENARIOS
Room 2.2.12 | Topic 7 - Climate and global changes (4)

OC-219 - (EEF2019-13963) - SIMULATING PLANTS BIOLOGICAL PROCESSES FOR GLOBAL CHANGE IMPACTS MODELLING ON SPECIES DISTRIBUTION

Matthieu Vignal (France)[1,2]; Julien Andrieu (France)[1,2]

1 - UMR 7300 ESPACE; 2 - Université Côte d'Azur

Global changes (e.g. global warming and Land-use/Land-cover changes) should have significant effects on species distribution. Considering the species' capacity to move is necessary for assessing this impact. The movement of plant species depends on the succession and the success of their own biological processes. The aim of this study is to present a spatially and temporally explicit model that can simulate these processes to assess global changes impact on seven trees and shrubs species in the Roya Valley (Southeastern France).

A dynamic hybrid species distribution model has been developed. It's based on (1) habitat suitability modelling (2) species abundance modelling as current species distribution, (3) observed landscape dynamics and (4) monitoring of recent changes impact on population dynamics of studied species. Biological processes simulated in this model are production, dissemination and germination of seeds, as well as the mortality rate of population due to various disturbances. This model is multiscale, i.e. each process and each interaction differ between micro-local scale (individual), local scale (population) and regional scale (species distribution).

Field data collection suggests that anthropogenic factors are more relevant than climatic factors. The results showed the potential future distributions of species for three time horizons and a set of climate scenarios.

This study established the importance of considering species abundance as current distribution and integrating plants biological processes into a dynamic model to simulate species distribution dynamics. The conclusions of this study are questioning the effectiveness of correlative models to assess the global change impacts on species distribution.

02/08 | 15h20
PARALLEL SESSION IX - T7.P6 - BUILDING MODELS AND SCENARIOS
Room 2.2.12 | Topic 7 - Climate and global changes (4)

OC-220 - (EEF2019-13628) - LIMITATIONS OF SPECIES DISTRIBUTION MODELS BASED ON AVAILABLE CLIMATE CHANGE DATA: A CASE STUDY IN THE AZOREAN FOREST

Lara Dutra Silva (Portugal)[1]; Eduardo Brito De Azevedo (Portugal)[2]; Francisco Vieira Reis (Portugal)[2]; Rui Bento Elias (Portugal)[3]; Luís Silva (Portugal)[1]

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Climate change is gaining attention as a major threat to biodiversity. It is expected to further expand the risk of plant invasion through ecosystem disturbance. Particularly, island ecosystems are under pressure, and climate change may threaten forest-dependent species. However, scientific and societal unknowns make it difficult to predict how climate change and biological invasions will affect species interactions and ecosystem processes. The purpose of this study was to identify possible limitations when making species distribution model projections based on predicted climate change. We aimed to know if climatic variables alone were good predictors of habitat suitability, ensuring reliable projections. In particular, we compared the performance of Generalized Linear Models, Generalized Additive Models and a selection of machine learning techniques (BIOMOD 2) when modelling the distribution of forest species in the Azores, according to the climatic changes predicted to 2100. Some limitations seem to exist when modelling the effect of climate change on species distributions, since the best models also included topographic variables, making modelling based on climate alone less reliable, with model fit varying among modelling approaches, and Random Forest often providing the best results. Our results emphasize the adoption of a careful study design and algorithm selection process. The uncertainties associated with climate change effect on plant communities as a whole, including their indigenous and invasive components, highlight a pressing need for integrated modelling, monitoring and experimental work to better realize the consequences of climate change, in order to ensure the resilience of forest ecosystems in a changing world.

02/08 | 15h20
PARALLEL SESSION IX - T7.P6 - BUILDING MODELS AND SCENARIOS
Room 2.2.12 | Topic 7 - Climate and global changes (4)

OC-221 - (EEF2019-13782) - NICHE, DISTRIBUTION AND CLIMATE CHANGE: ARE NICHE AND SPATIAL METRICS VALUABLE PREDICTORS OF PLANTS' VULNERABILITY TO CLIMATE CHANGE?

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It has been hypothesized that species with different distributions in environmental niche and geographical space may respond differently to changes in climate. The aim of this study is to assess how niche and spatial metrics are related to plants' vulnerability to climate change.

We used, as a case study, mountain saxicolous bryophyte species in Iberian Peninsula that are likely to be most vulnerable to the impacts of climate change. The current and future distribution for 39 bryophyte species were predicted by species distribution models using climatic and topographic variables known to have an important role in limiting such plants. Niche metrics (e.g. niche breadth and niche position) were calculated using a new tool based on multidimensional kernel density estimation procedure. Species range changes, specifically range contraction, were then related to niche and spatial metrics (e.g. range size) using linear regressions.

Correlation results between species range contractions and niche and spatial metrics revealed that species with higher marginality, narrow niche breadth and restricted range are more likely to experience range contractions. Taking in account different climate change scenarios in 2050, the best models explaining species range contractions included the single effect and combination of niche metrics and also the combination of range size and both niche metrics.

Our results suggest that the combination of niche and spatial metrics may improve predictions about plants' vulnerability in the context of global changes.

02/08 | 15h20
PARALLEL SESSION IX - T8.P4 - EXPLORING ECOLOGICAL INDICATORS
Room 2.2.14 | Topic 8 - Marine ecology (4)

OC-222 - (EEF2019-13723) - EXPLORING THE DISTRIBUTION AND DIAGNOSTIC POWER OF MICROBIOMES ACROSS THE GREAT BARRIER REEF TOWARDS THE IMPLEMENTATION OF MICROBIAL OBSERVATORIES

Pedro Frade (Portugal)[1]

1 - CCMAR Centre of Marine Sciences of Algarve

Microorganisms are fundamental drivers of biogeochemical cycling within coral reef ecosystems but their contribution to reef resilience is poorly understood. Faced with the growing impacts of rapid climate change which lowers the resilience of the Great Barrier Reef (GBR), identification of microbial taxa and functions that contribute to a healthy reef is critical. Here, we assess the diagnostic power of free-living and host-associated microbiomes for identifying environmental perturbation based on their habitat-specificity, environmental sensitivity and uniform response. We show that the seawater microbiome has the greatest diagnostic value, with environmental parameters explaining most of the observed compositional variation and temporal successions being dominated by uniform community assembly patterns. Further, seawater microbial community data provided a highly accurate prediction of seawater temperature, highlighting the diagnostic value of microorganisms and illustrating how long-term reef monitoring initiatives could be enhanced by incorporating assessments of microbial communities in seawater. We further synthesize current information that characterizes the pelagic microbial communities within distinct GBR regions to identify: a) how communities are influenced by input of riverine floodwaters and plumes on inshore reefs, b) how changes in benthic composition and health of the reef influence the pelagic microbes, and c) how microbial communities change along inshore to offshore gradients. We then extrapolate putative microbial community composition from known case studies to the overall spatial dimension of the GBR to create the first microbial mapping of the GBR. We postulate that incorporation of microbial observatories into environmental monitoring programs will improve prediction and management of environmental pressures.

02/08 | 15h20
PARALLEL SESSION IX - T8.P4 - EXPLORING ECOLOGICAL INDICATORS
Room 2.2.14 | Topic 8 - Marine ecology (4)

OC-223 - (EEF2019-13656) - BIOMASS-DENSITY RELATIONS OF ALGAE AND SEAGRASS AND THEIR USE AS ECOLOGICAL INDICATORS

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3 - Universidade Estadual do Rio de Janeiro, Departamento de Ecologia

As plants and algae grow in monospecific assemblies their collective biomass increases and if they compete hard enough some die, freeing up space. The concurrent increase in biomass and decrease in density is called self-thinning. Previous meta-analysis on plants identified a biomass-density boundary condition representing plants' maximum efficiency in packing biomass into space. Here, we analysed compiled data from 42 algae and 9 seagrass distributed worldwide. Results show that algae are the most efficient space occupiers on Earth, with its own biomass-density boundary transgressing that of land plants, probably because the watery environment facilitates the physical process of space occupation. On the other hand, the lower boundary of seagrass shows that these occupy space less efficiently. We applied a new metric - each stand's perpendicular distance to the boundary - showing that, within algae, the efficiency of space occupation depended on taxonomic group, functional group, clonality and latitude. Biomass-density relations have been at the centre of a search for an index describing the health of seagrass meadows. However, this search has been complicated by the intricacy of seagrass demographics and their fuzzy biomass-density relations, a consequence mainly of their modularity and clonal growth. Our study clarified their demography, with the new metric revealing and excellent tool to review fundamental aspects as clonal growth patterns, depth distribution, seasonality, interspecific competition, the effects of light, temperature and nutrients, and to evaluate their meadows as an ecological indicator for the health of coastal ecosystems. Seagrass meadows benefited from moderate nutrient inputs from waste-water treatment plants.

02/08 | 15h20
PARALLEL SESSION IX - T8.P4 - EXPLORING ECOLOGICAL INDICATORS
Room 2.2.14 | Topic 8 - Marine ecology (4)

OC-224 - (EEF2019-13937) - HOW CAN ENVIRONMENTAL FACTORS INFLUENCE THE SETTLEMENT OF DIPLODUS SPP. JUVENILES IN A TEMPERATE ROCKY REEF

Pedro Duarte-Coelho (Portugal)[1,2]; Diana Vieira (Portugal)[1,2]; André Valente (Portugal)[2,3]; José Neto (Portugal)[1,2]; Vanda Brotas (Portugal)[2,3]; Frederico Almada (Portugal)[1,2]

1 - ISPA-Instituto Universitário;
2 - MARE-Marine and Environmental Sciences Centre;
3 - Faculdade de Ciências da Universidade de Lisboa

Long-term biological data series on marine species are useful to reveal trends emerging from yearly fluctuations that are difficult to evaluate in short-term studies. They can also clarify the importance of different environmental factors in fish reproduction and settlement by comparing results from different years. Furthermore, ecological effects should become more evident while monitoring larvae and juvenile stages compared to adults. This study focused on four sparid species: *Diplodus sargus, D. vulgaris, D. cervinus* and *D. puntazzo*, with significant commercial interest and whose early life stages are frequently found in temperate rocky reefs. Intertidal surveys started in 2009 in a recent MPA at the central west coast of Portugal and the results showed extreme interannual fluctuations in juvenile abundances during their settlement phase which may be influenced by environmental variables (e.g. sea surface temperature, sea conditions, chlorophyll, wind). The most common species, *D. sargus*, shows a concerning decreasing trend between 2012 and 2017. Our preliminary results show that warmer years seem to contribute to small surges of *D. cervinus* and *D. puntazzo* settlers that are typically found in southern latitudes, highlighting the dynamic biogeographic frontier located along the Portuguese coast.

