BOOK OF ABSTRACT

I. SESSION DESCRIPTION

ID: B5

Predicting the provision and demand of ecosystem services under global change in Mediterranean systems

Hosts:

	Title	Name	Organisation
Host:	Ms.	Alejandra Morán Ordóñez	InForest Joint Research Unit (CTFC-CREAF), Spain
Co-host:		Cláudia Carvalho- Santos Ana Ruiz Frau Ilse Geijzendorffer	

Abstract:

Mediterranean ecosystems are biodiversity-rich, complex socio-ecological systems that provide important and multiple services and goods to society. They represent semi-natural systems subjected to a long history of human use and transformation; therefore, its conservation must deal with multiple cultural, ecological and economic values, and complex dynamics of social change. Changes in the composition and functioning of these ecosystems linked to increasing global change threats (including land use change, climate change, and increasing overexploitation of resources, e.g. overfishing, due to variation in social demands/preferences), will inevitably lead to changes in its capacity to contribute to human well-being.

In this session, we want to bring together a diverse array of people across Europe working on predicting the future demands/provision of ecosystem services by Mediterranean systems (both terrestial and marine). We would like to learn about novel approaches for modelling and mapping future ecosystem services' provision and demand. The evaluation of the future state and condition of ecosystem services relies on scenario building. Therefore, the session also welcomes contributions about scenario generation within the context of ecosystem

service assessments. Since predicting the future is never easy, the session also welcomes historical evaluations that could shed light about plausible future ecosystems trends. We would like to receive contributions representative from a range of geographical and systems settings, from the wildest to the most intensively-managed Mediterranean systems.

Goals and objectives of the session:

Learn about the state-of-the art modelling and mapping tools to predict ecosystem services provision and demand
Learn about plausible trends of ecosystem service provision and demand under different global change pressures
Publicize the work done at the ESP BWG5 on Mediterranean Systems.
Attract new members to the ESP BWG5 on Mediterranean Systems

Planned output / Deliverables:

We will use social-media (e.g. live-tweeting #EcosystemServices, #ESPEurope2018, @ESPartnership) as well as the page of the ESP WG5 on Mediterranean Systems and the ESP monthly newsletter to advertise the outcomes of session (a summary of the session with information about the participants, the topics presented and the take home messages from each oral/poster communication). We will also explore the possibility of a joint publication resulting from the different talks in the session.

Related to ESP Working Group/National Network:

Biome Working Groups: B5 - Mediterranean systems

II. SESSION PROGRAM

Date of session: Wednesday, 17 October 2018
Time of session: 8:45 – 13:00

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
8:45–9:00				Opening. Introduction to the B5 Mediterranean Working group and to the session topic.
9:00–9:15	Laetitia	Tuffery	INRA, France	Combining ecological modeling and economic analysis in a prospective analysis of ecosystem services in the Mt Ventoux MAB Reserve
9:15–9:30	Vassiliki	Vlami	University Of Patras, Greece	Insights from an exploratory assessment of Cultural Ecosystem Services in Greece
9:30–9:45	José Valentín	Roces-Díaz	Swansea University, United Kingdom	Temporal dynamics of Mediterranean forest ecosystem services and their relationships with climate and local biodiversity
9:45–10:00	Alejandra	Morán-Ordóñez	InForest Joint Research Unit (CTFC-CREAF), Spain	Trade-offs in ecosystem service provision in Mediterranean forests under global change
10:00–10:15	Heera	Lee	Karlsruhe Institute of Technology (KIT), Germany	The impact of conservation farming practices on Mediterranean agro-ecosystem services provisioning – a meta-analysis

Time	First name	Surname	Organization	Title of presentation
10:45-11:00	Ilse	Geijzendorffer	Tour du Valat, France	Positive futures for Mediterranean wetlands biodiversity and ecosystem services
11:00-11:15			Flash poster presentations:	
	Rui	Santos	CENSE - Center for Environmental and Sustainability Research, NOVA University Lisbon.	Paying for Biodiversity Conservation and Ecosystem Services Delivery in Rural Landscapes in Portugal
	Adrián	Luque Florido	IGS-UMA, Universidad de Malaga, Spain	Does Malaga city have green and blue infrastructures? Analysis of their ecological connectivity, population accessibility and potential ecosystem services.
11:15-13:00	Session discussion followed by meeting of members B5 Mediterranean working group. Topic of the meeting 'How well is the Mediterranean region represented in the latest IPBES regional assessment reports? Gaps and the way forward'. This discussion and the meeting areopen to anyone interested in joining the group or interested in research of ecosystem services and biodiversity in the Mediterranean context.			

