BOOK OF ABSTRACTS

I. SESSION DESCRIPTION
II. SESSION PROGRAM
III. ABSTRACTS

I. SESSION DESCRIPTION

ID: O2

Transforming ecosystem services research through knowledge co-production and participatory approaches

Hosts:

	Name	Organisation	E-mail
Host:	Ina Sieber	Kassel Institute for Sustainability, Universität Kassel, Germany	ina.sieber@uni-kassel.de
Co-host(s):	Cathleen Cybèle Jarumi Kato-Huerta Andreas Braun	La Réunion Développement University of Trento, Trento, Italy Kassel Institute for Sustainability	cathleen.cybele@lareuniondeveloppement.re jarumi.katohuerta@unitn.it andreas.braun@uni-kassel.de

Abstract:

Against the backdrop of evolving environmental challenges and the need for sustainable, equitable and just resource management, this session addresses the transformative potential of co-producing knowledge in ecosystem services research. Ecosystem services, i.e. the benefits people derive from ecosystems, are closely linked to societal well-being and economic prosperity. Understanding, valuing and managing these services, which are often supported by strategies such as Nature-based Solutions (NbS), requires interdisciplinary collaboration, stakeholder engagement and innovative methodologies.

This session will provide a platform for researchers, practitioners, policy makers and stakeholders to explore how knowledge co-production processes can revolutionise ecosystem services research. Through knowledge co-production, or co-creation, which involves the active engagement of diverse stakeholders throughout the research process, new insights can be

generated to build collective understanding and develop innovative solutions to complex environmental problems. The co-benefits of such co-creation processes include enhanced awareness, capacity building, and positive spill-over effects.

This session opens up an arena for ES research that applies participatory and co-creation methodologies to explore the potential, opportunities, and challenges of such interactive, collaborative, and process-based research. We welcome all case studies that explore different approaches to co-creating knowledge, ranging from participatory action research, NbS co-production and citizen science initiatives. These methods not only democratise knowledge production, but also empower communities and stakeholders to actively participate in decision-making processes that affect their environment. Yet, challenges arise, as stakeholders are heterogenous groups with diverging interests and power relations at play, challenging conventional approaches to research. The session will share real-world examples where the co-production of knowledge has been applied for transformative change in ecosystem management. From restoring degraded ecosystems to building resilience in the face of climate change, with an impact on economic development, collaborative research efforts have the potential to achieve positive outcomes for people and nature.

The session's outcomes are broad: first, the session aims to inspire to use the knowledge co-production as a powerful tool to advance ecosystem services research and promote sustainability. Second, by harnessing the collective wisdom and expertise of diverse case studies, the session targets a shared publication, e.g. on the potential of co-production methodologies as a path to a more resilient, equitable and sustainable future for ecosystems and the communities that depend on them.

Goals and objectives of the session:

We want to facilitate experience sharing & joint knowledge production among researchers applying such knowledge co-production methodologies. We also aim to catalyse collaborations for co-authoring concrete scientific manuscripts on shared experiences. For this reason, we invite two types of presentations:

(A) presentations that give a structured overview of the process of co-produced ES research

(B) presentations that apply multiple participatory approaches in a tiered approach (for example: interviews, focus groups, expert assessments, PGIS), or identify future trends and priorities for future assessments.

Planned output / Deliverables:

We will invite the session participants to a pre-conference preparatory activity through a web survey. The outcomes of this activity will be presented at the session. In addition, for

presentations of type (A), we will give the presenting authors several questions in the form of a template, covering several aspects of assessment design, governance, and implementation.

At the end of the session we also plan to create a structured discussion on commonalities and the publication opportunities that they offer. Based on the (oral and poster) presentations, outcomes of the web survey, and the discussion session, we will negotiate a special issue in leading ES journal for publishing joint papers examining selected aspects of participatory and co-production methodologies.