02/08 | 15h20
PARALLEL SESSION IX -T9.P12 - LOOKING AT THE POPULATION PICTURE
Room 2.2.15 | Topic 5 - Urban sustainability (1); Topic 9 - Biodiversity and ecosystems (4)

OC-226 - (EEF2019-13756) - POPULATION CYCLES OF GRAY-SIDED VOLES IN THE ARCTIC TUNDRA

Pedro G. Nicolau (Portugal)[1]; Sigrunn H. Sørbye (Norway)[1]; Nigel G. Yoccoz (Norway)[1]

1 - UiT The Arctic University of Norway

Voles represent a fundamental element of boreal and subarctic ecosystems, in which they play a key role in different biological functions. Vole populations cycles are thus a mirror of important links between ecological systems and the large-scale factors which drive them. In this study, we analyze the population cycles of Gray-sided Vole (Myodes rufocanus) populations in Northeast Norway, through 18 years from capture-recapture data, along a gradient of 200km within subarctic birch forest habitat, subject to strong environmental clines. Vole cycles can be described using autoregressive (AR) process, and by not considering sampling error, density-dependence might be underestimated and the cycles' parameters inaccurately estimated. To account for this bias, we used individual information and random effects to estimate capture probabilities using a multinomial likelihood on R-INLA. Furthermore, we corrected the observed counts using the Horvitz-Thompson (HT) estimator on the estimated probabilities, and fitted a second-order AR model log-transformed observed counts. To assess performance of our methodology, a simulation study was conducted in which different usual methods were compared. Our results showed a gradient in the population cycles from the coast to inland, with both the first and second AR varying inversely with the distance to the coast, a proxy for continentality. Capture history information had little impact in the improvement of our estimates, something which may reflect the large spatial variation, despite the use of spatio-temporal random effects, and limitations of the HT estimator. Methodological considerations and recommendations for population dynamic studies are further discussed in this presentation.

02/08 | 15h20
PARALLEL SESSION IX -T9.P12 - LOOKING AT THE POPULATION PICTURE
Room 2.2.15 | Topic 5 - Urban sustainability (1); Topic 9 - Biodiversity and ecosystems (4)

OC-227 - (EEF2019-13800) - DIETARY PREFERENCES OF THE EUROPEAN BEE-EATER (MEROPS APIASTER): SEASONAL AND BETWEEN-HABITAT VARIATION

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The European Bee-eater (*Merops apiaster*) is an insectivore species foraging mainly on flying insects. Despite the diet of bee-eaters being relatively well studied, there is still a lack of understanding about its spatio-temporal variation. In this study we explore the between-habitat variation in diet and prey preferences of adult and nestling bee-eaters as well as temporal variation in diet of adults during breeding season in Portugal. We sampled pellets of adults and nestlings as well as prey availability on five breeding colonies located in distinct habitats categorized by land-use type: oak woodland, dryland pasture, meadow, irrigated pasture and pine tree forest.

Hymenoptera and Coleoptera comprised more than 90% of adults' and nestlings' diet. Besides the decrease in Hymenoptera consumption across time in pine tree forest, no other temporal differences were evident in adult diet. Adults and nestlings consumed more Coleoptera in dryland and irrigated pasture and Hymenoptera were consumed in higher proportions in dryland pasture and pine tree forest, possibly due to the presence of bee-hives in the vicinity. We found no relevant significant differences between the diet of adults and nestlings. Based on Jacob's Index, bee-eaters prefer Hymenoptera, Coleoptera or Hemiptera but rejected the other orders. In sum, bee-eaters are highly selective, consuming mainly Coleoptera and Hymenoptera regardless of habitat. Adults don't seem to change their diet during the course of the breeding season and feed the nestlings with the same proportions of each taxa as they consume.

02/08 | 15h20
PARALLEL SESSION IX -T9.P12 - LOOKING AT THE POPULATION PICTURE
Room 2.2.15 | Topic 5 - Urban sustainability (1); Topic 9 - Biodiversity and ecosystems (4)

OC-213 - (EEF2019-13712) - THE VALUE OF SOUTHWESTERN ETHIOPIAN FORESTS FOR MAMMAL DIVERSITY CONSERVATION: INSIGHTS FROM A COFFEE GROWING REGION UNDER RAPID CHANGE

Patricia Rodrigues (Germany)[1]; Dale Nimmo (Australia)[2]; Ine Dorresteijn (Netherlands)[3]; Kristoffer Hylander (Sweden)[5]; Feyera Senbeta (Ethiopia)[4]; Jan Hanspach (Germany)[1]; Joern Fischer (Germany)[1]

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4 - College of Development Studies, Addis Ababa University, Ethiopia;
5 - Dept. Ecology, Environment and Plant Sciences, Stockholm University, Sweden

High rates of human population growth and deforestation are threatening Ethiopia's highlands forests, a biodiversity hotspot, and the place of origin of Arabica coffee. We predicted the changes in mammal diversity patterns to the year 2050, as a result of human population growth and forest cover change and assessed the contribution of natural coffee forests for those patterns. Mammals were sampled using camera traps in 96 locations, during 13 months. Sampling points were located in coffee forests and undisturbed natural forest habitat. Data analysis included generalized additive mixed models and the development of future scenarios of human population growth. Different mammal species responded differently to predicted changes in human population density, while the response of the mammal community was consistent across the development scenarios. The leopard, a top predator, was found to be positively associated with undisturbed forests and negatively affected by the development scenarios. Our results contribute to the understanding of how human population growth will affect mammal community and individual species while also revealing which of the possible pathways of growth will impact mammal diversity the least. This information can be used to guide conservation and development strategies in the region.

02/08 | 15h20
PARALLEL SESSION IX -T9.P12 - LOOKING AT THE POPULATION PICTURE
Room 2.2.15 | Topic 5 - Urban sustainability (1); Topic 9 - Biodiversity and ecosystems (4)

OC-230 - (EEF2019-13733) - COULD MARKED PRESENCE OF BLASTOCYSTIS IN INTESTINAL MICROBIOME OF LITTLE AND GREAT BUSTARDS, BE AN INDICATOR OF STRESS?

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Objectives: To analyse the presence of Blastocystis in some protected steppe bird species and its proportion in the microbiome. In addition, to test what Blastocystis STs appear in these birds and their importance.

We analysed faecal samples of 6 steppe bird species by flocks; 6 flocks of Great Bustard (Otis tarda), 15 flocks of Little Bustard (Tetrax tetrax), 10 flocks of Pin-tailed Sandgrouse (Pterocles alchata), 2 flocks of Black-bellied Sandgrouse (Pterocles orientalis), 7 flocks of Red-legged Partridge (Alectoris rufa), 5 groups of farmed Red-legged Partridge (Alectoris rufa) and 1 group of Quail (Coturnix coturnix). All samples were collected in Spain except for one flock of Little Bustard sampled in the Republic of Kazakhstan.

All samples were analysed by metabarcoding using large spectrum 18S primers.

We found Blastocystis in all of the studied host species. However, we obtained very high proportions of Blastocystis reads in Little Bustards (10.82% of total sequences, 90.6% of protist sequences) and Great Bustards (3.62% of total sequences, 95.6% of protist sequences), while in farm Red-legged Partridges these were only 0.24% and in the other species lower than 0.1%.

Although we do not know the true role of Blastocystis in the microbiota of these species, the high numbers of Blastocystis found in Little and Great Bustards suggest that these species may suffer immunosuppression due to stress factors. This could be especially worrying in Little Bustards, which in the last 11 years have suffered a population decline almost of 50 percent in Spain.

02/08 | 15h20
PARALLEL SESSION IX -T10.P4 - RESTORING MEDITERRANEAN ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (2); Topic 11 - Ecological networks (1)

OC-231 - (EEF2019-13816) - EMBEDDING ENVIRONMENTAL STEWARDSHIP IN ECOLOGICAL NETWORKS DEFINITION. AN OPPORTUNITY FOR POLICY MIX APPROACHES IN SOUTHWESTERN PORTUGAL.

Rosário Oliveira (Portugal)[1]; Diogo Alagador (Portugal)[2]; Miguel Araújo (Portugal)[2]; Carla Antunes (Portugal)[3]

1 - Institute of Social Sciences - University of Lisbon;
2 - CIBIO, University of Évora; 3 - MeditBio, University of the Algarve

Ecological connectivity in Portugal has not deserved particular attention so far. In 2018 a preliminary proposal of green infrastructure has been integrated into the National Program for Territorial Planning Policy that was considered as relevant as other grey infrastructure networks regarding the role they play in territorial dynamics.

At the regional scale, the definition of ecological corridors in spatial planning instruments, such as the Regional Plans of Spatial Planning or the Regional Forestry Plans, are disconnected from local spatial management. Scaling-down methodologies with application at least at municipal level should provide guidance for green infrastructures design and implementation embedded in appropriate and effective management and governance models.

The objective will be to present the methodology for defining a green infrastructure in the Seixe river basin along with the management model for its implementation, in an area with about 25,000 hectares that includes 3 municipalities in the southwesthern Portugal.

In this area, 44% of the land use corresponds to eucalyptus and 93% has a protection status – the Monchique Natura 2000 site and the Southwest Alentejo and Vicentina Coast Natural Park. The results allowed the identification of management typologies - areas to be conserved, recovered and reconverted, which implementation implies solutions of policy mix and environmental stewardship management, as a result of a participatory process. The aim is to present solutions for land management through the restoration of ecological connectivity, as a response to climate change, to biodiversity threats and depopulation of rural areas once they are problematic with great national expression.

02/08 | 15h20
PARALLEL SESSION IX -T10.P4 - RESTORING MEDITERRANEAN ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (2); Topic 11 - Ecological networks (1)

OC-232 - (EEF2019-13969) - QUANTIFYING MICROCLIMATE IMPACT IN MEDITERRANEAN OAKS FROM TREE TO LANDSCAPE LEVEL

Adriana Príncipe (Portugal)[1]; Pedro Pinho (Portugal)[1]; Alice Nunes (Portugal)[1]; Paula Matos (Portugal)[1]; Cristiana Aleixo (Portugal)[1]; Cristina Branquinho (Portugal)[1]

1 - FCUL/cE3c

Semi-arid Mediterranean woodlands dominated by cork oak and holm oak are facing significant tree decline. Thus, the recovery of tree cover is vital to better adapt these ecosystems to climate change. At the local scale, microclimate conditions may largely influence tree regeneration and growth rates being important to design guidelines to improve semi-arid forest restoration and resilience.

Here, we assessed the impact of microclimate conditions (e.g. created by topography) on holm oak and cork oak using: i) physiology and ecological traits, ii) potential natural regeneration rate and iii) potential cover at the landscape level (c. 35.000 km2). Potential Solar Radiation was used as a surrogate of microclimate. First, we measured tree traits to quantify the relative importance of microclimate at tree level. Second, we used aerial photography and satellite images, both forms of remotely sensed data, to measure the effects of microclimate at forest stand and at landscape levels. Lastly, we developed an empirical model to map with high resolution (10 m) tree cover potential.

We found that the rate of natural regeneration and tree density were significantly reduced in areas with high potential solar radiation. At the landscape level, we confirmed that tree cover was influenced jointly by micro and macroclimate. The model built could identify areas where natural tree regeneration is possible without further management (passive restoration), and areas where assisted afforestation techniques are necessary (active restoration) to increase tree cover. Microclimate proved to be relevant for regeneration and restoration success, aiming at increasing semi-arid forest cover.

