BOOK OF ABSTRACTS

This Book of Abstracts provides a comprehensive overview of the session content and is structured into three main sections:

I. Session Description – an introduction to each session, including its objectives and expected outputs
II. Session Program – a detailed schedule for each session, including speakers and timing
III. List of Abstracts – a complete compilation of all accepted abstracts

I. SESSION DESCRIPTION

ID: X5

Restoration potential of coastal wetlands in Europe for climate change mitigation and co-benefits

Hosts:

	Name	Organisation	E-mail
Host (s):	Ana Lillebø	University of Aveiro	lillebo@ua.pt
Co-host(s):	Eleftheria Kampa	Ecologic Institut, gemeinnützige GmbH (Ecologic)	eleftheria.kampa@ecologic.eu
	Christoph Schröder	Universidad de Málaga (UMA)	christoph.schroder@uma.es
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Abstract:

Coastal wetland ecosystems hold large, under-exploited potential for climate change mitigation via carbon sequestration, while simultaneously delivering multiple ecosystem service co-benefits (flood regulation, water purification, biodiversity habitat, recreation). The RESTORE4Cs project ("Modelling RESTORation of coastal wetlands for Carbon pathways, Climate change mitigation and adaptation, ecosystem services, and biodiversity Co-benefits") has developed integrative models, data protocols, and a toolbox applied across six European pilot sites. This session offers a unique blend of discussion and training: we first bring together leading scientists, practitioners, and policy actors to debate restoration potential, challenges, and trade-offs across Europe; then we guide participants in a hands-on workshop using the RESTORE4Cs toolbox to explore restoration scenarios, assess ecosystem service outcomes, and integrate stakeholder dimensions. Participants will gain insights and experience to further adapt the toolbox in their own contexts, contribute to improving it, and help advance nature-positive restoration planning across Europe. The session contributes directly to the ESP conference theme by combining knowledge of ecosystem services with actionable tools that promote a nature- and people-positive Europe.

Goals and objectives of the session:

- Share latest findings on wetland restoration potential for climate mitigation and co-benefits.
- Link restoration science to EU policy agendas and practical implementation.
- Provide an interactive overview of the RESTORE4Cs online platform and toolbox.
- Collect user feedback to improve the toolbox and foster co-design.
- Build networks across ESP working groups and regional chapters.

Planned output / Deliverables:

- Short session report with key lessons and recommendations.
- User feedback report to guide toolbox development.
- Expanded collaboration network through the RESTORE4Cs Community of Practice

Session format:

Format

- 1,5h session combining a Discussion Forum (keynote + panel + plenary debate) and an interactive introduction to the RESTORE4Cs online platform and toolbox.
- The session combines a discussion forum and an interactive slot. The forum will feature experts and stakeholders debating opportunities, barriers, and trade-offs in scaling up wetland restoration, drawing on insights from the EU Horizon project RESTORE4Cs. The interactive slot will showcase the use of the RESTORE4Cs toolbox and online platform, an integrative modeling platform that assesses carbon pathways, climate adaptation, and ecosystem service outcomes across European pilot sites.
- Participants will gain knowledge, practical skills, and new collaborations to apply restoration tools in their own contexts, strengthening the ESP community of practice on ecosystem services and restoration.

Related to ESP Working Group:

Other

II. SESSION PROGRAM

Room: Lounge
Chair: Christoph Schröder **Timekeeper:** Enrickson Varsori
Date of session: Wednesday, 20th May 2026
Time of session: 15:00-16:30

Timetable speakers:

Time	First name	Surname	Organization	Title of presentation
10′ + 20′ interaction with the platform	Anis	Guelmami	Tour du Valat	An integrated online platform to support coastal wetland restoration planning for climate mitigation and ecosystem service co-benefits in Europe
10′ +5′	Olivia Rose	Cason	Forest Science and Technology Centre of Catalonia (CTFC)	Co-designing Socio-ecological Resilience: An Integrative and Multi-valuation Landscape Approach for Mediterranean Biosphere Reserves
10′+5′	Bruna R.F.	Oliveira	CESAM, Universidade de Aveiro	Co-benefits and economic valuation in coastal wetlands: an integrated transdisciplinary framework for ecosystem service assessment
10′+5′	Jan	Melichar	Charles University Environment Centre	Economic value of carbon: a parameter changing the optimal rotation of forest stands
10′+5′	Carmela	Carmela	Istituto per le Applicazioni del Calcolo "M. Picone", Consiglio Nazionale delle Ricerche, Bari, Italy	Optimising Coastal Wetland Restoration for Climate and Ecosystem Services under Budget Constraints