Session format:

Standard session (presentations)

II. SESSION PROGRAM

Room: Success Avenue 1

Date of session: 21st of November 2024
Time of session: 11:00 – 12:30 & 13:30 – 15:30

Timetable speakers

Time	First Name	Surname	Organization	Title of presentation
11:00 – 11:14	Connie	Lopez		Rural Community Perceptions of Nature's Contributions to People (NCP) in a Wet Forest Protected Area: A Case Study in Northwestern Colombia, South America.
11:28 – 11:42	Alhassan	Ibrahim	James Hutton Institute	Challenges and transformations for large-scale peatland restoration: experience from working with European peat extraction stakeholders
11:42 – 11:56	Miguel	Moreira	Centre for Functional Ecology – Science for People and the Planet (CFE), TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Portugal	Participatory mapping as territorial co-management tool through the spatial depiction of ecosystem services in the Portuguese Biosphere Reserves
11:56 – 12:10	Matteo	Giacomelli	Copernicus Institute of Sustainable Development, Utrecht	Including the perspective of stakeholders in landscape planning through the Ecosystem Services co-production

			University, the Netherlands	framework: an empirical exploration in Le Marche, Italy
12:10–12:24	Erica	Garau		Spatially combining social participatory with biophysical mapping. The role of landscape geographical components on perceived distribution of ES supply.
Lunch Break				
13:30 – 13:42	Cecilia	Zagaria		Co-developing and operationalizing a Multi-Criteria Analysis framework for the monitoring and evaluation of agroecological farming systems in Europe
13:42 – 13:54	Loes	Verkuil	Vrije Universiteit Amsterdam, the Netherlands	Perceptions of drivers and ecosystem services by agroecological farmers in the Netherlands
13:54 – 14:06	Swantje	Gebhard		A participatory planning tool to share knowledge and discuss landscape tradeoffs between ecosystem services and to inform implementation of Nature-based Solutions
14:06 – 14:18	Gerid	Hager	International Institute for Applied Systems Analysis (IIASA)	Observing biodiversity and ecosystem services with farmers: bottom-up pathways for engagement and knowledge co-production
14:18 – 14:30	Annemarie	Walczuck	Carl-von-Ossietzky Universität Oldenburg, Germany	Future Proof Grasslands: Enhancing Ecosystem Services through Effective Governance and Integrated Water
14:30–14:42	Edgars	Jürmalis		Forest, park or nature conservation area? Engaging stakeholders in studying forest recreation.
14:42–14:54	Eliska	Tichopa		Collaborative Management of Ecosystem Services: Participatory Workshops in Natura 2000 Areas
14:54 – 15:06	Eirini	Gallou	University of Strathclyde	Practice-based reflections on the transformative potential and co-production capacity of methods for CES values capturing: lessons from small island context
15:06 – 15:30	Ina	Sieber	Kassel Institute for Sustainability, University of Kassel, Germany	The Transformative Potential of Participatory and Co-production Approaches in Ecosystem Services Research

III.ABSTRACTS

The first author is the presenting author unless indicated otherwise.

1. Practice-based reflections on the transformative potential and co-production capacity of methods for CES values capturing: lessons from small island context

First authors(s): Eirini Gallou
Affiliation: University of Strathclyde
Contact: eirini.gallou@strath.ac.uk

Understanding, valuing and managing ecosystem services, , i.e. the benefits people derive from ecosystems with a focus on cultural ones (CES), requires interdisciplinary collaboration, stakeholder engagement and innovative methodologies. This abstract provides a critical reflection of the experience of the researcher working with interviews and structured surveys as well as with less structured participatory methods (values and priorities workshops) on capturing the values of local community and leaders of ecosystem services at small island setting (Greece, island of Samothraki).

The Samothrace case will revolve around citizen-driven perceptions and values captured via tools like citizen surveys (Vlami et al 2020) and participatory workshops (Gallou & Alexopoulos, 2018, unpublished workshop report) that bring together stakeholders with different levels of power and expertise around assessing significance of C(ES)on a particularly challenging, resource-restricted islands context. It introduces a sustainable resource use perspective, integrated spatial zoning considerations in decision making and proposes new tools for synthesising co-produced value assessments (Gallou and Fouseki, 2019) and priorities for local level action.

Cultural and natural protected areas are included in the assessment (MAB proposed areas and nationally protected archaeological site) offering additional input around the complexity of assessing ecosystem services within the presence of trade-offs around protecting the symbolic, cultural and landscape aesthetic values of those.

The synthesis of findings and reflection on process and engagement of specific segments of stakeholders within each approach, will lead to grounded suggestions for 'realising' knowledge co-production in diverse contexts.

Discussion will include a focus on co-production capacity to capture top-down vs bottom-up values and perception (policy, citizens) and how the findings can be used in local decision-making contexts required to support localised actions on harnessing CES.