02/08 | 15h20
PARALLEL SESSION IX -T10.P4 - RESTORING MEDITERRANEAN ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (2); Topic 11 - Ecological networks (1)

OC-233 - (EEF2019-13783) - LONG-TERM DYNAMICS OF CANOPY COVER IN MEDITERRANEAN EVERGREEN OAK WOODLANDS REVEALS A DEGRADATION TREND DETERMINED BY MANAGEMENT AND CLIMATE

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Mediterranean evergreen oak woodlands are global priority ecoregions and cover approximately 4.6 million ha in southern Iberian Peninsula. However, widespread oak mortality and crown defoliation is occurring, especially since the 1980s. We quantify, for the first time, long-term trends in canopy cover for evergreen oak woodlands in Portugal and aim to analyze if canopy cover trends reflect increasing ecosystem degradation over time, in association with changes in land management and climate. We assume increasing canopy cover as a proxy of ecosystem recovery and decreasing canopy cover as a proxy of ecosystem degradation. We use forest cover data at the national scale to quantify changes in cork oak and holm oak canopy cover in Portugal for the period 1965-2006, and separately for the first half (1965-1990) and the second half (1990-2006). We explore drivers of canopy cover change using binomial logistic regression. Between 1965 and 2006, cork oak canopy cover was dominantly persistent (45.1%), whilst holm oak canopy cover mainly decreased (48.6%). Canopy cover dynamics however showed an increased and accelerated decline over time for both oak species. Whilst between 1965 and 1990, canopy cover gains (over 40%) were much higher than losses (under 10%), between 1990 and 2006, losses (over 40%) were higher than gains (under 6%). Canopy cover decrease was higher in flatter areas with more intensive understory use, and during periods of more prolonged heat, more intense spring-summer precipitation and spring-summer water deficit. Identification of hotspots of canopy cover decrease needing active oak woodland restoration is urgently needed.

02/08 | 15h20
PARALLEL SESSION IX -T10.P4 - RESTORING MEDITERRANEAN ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (2); Topic 11 - Ecological networks (1)

OC-234 - (EEF2019-13897) - RESPONSES OF WOODY VEGETATION TO GROUNDWATER CHANGES: INSIGHTS FROM MEDITERRANEAN AND TROPICAL COASTAL DUNE ECOSYSTEMS

Cristina Antunes (Portugal)[1]; Sergio Chozas (Portugal)[1]; Mari Cruz Barradas (Spain)[2]; Maria Zunzunegui (Spain)[2]; Simone Vieira (Brazil)[3]; Cristina Máguas (Portugal)[1]

1 - cE3c;
2 - Universidad de Sevilla;
3 - UNICAMP

Predicted droughts and anthropogenic groundwater use will increase the rates of water table lowering in several regions of the world. Spatio-temporal variations in water-table depth can have a great impact on physiological fundamental processes, constraining plant performance and, ultimately, survival. In seasonally dry coastal dune forests, groundwater can be particularly important for ecosystem water balance and a relevant water source for vegetation. We aimed to understand the impacts of a falling water table on the woody vegetation of costal dune ecosystems under contrasting climatic conditions.

Through water-table depth modeling, determination of plants' water-sources-use and evaluation of physiological traits, we investigated plants' ecophysiological responses to increasing depths to groundwater in a semi-arid Mediterranean and Tropical coastal ecosystem. We showed that climatic conditions, hydrology and vegetation water-use determined plant ecophysiological patterns.

We found that while groundwater influence on water-uptake depth is globally prevalent, its contribution to the overall physiological status of woody species is not. The impact of increasing depth to groundwater showed to be greater in the semi-arid mediterranean site, particularly affecting plants' water status. Inter and intra-specific variability of both water-uptake depth and carbon and nitrogen acquisition showed to be greater in drier conditions, reflecting different strategies to thrive in particular hydrological conditions.

By disentangling the functional responses of woody community to water table depth, our study identified mechanisms underlying the hydrological impacts that threaten the persistence of ecosystems in their current structures and compositions. It establishes the basis for predicting the vulnerability of coastal dune vegetation to groundwater drawdown.

02/08 | 15h20
PARALLEL SESSION IX -T10.P4 - RESTORING MEDITERRANEAN ECOSYSTEMS
Room 2.2.21 | Topic 6 - Sustainable agro-ecosystems (1); Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (2); Topic 11 - Ecological networks (1)

OC-235 - (EEF2019-13757) - SUSTAINABLE USE OF THE LAND IN SEMIARID REGIONS WITH ARGANIA SPINOSA

Mari Cruz Díaz-Barradas (Spain)[1]; Maria Zunzunegui (Spain)[1]; Juan Jáuregui (Spain)[1]; Said Boutaleb (Morocco)[2]; Fatima Ainlhout (Morocco)[2]

1 - University of Seville;
2 - University of Agadir

Argania spinosa is a model of sustainable use of resources in semiarid regions of Morocco. This tree, mostly endemic of the country, offers a variety of ecosystems services, protection of the land against desertification, high quality wood, leaves browsed by goats and the seeds provide high quality oil that is used for cooking and cosmetic. Oil is mainly processed by women cooperatives, which obtain their economic support from these activities. Argan woodlands are also a cultural landscape, named as World Heritage from UNESCO.

Due to the importance of this species, we have been studying the ecology and function of this tree in order to promote conservation practices. Argan woodlands are open spaces, with tree density oscillating between 30-60 trees.ha-1, showing a clumping spatial pattern at small scale that could be the result of sprouting.

Xylem water isotopic composition (δ18O) and electrical resistivity images have shown that roots exploit a mixture of water sources, including precipitation and soil at different depths. Photosynthetic activity ranges between 10-30 µmol.m-2s-1 and it is strongly controlled by leaf conductance which responds to VPD. Mature leaves are soft and present all over the year elevated δ13C discrimination (-29 to -31‰ values).

Greenhouse experiments are showing that young saplings resist to cold stress, plant growth increases in response to simulated browsing and atmospheric CO2 concentration

All these studies evidence the multiple adaptations of A.spinosa to face the semiarid conditions of its habitat, maintaining an elevated productivity and we propose the regeneration of this tree in abandoned areas.

02/08 | 15h20
PARALLEL SESSION IX -T11.P2 - SOIL-PLANT-ANIMAL INTERACTIONS
Room 2.3.13 | Topic 6 - Sustainable agro-ecosystems (1); Topic 11 - Ecological networks (4)

OC-236 - (EEF2019-13779) - THE HORMETIC EFFECT OF CADMIUM ACCUMULATION ON HERBIVOROUS SPIDER MITES IS UNAFFECTED BY ORGANIC DEFENCES OR PLANT SUGARS

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1 - Centre for Ecology, Evolution and Environmental Changes;
2 - Biosystems and Integrative Sciences Institute

Some plants accumulate toxic metals in their shoots, which ca be used as a defence against herbivores. However, how the interaction between metals and herbivores is affected by the physiological changes imposed by metals on plants or by the induction of organic plant defences remain overlooked.

Here, we studied the interactions between tomato (*Solanum lycopersicum*), a cadmium accumulating plant, and two spider-mites, Tetranychus urticae and T. evansi that respectively induce and suppress organic plant defences. The oviposition of both species increased with mild cadmium concentrations but decreased at higher concentrations, revealing a hormetic response. Sugar contents co-varied with spider-mite oviposition, with the lowest concentrations obtained for the highest oviposition values. Moreover, induction and suppression of plant defences by spider mites were not related to Cd in the plants; nor the effect of Cd on spider-mite performance was affected by induction and suppression of plant defences. These results suggest no interaction between metal accumulation and induction of organic plant defences.

We then offered an artificial diet to mites with different concentrations of cadmium or sugars. When given a diet with cadmium only, spider mites recovered the hormetic response shown on entire plants, which was not the case when they were fed with sugars. This indicates that Cd directly affected spider-mites, instead of indirectly through physiological changes in the plant.

Our results have important consequences for the evolution of metal-accumulation and on plant-herbivore interactions on metal polluted environments.

02/08 | 15h20
PARALLEL SESSION IX -T11.P2 - SOIL-PLANT-ANIMAL INTERACTIONS
Room 2.3.13 | Topic 6 - Sustainable agro-ecosystems (1); Topic 11 - Ecological networks (4)

OC-237 - (EEF2019-13620) - ORANGES AND APPLES? PLANT RESPONSES TO INSECT HERBIVORES OF DISTINCT FEEDING GUILDS

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Plants face a diversity of biotic challenges in the field, including a broad range of arthropod herbivores. To understand plant responses to multiple herbivory challenges, chemical and molecular ecologists generally focus only on their proximate mechanisms, employing arbitrary herbivore loads in factorial presence-absence treatments of two species, or additive density designs. These experiments do not disentangle specific responses of plants to herbivore species from responses to the overall herbivore pressures that they experience.

We suggest a conceptual methodological approach for determining functionally equivalent loads of each herbivore species, exerting on the plant similar herbivore pressures, which can be measured using a common currency (e.g. a proxy for plant fitness or yield). We present an example, calibrating equivalent loads of leaf-chewing caterpillars and phloem-sucking aphids for similar damage to cabbage seedlings, coupled with the quantification of plant hormone and volatile responses.

Seedling vegetative growth decreased linearly with the loads of each herbivore species, producing a one-to-one equivalence mapping between herbivore loads. This mapping covered all of the implemented range of caterpillar loads, and most of the implemented aphid loads. Consequently, across these ranges, differences between plant chemical responses to the herbivores could be attributed to the identities of the herbivore species.

This calibration approach offers to remove the common confound of unstandardized herbivore pressures in multiple herbivory experiments, and can foster a more refined understanding of plant responses to the diversity of herbivores encountered in nature.

02/08 | 15h20
PARALLEL SESSION IX -T11.P2 - SOIL-PLANT-ANIMAL INTERACTIONS
Room 2.3.13 | Topic 6 - Sustainable agro-ecosystems (1); Topic 11 - Ecological networks (4)

OC-238 - (EEF2019-13934) - FLORAL TRAIT PREFERENCES OF NONFLOWER-SPECIALIZED BIRDS AND INSECTS ON THE GALÁPAGOS

Sandra Hervías-Parejo (Spain)[1]; Ruben Heleno (Portugal)[2]; Manuel Nogales (Spain)[3]; Jens Olesen (Spain)[4]; Pablo Vargas (Spain)[5]; Anna Traveset (Spain)[1]

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2 - University of Coimbra;
3 - IPNA (CSIC);
4 - University of Aarhus;
5 - Real Jardín Botánico (CSIC)

Relying on floral morphology to assess pollination systems has been shown to underestimate the ecological service that novel mutualisms can provide. Although vertebrates with opportunistic food habits are common on islands, little is known about how effective they are as pollinators. We thus investigated whether native insectivorous and frugivorous birds act as pollinators by means of pollinator exclusion experiments, and then tested if birds show any preference for specific floral traits. Galápagos passerines are not specialized flower-visitors, either in feeding habits or in terms of morphology, but bird-flower visitation seems to be very common across the entire archipelago. Non-metric multidimensional scaling (NMDS) was used to evaluate the distribution of 16 flower morphology and nectar traits values along two main dimensions and measure the similarity between 26 native plants visited mostly by birds versus those by insects. We confirmed the pollination effectiveness of opportunistic Galápagos birds. Quantitatively, birds were not important pollinators compared to insects. However, qualitative components of fitness improved when both birds and insects visited the flowers. We further reported two main flower types: entomophilous species, which are as expected to be mostly visited by insects, and a second group mostly visited by opportunistic birds that display mixed floral traits not fitting the classical ornithophilous syndrome. Flower shape, corolla size and nectar volume seem to be important for bird visitation in the plant community of the Galápagos. Our study underscores the importance of co-adaptation and floral diversification in non-specialized plant-visitor interactions.

02/08 | 15h20
PARALLEL SESSION IX -T11.P2 - SOIL-PLANT-ANIMAL INTERACTIONS
Room 2.3.13 | Topic 6 - Sustainable agro-ecosystems (1); Topic 11 - Ecological networks (4)

OC-240 - (EEF2019-13657) - MAKING INFERENCES ON HOST-MICROBIOTA INTERACTIONS USING ECOLOGICAL NETWORK METHODS

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The past twenty years have seen both a surge of interest in assessing ecological interactions using tools borrowed from network theory and an explosion of data on the occurrence of microbial symbionts thanks to next-generation sequencing. Ecologists now face huge datasets reporting microbial co-occurrences within different hosts, and have yet to understand them.