III. LIST OF ABSTRACTS

The first author is the presenting author unless indicated otherwise

1. Co-designing Socio-ecological Resilience: An Integrative and Multi-valuation Landscape Approach for Mediterranean Biosphere Reserves

***First author*:** Olivia Rose Cason
Other author(s): Quim Zaldo-Aubanell, Núria Junyent Aquilué, Roser Zaragoza Maneja
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The link between Water-Energy-Food-Ecosystem (WEFE) nexus and ecosystem services (ES) remains underexplored yet increasingly important for achieving socio-ecological resilience amid climate and global change. This is the case for the Mediterranean region, which is recognized as a global hotspot where ecological richness converges with profound socio-cultural values. Mediterranean Biosphere reserves

(MBRs) are considered living labs for sustainable development as their scale and landscape priorities are an excellent setting for testing and refining integrated landscape management. This research presents the Water-Energy-Food-Ecosystem Socio-ecological modelling approach (WEFE-SEM), a methodological framework that ensures integrative landscape management to accelerate the transformation of MBRs toward more resilient and climate change-adaptive territories. The framework was applied to seven MBRs using a five-stage process that began with the compilation of WEFE indicators and the construction of Land Use Land Cover maps simulated under three predefined global climate scenarios. ES were quantified for each scenario using the Integrated Valuation of Ecosystem Services and Trade-offs (InVEST) modelling software. The three simulated futures serve as a diagnostic tool to identify potential risks, trade-offs, and socio-ecological challenges that may emerge if no corrective actions are taken. Insights derived from the resulting ES bundles provide a structured evidence base for stakeholder engagement, which enabled the co-design of a fourth, adaptive scenario aimed at mitigating the most critical projected impacts. The outcome is a portfolio of alternative resilient landscape configurations, visualized through spatially explicit maps, that serve as a decision support tool from which biosphere reserve managers collectively select the option that best aligns with territorial priorities and optimizes WEFE objectives for the MBR.

Keywords: Mediterranean region, Spatial Modelling, Resilient Landscapes, Ecosystem Services, Social values

2. Economic value of carbon: a parameter changing the optimal rotation of forest stands

First author: Jan Melichar
Other author(s): Hana Škopková, Kateřina Mácová
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Sequestering carbon in forest ecosystems is an important nature-based solution for mitigating climate change. One way to assess the effectiveness of carbon uptakes in forestry is to determine the effect that the inclusion of carbon price has on the length of economic rotation period of forest stands. Whether and until when forests should be left unharvested and store carbon in living biomass and deadwood, or harvested and store carbon in harvested wood products is the issue which is investigated in this study by computing the rotation ages and mitigation effects, when both net revenues from commercial timber and the economic value of carbon storage are considered. The economic benefits from carbon sequestration can flow to a forest enterprise from the sale of carbon credits or payments for ecosystem services. The optimization is carried out with an economic-ecological model that includes size-structured matrix growth model and accounts for climate effects on forest dynamics. The study concerns with uneven-aged mixed-species mountain forests consisting of Norway spruce (Picea abies L.), European beech (Fagus sylvatica L.) and silver fir (Abies alba Mill.). The data on forest initial distributions comes from the Czech National Forest Inventory. The results showed that inclusion of carbon pricing to economic criteria for determining optimal rotation ages prolongs the rotation period. An increase in the carbon prices postpones optimal harvest age and leads to higher total net carbon sinks. However, the optimal solutions are sensitive not only to the discount rate, but also to the site characteristics of a forest stand and future climate evolution.

Keywords: carbon sequestration, growth model, economic rotation period, shadow price of carbon, climate change

3. Optimising Coastal Wetland Restoration for Climate and Ecosystem Services under Budget Constraints

First author: Vsevolod Bohaienko
Other author(s): Fasma Diele, Benjamin Misteli
Presenting author: Carmela Marangi
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Coastal wetlands provide critical ecosystem services, including climate regulation, biodiversity support, and flood protection, yet many remain degraded due to historical land-use change. Designing effective restoration strategies requires balancing ecological benefits with economic feasibility and implementation constraints.
We present a novel decision-support framework that formulates coastal wetland restoration planning as a mixed-integer optimal control problem. The approach integrates discrete restoration choices (e.g., vegetation type, hydrological interventions) with continuous management intensities (e.g., planting density, treated area). These decisions are dynamically linked to a vertically resolved, process-based model of soil organic carbon (SOC) and greenhouse gas (GHG) emissions (CO_2 and CH_4), enabling mechanistic assessment of climate regulation services.
A genetic algorithm is employed to identify cost-effective restoration portfolios that meet specified climate and carbon targets under explicit budget and feasibility constraints. Application to a case study reveals clear trade-offs between grass seeding and shrub planting strategies. Results show that planting density plays a more influential role than treated area in controlling methane emissions, highlighting the importance of intervention intensity in ecosystem service delivery.
Sensitivity and convergence analyses confirm the robustness of the optimisation outcomes. Overall, the framework provides a transparent and flexible tool for evaluating restoration pathways that maximise climate mitigation benefits while respecting financial constraints. It can be extended to incorporate additional ecosystem services such as biodiversity enhancement and flood risk reduction, supporting evidence-based policy and adaptive management of coastal wetlands.