The paper critically counterpoises the aspect of assessing values around CES with co-production methods with similar scholarly approaches on pluralistic values from the discipline of critical heritage studies.

Keywords: Cultural ecosystem services, values assessment, co-production, local policy makers, participatory methods

2. Spatially combining social participatory with biophysical mapping. The role of landscape geographical components on perceived distribution of ES supply.

First authors(s): Enrica Garau
Other author(s): Josep, Pueyo-Ros, Amanda, Jiménez-Aceituno, Garry, Peterson, Albert, Norstrom, Anna, Ribas PDepartment of Geography, Institute of Environment, IMA-UdG, University of Girona, 17071 Girona, Spainalom, Josep, Vila-Subirós
Affiliation: University of Almeria, Department of Biology and Geology, 04120, Almeria, Spain.
Contact: egarau@ual.es

Social-ecological systems are characterized by multiple social and ecological interactions that reshape both ecological and social structures. Landscapes, understood as complex social-ecological systems, are typically formed through a variety of interactions between people and nature over long periods. Thus, ecosystem services (ES) provide a conceptual framework to examine and analyze social-ecological interactions in landscapes. Despite this, most approaches to landscape planning and ES mapping primarily emphasize the biophysical aspects rather than the social and cultural dimensions.

This raises important questions: What are the spatial relationships between social values and landscape features? How do different geographical features relate to people's perception of

ecological processes? How can participatory approaches support knowledge co-production to improve sustainable environmental policies based on a share understanding of landscapes?

This communication starts from the premise that participatory mapping can be employed to create spatial representations of people's perceptions, mental models, and local knowledge of ES, fostering collaboration, knowledge co-production, and co-design of shared visions of the landscape among participants.

We employ participatory mapping to explore how people's perceptions of provisioning, regulating, and cultural ES supply areas align or diverge with the landscape features in two Mediterranean river basin in north-eastern Catalonia, Spain.

Our findings indicate that random forest and geographically weighted regression techniques effectively correlate landscape features with stakeholders' perceptions of ES supply areas. These results reveal that stakeholders associate various geographical elements, such as reservoirs, mountains, and wetlands, with different types of ES supply areas more significantly than with ecological or biophysical indicators. This highlights that the ecological dynamics underlying ecosystem functions are often invisible and not fully comprehended.

Incorporating these informations into participatory landscape planning and practices can render the “invisible visible”, increasing stakeholder awareness, facilitating the development of more effective environmental policies, and fostering social understandings of ecological processes for transformative conservation policies.

Keywords: Social-ecological systems, Stakeholder perceptions, Participatory mapping, Knowledge co-production, Spatial analysis

3. Observing biodiversity and ecosystem services with farmers: bottom-up pathways for engagement and knowledge co-production

First authors(s): Gerid Hager

Other author(s): Daniela Ablinger, Virginia Bagnoni, Gillian Banks, Clare Buckerfield, Alice Caselli, Kristina Janečková, Riina Kaasik

Affiliation: International Institute for Applied Systems Analysis

Contact: hager@iiasa.ac.at

Biodiversity and associated ecosystem services (ES) are essential for agroecosystem resilience, sustainability, and long-term food security. Traditionally, agricultural land management focused on short-term economic returns has been prioritized over management for environmental health and ES. Current mechanisms for encouraging farmers to use biodiversity-sensitive land management and food production practices are often applied at the individual farm rather than the landscape level, and they tend to be imposed top down from an EU or national level. At the same time, biodiversity and ES monitoring is infrequently carried out and gaps persist in demonstrating improvements to farmland biodiversity and ES. The EU "FRAMEwork" project addresses these challenges by supporting farmer- and community-led innovation. The project empowers eleven farmer groups, so-called 'farmer clusters', across nine European countries to improve biodiversity-friendly farming on a landscape scale as well as to observe and monitor biodiversity on their farms in partnership with researchers and local communities. While these farmer groups work as a collective to deliver landscape-scale management, supported by a group facilitator, locally run citizen science activities enable farmers and the local communities to understand and observe biodiversity and associated ES. This presentation provides a structured overview of the process of action-based co-production of knowledge based on a model of local stakeholder engagement at the science-society interface (Danielsen et al. 2022) coupled with the concept of value creation stories and storytelling (Wenger et al. 2011). It outlines several emerging activity pathways to engage farmers and local communities in context-specific learning about and conducting biodiversity and ecosystem services observations using citizen science methods and approaches.