We present two methods to elucidate the determinants of multipartite interaction networks under controlled or observational protocols and apply them to experimental data on Daphnia magna and its interactions with gut microbiota and bacterioplankton.

The first method is based on classifications and compares communities (modules) within networks to the grouping of nodes by treatment or similar controlling groups. The second method assesses the link between multivariate explanatory variables and network structure using redundancy analyses of 'trait matrices' obtained after singular value decomposition. In both methods, the significance of effects can be gauged through edge randomization.

Our results suggest that bacterioplankton and gut microbiota communities are different. Daphnia's diet only affects bacterioplankton while its genotype determines its gut microbiota through a richness effect and its bacterioplankton through an affinity effect. Overall our results suggest little reciprocal effect between the two microbial communities.

Our methods are widely applicable to bipartite networks, can elucidate both controlled or environmental effects, and can even tease apart reciprocal effects of networks on one another. In Daphnia magna's microbial networks, there is little reciprocal effect, but both networks are at least partly determined by the host's diet and/or its genotype.

02/08 | 17h50
PARALLEL SESSION X -T7.P7 - FRONTIERS WITH POLICY AND SOCIETY
Room 2.2.12 | Topic 7 - Climate and global changes (4)

OC-241 - (EEF2019-13815) - NATURA 2000 NETWORK ADAPTATION STRATEGIES IN THE FACE OF CLIMATE CHANGE

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2 - Research Centre in Biodiversity and Genetic Resources - EcoChange lab;
3 - University of Santiago de Compostela

Changes on biodiversity distribution due to climate change could lead to a loss of effectiveness of the protected areas worldwide. It is necessary to adapt conservation efforts to be more resilient to these changes. In this study we used predicted models to project bird distribution in Catalonia into the future (2050) under a climate change scenario, and assessed how changes in distribution would affect their coverage under the current extent of Natura 2000 (N2K). We observed that the distribution of 60% of the species decreased inside the N2K, and is especially remarkable for open habitat species such as European turtle dove (Streptopelia turtur, 80% reduction). We developed a systematic planning approach to address the decrease of bird species representation inside N2K and to try to improve the resilience of N2K and therefor our conservation efforts, in the face of these expected changes. We identify priority zones for biodiversity conservation that would be important in the future for ensuring the maintenance of these bird species by using a systematic conservation planning tool: Marxan. Preliminary results show that these zones are mainly in the west of Catalonia. The adequate management of these areas and the maintenance of open habitats within N2K will be key aspects to guarantee the correct management of these species in the future. The exercise that we present here shows the need to incorporate the dynamism of natural systems in conservation planning to adapt them to future changes that may occur and enhance the resilience of our conservation efforts

02/08 | 17h50
PARALLEL SESSION X -T7.P7 - FRONTIERS WITH POLICY AND SOCIETY
Room 2.2.12 | Topic 7 - Climate and global changes (4)

OC-242 - (EEF2019-13855) - ESSENTIAL BIODIVERSITY VARIABLES: A FRAMEWORK FOR MONITORING BIODIVERSITY CHANGE AND SUPPORT DECISION MAKING

Laetitia Navarro (Germany)[1]; Néstor Fernández (Germany)[1]; Henrique Pereira (Germany)[1]

1 - German Center for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig

The ability to monitor changes in biodiversity underpins the need to produce relevant and trustworthy information on the status and trends of biodiversity, the mechanisms driving these trends, and the efficiency of conservation policies. Yet, biodiversity monitoring efforts are still spatially and temporally fragmented and biased, and are often not sufficient to support both assessments and projections of scenarios for nature futures. In response, the Essential Biodiversity Variables (EBVs) framework was proposed by the Group on Earth Observations Biodiversity Observation Network (GEO BON). Here, we will present a conceptual and operational revision of the EBV framework and its ability to support the detection and attribution of biodiversity change and to guide countries and regions in the definition of priorities for monitoring. In particular, we will discuss how the development of EBVs can catalyze the mobilization of massive amounts of in situ biodiversity data, and take full advantage of emerging remote sensing technologies, novel biodiversity models, informatics infrastructures and open data policies. We will then demonstrate the potential of the EBVs to guide the design of biodiversity observatories that effectively prioritize the production of relevant and timely biodiversity information. We will conclude by illustrating how EBV products can provide information readily available to produce policy-relevant outputs, including multi-scale indicators of biodiversity change.

02/08 | 17h50
PARALLEL SESSION X -T7.P7 - FRONTIERS WITH POLICY AND SOCIETY
Room 2.2.12 | Topic 7 - Climate and global changes (4)

OC-243 - (EEF2019-13791) - A MULTIMODEL COMPARISON OF BIODIVERSITY HISTORICAL TRENDS AND FUTURE SCENARIOS WITH THE SHARED SOCIO-ECONOMIC PATHWAYS

Henrique Pereira (Germany)[1]

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Over the last two decades many scenarios exercises about the future of biodiversity have been carried out. However, they often use a single model and when different models are compared, they often use different driver projections. Here we present the first multi-model comparison with a set of harmonized land-use and climate change scenarios. We brought together ten biodiversity models and six ecosystem function and ecosystem services models to assess impacts of land-use and climate change scenarios in coming decades (up to 2050) and to hindcast changes to the last century (to 1900). We used harmonized scenarios from the Shared Socio-Economic Pathways – Relative Concentration Pathways (SSP-RCP). Biodiversity loss from land-use change is projected to keep up with historical rates or reduce slightly, but when combined with climate change it is projected to accelerate. In the last century, most local extinctions have occurred in Central America, the Southeast of Brazil, West Africa, East Africa, South-East Asia, Eastern Australia and South-West Australia. In the future biodiversity losses include these but can also expand to much of the Amazon basin, central Australia, and northern Eurasia. During the 20th century there were increases in provisioning services at the cost of declines in regulating services. The same overall trend is projected to happen in coming decades, although with variation across scenarios. Renewed efforts are needed by governments if the 2050 vision for the Convention of Biological Diversity is to be met.

02/08 | 17h50
PARALLEL SESSION X -T8.P5 - RESTORING THE COASTAL AND MARINE HEALTH
Room 2.2.14 | Topic 8 - Marine ecology (3); Topic 10 - Land degradation and ecosystem restoration (1)

OC-245 - (EEF2019-13892) - CURRENT STATUS, CONSERVATION AND RESTORATION OF SEAGRASS MEADOWS: RIA DE AVEIRO (PORTUGAL) AS A SHOW CASE

Ana I Sousa (Portugal)[1]; João Pedro Coelho (Portugal)[1]; José F. Da Silva (Portugal)[2]; Valentina Costa (Portugal)[1]; Marta Lopes (Portugal)[1]; Ana F Costa (Portugal)[1]; Ana R Azevedo (Portugal)[3]; Ricardo Calado (Portugal)[1]; Rod M Connolly (Australia)[4]; Mogens R Flindt (Denmark)[5]; Ana I Lillebo (Portugal)[1]

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Seagrass meadows are distributed worldwide, from tropical to temperate environments, playing a key role in ecosystem functions, being valuable in terms of biodiversity and providing important ecosystem services (ES). They remove atmospheric CO2 and contribute to carbon (C) storage in the sediment, ameliorating climate regulation. Finally improving ecosystem health and human well-being, from a local to a global scale, seagrasses are similarly relevant in pollutants' remediation and providing habitat to invertebrates or fishes. Nevertheless, seagrasses are one of the most threatened ecosystems, declining worldwide, leading to a great loss in biodiversity and impacting the ES provided. Thus, development and implementation of seagrass conservation and restoration programs are pertinent, and recommended through several international conventions and EU regulations. Bearing in mind the need to preserve and restore seagrass meadows, and taking Ria de Aveiro (LTER site) as a show-case, Zostera noltei seagrass status and changes over space and time were mapped and assessed by aerial imagery, and Blue C stock was estimated. In addition, innovative seagrass restoration techniques have been developed and applied as nature-based solutions to minimize disturbance by non-indigenous species of fauna, promote pollutants remediation, trigger seagrass meadows recovery and promote biodiversity. Complementary research focused on seagrass conservation and restoration is being performed in the scope of 6 international and national projects. Future work will include mapping and monitoring of seagrass recovery, and amplification of restoration efforts and of applied approaches; in order to promote biodiversity and improve coastal wetlands' ecosystem health.

02/08 | 17h50
PARALLEL SESSION X -T8.P5 - RESTORING THE COASTAL AND MARINE HEALTH
Room 2.2.14 | Topic 8 - Marine ecology (3); Topic 10 - Land degradation and ecosystem restoration (1)

OC-246 - (EEF2019-14089) - INTERTIDAL FUNGAL DIVERSITY FROM MEGATIDAL NOVA SCOTIA, CANADA: IMPLICATIONS FOR COASTAL RESTORATION AND BIOREMEDIATION

Allison K. Walker (Canada)[1]; Sarah Adams (Canada)[1]; Victoria Taylor (Canada)[1]; Tyler D'Entremont (Canada)[1]; Brent Robicheau (Canada)[1]

1 - Acadia University

Coldwater nearshore fungal diversity is underexplored. We are characterizing fungi from the megatidal intertidal environments of Nova Scotia, Canada. Fungi are key decomposers and saltmarsh plant root symbionts in these systems. Seawater, coastal sediments, saltmarsh grasses, *Zostera marina* (eelgrass) and marine macroalgae were collected and plated onto saltwater media (saltwater potato dextrose agar, and saltwater agar containing antibiotics). Detrital marine wood and plant samples were incubated in sterile damp chambers to promote the emergence of fungal reproductive structures used for microscopic identification and single spore isolations. ITS rDNA barcode sequences were identified from axenic cultures using the online reference sequence database NCBI Genbank. From 11 locations sampled in Nova Scotia, over 100 fungi were identified from coastal habitats and two have been confirmed as new fungal species. We present morphological and multi-locus molecular evidence for a new species of obligate lignicolous marine fungus in the genus Lulworthia (Luworthiales, Sordariomycetes, Ascomycota) isolated from naturally occurring submerged wood at Apple River Bay, Cumberland County, Nova Scotia. We also present ITS2 metaamplicon barcoding data comparing saltmarsh sediment fungal assemblages from low and high marsh. Tidal mesocosm experiments document beneficial growth effects of arbuscular mycorrhizae on *Sporobolus pumulis* (formerly *Spartina patens*). Our research sheds light on underexplored roles of fungi in coldwater coastal intertidal zones and will guide saltmarsh restoration and bioremediation applications.

