BOOK OF ABSTRACTS

I. SESSION DESCRIPTION

ID: T7

Making nature count: monetary valuation for transformation to nature-inclusive decision-making

Hosts:

	Name	Organisation	E-mail
Host:	Nico Polman Vince van 't Hoff	Wageningen Economic Research Foundation for Sustainable Development	nico.polman@wur.nl vince.vanthoff@fsd.nl
Co-host(s):	Peter Roebeling Luiz Magalhães-Filho Luke Brander Mieke Siebers Waldecy Rodrigues	University of Aveiro University of Aveiro Vrije Universiteit Amsterdam Foundation for Sustainable Development Universidade Federal do Tocantins	peter.roebeling@ua.pt luizlacerda@ua.pt l.m.brander@vu.nl mieke.siebers@fsd.nl waldecy@mail.uft.edu.br

Abstract:

To transform the current economic decision-making process, it is important to mainstream nature into different forms of private and public decision-making. The valuation of ecosystem services in general, and monetary valuation of ecosystem services in particular, is playing an increasingly important role in the integration of nature into private and public decision-making. Monetary valuation is institutionalized in official UN frameworks (SEEA-EA framework), is being addressed in private and influential initiatives (such as the Taskforce on Nature-related Financial Disclosures; TNFD) and has the potential to contribute to many of the targets of the Global Biodiversity Framework (GBF).

With the increase in available primary valuation studies (see e.g. ESVD), value transfer is increasingly used to estimate the (monetary) value of ecosystem services. These monetary ecosystem service values are important for sustainable natural resources management (by

internalizing the value of nature) and natural capital accounting (by recognizing the value of nature in national accounts).

However, many questions regarding the implementation and transformative nature of monetary valuation remain. How does monetary valuation substantialize in private and public decision-making? How can we tailor and scale-up value transfer for better and more accurate decision-making? Or how can we use monetary valuation to close the biodiversity finance gap? Given these opportunities and challenges, it is important to critically explore methodological considerations, assess advances and discuss applications of monetary valuation – in particular in relation to their potential role to inform decision making, underpin natural capital accounting, and facilitate transformative change towards sustainable natural resources management.

Across this session we will seek to discuss recent considerations, advances and applications of monetary valuation for the integration of nature in private and public decision-making. These may be examples of monetary valuation in private or public decision-making, methodological advances and practical innovations in value transfer and/or critical contributions and thoughts on the mainstreaming and institutionalization of monetary valuation in public and private decision-making contexts.

Goals and objectives of the session:

Researchers are invited to present their recent considerations, advances and applications of monetary valuation, underpinning the transformative change towards sustainable natural resource management. This session will give insight in the opportunities, challenges and practices of using monetary valuation in private and public decision making.

Planned output / Deliverables:

Journal Special Issue about considerations, advances and applications of monetary valuation for transformation to nature-inclusive decision-making.

II. SESSION PROGRAM

Room: Expert Street 8

Date of session: 19th of November 2024

Time of session: 11:00 – 12:30 & 14:00 – 15:30 & 16:00 – 18:00

Timetable speakers

Time	First name	Surname	Organization	Title of presentation
11:00–11:05	Nico	Polman	Wageningen Research	Introduction
11:05–11:20	Nalini	Rao	Electric Power Research Institut	Biodiversity and Ecosystem Services: Economic Analysis for Decision-making
11:20–11:35	Jan Philipp	Schägner	German Environmental Agency	Reporting and Quality Standard for Environmental Economic Valuation to Support Meta-Analyses and Benefit Transfer
11:35–11:50	Maria	Bastos	University of Aveiro	Benefits from pollution abatement in eco-sensitive areas under development stress – assessing impacts in ecosystem services value of a Natura 2000 area
11:50–12:05	Máté	Chappon	Széchenyi István University	Valuation of Ecosystem Services within the Water Value Flow framework – a case study from Lake Velence, Hungary
12:05–12:20	Luiz	Magalhães Filho	Federal Institute of Education, Science and Technology of Tocantins	Integrated climate change adaptation for resilient coastal communities: An ecosystem service valuation approach
12:20–12:35	Luke	Brander	Leibniz University	Wrap-up: Future of value transfer functions
14:00–14:13	Peter	Roebeling	University of Aveiro	Potentiating the transformation to legume-based farming systems through private and social ecosystem service valuation
14:13–14:26	Michaela	Robers	James Hutton Institute	Considering wider peatland values
14:26–14:39	Veronika	Liebelt	German Federal Agency for Nature Conservation (BfN)	Hedonic analysis of biodiverse urban green: a survey-based case study of 14 German cities
14:39–14:52	Lovelater	Sebele	Birdlife International	Economic valuation of ecosystems services provided by vultures in Southern Africa
14:52–15:05	Allesandra	Santini	University of Padova	The multifunctionality of irrigation water: an economic valuation of the ecosystem services provided by irrigation water canals in the Veneto region, Northeastern Italy.