Keywords: biodiversity observations, monitoring, citizen science, farmers, community engagement

4. Challenges and transformations for large-scale peatland restoration: experience from working with European peat extraction stakeholders

First authors(s): Alhassan Ibrahim
Other author(s): Kirsty Blackstock
Affiliation: The James Hutton Institute
Contact: alhassan.ibrahim@hutton.ac.uk

While peatlands comprise only 3% of the global land area, fully functioning peatlands store up to 75% of atmospheric carbon, are home to precious biodiversity, and can be managed to help mitigate flood, drought and fire risks. However, management of peatlands has historically included draining for agriculture and forestry, extraction for burning for fuel and producing growing media. Europe has, therefore, lost over 50% of its peatlands, while the remaining are degraded and unable to provide their vital ecosystem services.

Implementing nature-based solutions (NbS) as a land management strategy could help restore peatlands to reduce their carbon emissions, contribute to fire risk reduction, and improve water flow regulation and biodiversity. However, the scale of degradation and diverse stakeholder interests in peatland values mean restoration should occur through transformative actions within the landscape context and multi-stakeholder collaboration.

This research shares the experience of co-developing transformative strategies to upscale peatland restoration through NbS and working with peat extraction stakeholders. The co-development process involved identifying an umbrella representative, following which stakeholder mapping was used to select private, public and non-governmental stakeholders to form a community of practice (CoP). Moreover, multiple interactions, including roundtables, interviews and bilateral discussions were used to understand the peat extraction sector and their priorities for peatland management. Finally, cooperation points were identified and used to develop future scenarios for large-scale restoration of peatlands through multi-stakeholder collaboration. We learned that since the peat extraction sector operates on a very small proportion of peatlands, they feel unfairly targeted and reluctant to take responsibility for the actions of major users of peatlands, such as agriculture and forestry, or manage peatland for specific services, such as reduction in fire risk. The CoP was dominated by for-profit organisations; hence, their support for large-scale restoration depends on how it benefits their business sustainability.

Keywords: Transformative peatland restoration; peat extraction sector; co-production; ecosystem services; nature-based solutions

5. Forest, park or nature conservation area? Engaging stakeholders in studying forest recreation.

First authors(s): Edgars Jurmalis
Presenting author: Zane Lībiete
Other author(s): Linda Gerra-Inohosa, Ieva Kraukle
Affiliation: Latvian State Forest Research Institute "Silava"
Contact: edgars.jurmalis@silava.lv

In 2024, a research project focusing on exploring user needs, management challenges and environmental pressures in urban and peri-urban/rural forests in Latvia was started. Using three distinct areas as case studies and combining a wide range of data collection and analysis methods, the project aims to develop recommendations for stakeholders and area managers and improve the links between recreational user groups.

The involvement of interested parties in the project is implemented via: 1) stakeholder identification for the model areas; 2) close cooperation with area managers; 3) informative events and involvement of stakeholders in project activities; 4) citizen science events.

Stakeholder identification revealed a complex set of public and private stakeholders for two areas, where the distance to adjacent urban centers defined the spectrum and number of private stakeholders and the level of nature protection regime influenced available recreational activities.

Area managers have been involved in the project since the proposal stage and remain closely incorporated in the project activities, but levels of involvement and general interest in such synergetic research projects can be discussed. A survey on managers' perspective has explored the aspects of infrastructure and waste management specific for each area and applied forest management methods. The results revealed several management challenges, such as poorly defined management targets and nature conservation-related restrictions and conflicts between several user groups, for example, hikers and skiers/mountain bikers.

So far, the project team has participated in two events organized in case study areas, with information about the research activities and a mini survey of the area visitors. The mini-survey results revealed the most- and least-liked aspects of the areas, as well as most frequent activities performed there.

The study is supported by Latvia Council of Science, grant No. lzp-2023/1-0137, 'Environmental impacts and management implications in forest areas important for recreation in Latvia'.

Keywords: urban and peri-urban forests, managers' perspective, societal preferences, ES tradeoffs, citizen science

6. Rural Community Perceptions of Nature's Contributions to People (NCP) in a Wet Forest Protected Area: A Case Study in Northwestern Colombia, South America.