02/08 | 17h50
PARALLEL SESSION X -T8.P5 - RESTORING THE COASTAL AND MARINE HEALTH
Room 2.2.14 | Topic 8 - Marine ecology (3); Topic 10 - Land degradation and ecosystem restoration (1)

OC-247 - (EEF2019-13766) - INTRODUCTION OF NON-INDIGENOUS SPARTINA SPECIES IN MEDITERRANEAN SALT MARSH ECOSYSTEMS: PAST, PRESENT AND FUTURE

Bernardo Duarte (Portugal)[1]; Vanessa Fonseca (Portugal)[1]; Patrcik Reis-Santos (Portugal)[1]; Ricardo Cruz De Carvalho (Portugal)[1]; Eduardo Feijão (Portugal)[1]; Enrique Mateos-Naranjo (Portugal)[2]; Susana Redondo Gómez (Spain)[2]; Anabela Silva (Portugal)[3]; Ana Rita Matos (Portugal)[3]; Rui Rosa (Portugal)[4]; Isabel Caçador (Portugal)[1]

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The invasion of natural communities by non-indigenous species (NIS) represents one of the most serious threats to biodiversity. While these invasive processes are rather well studied in river corridors and riparian communities, the invasiveness of non-indigenous aquatic plants in wetlands has received far less attention. The Spartinagenus (cordgrasses) is one of the most ecologically successful halophytes (species that can survive and complete their life cycle under saline conditions) present in a wide range of latitudes across the globe. Typically, Mediterranean systems are inhabited by the endemic small cordgrass Spartina maritima, native from the Atlantic African and European Atlantic coasts. Alongside S. maritima, and with very similar geographical distribution ranges, two invasive species from the Spartinagenus have been detected in Mediterranean systems: Spartina patensand Spartina versicolor. This bio-invasion is conditioned not only by the invasive species' ecophysiological fitness but also by their ability to adapt and compete with native species. Additionally, this introduction has impacts in various processes including carbon storage, ecosystem feedback to climate change, natural remediation capacity and energy flows through the trophic web. Cross-tolerance mechanisms derived from a tailored adaptation to stresses present in their specific habitat will have significant effects in how plant mechanisms will respond to upcoming abiotic stresses, thus determining plant growth and development. This is a key factor to allow us to better predict the future of bio-invasions and the counteractive measures needed to be implemented.

02/08 | 17h50
PARALLEL SESSION X -T8.P5 - RESTORING THE COASTAL AND MARINE HEALTH
Room 2.2.14 | Topic 8 - Marine ecology (3); Topic 10 - Land degradation and ecosystem restoration (1)

OC-248 - (EEF2019-13640) - A JANZEN-CONNELL FILTER: ADULT PRESENCE LIMITS PROPAGULE SURVIVAL BUT NOT SETTLEMENT IN SIX CORAL SPECIES

Carrie Sims (Australia)[1]; Eugenia Sampayo (Australia)[1]; Maragret Mayfield (Australia)[2]; Timothy Staples (Australia)[1]; Nataly Gutierrez-Isaza (Australia)[1]; Steven Dalton (Australia)[1]; John Pandolfi (Australia)[1]

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Species diversity is often correlated with ecosystem productivity or functioning, and it is increasingly recognised that resolving the underlying ecological processes that maintain diversity is a critical challenge in community ecology. The Janzen-Connell (JC) hypothesis predicts increases in propagule survival with increasing neighbourhood diversity, as intraspecific effects on survival rates are diluted. Evidence of JC effects is widespread in plant communities, and despite its relevance to sessile marine invertebrates, empirical work has largely neglected a marine perspective. Using the JC framework, we explored evidence of JC effects in experimental coral communities in two ways. First, we experimentally quantified settlement success and survival for coral propagules at increasing densities, with and without a conspecific adult present, and associated spatial patterns. Second, we explored settlement success under increasing community diversity. We found no evidence that density-dependence mediates demographic processes for coral propagules. However, the presence of a conspecific adult significantly reduced propagule survival following settlement, but propagule mortality did not alter spatial settlement patterns. Coral propagules also had significantly higher settlement success in conspecific groups than in heterospecific groups. Diversity maintenance in communities may be driven in part by the outcome of species interactions during the establishment of new individuals. Density and distance JC effects are pervasive in numerous plant communities, yet we found that while corals may limit themselves via propagule-adult interactions, density-dependence was not relevant. Thus, the proximity of propagule settlement to established conspecific adults may be more important in driving coral community diversity and structure.

02/08 | 17h50
PARALLEL SESSION X -T9.P13 - DIVERSITY IN CONSERVATION STRATEGIES
Room 2.2.15 | Topic 1 - Environmental risks and health (1); Topic 9 - Biodiversity and ecosystems (4)

OC-249 - (EEF2019-13681) - BIOTECHNOLOGICAL TOOLS IN THE PRESERVATION OF ENDEMIC PLANT GENETIC RESOURCES

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The conservation of plant genetic resources (PGR) requires the use of different strategies, supported by efficient technologies. Biotechnology has given a major contribution, complementing and improving traditional conservation methods. The application of conservation approaches based on biotechnology can provide tools not only for PGR conservation, but also in its management and utilization. The methods are employed in the collection, characterization, propagation, patenting, storage, documentation and exchange of PGR. Besides, the range of application goes from the conservation of endangered species to the storage of economically important crop plants or to genetically transformed material.

Plant propagation by tissue culture, cryopreservation storage and molecular techniques are procedures often used in the *ex situ* conservation of PGR. Molecular biology also plays an important role in the understanding of the amount and distribution of plant genetic variation, contributing for the development of *in situ* conservation programmes.

In Portugal there are approximately 135 endemic plant species, many of which are vulnerable or endangered at different levels. For some of these species, legally measures have already been taken to protect them and/or their habitat. But to ensure their long-term conservation, complementary strategies are necessary.

Micropropagation was accomplished for several of these endemic species, such as *Plantago almogravensis, Drosophyllum lusitanicum* and *Juniperus navicularis*. In addition to micropropagation protocols, different cryopreservation approaches were developed for *Plantago algarbiensis, Tuberaria major* and *Thymus lotocephalus* and studies concerning the genetic structure of natural populations were also completed and will be presented.

02/08 | 17h50
PARALLEL SESSION X -T9.P13 - DIVERSITY IN CONSERVATION STRATEGIES
Room 2.2.15 | Topic 1 - Environmental risks and health (1); Topic 9 - Biodiversity and ecosystems (4)

OC-250 - (EEF2019-13978) - CONSERVATION AND RESTORATION OF MEDITERRANEAN TEMPORARY PONDS

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Mediterranean Temporary Ponds are habitats of major conservation importance in Europe. They are classified as priority habitat (3170*) for conservation by the Habitats Directive and accessed as Vulnerable by (IUCN Red List of Habitats) because of a strong decline in habitat area and quality over the last decades. Our work, part of LIFE Charcos project*, meant to implement management and restoration actions in order to preserve this habitat in the Southwest Coast of Portugal.

We carried out physical replacement of pond basin topography, invasive vegetation control and plant communities' enhancement. The management was done by extensive sheep grazing during a particular time window (July to September), as also by simulation with mechanic vegetation cutting.

To assess the impact of management and restoration practices we surveyed and monitored plant species before and after the interventions.

The restoration results are positive, with a reinforcement of the spatial differentiation of the floristic communities and the increase of characteristic / indicator plant species. Regarding the control of invasive species, Acaciasp. and Carpobrotus edulis, the results were positive, since the removal of the vegetal mass allows the germination of the small annual species. However, and as it is known these actions require reiterated interventions in time. The results also demonstrate the positive impact of traditional sheep grazing, with a significant reduction of competitive species, such as Agrostis stolonifera,allowing the increase in richness and frequency of the characteristic species.

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02/08 | 17h50
PARALLEL SESSION X -T9.P13 - DIVERSITY IN CONSERVATION STRATEGIES
Room 2.2.15 | Topic 1 - Environmental risks and health (1); Topic 9 - Biodiversity and ecosystems (4)

OC-252 - (EEF2019-13652) - INTO THE PATH OF STEPPE BIRDS' RECOVERY: FALLOW MANAGEMENT INCREASES BIRD OCCURRENCE THROUGH CHANGES IN VEGETATION STRUCTURE

Ana Sanz-Pérez (Spain)[1]; Giralt David (Spain)[1]; Irene Robleño (Spain)[2]; Bota Gerard (Spain)[1]; Cyril Milleret (Spain)[3]; Santiago Mañosa (Spain)[4]; Francesc Sardà-Palomera (Spain)[1]

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4 - Department of Biologia Evolutiva, Ecologia i Ciències Ambientals, IRBio, University of Barcelona

In the face of the dramatic worldwide decline of farmland bird populations, the preservation of fallow fields (FF) is a conservation measure encouraged through subsidies (e.g. agri-environmental schemes, AES). Beyond the general benefits of increasing the FF availability for steppe bird populations, there is a general lack of information on how to better manage FF to meet the species-specific requirements in terms of vegetation structure and food availability. We used occurrence data from three endangered steppe bird species (Stone curlew Burhinus oedicnemus, Little bustard Tetrax tetrax, and Calandra lark Melanocorypha calandra), framed in a quasi-experimental approach covering an unprecedented spatio-temporal scale that included 612 FF in a 3-year-study in an agricultural Mediterranean landscape (Spain). We used path analysis to explore the mechanisms by which different agricultural practices (e.g., shredding) caused species-specific occurrence. We examined partial effects of agricultural practices on vegetation structure (e.g., cover) and food availability (e.g., leaf availability), and the partial effect of these variables on bird occurrence compared to control fields (no agricultural practices applied). Agricultural practices had a significant effect on the presence of the 3 studied species. Through changes in the vegetation structure, Shredding + Herbicide and Tillage increased the occurrence of the Stone curlew and Shredding increased the occurrence of the Little bustard. We captured the mechanisms explaining the occurrence of three steppe bird species when using specific agricultural practices before the breeding season. Such information is key to future conservation management, as it helps providing specific recommendations for endangered species (e.g., within AES).

02/08 | 17h50
PARALLEL SESSION X -T9.P13 - DIVERSITY IN CONSERVATION STRATEGIES
Room 2.2.15 | Topic 1 - Environmental risks and health (1); Topic 9 - Biodiversity and ecosystems (4)

OC-253 - (EEF2019-14192) - ALTERNATIVE FINANCING SCHEMES FOR TIGER CONSERVATION IN NEPAL

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Many scientists and conservation workers agree that global tiger numbers in key areas could double by 2022 if efforts are taken immediately. Countries facing declining tiger numbers and having the ability to meet this goal have produced national tiger recovery plans that outline necessary program activities and their associated costs. To assess the financial feasibility of the tiger conservation program in Nepal and to recommend viable alternatives to secure funds to cover long-term tiger conservation costs, we conducted financial analyses of tiger conservation programs in Nepal. Our results show that the present funding level fails to cover the long-term costs of taking the recommended steps for tiger conservation. Thus there is a need to identify and secure alternative funding sources to supply approximately a 100% increase in revenues currently generated from tiger-bearing protected areas assuming a continuance of the current level of funding by the government. This finding is troublesome given the magnitude of the financial burden associated with necessary steps to increase the tiger population, plus the fact that no policy instrument exists that can target the revenue generated by the protected areas specifically for tiger conservation. To achieve financial sustainability of the tiger conservation program, alternative financial mechanisms warrant serious consideration. One alternative institutional mechanism could be a tiger conservation trust fund that would be entrusted to secure a wide range of financing from domestic and international sources to ensure financial sustainability of the Nepal's tiger conservation program.

02/08 | 17h50
PARALLEL SESSION X -T9.P14 - THE DILEMMA OF THE INVASIVE SPECIES
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-254 - (EEF2019-13772) - ADDING KNOWLEDGE TO THE ECOLOGY OF A RECENT INVASIVE INSECT IN EUROPE - THE BUG LEPTOGLOSSUS OCCIDENTALIS

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We investigated the ecology of the invasive bug Leptoglossus occidentalis Heidemann (Heteroptera: Coreidae) on southern European pine forests with a focus on stone pine, Pinus pinea, forests.