Time	First name	Surname	Organization	Title of presentation
15:05–15:18	Liisa	Saikkonen	Finnish Environmental Institute	Market-based approaches to quantify and value recreation related ecosystem services
15:18–15:31	Tomas	Badura	Czech Globe	Incorporating spatial complexity and variability into stated choice experiments for biodiversity policy support
16:00–16:15	Francisco	Alpizar	Wageningen University and Research	Keynote
16:15–16:27	Mark	Van Oorschot	Netherlands Environmental Assessment Agency.	Assessing the dependence on ecosystems of the economic and financial system, using the new ENCORE database
16:27–16:39	Caroline	van Leenders	Netherlands Enterprise Agency	Strategies To Scale-Up Payments For Ecosystem Services
16:39–16:51	Anna	Biasin	Etifor	The economic and financing side of Nature-based Therapies (NbTs): an European perspective
16:51–17:03	Frits	Bos	Netherlands Bureau for Economic Policy Analysis.	How to measure the non-use value of nature in cost-benefit analysis: the case of Bonaire's coral reefs
17:03–17:15	Ferdinand	Lang	Leibniz Centre for Agricultural Landscape Research	Consumer preferences for nature conservation certificates improving soil-related ecosystem services and biodiversity
17:15–17:27	Francesca	Leucci	Wageningen University	The ES approach to damage valuation: costs, benefits and improved deterrence
17:27–17:39	Madli	Linder	Estonian Environment Agency	Socioeconomic values of ecosystem services as a tool in decision-making in Estonia
17:39–17:51	Vince	Van ‘t Hoff	Foundation for Sustainable Development (FSD)	From dimes to decisions – Applying monetary values in local public decision making in the Netherlands
17:51–18:00	Session	hosts		Wrap-up: Making Nature Count

III. ABSTRACTS

The first author is the presenting author unless indicated otherwise.

1. Incorporating spatial complexity and variability into stated choice experiments for biodiversity policy support

First authors(s): Tomas Badura

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Understanding the spatial distribution of preferences for both use and non-use values of biodiversity is crucial for designing environmental policies that maximize social value. Yet, the integration of spatial factors that influence these preferences and estimated values in stated preference research remains a formidable challenge. This includes designing studies that not only control for and accurately represent multiple spatial factors simultaneously, based on the actual context rather than abstract hypothetical landscapes, but also yield insights that are broadly generalizable. We introduce a novel approach designed to address these issues. It allows for the creation of numerous, individually tailored choice scenarios that exhibit a high degree of variation of spatial factors among respondents. This increases the generalizability and accuracy of results while enhancing the realism of the choice scenarios to ensure the validity of valuation scenario. Specifically, this study examines how spatial factors—such as the location of environmental changes, its characteristics, as well as the surrounding of respondents— influence preferences for enhancing existing sites versus creating new ones in terms of quantity and quality of sites that can harbour biodiversity at these locations. The approach presented here offers one of the most comprehensive and generalizable examinations of spatial factors in stated preference research to date, with results that are highly relevant for national policy. The country-level application of this spatial methodology focuses on the implementation of biodiversity strategy across Czech Republic with results of relevance for the national implantation of the EU Nature Restoration Law, the EU Biodiversity Strategy, and the Global Biodiversity Framework.

Keywords: biodiversity; non-use values; choice experiments; non-market valuation; stated preferences

2. Benefits from pollution abatement in eco-sensitive areas under development stress - assessing impacts in ecosystem services value of a Natura 2000 area