First authors(s): Maria Fernanda Gonzalez
Other author(s): Connie López-Gómez, Clara Villegas Palacio
Affiliation: Master student, National University of Colombia, Medellin-Colombia
Contact: cplopezg@unal.edu.co

This master research investigates the influence of different types of capital—natural and anthropogenic—on the co-production of perceived Nature's Contributions to People (NCP) in the Cuervos Regional Integrated Management Districts protected area. Spanning 501.6 hectares, the area is characterized by premontane humid forest, with an average temperature ranging from 18 to 24°C and an annual rainfall exceeding 4,000 mm. The region comprises high open mountain forest (45.8%) and agricultural land (28.5%). It is inhabited by rural communities engaged in cattle raising, subsistence agriculture, and forest resource use, with limited access to basic services. Farm sizes range from 1 to 20 hectares.

Utilizing a participatory and qualitative approach, we engaged rural and farming communities through workshops and semi-structured interviews with key stakeholders. Our findings reveal that NCPs rarely arise from nature alone; they typically emerge from the interaction between natural and anthropogenic capital, affecting people both positively and negatively. The relationships between actors and their influence on different forms of capital are crucial in maintaining, creating, or producing these contributions.

Understanding the benefits that nature currently provides to people in this protected area, and the capitals required for their co-production, is essential for developing future strategies for sustainable natural resource management, rural development, and the overall health of the protected area. Furthermore, by identifying key actors and their influence on NCPs, we can

enhance collaboration between public, private, and community stakeholders. This improved collaboration is essential for effective decision-making and management of capitals, thereby generating positive impacts on NCPs and improving the quality of life for communities within the protected area.

Keywords: Nature's Contributions to People (NCP), Participatory Qualitative Research, rural communities

7. Participatory mapping as territorial co-management tool through the spatial depiction of ecosystem services in the Portuguese Biosphere Reserves

First authors(s): Miguel Moreira

Other author(s): Luciana FRAZÃO, Jarrod CUSENS, Paula CASTRO, António C. GOUVEIA, António ALVES DA SILVA, Sara H. SANTOS, Inger MÅREN

Joana ALVES

Affiliation: Centre for Functional Ecology – Science for People and the Planet (CFE), TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Portugal

Contact: mmoreira@uc.pt

Ecosystem services (ES) supply depends on land-use governance and management decisions, where stakeholders in a landscape can be both beneficiaries and/or co-producers of ES. Participatory methodologies are crucial for linking territory needs to the sustainability of ES supply. In this sense, public participation geographical information system (PPGIS) approaches seek to understand the location of specific natural values and human perceptions and preferences for future land use and development. Biosphere Reserves (BRs) are pivotal for studying and fostering sustainable interactions between humans and nature. Hence, the linkage between the spatial depiction of ES based on stakeholders' perceptions and BR territories' governance may be a powerful tool to enhance its sustainable management. This study employed a PPGIS approach targeting local stakeholders across the 12 Portuguese BRs, to map its key ES using the Nature's Contributions to People (NCP) classification typology. Stakeholders actively mapped NCP within their BR territory, highlighting Habitat creation and maintenance (NCP 1), Physical and psychological experiences (NCP 16), and Supporting identities (NCP 17), underscoring the significance of the endogenous natural and cultural values from the BRs territories. In the analysis of mapped results, we identified NCP hotspots, pinpointing the most valued areas for conservation or restoration efforts. Zonation analysis within BRs was also assessed, revealing the perceived effectiveness of the different zones by local stakeholders. Our

study also provided valuable insights into non-material NCP from a local perspective, together with the place-based perception of regulating and material NCP provision. We outline that PPGIS may serve as a feasible GIS-based decision support system, offering a comprehensive assessment of NCP, especially for cultural values which are not easily quantified by remote methods. Therefore, participatory approaches such as PPGIS may play a crucial role in BRs governance, enhancing sustainability and equity by integrating local stakeholders' perceptions into land use planning.

Keywords: Natural resources governance, Nature's Contributions to People, Participatory planning, Stakeholders, PPGIS

8. The Transformative Potential of Participatory and Co-production Approaches in Ecosystem Services Research

First authors(s): Ina Sieber
Other author(s): Cathleen Cybele, Jarumi Kato Huerta, Andreas Christian Braun
Affiliation: Kassel Institute for Sustainability
Contact: ina.sieber@uni-kassel.de

There is an increasing relevance of participatory and co-production approaches in ecosystem services (ES) research, particularly for the effective implementation of ES mapping and assessment at local and regional levels. This talk explores the transformative potential of these approaches, drawing insights from a pre-conference survey conducted to gather information on various participatory research methods, their aims, and the desired outcomes. The survey targeted a diverse group of ESP stakeholders, including researchers, practitioners, and community members involved in ES research and application.