III. ABSTRACTS

The abstracts appear in alphabetic order based on the last name of the first author. The first author is the presenting author unless indicated otherwise.

1. *Type of submission:* ***Abstract***

B. Biome Working Group sessions: B5 Predicting the provision and demand of ecosystem services under global change in Mediterranean systems

Positive futures for Mediterranean wetlands biodiversity and ecosystem services

First author: Ilse Geijzendorffer

Other author(s): Özge Balkiz, Valia Drakou, Lena Hatziiordanou, Flavio Monti, Chris McOwen, Alejandra Morán-Ordóñez, Nigel Taylor

Affiliation, Country: Tour du Valat, France

To change the current negative trend of biodiversity and related ecosystem services, the actors that are capable of changing either policies or daily management of ecosystems or protected areas need to know what their biggest challenges are and how what the impact could be of changes in their current approaches. However, information on what possible futures might bring under the impact of global change and different policy and management measures is a generally recognized knowledge gap. Wetlands only occupy 9% of the land globally, but they provide proportionally significantly more ecosystem services, which are also of high importance (e.g. water provision, regulation of hazards). Especially in regions such as the Mediterranean Basin where wetland extent is decreasing while the human population is increasing, the importance of wetlands for ecosystem services and biodiversity is increasingly disproportionate. Meanwhile, ongoing social and political instability in the region means progress towards Sustainable Development Goals is not a trivial challenge. Information on how policy and management measures could improve the outlook for Mediterranean wetlands biodiversity and ecosystem services is however lacking.This study uses a systematic literature review to identify the pathways, conditions and criteria for positive developments of Mediterranean wetlands under the current global change context. The study is undertaken by the Scientific and Technical Network of MedWet. MedWet is a Mediterranean initiative of 27 Mediterranean countries that have signed the Ramsar convention on the conservation of Mediterranean wetlands.The information from this study is used to develop specific recommendations towards positive futures (e.g. water security,

safe coasts). These recommendations are not primarily directed to global platforms, but rather to national governments, NGOs and local citizens' organizations. These parties are most directly concerned with the benefits from a sustainable development path and the safeguarding of related ecosystem services and biodiversity.

Keywords: global change, literature review, scenario, sustainable development

2. *Type of submission:* ***Abstract***

B. Biome Working Group sessions: B5 Predicting the provision and demand of ecosystem services under global change in Mediterranean systems

The impact of conservation farming practices on Mediterranean agro-ecosystem services provisioning – a meta-analysis

First author: Heera Lee

Other author(s): Sven Lautenbach, Ana Paula García Nieto, Alberte Bondeau, Wolfgang Cramer, Ilse R. Geijzendorffer

Affiliation, Country: Institute of Meteorology and Climate Research, Atmospheric Environmental Research (IMK-IFU), Karlsruhe Institute of Technology (KIT), Germany

In the Mediterranean region, the long-term provision of ecosystem services (ES) by agroecosystems is threatened by ongoing climate change and concurrent exploiting ways of farming practices. Conservation agriculture could be expected to ensure sustainability of ES from Mediterranean agro-ecosystems. Conservation agriculture is characterized by minimal soil disturbance, permanent soil cover, and diversification of crop species. We analyzed the impacts of alternative agricultural management practices (conservation tillage, cover cropping, mulching, manual weed management, organic/non-fertilizer use, rainfed system) on multiple ES based on 155 published case studies (1994- 2015). The effect size of various management options on four provisioning and four regulating ES was quantified. Impacts of conservation management options on ES are not uniform. All regulating services were positively affected by the conservation management options except for under the no-irrigation system. In contrast, the provisioning services were inconsistently influenced by the conservation management options in different ways. For crop yield, environmentally sustainable soil management was beneficial, but organic fertilization (effect size = -0.17), manual weed management (effect size = -0.35) and no-irrigation system (effect size = -0.5) led to lower crop yields. The impact on crop biomass was mainly negative but not significant. Water availability was especially important to enhance both provisioning and

regulating services. Overall, conservation agriculture management practices led to more positive than negative effects on ES in the study region. Stimulating the application of conservation management practices is, therefore, an important policy option for decision makers given the vulnerability of ES in the Mediterranean basin.