Native from Western North America, this insect was first detected in Europe in 1999 being now present in the whole European territory. Both nymphs and adults feed on seeds of several conifer species. The bug has serious negative impacts on seedling programs and natural regeneration in central Europe and on the million euros pine nut market of Stone pine (P. pinea) in Southern Europe.

In this study we analyze the bug host preference between three main native pine species growing in southern Europe (Pinus pinea, P. pinaster and P. halepensis). We further assessed the impact on Stone pine seed orchards under two different management strategies.

Results showed that this bug species feeds gregariously and therefore damage is concentrated on particular cones and seeds. Individual seeds and cones of P. pinea were 2 to 3 times more consumed than those of the two other pine species. This preference for stone pine reflects the fact that the greater seeds and cones are highly rewarding for this polyphagous bug. Field trials in pure stone pine seed orchards indicated that fertilized and irrigated trees are more susceptible to both young cones mortality and seed damage compared to trees with no treatment.

The study present cues to better understand this pest ecology in the new invaded region of southern Europe which can further help control their populations.

02/08 | 17h50
PARALLEL SESSION X -T9.P14 - THE DILEMMA OF THE INVASIVE SPECIES
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-256 - (EEF2019-13971) - DETECTING EARLY INDICATORS OF HIGH IMPACT OF AN INVASIVE ECOSYSTEM ENGINEER USING REMOTE SENSING

André Große-Stoltenberg (Germany)[1]; Hellmann Christine (Germany)[2]; Jan Thiele (Germany)[3]; Christiane Werner (Germany)[2]; Jens Oldeland (Germany)[4]

1 - Justus-Liebig-University Giessen;
2 - University of Freiburg;
3 - Johann Heinrich von Thünen Institute;
4 - University of Hamburg

High impact invaders, such as the N-fixing *Acacia longifolia*, are a major threat to ecosystem functioning worldwide. While local impact of *A. longifolia* in Mediterranean dune ecosystems is well understood, there is a lack of methods for early detection of its impact at larger scales. Thus, we aimed to identify early warnings signs using sensor-based techniques focussing on three questions: Can differences in leaf traits, e.g. N content, between *A. longifolia* and native species, be derived from hyperspectral data? Can *A. longifolia*'s spatial impact on N cycling be tracked using functional tracers? How can *A. longifolia*'s modifications of ecosystem functioning be detected at landscape scale?

First, the invader differed in its biochemical traits from the native species, particularly regarding leaf N content. This dissimilarity may provide an indicator for invaders with a high impact on N cycling, and can be retrieved from hyperspectral data.

Second, the impact of the invader on N cycling at the stand scale was traced joining a functional tracer of N-fixation, δ15N, with airborne LiDAR data. Foliar δ15N of a non-fixing, native increased in vicinity (5-8 m) of invasive stands indicating an uptake of N previously fixed by the invader.

Third, A. longifolia was mapped at landscape level by integrating airborne hyperspectral imagery with LiDAR data. A clear increase of Gross Primary Production (GPP) after invasion was detected even at low invader cover. Thus, early indicators of high impact can be retrieved using remote sensing, which offers promising possibilities for monitoring invasions of ecosystem engineers.

02/08 | 17h50
PARALLEL SESSION X -T9.P14 - THE DILEMMA OF THE INVASIVE SPECIES
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-257 - (EEF2019-13883) - THE STORY OF A TRANS-HEMISPHERIC SHIFT: ESTABLISHMENT OF AN AUSTRALIAN BIOLOGICAL CONTROL AGENT AGAINST AN INVASIVE PLANT IN EUROPE

Hélia Marchante (Portugal)[1]; Francisco A. López-Núñez (Portugal)[2]; Liliana Duarte (Portugal)[1]; Jael Palhas (Portugal)[2]; Helena Freitas (Portugal)[2]; John H. Hoffmann (South Africa)[3]; Fiona Impson (South Africa)[4]; Elizabete Marchante (South Africa)[2]

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4 - Department of Biological Sciences, University of Cape Town, Rondebosch 7700, South Africa. AND Plant Protection Research Institute, Private Bag X5017, Stellenbosch 7599, South Africa

Acacia longifolia is one of the most widespread invasive plants in coastal areas of Portugal, disrupting the composition and function of natural plant and insect communities as well as soil microorganisms. The Australian bud-galling wasp, *Trichilogaster acaciaelongifoliae*, has been used successfully for many years as a biocontrol agent of *A. longifolia* in South Africa (southern hemisphere). After host-specificity testing and risk assessment at Portuguese and European level, releases of *T.acaciaelongifoliae* originating from South Africa began in 2015 along the Portuguese coast (northern hemisphere). This work aims to assess the establishment of *T.acaciaelongifoliae* in Portugal and its effects at the target and non-target plants in order to determine its ecological impacts.

Release sites were seasonally monitored in order to evaluate: 1)establishment; 2)abundance and 3)spatial distribution of T.acaciaelongifoliae galls; 4)gall phenology and characteristics; 5)growth and phenology of target plants; and 6)gall formation on non-target plants.

During April-July 2016, post-release monitoring detected the first galls at four sites; abundance of second (2017) and third (2018) generation galls increased exponentially. In June-July 2018 the first wasps of Portuguese origin were released, with plant phenology synchronized. First generation galls were detected in 2019 with apparent (preliminary quantification) higher abundances than first generation of South African wasps. To date, no) galls have been detected on any non-target species.

Despite the inherent difficulties associated with transferring the insects between hemispheres, *T.acaciaelongifoliae* successfully completed its life cycle and is starting to affect reproductive (and vegetative) ability of *A.longifolia*, decreasing its invasive potential in Portugal.

02/08 | 17h50
PARALLEL SESSION X -T9.P14 - THE DILEMMA OF THE INVASIVE SPECIES
Room 2.2.21 | Topic 9 - Biodiversity and ecosystems (5)

OC-258 - (EEF2019-13935) - SUSTAINABLE INVASIVE SPECIES MANAGEMENT - A STUDY ON INVASIVE SOCIAL WASPS ON OFFSHORE ISLANDS IN NEW ZEALAND

Julia Schmack (New Zealand)[1]; Jacqueline Beggs (New Zealand)[1]; Darren Ward (New Zealand)[2]; Matthias Schleuning (Germany)[3]

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2 - Manaaki Whenua Landcare Research;
3 - Biodiversity and Climate Research Centre Frankfurt

Worldwide invasive species have caused severe ecological and economic damages to native ecosystems. Why some ecosystems are more susceptible to invasion than others is driven by an interplay of biogeographic, biotic and human factors. Understanding this interplay is key to a sustainable management of invasive species. Introduced social wasps rank among the most severe insect pests in New Zealand, Hawaii and other parts of the world. We investigated the drivers of invasive Vespula and Polistes wasps on 36 islands off the coast of New Zealand. Our results show that invasive wasp abundances are determined by the interplay of island isolation, human settlement and canopy cover. We demonstrate that human impact skews biogeographic drivers of wasp abundances on offshore islands. Canopy cover and the absence of human settlement were negatively correlated with wasp abundances; highlighting the importance of intact vegetation as a determinant for biotic resistance of island ecosystems. Overall, our results emphasize the importance of investigating the joint effect of biogeographic, biotic and human impact factors that inhibit or boost the success of invasive species. We recommend further research on drivers of biotic resistance towards invasive species and the incorporation of these insights into government policies to promote sustainable invasive species management.

02/08 | 17h50
PARALLEL SESSION X -T10.P5 - MANAGING LANDSCAPE RESTORATION
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (4)

OC-259 - (EEF2019-13964) - QUARRY RESTORATION AND BIODIVERSITY. SECIL-OUTÃO IN ARRÁBIDA NATURAL PARK

Alexandra Silva (Portugal)[1]

1 - SECIL - Companhia Geral de Cal e Cimento S.A

Extraction activities have a profound impact on the landscape and on biodiversity. As the natural regeneration of these areas and the restoration process of ecosystems may take hundreds of years, it is important to minimize these impacts and accelerate the process of natural colonization, especially in areas of high conservation value.

Resource exploitation started from top to bottom in Outão quarries, located within Arrábida's Natural Park, leaving a set of benches available for restoration after exploitation. The process of progressive revegetation began in 1983 aimed at recreating the natural habitats surrounding the quarries, dominated by Mediterranean sclerophyllous vegetation, using various techniques: Reintroduction of substrate to facilitate plant development; Introduction of herbaceous and shrub vegetation by hydroseeding; Encouraging the development of native species (through planting) produced in SECIL´s own nursery.

In 2007, fauna component was integrated in the restoration plan. The study began with the survey of vertebrate and invertebrate terrestrial fauna. This baseline data was used to define an Action Plan aiming to promote conditions to increase the natural colonisation by fauna in the revegetated areas.

Scientific knowledge and applied research are important pillars in the process of restoration in Outão quarries. Carrying out scientific studies and communication within multidisciplinary teams is essential for the identification of innovative solutions and the development of new techniques.

During the 35 years of this revegetation programme, habitats have been established with different plant communities, ages and cover in a restored area of 44 ha.

02/08 | 17h50
PARALLEL SESSION X -T10.P5 - MANAGING LANDSCAPE RESTORATION
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (4)

OC-260 - (EEF2019-13846) - THE BAIXO GUADIANA LANDSCAPE - PLANNING AND RESTORATION

Luísa Franco (Portugal)[1]; Manuela Raposo Magalhães (Portugal)[1]; Manuel Belo Moreira (Portugal)[1]; Fernando Oliveira Baptista (Portugal)[1]

1 - Instituto Superior de Agronomia

Past national agricultural policies applied in Baixo Guadiana promoted agricultural intensification, with consequences in landscape degradation, such as soil erosion and death and lack of natural regeneration of holm and cork oaks. Dense stone-pine plantations were later financed by European funds in order to restore soil. However, these plantations have had a weak development.

This research provides guidelines for land use policy, aiming at the recovery of the Baixo Guadiana landscape. A three phase methodology was followed: a) landscape diagnosis, b) landscape plan and c) evaluation of technical and social conditions to plan implementation.

The diagnosis phase included the evaluation of landscape suitability and landscape change. The landscape plan includes the following recommendations: “areas to preserve”, “areas to preserve, with land management restrictions” and “areas to be recovered”, in which agricultural crops and tree species are suggested.

Technical recommendations for forest species implementation were discussed, since holm and cork oak plantations have exhibited low rates of survival. The social conditions were then evaluated based on the forest landowner’s management attitudes and their willingness to implement the plan recommendations.

In conclusion, forest grazing systems (holm oak mainly), cork oak (in some cases) and olive trees should be promoted and most land owners prefer this kind of land use, when comparing to stone-pine plantations. However landowners do not invest on these land uses, mainly because of technical and financial constraints. Regarding these constraints this work presents recommendations for future research, for land use and financial policies.