Our findings highlight several key aspects: the diversity of participatory methods being employed, ranging from community workshops and focus groups to citizen science initiatives and collaborative mapping. The aims of these methods vary but commonly include enhancing the relevance and accuracy of ES assessments, fostering local engagement and ownership, and integrating traditional and local knowledge with scientific data. Desired outcomes frequently cited by respondents encompass improved decision-making, greater social equity, and increased ecological sustainability.

During our presentation, we will delve into the survey results, showcasing case studies that exemplify successful participatory and co-production efforts. These examples will illustrate the

tangible benefits of these approaches, such as heightened community awareness and more robust, context-specific ES management strategies. Moreover, we will address the challenges and limitations identified, including potential power imbalances, the need for capacity building, and the time-intensive nature of participatory processes.

The talk will conclude with an interactive discussion, inviting participants to share their experiences and perspectives on the implementation of participatory approaches in ES research. This exchange aims to foster a deeper understanding of the conditions under which these approaches can most effectively contribute to transformative change in ES research and practice.

Keywords: Citizen sciences, transformative change, participation

9. Perceptions of drivers and ecosystem services by agroecological farmers in the Netherlands

First authors(s): Loes Verkuil
Other author(s): Nynke Schulp, Mario Torralba Viorreta
Affiliation: Institute for Environmental Studies, Vrije Universiteit Amsterdam
Contact: l.a.verkuil@vu.nl

Agroecological farm management has been recognized as a more sustainable alternative to conventional, highly industrialized farming systems, through the improvement of ecosystem services (ES). As farmers are directly responsible for managing agroecosystems, their decisions to transition to agroecological practices have a large influence on the environment. However, it is unknown how the perceptions and knowledge systems of farmers regarding their environment relate to management choices. Better understanding of these perceptions and related drivers can help create appropriate incentives for sustainable practices. This study assesses the drivers of farmers to transition from conventional management to agroecological practices, in relation to their perceptions on ES in their direct environment. The study is executed in the highly industrialized agricultural sector of the Netherlands. We co-created Fuzzy Cognitive Maps (FCM) with individual agroecological dairy farmers. The participants identified drivers for farm transformation for a range of predefined agroecological practices, and linked these to perceived effects on ES. The individual maps were combined into one FCM that shows the relations between relevant drivers, practices and ES. The results show that relevant drivers were operational costs, revenues and personal values such as ethics or resource autonomy and being less reliant of agro-industry. Overall, these results suggest that financial

strategy and personal beliefs are most influential upon agroecological transitions. Cost reduction was achieved mostly through pasture management practices, such as rotational grazing, and on-farm feed production. Revenues are increased mainly through nature management subsidies. Farmers indicated that the practices had a clear impact on biodiversity (through pasture management and landscape elements) and animal health (through animal welfare practices, robust breeds, and pasture management), and to a lesser extent soil quality and water availability. The perceived drivers and environmental benefits of measures can provide an important argument for policy makers and farmers to support agroecological transformations.

Keywords: Agroecological transitions, drivers of change, ecosystem services, Fuzzy Cognitive Mapping, farm management

10. Future Proof Grasslands: Enhancing Ecosystem Services through Effective Governance and Integrated Water

First authors(s): Anne-Marie Walczuch
Other author(s): Jule Talea Froehlich, Ernst Schäfer
Affiliation: Carl-von-Ossietzky Universität Oldenburg, Germany
Contact: anne-marie.walczuch@uni-oldenburg.de

Grassland farming is a central element in northwest Germany which plays a crucial role in achieving the sustainability transformation of rural areas. Approximately one-third of the agricultural land in Germany is permanent grassland. This cultural landscape provides various ecosystem services (ES) for humans (Gerowitt et al. 2013). Due to advancing climate change, the region faces more frequent and intense rainfall in winter and/or severe drought periods in summer (IPCC 2022). This situation increasingly challenges the existing management methods in both agriculture and water management, as well as flood protection. In light of these developments, a transformation towards integrated water management, which includes proactive water retention alongside traditional drainage, appears essential. This also requires an adjusted design of agriculture and other land uses, such as flood protection.