First authors(s): Maria Isabel Bastos

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Contamination induced by high-risk water pollution (HRWP) puts at jeopardy ecosystem services (ES) and values across marine, coastal, estuarine and freshwater socio-ecological systems (MCEF-SES). Several measures for reducing HRWP in MCEF-SES have been identified, though their impact on ecosystem services and values have rarely been assessed. This study develops and applies an approach to assess the environmental risk reductions and ES benefits from HRWP abatement measures in MCEF-SES surrounded by heavily industrialized and urbanized areas. The approach combines a HRWP habitat risk assessment (using InVEST-HRA) and risk-adjusted meta-analytic based ecosystem service value functions, to estimate and map ES benefits from HRWP abatement measures. A case study is provided for the Ria de Aveiro Natura 2000 coastal lagoon in Portugal, considering integrated multitrophic aquaculture (IMTA), vegetation cover (CV), short rotation forests (SRF), hazardous material road transport (HAZMAT-TR) and phytoremediation (PHYTO-R) HRWP abatement measures. Results show that individual HRWP abatement measures can, on average, decrease habitat risks by between 0.04% (IMTA) and 4.6% (HAZMAT tr) and lead to an increase in corresponding ecosystem service values of, respectively, 0.004% (+2.1 k€/yr) and 0.8% (+436.9 k€/yr). Combined measures can, on average, decrease habitat risks by up to 8.4% and lead to an increase in corresponding ES values of up to 1.7% (+986.0 k€/yr). Largest relative ES benefits from individual HRWP measures are observed for Water courses, Salines and Inland marshes (up to +2.1%, +2.0% and +1.5%, respectively); for combined measures ES benefits increase most for Water courses, Salines and Coastal lagoon, by up to +6.5%, +5.1% and +2.7%, respectively. Hence, it can be concluded that additional HRWP abatement measures across fragile, Nature 2000, MCEF-SES can lead to significant ES benefits. Moreover, it's shown that the developed approach provides a robust and replicable framework to estimate and map ES benefits from HRWP abatement measures in MCEF-SES.

Keywords: Marine, coastal, estuarine and freshwater socio-ecological systems; ecosystem services and values; high-risk water pollution; risk-adjusted ecosystem service values

3. The economic and financing side of Nature-based Therapies (NbTs): an European perspective

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The positive link between exposure to nature and human health is well-documented, leading to a growing interest in nature-based therapies (NBTs). Despite this surge, the economic valuation, cost-effectiveness, and financing potential of these therapies remain underexplored in the research. Filling this gap is critical, as valuation and financial sustainability are essential for integrating NBTs into decision-making processes.

Within the RESONATE project (Horizon), we are conducting a comprehensive cross-case study to evaluate, over the next two years, the economic value and cost-effectiveness of six NBTs. Simultaneously, we will explore the potential means of financing for these therapies. Our study aims to map and identify relationships among supply, demand, financing, and other key stakeholders in the European NBT market. Focusing on the financing perspective, the study seeks to identify mechanisms for NBT development financing, define the drivers and barriers to accessing public and private finance, and provide examples of business models using case studies.

For this session we will review the main methodologies and approaches used to assess the economic value of nature exposure and NBTs, highlighting key features and challenges . Furthermore, we will present our protocol for integrating economic evaluation into health research. Finally, we will address the challenges in making a business case for NBTs, supported by preliminary results from our analysis on their financing potential.

Keywords: Nature based therapies, financing NbT, economic valuation, cost-effectiveness, stakeholder mapping

4. How to measure the non-use value of nature in cost-benefit analysis: the case of Bonaire's coral reefs

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The non-use value of nature should be included in cost-benefit analysis (CBA), but how to include it is not straightforward. This paper discusses a cost-benefit analysis about a new harbour in Bonaire and its damage to coral reefs (Ecorys, 2022). The non-use value of the damage is estimated by a survey among Dutch citizens about their willingness to pay for the existence of coral reefs in Bonaire. This survey was part of a well-known The Economics of Ecosystems and Biodiversity (TEEB) study which among others assessed the value of Bonaire's nature (Van der Lely et al., 2012). We discuss the pros and cons of this approach. For a wide range of reasons, such stated preference methods will not lead to an adequate estimate of the non-use value, e.g. the purpose of the TEEB-study is fundamentally different and not focused on marginal changes, the relevant population is not trivial, coral reefs are an international public good and only anthropocentric values are included. Assessing the direct physical effects of the new harbour on nature seems the best way forward for this case. The methodology of biodiversity points may in some cases be used to quantify these effects. The costs of mitigation and compensation measures will probably be most helpful for assessing indirectly the value of Bonaire's nature. In practice, policy makers must balance the net monetary benefits of the new harbour with its negative physical effects on coral reefs and other nature.

Keywords: Non-Market Valuation; Natural Capital, Existence Value, Biodiversity

5. Valuation of Ecosystem Services within the Water Value Flow framework – a case study from Lake Velence, Hungary

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Lake Velence – Hungary's third-largest lake – is a nationally popular recreational area and a nature conservation site listed by the Ramsar Convention. Conflicts of interest between water users around the lake and throughout the catchment area surfaced when the lake's water level reached a record low point due to a series of climatic and anthropogenic phenomena in September 2022. This event has questioned the ability of the current water resources management scheme to successfully address future challenges posed by climate change and increasing water use.

In this study, we apply a framework based on the Water Value Flow concept to assess water availability in different water allocation scenarios while simultaneously evaluating water-related ecosystem services within the main waterbodies of the catchment area.