Keywords: Land management, Farming practices, Meta-analysis, Trade-offs, the Mediterranean region

3. *Type of submission:* ***Abstract***

B. Biome Working Group sessions: B5 Predicting the provision and demand of ecosystem services under global change in Mediterranean systems

Trade-offs in ecosystem service provision in Mediterranean forests under global change

First author: Alejandra Morán-Ordóñez

Other author(s): Aitor Ameztegui, Miquel de Cáceres, Sergio de Miguel, Lluis Brotons, Lluis Coll

Affiliation, Country: InForest Joint Research Unit (CTFC-CREAF), Spain

Mediterranean forests represent a good example of biodiversity-rich and complex socio-ecological systems, with a long history of human use and management. These forests have historically played a key role in providing important services and goods to society and are currently threatened by global change.In this study we evaluate the changes in ecosystem service provision by Mediterranean forests of black pine (Pinus nigra) and Scots pine (Pinus sylvestris) under eight different future scenarios, for the 2035, 2050 and 2100 time horizons. These scenarios resulted from the combination of different socio-economic, management and climate change assumptions. We used the process-based model SORTIE-ND to simulate spatially-explicit forest dynamics in 261 forest plots of these species (1 ha) under each scenario. Simulation plots correspond to the plots of the National Forest Inventory within the Solsonès county, located in central Catalonia (NE Spain). We used the outputs of SORTIE-ND (predictions of changes in forest structure and composition over time) as inputs of different empirical and process-based models to estimate changes in the provision of the following ecosystem services: harvested timber, carbon storage, mushroom yield, regulation of water quantity and prevention of soil erosion. We also assess whether or not there are trade-offs between ecosystem services provision and if those trade-offs hold over time and between scenarios. Preliminary results suggest provision of ecosystem

services does not change substantially among scenarios, except for harvested timber which was much higher in the scenario assuming forest management aimed at increasing biomass production under a high-end climate change scenario. The small differences in predictions of ecosystem service provision among scenarios might be due to the fact that those services are influenced by drivers not explicitly considered in the scenarios. In any case, greater differences between scenarios arise for longer time horizons or more severe emissions scenarios.

Keywords: European Policies; Future Scenarios; Global Change drivers; Mediterranean forests; Modelling

4. *Type of submission:* ***Abstract***

B. Biome Working Group sessions: B5 Predicting the provision and demand of ecosystem services under global change in Mediterranean systems

Temporal dynamics of Mediterranean forest ecosystem services and their relationships with climate and local biodiversity

First author: Jose V. Roces-Díaz

Other author(s): Banqué-Casanovas, M., De Cáceres, M., de-Miguel, S., García-Valdés, R., Morán-Ordóñez, A., Vayreda J., Martínez-Vilalta, J.

Affiliation, Country: 1. Department of Geography, Swansea University, Singleton Park, Swansea, United Kingdom, Spain

Mediterranean forest ecosystems are responding to different drivers of Global Change. These drivers include a general decline of human use of the landscape (that brings a general expansion of forests) and a growing impact of different disturbances such as extreme climatic events. These drivers are expected to impact forest ecosystems, their biodiversity, their distribution and their ecological functioning. However, the recent impact of these (or other) drivers on the ecosystem services (ES) provided by these forests still remains partially unexplored. Exploring these recent impacts should constitute one of the basis for accurate and consistent future predictions of ES provision. In this work we have used a network of more than 3,400 forest inventory plots in Catalonia (Northeastern Iberian Peninsula) to assess and attribute recent changes in forest ecosystem services. These plots have been surveyed three times during last three decades (approximately in 1990, 2000 and 2015). We analyzed changes in forest structure and composition, and used previously tested ecological models to estimate a series of ecosystem services (ES). We obtained spatially explicit indicators (a grid with 5x5 km of cell size) for the three reference periods centered around

survey years (1990, 2000 and 2015) for the following ES: food (mushrooms) provision, water provision, timber provision, climate regulation (carbon sequestration) and erosion control. Preliminary results did not show huge differences among ES for this period, however some of these indicators showed a slight decline, apparently related with inter-annual variability of climatic conditions. In addition we did not find strong relationships between these changes on ES supply and the spatial patterns (or observed) changes of forest biodiversity (tree species richness and Shannon diversity index). However, these potential links should be explored with more detail in further analysis.

