III - Terrestrial biodiversity, ecosystems and nature conservation

Parallel session A – Monday 10th March 14:00-15:30

ID: [60]

Title: **EXPLORING THE ROBUSTNESS OF ADAPTATION OPTIONS FOR BIODIVERSITY TO THE DIRECT AND INDIRECT EFFECTS OF CLIMATE AND SOCIO-ECONOMIC CHANGE**

Authors: Paula Harrison[1]; Pam Berry[1]; Robert Dunford[1]; Mark Rounsevell[2]; Jill Jaeger[3]

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Numerous studies have explored the impacts of climate change at a variety of spatial scales on biodiversity and ecosystems. However, most of these studies ignore potential interactions with other sectors. Cross-sectoral interactions are important since changes in one sector can affect another sector either directly (e.g. land use change affects biodiversity) or indirectly through policy (e.g. measures designed for coastal flood defence also impact on coastal habitat). Ignoring cross-sectoral interactions can lead to either over- or under-estimation of climate change impacts on biodiversity and the need for adaptation. Furthermore, many previous studies report the impacts of climate change under current socio-economic conditions, but in fact impacts will interact with those associated with continuing socio-economic and political changes, in potentially complex, non-additive ways.

This paper will provide examples of how integrated assessment approaches can be used to explore choices which inform the integration of adaptation actions and policies for biodiversity with those from a range of other sectors (including agriculture, forests, coasts, water resources and urban development). This includes application of the CLIMSAVE Integrated Assessment (IA) Platform, a user-friendly, interactive web-based tool which enables stakeholders to explore and understand the interactions between climate change impacts and adaptation across different sectors, rather than viewing their own sector in isolation. This helps ensure that unintentional adaptation resulting from actions in one sector does not reduce the effectiveness of purposeful adaptation in another sector. This paper will illustrate such interactions for a range of biodiversity and ecosystem service indicators covered by the platform.

It will also demonstrate how the platform can be used to identify robust adaptation strategies for reducing climate change vulnerability which are scenario-independent or no regret strategies. An extensive range of adaptation options for biodiversity and other sectors were identified through a series of stakeholder workshops. These were clustered into four policy archetypes (ecosystem-based adaptation, market-based adaptation, technology-based adaptation and people-based adaptation) and their robustness tested using the CLIMSAVE IA Platform to examine whether they would reduce vulnerability to climate and socio-economic changes across sectors, scales and scenarios. Synergies and trade-offs between adaptation and mitigation measures in different sectors will also be discussed focussing on examples which highlight neutral, positive and negative interactions with biodiversity and the implications this has for ecosystem-based adaptation. The results explore the effect of uncertainties about future climate change, technological advances and socio-economic development on policy responses in order to find strategies that can be most effective in the long-term.

Presenter

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Conference on European Climate Change Adaptation
Research and Practice

ID: [98]

Title: **ADAPTING THE PORTUGUESE HERPTOFAUNA TO CLIMATE CHANGE, WHAT AND HOW TO DO IT? A CONTRIBUTION TO THE PORTUGUESE ADAPTATION STRATEGY USING A COMBINED METHODOLOGY**

Authors: Mário Pulquério[1]; David Avelar[1]; Tiago Costa[1]; Paula Araújo[2]; Emília Silva[2]; Rui Rebelo[1]; Maria João Cruz[1]
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During this century, climate change is expected to be one of the major driving forces for the loss of biodiversity. Twenty to thirty percent of animal and plant species are expected to go extinct worldwide due to climate change. The Mediterranean region will be one of the main affected areas, in particular due to the increase of droughts.

At the European level, the biodiversity sector is considered prioritary in the Europe 2020 strategy and by all countries that are developing national adaptation strategies. For example, Spain and France, consider biodiversity as one of the three most priority sectors for action.

In 2010, Portugal has initiated the elaboration of a National Climate Change Adaptation Strategy to (NCCAS) with 9 societal sectors, including the biodiversity sector. To assist the elaboration of this strategy we have combined an existent methodology that considers the impacts and vulnerabilities of species via bioclimatic models with dynamic expert consultation methodologies. This allow to: i) identify key (indicator) herptofauna species and ii) select a set of adaptation measures for those species.

For each amphibian and reptile species, climate impact was assessed by considering its exposure and its sensitivity to climate change through considering changes in climate space in future climate scenarios. This was performed using bioclimatic enveloped models produced by the project Iberia Change. The adaptive capacity traits of each species were evaluated by experts through a questionnaire. Afterwards, a vulnerability index was calculated by combining the species adaptive capacity with its potential climate impacts. Species were then ranked according with their vulnerability index and presented during the final workshop with several experts in order to identify a list of target and indicator species. A total of 63% and 36% target species of amphibians and reptiles were identified, respectively. In the second part of the workshop, a limited number of adaptation measures were prioritized with the goal of maintaining herptofauna diversity in face of climate change.