Against this backdrop, the transdisciplinary project "Future Proof Grasslands" (FPG) examines the socio-ecological transformation in two study areas in northwest Lower Saxony. Within the framework of the project, an iterative co-creation process (Mauser et al. 2013) is undertaken, involving cooperation among local and regional stakeholders from agriculture, water management, and science. Based on three future scenarios, solution-oriented approaches are

developed to strengthen ES by adapting water management to climate change. This contribution outlines the conceptual framework of the transdisciplinary collaboration within the FPG project and presents initial findings regarding prevailing governance structures (Vervoort und Gupta 2018) and the operationalization of the ES concept (Burkhard et al. 2012; Abson et al. 2014; Malmborg et al. 2021) in the context of grasslands. The following questions are the focus:

- What actor and governance structures exist in the context of grasslands in northwest Lower Saxony?
- Which ES characterize the grasslands in northwest Lower Saxony?
- What indicators can describe and assess the ES?
- How can the ES be located within the existing actor and governance framework?

Keywords: ecosystem services, governance, participation, water management, co-creation

11. Co-developing and operationalizing a Multi-Criteria Analysis framework for the monitoring and evaluation of agroecological farming systems in Europe

First author(s): Cecilia Zagaria
Other author(s): Jeroen Groot, Aline Fockedey, Carla Barlagne, Jean-Luc Gourdine, Nathalie Mandonnet, Raquel Luján Soto, Elisa Oteros Rozas, Bertrand Dumont
Affiliation: Wageningen University, Wageningen, the Netherlands
Contact: cecilia.zagaria@wur.nl

Agroecological interventions hold the potential to significantly transform our global food systems and increase the supply of numerous ecosystem services, including carbon storage, biodiversity conservation, nutrient cycling, and cultural services through the revitalization of rural communities. As a result, European policy is increasingly promoting agroecology and the development of transdisciplinary agroecological research to identify conditions under which such co-benefits can be achieved. This initiative has led researchers and practitioners to co-develop monitoring and evaluation frameworks, presenting a standardized means to build comparable evidence on the benefits of agroecology. These frameworks not only aim to support

results-based advocacy and policy-making in Europe, but also hold the ambition to directly contribute to local agroecological transition processes. However, few studies have examined the extent to which both these goals can be achieved, thus offering limited guidance on how to balance the demands of delivering salient and legitimate results at both local and supra-national scales. This research presents findings from the co-development and operationalization of a multi-criteria analysis framework to monitor and evaluate the impacts of agroecological interventions in three "Innovation Hubs" in Spain, Belgium, and Guadeloupe. These Hubs represent spaces of established science-practitioner agroecological collaboration, respectively evaluating the impacts of cover cropping in orchards, reduced tillage in organic arable systems, and crop-livestock integration in mixed farms. We showcase how conducting transdisciplinary research in these highly-diverse settings, facilitated by a reflexive project governance context focused on adaptive learning, resulted in a co-developed framework suited to the realization of both ambitions. Following a presentation of the co-development methodology, we present results on (1) the co-benefits and trade-offs of implementing agroecological interventions in the three Hubs based on a comparison of a common set of indicators aligned with EU policy objectives, and (2) lessons learnt on common challenges and tension-points, of value to future transdisciplinary projects.

Keywords: co-development; agroecology; monitoring and evaluation; reduced tillage; crop-livestock integration; cover cropping; experimentation

12. A participatory planning tool to share knowledge and discuss landscape tradeoffs between ecosystem services and to inform implementation of Nature-based Solutions

First authors(s): Swantje Gebhardt
Other author(s): Julia C. Assis
Affiliation: Copernicus Institute of Sustainable Development, Utrecht University
Contact: s.gebhardt@uu.nl

Stakeholders in landscape planning are often faced with the challenge of balancing multiple demands for different ecosystem services. To assist actors with identifying ecosystem services tradeoffs and resolving societal challenges, a myriad of tools are available. However, existing approaches fall short to simultaneously integrate various ecosystem services, explicitly simulate spatial configuration effects, provide an understandable representation of the system for stakeholders with different expertise, and enable a dialog between them. Utilizing expert consultations and focus group-like interactions, we developed PLACES - Participatory

Landscape Configuration Effects Simulator. This tool estimates the influence of land use configurations on multiple ecosystem services in real-time and visualizes the tradeoffs among them. PLACES acts as a boundary object at the science-policy interface as it allows stakeholders of various backgrounds to create land use scenarios that are desirable according to their valuation of different ecosystem services. Moreover, through the interaction with maps of ecosystem services gains and losses, stakeholders get to experience spatial processes and the complexity of landscape planning.

