

SESSION DESCRIPTION

ID: T5a

Ecosystem Services Modelling for Nature-based Solutions

Hosts:

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Abstract:

"Nature-based solutions (NbS) are defined by the IUCN as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits" (Cohen-Shacham et al., 2016). NbS could be used to enhance Ecosystem Services (ES) to solve particular societal challenges, through targeting the provision of multiple social, economic and environmental co-benefits. For example, NbS can contribute to 1) better use of ecosystems; 2) sustainable and multifunctional management of ecosystems; and 3) design and management of new ecosystems. Applying NbS requires an integrated understanding of the environmental, economic and social systems and their interactions.

So far, modelling studies of ES and NbS have predominantly focused on the urban environment. For instance, different scenarios of green and blue infrastructure in cities have been modelled for their impact on ES to achieve urban cooling and flood abatement while also storing carbon, reducing air pollution, improving biodiversity and providing recreation and health benefits (Seddon, 2020). NbS in agricultural or natural landscapes are less commonly described, but nevertheless can address key challenges in landscape management. An example is the restoration of natural forests in upper catchment areas in order to supply multiple ES that help protect downstream communities from flooding while increasing carbon sequestration and

protecting biodiversity. Still, modelling how NbS can increase ES on landscape level is challenging and rarely operationalised, since it requires an integral modelling approach.

Modelling the negative environmental impact of NbS that focus on a specific ES is also underrepresented. For example, the implementation of a NbS aimed at carbon sequestration may require the use of materials and energy that generate an overall net gain in greenhouse gas emissions throughout their supply chains and therefore shifted negative environmental impact. As such, modellers at the interface between industrial ecologies (e.g. Life Cycle Assessment) and ecosystem services must acknowledge the indirect impact of processes on the challenges that an NbS aims to remediate.

NbS, by enhancing ES, seem to be a promising concept to solve societal challenges and policy targets simultaneously and sustainably. Modelling of ES to assess NbS can help decision makers to mainstream NbS in policy and practice. However, a better understanding of how best to model this and how to assess the synergies and trade-offs between different goals is needed.

This session specifically focusses on modelling of how ES modelling can help to assess NbS. How can ES models help us to identify these solutions and help solve societal challenges? How can scenario studies inform us to assess how and where NbS could be applied most effectively? How can models be used to quantify the benefits and trade-offs? What are the uncertainties of the predictions? And in general: what are the benefits and barriers to use ES models on NbS within environmental management and planning practice?

We invite speakers to present advancements in modelling ES for NbS in relation to:

- Application of ES models for NbS in real world case studies with stakeholders and end-users
- Linking ES with NbS and societal challenges through models
- Modelling the interactions between the biophysical, economic and the social system
- Good and bad practices in the development and application of ES models for NbS
- Multiscale modelling of ES for NbS (from cities to landscapes) —the impacts of local NbS on landscape scale
- Modelling to inform practices for robust policy-making and sustainable development
- Modelling impact of NbS implementation and trade-off analysis with other/conventional solution

Goals and objectives of the session:

This session is organized by ESP's Thematic Working Group on Modelling (TWG5) and has two main goals:

- to showcase recent advancements and developments in applications of ES models for NbS by the European ES community;

- to initiate a discussion on how to proceed in the development of these models in real life and to learn from each other's experience.

Planned output / Deliverables:

This session will be used to further develop collaboration and a research agenda within the Thematic Working Group on Modelling.

Session format:

Standard session (presentations)

Voluntary contributions accepted:

Yes, I allow any abstract to be submitted to my session for review

Related to ESP Working Group/National Network:

[Thematic Working Groups: TWG 13 – Role of ES in Ecosystem restoration](#)