Twenty nine adaptation measures were proposed for the Portuguese herptofauna, and later incorporated in NCCAS. Eleven were related with changes in conservation practices, the same amount were of scientific/technological nature, six were political or legal and one was directed to individual or community behavior. Some adaptation measures were transversal to other sectors considered in NCCAS.

Our combined methodology allowed the identification not only of the most vulnerable herptofauna species, but also species that can be considered as indicators of climate change. This was crucial for the definition of a limited number of specific adaptation measures.

The results of the project, a critical assessment of the methodology used and specific guidelines for developing future vulnerability assessments and adaptation strategies for biodiversity will be presented during the conference.

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Conference on European Climate Change Adaptation
Research and Practice

ID: [254]

Title: **ECOSYSTEM SERVICES' SENSITIVITY TO CLIMATE CHANGE AND POSSIBLE ADAPTATION OPTIONS IN MOUNTAIN REGIONS**

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Ecosystems provide goods and services essential for human well-being, e.g. supply of drinking water, carbon sequestration and protection against natural hazards. These ecosystem services (ES) are vulnerable to climatic changes and require an appropriate management to sustain future generations. However, there is only little knowledge about which ES might be particularly sensitive to climate change. We used expert interviews in order to i) identify those ES with a particular relevance for mountain regions and to ii) assess potential impacts of climate change on the provision of and demand for ES. Based on these interviews we used quantitative and qualitative analyses tools to develop ES-change-scenarios. We found out that particularly important for mountain regions are those services of the basic needs (i.e. fresh water, habitat, energy and food). Preliminary results on the climate change sensitivity of ES show that the supply and quality of fresh water is perceived to be affected. This could have far reaching consequences not only for the people living in the Alps, but also for adjacent areas. In addition, experts asserted that tourism is likely to be negatively affected in winter and positively affected in summer. Experts' statements regarding natural hazard regulation were ambivalent. On the one hand 63% of the interviewees mentioned an increase of weather extremes which might reduce the protective function of ecosystems and therefore have a negative impact on this service's provision. On the other hand 26% of the experts stated that climate change would have no impact on this service what so ever, and argued instead that because of socio-economic developments the vulnerability of society had increased. This would result in a higher demand for natural hazard regulation. Also we found, that only few adaptation options were considered by the experts. We conclude that such ES-change scenarios are a valuable tool to illustrate conflicts of future management and to identify adaption requirements in order to secure ES for future generations.

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ID: [194]

Title: **MANAGING THE FUTURE OF MEDITERRANEAN CORK OAK WOODLANDS: PITFALLS OF USING INCOMPLETE SPECIES RANGE MODELS FOR CLIMATE CHANGE ADAPTATION PLANNING**

Authors: Ricardo Correia[1]; Jorge Palmeirim[1]; Aldina Franco[2]

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Species Distribution Models (SDMs) are potentially useful for conservation and adaptation planning, but their accuracy depends, among other factors, of the adequacy of the data set used to train them. Most Mediterranean species are present across the basin, but models are often trained with data from their European range only. To understand how this data restriction might influence model predictions, we modeled the future climatically suitable areas for Cork oak (*Quercus suber*), a species that often dominates the Montado, an agro-silvo-pastoral system recognized for its biological, social and economic value. We aim to (i) evaluate how differences in model predictions, due to the use of incomplete training sets, may affect estimates of climate change impacts on Cork oak woodlands, and (ii) using Portugal as a case study, assess the potential success of current afforestation efforts in compensating future losses of Cork oak areas.

We used MAXENT to predict the future distribution of Cork oak using two different training data-sets: European range and full range (Europe and Africa). All the models performed well and resulted in similar extents of current predicted suitable areas. However, the two training sets resulted in significant differences in future predictions, both in terms of predicted range changes and the proportion of the current range to remain suitable. The model trained with the European distribution generally predicted a smaller total range and a smaller area of the current range expected to remain suitable, independently of the climate change scenario analyzed.

These results are also reflected on the evaluation of the climatic suitability of recent plantations in Portugal. The model trained with the full range indicates that most new plantations are located in areas that will remain suitable in the future, whereas the European model suggests that most new plantations are located in areas likely to become climatically unsuitable for Cork oaks. These results show that the sitting of new plantations should take into consideration their future suitability, and that further efforts will be required to compensate the predicted losses in range extent due to climate change.

In conclusion, our results show that models of Mediterranean species trained using only their European range tend to over-estimate future range changes and produce uncertain predictions. Hence, a good representation of the total geographic and climatic niche of the species is needed for proper model calibration. For the Cork oak, the analysis using the full range still predicted a significant distribution shift across its range, an impact that seems possible to minimize with carefully planned afforestations. Considering that the Cork oak is a long lived species, which only matures after 30 years, we argue that timely conservation and adaptation actions are needed to compensate potential climate change impacts on this system and its biodiversity.

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