02/08 | 17h50
PARALLEL SESSION X -T10.P5 - MANAGING LANDSCAPE RESTORATION
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (4)

OC-261 - (EEF2019-14003) - ASSESSMENT OF RIVER RESTORATION ECOSYSTEM SERVICES IN CHINA AND THE IMPACT PROTECTION AND REHABILITATION MEASURES HAD ON THEIR FUNCTIONS

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This paper analyzed the river ecosystem services in China and the impacts of human activities on it as well as the impact protection and rehabilitation measures had on their functions. The objective of this work was to make an assessment of the current status of Esosystem Services Rivers provide in China and the impact restoration practices had on it. To achieve this Mellenium Ecosystem Services Assessment methodologies were used in the main river basin in China: Yanze river, Yellow river, Pearl River, Songhuajiang and Huaihe River. The results showed that the supply function of river ecosystem in water resources, energy, aquatic products and shipping has been improved, and the storage capacity of artificial water resources has been greatly enhanced, which provided for the strong improvement of social and economic development. However, the regulation functions of water purification and sediment transport have declined abruptly. About one fifth of the inland fishes in China are threatened, which restricts the sustainable utilization of water resources. River habitat protection and rehabilitation measures had a positive impact on self-purification function restoration and aquatic biological protection. This points out that China is in the stage of comprehensive river management aiming at improving water environment. A good water environment is the basic condition for the restoration and protection of aquatic biodiversity, and a good river ecosystem has a strong self-purification function, which is the basic condition for maintaining a virtuous cycle of river water environment.

02/08 | 17h50
PARALLEL SESSION X -T10.P5 - MANAGING LANDSCAPE RESTORATION
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (4)

OC-262 - (EEF2019-13753) - RESTORING ECOLOGICAL INFRASTRUCTURE IN THE BIODIVERSITY-RICH SEIXE RIVER BASIN IN SOUTHWESTERN PORTUGAL.

Justin Roborg-Söndergaard (Portugal)[1]; Diogo Alagador (Portugal)[2]; Rosário Oliveira (Portugal)[3]; Carla Antunes (Portugal)[4]; Miguel Jerónimo (Portugal)[5]; João Joanaz De Melo (Portugal)[6]

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2 - CIBIO, University of Évora;
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4 - MeditBio, University of the Algarve;
5 - GEOTA (Study Group on Spatial Planning and Environment);
6 - CENSE, University NOVA Lisbon

Climate actions, life on land and partnerships for the goals (SDGs 13, 15 and 17) underpin the objectives of the GEOTA TerraSeixe Project. Focused on restoring ecological infrastructure in key areas of the Seixe River Basin (SRB), an area of 254km2, the process for ecological restoration (ER) is on recovering green infrastructure (GI). This project involves a partnership platform made up of local municipalities, regional environmental agencies, universities, development organizations and landowners together in a participatory stakeholder process for ER. Although 90% of the SRB is protected under Natura 2000, 45% remains pervasively covered by eucalyptus-based plantations. Key aspects for restoring natural functionality, i.e. the potential for ecosystem services delivery, are 'assisted recovery' actions in areas of predicted (medium-term) climatic stability (i.e. cold-area refuges) and priority Natura 2000 habitats. Linking land-use and water management in an integrated management plan focused on these key SDGs includes the control of invasive plant species and the creation of a network of interconnected ecological corridors, all fundamental for effective ER within the SRB. Sustainable land-use and protection of biodiversity and ecosystems are key factors for the resilience of this socio-ecological river basin system and its associated socio-economic activities. Although possibly limiting the full implementation of ER measures, project costs and access to land are supported via the diverse partnership platform. In summary, the project intends to test in a small region of socio-ecological value within the SRB the restoration of an area capable of attenuating biodiversity threats by embedding ecology in SDGs.

02/08 | 17h50
PARALLEL SESSION X -T10.P5 - MANAGING LANDSCAPE RESTORATION
Room 2.3.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 10 - Land degradation and ecosystem restoration (4)

OC-263 - (EEF2019-13796) - CHANGES IN ECOSYSTEM MULTIFUNCTIONALITY IN GRASSLANDS UNDERGOING RESTORATION MANAGEMENT TOWARDS SEMI-NATURAL NARDUS GRASSLANDS

Eva Decock (Belgium)[1]; Iris Moeneclaey (Belgium)[1]; Stephanie Schelfhout (Belgium)[1]; Safaa Wasof (Belgium)[1]; Margot Vanhellemont (Belgium)[2]; Pieter Vangansbeke (Belgium)[1]; Kris Verheyen (Belgium)[1]; Jan Mertens (Belgium)[1,2]; An De Schrijver (Belgium)[1,2]; Lander Baeten (Belgium)[1]

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2 - University College Ghent - Faculty of Nature and Technology

To combat biodiversity loss and habitat degradation, ecosystem restoration has become a key policy goal (e.g. EU 2020 Biodiversity Strategy). The need for restoration is critical for semi-natural grasslands, a highly diverse habitat type. Besides the ultimate diversity goals, the phases leading up to these restored grasslands can help to improve the life on land, attribute to clean water and the well-being for people as well as play an important role in the light of climate change.

We focus on the restoration of oligotrophic Nardus grasslands and explore how their functioning and thus the capability of supplying goods and services changes while restoring these grasslands.

Multiple ecosystem functions were measured in a greenhouse experiment, where a restoration gradient was simulated in 110 mesocosm communities growing under different combinations of nitrogen-, phosphorus- and soil biota treatments as well as in an observational study in grasslands undergoing restoration management towards Nardus grasslands in Flanders, northern Belgium.

We study the trade-off between different types of ecosystem functions and identify restoration scenarios where the ecosystem shows optimal delivery of multiple ecosystem functions. Furthermore, more restored systems are expected to have a higher combined functioning. A completely restored system is not necessarily preferable if both functioning and biodiversity are the scope of restoration management. This of course raises questions if it is necessary to conserve biodiversity in se or if it is more desirable to create a well-functioning ecosystem that can deliver as much services as possible.

02/08 | 17h50
PARALLEL SESSION X -T11.P3 - NETWORKING AT SPECIES AND POPULATION LEVELS
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (4)

OC-264 - (EEF2019-13626) - CLINGING ONTO YOUR NEIGHBOURS WHEN SCARED? MUSSELS COOPERATION IS ALTERED BY PERCEIVED LEVELS OF PREDATION RISK BUT DEPENDS UPON ENVIRONMENT

Camilla Bertolini (Netherlands)[1]; Jacob Capelle (Netherlands)[2]; Johan Van De Koppel (Netherlands)[1]; Tjeerd Bouma (Netherlands)[1]

1 - NIOZ;
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Cooperation can enhance resilience, exerting positive feedback loops to maintain a healthy population. Similarly, it can be costly, increasing competition. Simulations predict increased cooperation under increasing levels of environmental stress, although empirical understanding of mechanisms is limited. Predation risk is viewed as a behaviour-modifying stressor, but its role on cooperation is unknown.

This study harnesses this framework to understand how cooperation changes under different perceived levels of risk using mussel beds as model of a complex 'self-organised' system. With three experiments we assessed the influence of predation on cooperation under different scenarios: (1) presence of different 'cue' types, (2) different substratum complexity and mussel sizes, (3) presence of waves and initial distribution of individuals.

Our experiments demonstrated that (1) cooperation in a mussel bed system generally increases when predator cues are present, and cue from smell was enough to trigger a response. This relationship was (2) strongly context-dependent upon substratum availability. While cooperation was greater for larger individuals, the response to risk results in greater cooperation when alternative attachment substratum is

absent, with simpler landscapes perceived as more fearsome. Further (3) predator cue alone was not enough to trigger cooperation if mussels were at low densities, and wave disturbance disrupted this response.

We showed that species with a sessile life-strategy cooperate in a landscape of fear, despite the competitive disadvantage of this strategy. The context-dependency of structural complexity is an essential finding to consider in a changing world where habitats are losing complexity and cooperative strategies should be maximised.

02/08 | 17h50
PARALLEL SESSION X -T11.P3 - NETWORKING AT SPECIES AND POPULATION LEVELS
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (4)

OC-265 - (EEF2019-13759) - COEXISTENCE OF DIVERSE STRATEGIES OF SYMBIOTIC DINITROGEN FIXATION IN MEDITERRANEAN HERBACEOUS LEGUMES

Efrat Sheffer (Israel)[1]; Hila Bakhshian (Israel)[2]; Anil Babu Pokhrel (Israel)[1]; Tania Masci (Israel)[1]; Dovrat Guy (Israel)[2]

1 - Hebrew University of Jerusalem;
2 - Agricultural Research Organization, Ne'we Yaar

Dinitrogen fixation by plants (in symbiosis with root bacteria) is a major source of new nitrogen for ecosystems. However, plant investment in energetically costly dinitrogen fixation potentially increases ecosystem nitrogen availability therefore creating improved conditions for competition by non-fixing neighbours. Our research aimed to evaluate the emergence of strategies of nitrogen fixation at the individual level, in the context of a competitive plant community and dynamic ecosystem nitrogen cycle. Our study asks if different strategies differ in their influence on plant fitness and persistence in specious communities. To do this we evaluated dinitrogen fixation, and how it is regulated by the plant in response to soil nitrogen availability.

We found a selection of nitrogen fixation strategies in a species of annual herbaceous legumes that often coexist in the same habitats. The most common species of herbaceous Mediterranean legumes included species that maintained constant nitrogen fixation in both high and low levels of soil nitrogen availability (obligate strategy), species that reduced plant investment in fixation when soil nitrogen was high (facultative strategy), and species that increased the investment in fixation when soil nitrogen was high (upregulation). Fixed nitrogen was used for biomass growth and seed production, but the allocation of soil nitrogen vs. fixed nitrogen differed between species depending on their nitrogen fixation strategy. Our studies suggest that the evolution of diverse strategies of nitrogen fixation and nitrogen allocation in co-occurring herbaceous legumes could allow their coexistence and persistence in diverse Mediterranean plant communities.

02/08 | 17h50
PARALLEL SESSION X -T11.P3 - NETWORKING AT SPECIES AND POPULATION LEVELS
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (4)

OC-266 - (EEF2019-13758) - DOES FEAR OF PREDATORS MAKE LEAFHOPPER VECTORS LESS INFECTIOUS?

Ferenc Samu (Hungary)[1]; András Kis (Hungary)[2]; Anna Medzihradszky (Hungary)[2]; Zoltán Tóth (Hungary)[1]; Éva Szita (Hungary)[1]; Dávid Fülöp (Hungary)[1]; Regina Gerstenbrand (Hungary)[1]; Gergely Tholt (Hungary)[1]

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2 - National Agricultural Research and Innovation Centre, Agricultural Biotechnology Institute, Gödöllő

Predators influence the behaviour of prey and if the prey also acts as a vector, they potentially reduce pathogen transmission . Arthropod predators have been shown to reduce the consumption of plant biomass by pest herbivores, but their cascading trait mediated (or non-consumptive, NCE) effects on vector insects' feeding behaviour and subsequent plant pathogen transmission has not been investigated experimentally before. In a laboratory study we examined predator-mediated pathogen transmission mechanisms using the economically significant plant pathogen Wheat Dwarf Virus (WDV) transmitted by its only vector, the leafhopper Psammotettix alienus. We applied in situ hybridization to localize which leaf tissues were infected with transmitted virus DNA in barley host plants, proving that virus occurrence is restricted to phloem tissues. In the presence of its natural enemy, the spider predator Tibellus oblongus, we recorded the within leaf feeding behaviour of the herbivore using electrical penetration graph. The leafhopper altered its feeding behaviour in response to predation risk. Phloem ingestion, the feeding phase when virus acquisition occurs, was delayed and was less frequent. The phase when pathogen inoculation takes place, via the secretion of virus infected vector saliva, was shorter when predator was present. Our study thus provides experimental evidence that predators can potentially limit the spread of plant pathogens solely through influencing the feeding behaviour of vector organisms.