Keywords: Wetland restoration, Mixed-integer optimal control problem, Greenhouse gas emissions

4. An integrated online platform to support coastal wetland restoration planning for climate mitigation and ecosystem service co-benefits in Europe

First author: Anis Guelmami
Other author(s): Christoph Schröder, Gabriel Martorell, Hélène Cretois, Ana Lillebø
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Coastal wetlands are key ecosystems for climate change mitigation, biodiversity conservation and socio-economic resilience, yet their restoration across Europe remains insufficiently coordinated and prioritised. A major challenge lies in integrating heterogeneous data on wetland extent, condition, pressures and ecosystem services into decision-support frameworks that are scientifically robust and policy-relevant.

This presentation introduces the RESTORE4Cs Interactive Online Platform, developed to support evidence-based planning and prioritisation of coastal wetland restoration at European and national scales. The Platform serves as a central access point for harmonised spatial datasets, indicators and analytical tools produced within the RESTORE4Cs project, facilitating the exploration, visualisation, interpretation, and free access of restoration-relevant information by scientists, policymakers and practitioners. It integrates multiple complementary data products, including indicators tracking policy progress, spatial assessments of ecosystem extent and condition, and pan-European maps of restoration potential. Among these, Potential Wetland Areas (PWA) and Potentially Restorable Wetlands (PRW) are used within an embedded Decision-Support Toolbox to help identify where wetlands were likely lost due to land-use conversion and where restoration remains biophysically and operationally feasible. In parallel, indicators on wetland degradation, pressures and ecosystem functioning support the identification of sites requiring ecological rehabilitation. Additional layers addressing biodiversity relevance, climate mitigation potential, protection status and socio-economic context allow users to explore restoration opportunities from a multi-benefit perspective.

Rather than producing prescriptive rankings, the Platform supports transparent and flexible exploration of restoration scenarios, enabling users to compare spatial patterns, assess trade-offs and adapt prioritisation criteria to different policy objectives. The presentation will demonstrate how the RESTORE4Cs Platform and Toolbox act as a bridge between large-scale ecosystem assessments and practical restoration planning, contributing to the implementation of the EU Nature Restoration Regulation and related climate and biodiversity policies.

Keywords: coastal wetlands, restoration, spatial prioritisation, ecosystem assessment, climate mitigation

5. Co-benefits and economic valuation in coastal wetlands: an integrated transdisciplinary framework for ecosystem service assessment

First author: Bruna R.F. Oliveira
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The UN Decade on Ecosystem Restoration and the EU Nature Restoration Regulation provide the momentum for coastal wetlands restoration, which requires a multidimensional approach due to their complex socio-ecological nature. This study presents a transdisciplinary framework for assessing co-benefits of coastal wetland restoration in Europe by integrating natural sciences and technology (ecological vulnerability assessment using the AquaLinks digital tool) with social sciences (Multi-Criteria Analysis and Social Acceptability Assessment) and economics (Meta-Analytic Value Transfer) dimentions. Applied to six European coastal wetlands (Camargue, France; Curonian Lagoon, Lithuania; Ria de Aveiro, Portugal; Dutch Delta, Netherlands; Danube Delta, Romania; and Valencian Wetlands, Spain), the methodology identifies priority ecosystem services, vulnerable habitats, dominant pressure pathways, stakeholder preferences and social acceptability issues. Results demonstrate widespread moderate to high vulnerability in transitional habitats, with agriculture, tourism, and industrial development as primary pressures. Stakeholder priorities emphasize biodiversity and habitat conservation, investments and maintenance costs, and trust in institutions as well physical health. This integrated approach supports evidence-based restoration planning and policy alignment with EU environmental directives and climate objectives.

Keywords: Coastal Wetlands; Restoration; Socio-ecological Assessment; Ecosystem Services