Keywords: Mediterranean forests; ecosystem services dynamics; forest dynamics; global change; forest biodiversity

5. *Type of submission:* ***Abstract***

B. Biome Working Group sessions: B5 Predicting the provision and demand of ecosystem services under global change in Mediterranean systems

Combining ecological modeling and economic analysis in a prospective analysis of ecosystem services in the Mt Ventoux MAB Reserve

First author: Laetitia Tuffery
Other author(s): Davi H., Courdier F., Lefèvre F., Rigolot E., Roux A., Stenger A.
Affiliation, Country: BETA, INRA, AgroParisTech, France

Forest ecosystems provide many ecosystem services (soil protection, wood and NWFPs, recreation, etc.) playing an essential role in our societies. In the context of global change and increasing anthropogenic pressures on Mediterranean forest ecosystems, careful consideration should, therefore, be given from public policies to forests adaptation. In this context of climate change and public policy evolutions, a multidisciplinary approach is needed. Climate change induces ecosystem changes (i.e. carbon sequestration or basal area variations), and public forest management policies impact land-use/land-covers (LULC). Thus, both drivers of change are closely interconnected and must be studied simultaneously to provide a robust spatially explicit valuation of ecosystem services.The Mont Ventoux is a Man and Biosphere Reserve also characterized by the multi-functionality of its forest areas. We combine biophysical and economic assessment of ES on this territory, along different global change scenarios developed in collaboration with local stakeholders.We use a process-based ecological model (i.e. CASTANEA) to predict the impact of climate change on the functioning of nine forest types at five altitudinal levels and two orientations. In parallel, a stakeholder-based analysis is carried out to estimate the evolution of the supply of ES

according to different LULC (using InVEST). Carbon sequestration and timber production are estimate by both approaches, soil erosion control and habitat quality are given by InVEST.Our first results have shown that in the case of RCP 8.5, the risk of mortality is very high. Regarding the evolution of carbon sequestration, results depend on the species and scenarios studied. Concerning the economic value of our three ES, the economic results of policy scenarios vary according to climate change scenarios: at horizon 2050, RCP 4.5 is more favorable to the Biomass option and RCP8.5 is more favorable to the inaction (i.e. Baseline). Moreover, across climate scenarios, four major forest species impact our economic results Pinus nigra, Pinus halepensis, Quercus ilex, Quercus pubescens. An analysis regarding ES synergies seems necessary to capture all the impacts of climate and policy scenarios on the multi-functionality of the forest.

Keywords: Mediterranean forests, climate change, policy scenarios, socio-ecological approach

6. *Type of submission:* ***Abstract***

B. Biome Working Group sessions: B5 Predicting the provision and demand of ecosystem services under global change in Mediterranean systems

Insights from an exploratory assessment of Cultural Ecosystem Services in Greece.

First author: Vassiliki Vlami

Other author(s): Ioannis Kokkoris, Stamatis Zogaris, Panayotis Dimopoulos.

Affiliation, Country: University of Patras, Department of Environmental and Natural Resources Management, Greece

In the Mediterranean, Cultural Ecosystem Services (CES) provide special challenges with regard to their identification, mapping and assessment. Until now, CES are poorly inventoried, assessed or mapped (e.g. regional or national scales). Since early 2018, Greece has expanded its Natura 2000 protected area network (covers approximately 28% of the country's land area and about 22% of its marine territory) and reforms are occurring in protected area management. This recent expansion is a reflection of commitment to EU nature conservation policy, but also a source of socio-political concern. In most cases, there is a poor appreciation of CES provided within protected areas and this heightens the complexity and may create conflicts. Since CES are closely associated with societal perspectives on complex socio-ecological systems it is important to identify specialized indicators for CES assessments in such sensitive environments. In this research we screen for

and identify several CES indicators within the Natura 2000 Network of Greece, as well as outside the Network where data was available. This assessment resulted in the compilation of a set of indicators ranging from specialized outdoor recreation interests (such as nature-viewing infrastructure, rafting areas, sacred natural sites, etc.) to site characterization proxies (such as blue-flag beach designations, traditional agriculture, "mythical landscapes" etc.). The analysis revealed that some types of indicators show redundancy or/and are complementary, while others are extremely specialized (e.g. birdwatching hotspots). GIS analysis produced heat maps and hotspots complementing a prioritization scheme that assists in highlighting the cultural ecosystem services both at the protected area scale and broader regional scale. A key outcome of the study is that uncertainties are defined and major gaps in progress are expressed. Thus, the analyses provide a kaleidoscope effect that may be helpful in expressing screening-level state-wide CES evaluations.

Keywords: CES indicators, environmental management, ES mapping, Natura 2000, recreation