02/08 | 17h50
PARALLEL SESSION X -T11.P3 - NETWORKING AT SPECIES AND POPULATION LEVELS
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (4)

OC-267 - (EEF2019-14088) - IDENTIFYING FUNGAL ASSOCIATIONS OF THE ENDANGERED PLANT CROCANTHEMUM CANADENSE (L.) BRITT. (CISTACEAE) IN NOVA SCOTIA, CANADA

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Crocanthemum canadense (L.) Britt. (Cistaceae) is a small, herbaceous perennial plant that is critically imperiled in Nova Scotia. Sand barren habitat loss and an insect pest, *Mompha capella* (Momphidae), are contributing to population decline. The role of fungal associations in *C. canadense* populations is unknown; the primary goal of this research was to identify fungal symbionts present in the Nova Scotia population to aid in propagation and conservation strategies. Fungi were isolated from surface-sterilized roots, stems, and leaves of *C. canadense* plants collected from six sites at 14 Wing Canadian Forces Base, Greenwood, Kings County, Nova Scotia. Arbuscular mycorrhizal fungi (AMF) were also observed directly using root staining and microscopic techniques to determine percent root colonization. Using ITS rDNA barcoding, 43 fungi were identified from roots, 14 from leaves, 6 from upper stems, and 11 from lower stems. Six ascomycete fungi colonized more than a third of the plants sampled. These included *Pyrenophora tetrarrhenae* (89% of plants, from above-ground tissues), *Arcopilus aureus* (56%; from all tissue types), *Pilidium concavum* (50%; from roots, leaves, and lower stems), *Phialocephala* cf. *fortinii* (44%; from roots and lower stems), *Apiognomonia* cf. *hystrix* (39%; from all tissue types), and *Sphaeronaemella fragariae* (39%; from leaves). We provide the first report of the fungal relationships influencing the critically imperiled Nova Scotia *C. canadense* population and provide valuable insights to guide future plant propagation and conservation efforts.

02/08 | 17h50
PARALLEL SESSION X -T11.P3 - NETWORKING AT SPECIES AND POPULATION LEVELS
Room 2.4.16 | Topic 9 - Biodiversity and ecosystems (1); Topic 11 - Ecological networks (4)

OC-268 - (EEF2019-13653) - DOES HABITAT FRAGMENTATION HAVE A POSITIVE EFFECT ON SPECIES DIVERSITY?

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3 - Centre for Ecology and Hydrology

Debate currently rages as to whether habitat fragmentation per se in the absence of habitat loss leads to biodiversity declines or, as has been recently suggested, has positive effects. We investigated theoretically the circumstances which may lead fragmentation to have a negative or a positive effect on gamma and beta diversity. We assessed the mechanisms that change this relationship; looking at specialist and generalist species, the trade-off between dispersal ability and competitiveness, and if this relationship is independent of the percentage cover of habitat or isolation of the landscape.

We created a customised flexible, multi-species, landscape-scale, individual-based model able to address multiple questions. The simulation can use different land cover locations and species types. The individuals within the simulation reproduce based on the habitat within the land cover and compete via shared density-dependent mortality.

We found that under most parameterisations of the simulation, gamma and beta diversity increased under moderate fragmentation but declined at higher levels. The amount of habitat cover did not change this relationship, but did cause the inflexion point of the fragmentation-diversity relationship to differ. The relationship between fragmentation and diversity was still present, but weaker in less isolated landscapes.

We can conclude that under certain theoretical circumstances, fragmentation per se causes an increase in gamma and beta diversity. While this is a modelling study, the simulated species are based on real-world types. Diversity responses to fragmentation require more theoretical research, to inform and explain the contradictory and controversial patterns seen in empirical studies.

02/08 | 17h50
PARALLEL SESSION X -T12.P5 - LOOKING AT SPECIES GENETIC POOL
Room 3.2.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 12 - Theoretical and evolutionary ecology (3)

OC-269 - (EEF2019-13705) - CONSERVING EVOLUTIONARY PROCESSES FOR THREE AMPHIBIAN SPECIES IN THE IBERIAN PENINSULA

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To maximize the long-term persistence of biodiversity, protected areas need to maintain evolutionary processes. However, assessments of existing protected areas and prioritizations for establishing new reserves rarely account for such processes explicitly. Here we evaluate if protected areas in Portugal and Spain are adequately representing various evolutionary components that underpin the survival of three endemic amphibian species (*Hyla molleri, Rana iberica,* and *Pelobates cultripes*).

We used environmental, genetic, and occurrence data to map patterns of (i) individual-level genetic diversity (using homozygosity by locus scores), (ii) broad-scale neutral genetic variation, (iii) broad-scale adaptive genetic variation, (iv) variation in contemporary selection pressures using climate data, and (v) intensity of future selection pressures using future climate projections. We then assessed if existing protected areas are adequately representing these evolutionary components for each species, and identified priority areas for protected area establishment.

We found that existing protected areas cover a broad range of contemporary climatic conditions across the distributions of these species. However, they are failing to represent many dimensions of genetic diversity. With two of these species listed internationally as Near Threatened, further erosion of genetic diversity could compromise their long-term persistence. To address these shortfalls, we also identified priority areas for conservation.

Strategic establishment of new protected areas could rapidly enhance the long-term persistence of these species. By applying this framework to other taxa, conservation assessments and prioritizations can explicitly account for evolutionary processes and, ultimately, enhance the long-term persistence of biodiversity.

02/08 | 17h50
PARALLEL SESSION X -T12.P5 - LOOKING AT SPECIES GENETIC POOL
Room 3.2.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 12 - Theoretical and evolutionary ecology (3)

OC-270 - (EEF2019-13765) - GENETIC PAUCITY, INBREEDING, POLLUTION AND SURPRISING CONNECTIONS: THE INTRIGUING CASE OF THE SADO BOTTLENOSE DOLPHIN POPULATION (PORTUGAL)

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2 - Associação para as Ciências do Mar;
3 - Ecco Ocean;
4 - IMAR – Institute of Marine Research, University of the Azores;
5 - MARE – Marine and Environmental Sciences Centre, Departamento de Oceanografia e Pescas, Universidade dos Açores;
6 - Madeira Whale Museum;
7 - Instituto da Conservação da Natureza e das Florestas (ICNF);
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9 - Centre for Environmental and Marine Studies (CESAM), Universidade de Aveiro;
10 - Centre of Marine Sciences (CCMAR), University of the Algarve;
11 - Coordinadora para o Estudio dos Mamíferos Mariños (CEMMA);
12 - Institut de Ciències del Mar (ICM-CSIC);
13 - Fundación Rosetta;
14 - Conservation, Information and Research on Cetaceans (CIRCE);
15 - Instituto de Investigacións Mariñas (CSIC);
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The bottlenose dolphin (*Tursiops truncatus*) has been declining in Europe in recent decades. It is listed under the EU Habitats Directive and requires the designation of Special Areas of Conservation. The population inhabiting the Sado estuary region (Portugal) is one of the smallest resident populations of this species in Europe (N=30 individuals), and the only one in Portugal. Dedicated research has revealed year-round long-term site fidelity, an ageing population, very low levels of immigration, high calf/juvenile mortality and a declining population in the last few decades. Nevertheless their genetic make-up is still unknown. In this collaborative study, we investigated the population structure and demographic history of Sado dolphins and their relationships with neighbouring populations (Atlantic Iberian Peninsula, Azores and Madeira archipelagos), analysing 224 samples and using mitochondrial and nuclear markers. Results from Bayesian clustering and Principal Component Analyses indicate that the Sado and Galicia (Spain) resident populations are genetically differentiated from the other regions. These two populations are similar despite the geographic distance, suggesting that they may share a common history in relation to the recent Sado estuary formation (<10,000 years). The low genetic diversity, the presence of unique maternal lineages and high levels of relatedness found in the Sado population, together with the fact that this is a very small population inhabiting one of the most polluted estuaries in Portugal, characterized by multiple sources of contamination and several anthropogenic pressures, highlight the critical situation of this resident bottlenose dolphin population and the urgency to implement effective conservation measures.

02/08 | 17h50
PARALLEL SESSION X -T12.P5 - LOOKING AT SPECIES GENETIC POOL
Room 3.2.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 12 - Theoretical and evolutionary ecology (3)

OC-271 - (EEF2019-13781) - POPULATION GENETICS OF THE TICK IXODES RICINUS: TOWARDS A BETTER UNDERSTANDING OF SPATIAL STRUCTURE

Pedro Poli (France)[1]; Jonathan Lenoir (France)[1]; Annie Guiller (France)[1]

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Population genetic structure of parasites are generally shaped by their hosts distribution and movement. The tick *Ixodes ricinus* is a generalist parasite of mammals, birds and reptiles whose genetic structure is not yet clear. Previous studies devoted to the population structuring of *I. ricinus* were based either on localised samples or conserved mitochondrial sequences. Those works have shown a weak or no apparent spatial pattern of population differentiation between European populations. Here we analysed 547 individuals from 27 populations sampled in 19 different countries across Europe and North-Africa. Samples covered a great part of the species' distribution, including populations close to its northern (Norwegian, Sweden, Ireland and England) and southern (Iran, Spain and North-Africa) range limits. Population genetics analyses were based on 154 SNPs and 4 mitochondrial sequences. Bayesian clustering and multivariate analyses were conducted to identify and describe clusters of genetically related individuals. Three well differentiated clusters were identified. As reported in earlier studies, Eurasian populations appears to be clearly differentiated from North-African ones. Individuals from the south and north-western parts of Europe were mostly assigned to a group clearly differentiated from the one formed by individuals of central and north-eastern Europe. Our preliminary results also reveal a southwest to northeast genetic gradient in Europe. Such findings have implications to better understand tick dispersal and distribution in Europe and its association to host dispersion.

02/08 | 17h50
PARALLEL SESSION X -T12.P5 - LOOKING AT SPECIES GENETIC POOL
Room 3.2.13 | Topic 9 - Biodiversity and ecosystems (1); Topic 12 - Theoretical and evolutionary ecology (3)

OC-272 - (EEF2019-13818) - DEMOGRAPHIC HISTORY OF WEST AFRICAN PRIMATES INFERRED FROM GENOMIC DATA

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The rapid pace of habitat loss and modification stands a major threat to most primates. However, primates are a remarkably diverse group and not all species are equally affected by the same habitat changes. Species with high mobility and behavioural flexibility are usually less affected than those strictly arboreal and more dependent of their natural habitat. Here we used a genomic approach to infer the past and current population dynamics of two strictly forest dependent primates, the Western red colobus – *Piliocolobus badius*- and Western black-and-white colobus – *Colobus polykomos*, and two more ecologically plastic species, the Guinean baboon – *Papio papio*– and the Western chimpanzee – *Pan troglodytes* verusin the Upper Guinean Forests, currently one of the most anthropogenic-fragmented regions on the planet. We sequenced genomes of seven wild individuals from Guinea Bissau and Ivory Coast, to a mean of 25-fold coverage per individual and conducted a Pairwise Sequential Markovian Coalescent (PSMC) analysis to uncover the historical demography of these sympatric primates. We found that all four West African primates have undergone several populations size changes but occurring in different historical periods, suggesting that they are differently affected by the same factors. The demographic histories of the two most forest dependent primates (the two colobus) overlap extensively. Interestingly, baboons and chimpanzees show opposite demographic trends, meaning that when the population of one species increases the other decreases, which may reflect their adaptation to different habitats and/or inter-specific interactions.