PLACES is adaptable to different contexts, as such, we have applied it as a serious game at a mixed stakeholder workshop on the agricultural landscape in the Dutch province of Noord-Brabant. There, we gathered data to evaluate its usefulness to facilitate communication and understanding of landscape complexity. PLACES provided insights on spatial processes and sparked a discussion on the societal and economic goals for the landscape. Through the participatory approach and the ecosystem service tradeoffs in the study area, the participants contemplated the diverse interests and power relations of involved actors. Finally, the participants discussed the challenges and possibilities of transforming the landscape by incorporating Nature-based Solutions on a landscape scale such as sustainable agricultural practices and nature restoration.

Keywords: ecosystem services tradeoffs, land use planning, participatory planning tool, stakeholder communication

13. Including the perspective of stakeholders in landscape planning through the Ecosystem Services co-production framework: an empirical exploration in Le Marche, Italy

First authors(s): Matteo Giacomelli
Other author(s): Massimo Sargolini, Maria Felipe-Lucia
Affiliation: Politecnico di Milano
Contact: matteo.giacomelli@polimi.it

Research on Ecosystem Services (ES) has become dominant in landscape planning to frame the relationship between people and nature. Increasingly, studies are stressing that most ES do not flow from nature alone but require a significant human contribution, known as ES co-production. However, there is a lack of understanding on how different stakeholders contribute to ES co-production. Here, we integrated the social actors perspective in landscape planning using questionnaires and focus groups in a local case study in Le Marche, Italy. We found that

respondents acknowledge co-production in a wide range of ES with major share of cultural ES. Mostly self-perceived as users and managers, local stakeholders invest in their activities mainly human and social capitals, while physical and financial capitals gain importance in the case of provisioning services. Our findings embraced the multiple aspects of human-nature interaction, offering the opportunity to bridge different sectors, such as agriculture, eco-tourism as well as resilience toward extreme events, toward a multifunctional vision of landscapes. The integration of the ES co-production framework proved useful in fostering the access of social actors to decision-making.

Keywords: Ecosystem services; co-production; landscape planning; nature contributions to people; land management; stakeholders.

14. Collaborative Management of Ecosystem Services: Participatory Workshops in Natura 2000 Areas

First author(s): Blanka Loučková
Other author(s): Eliška Tichopádová, David Stella, Johana Drlíková, Aneta Martinovská, Simona Zvěřinová, Davina Vačkářová
Affiliation: CzechGlobe – Global Change Research Institute of the Czech Academy of Sciences
Contact: louckova.b@czechglobe.cz

Participatory approaches have emerged as an important component of ecosystem service (ES) assessments, reflecting a growing recognition of the need for inclusive stakeholder engagement in ecosystem service evaluation. This methodology integrates local knowledge and preferences into the assessment process, enhancing the relevance and applicability of findings for diverse communities. This study explores the role and impact of participatory workshops in the assessment and evaluation of ES within the Natura 2000 areas in the Czech Republic. The study was conducted within the LIFE-IP One Nature project through a series of 12 workshops in 3 protected areas held from 2022 to 2024, key local and regional stakeholders were actively engaged in identifying, prioritizing, and mapping ES. The workshops focused on managing trade-offs and fostering sustainable practices, incorporating diverse stakeholder perspectives, including nature protection representatives and local business sectors, to ensure a comprehensive and collaborative approach to ecosystem management. The methodological approach involving participatory mapping and iterative stakeholder involvement highlighted the synergies and conflicts among various ES, providing insights into stakeholder preferences and influence in decision-making processes. The results show not only the distribution of

ecosystem services mapped with stakeholder inputs, but also potential hot spots of ecosystem service synergies. The momentum gained by participatory assessments is attributed to their ability to bridge scientific and local knowledge. Additionally, this approach facilitates the incorporation of ES into everyday use, ensuring that local stakeholders directly engage with the concept and benefit categories. Overall, this study demonstrates the value of participatory processes in enhancing the governance and sustainable utilization of ES in protected areas.

Keywords: participatory approaches, ecosystem services, stakeholder engagement, participatory workshops, Natura 2000