The water allocation scenarios include alternative operational rules for the lake and the two large reservoirs. These reservoirs were constructed 50 years ago with the primary purpose of compensating for the lake's water balance extremes. In recent decades, the secondary use of these reservoirs as fisheries has partially hampered their primary use, calling for an ecosystem service-type evaluation.

The water-related ecosystem services considered in the reservoirs and the lake include 1) water-related recreation, 2) fish production, 3) climate regulation, and 4) carbon sequestration. These services are valued in monetary terms, using available databases (TEEB, ESVD) and validated by a survey carried out during the summer of 2024, which explored water users' willingness to pay for more and-/ or cleaner water in the lake.

The Water Value Flow framework helps to assess and compare the hydrological and hydro-economic effects of water resources management interventions, thus fostering dialogue and conflict resolution between stakeholders. Policymakers can establish agreements and

compensation mechanisms based on these results in order to maximize the economic and societal benefits of using water resources.

Keywords: ES valuation, IWRM, Water Value Flow, hydro-economy, Lake Velence

6. Strategies To Scale-Up Payments For Ecosystem Services

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Ecosystems provide numerous ecosystem services, which are essential to biodiversity and humankind's well-being and prosperity. These services have drawn increasing attention from governments, private financial actors and knowledge institutes. Target 19 of the Global Biodiversity Framework (GBF) specifically calls for "stimulating innovative schemes such as payment for ecosystem services" to increase financial resources for biodiversity conservation. The need for strategic action to achieve the targets set by the GBF is critical. Based on the three types of ecosystem services (provisioning, cultural, and regulating ecosystem services), this paper describes and visualizes how to scale up payment for regulating ecosystem services based on characteristics of these services like function, scale and value. How ecosystem services are funded in the current economic system is also taken into account.

Based on the unique characteristics of ecosystem services, our paper outlines three strategies for scaling up finance for (regulating) ecosystem services. These strategies include actions that the private and public sector can take separately, as well as in collaboration with each other. The strategies are: (1) creating nature positive markets for provisioning and cultural ecosystem services, (2) creating coherence and synergies between publicly financed regulating ecosystem services and (3) blended finance strategies based on the interconnectedness of ecosystem services. With this paper, we hope to contribute to the ongoing (international) dialogue on financing biodiversity, and to stimulate further exploration of solutions that use ecosystem services as a basis for scaling up finance and bridging the current funding gap for nature. The paper also proposes a definition for nature-positive based on the characteristics of regulating ecosystem services.

Keywords: ecosystem services, payments for ecosystem services, blended finance, nature positive, GBF

7. Consumer preferences for nature conservation certificates improving soil-related ecosystem services and biodiversity

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Recent studies have highlighted that soil-related ecosystem services are declining at an unprecedented level on a global scale. Within the European Union (EU) 60-70% of soils are in an unhealthy condition resulting in decreased provision of their ecosystem services. However, land managers generally have little incentive to invest in healthy soils, as they cannot sufficiently capture the marketable value generated by these ecosystem services. Mobilizing private investments through innovative business models, particularly nature conservation certificates, is considered conducive to encourage consumers to pay a price premium for higher levels of soil-related ecosystem services provision while providing positive incentives for land managers by offering them an additional income for the currently non-marketed services they generate. The socioeconomic feasibility of certification depends on the actual consumer preferences for the extra direct and indirect benefits. To examine these preferences, we conduct a discrete choice experiment (DCE) in Germany to assess the willingness-to-pay (WTP) of consumers for such a business model while building on Germany's first online marketplace for certified nature conservation projects – AgoraNatura. Aiming to evaluate consumer demand, we examine consumer preferences for paying for a set of selected soil-related ecosystem services improved via certified nature conservation projects. Moreover, we evaluate whether bundling soil-related ecosystem services themselves, but also with biodiversity– e.g. carbon storage, erosion control and pollination – into one marketable product will have an effect on consumer preferences compared to offering them individually. Furthermore, we examine what effect governmental funding can have on leveraging investment as well as its effect on trust into certificates.

Keywords: ecosystem services, biodiversity, certificates, choice experiment, agriculture

8. The ES approach to damage valuation: costs, benefits and improved deterrence

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The potential of liability laws of preventing environmental accidents is often underestimated due to various issues that might hinder both their efficiency and their effectiveness. Among them, the uncertain level of monetary damages to be paid in litigation is likely not to induce polluters to invest adequate money on prevention. The aim of this presentation is therefore threefold. First, it wishes to shed a light on the current legal system of environmental liability at the EU level (at regional and national level), based on the American model. Secondly, it highlights advantages and pitfalls of specific methods to calculate ecological damages in the courtroom (contingent valuation, HEA, travel cost method, etc.). While judges have been employing for decades stated-preferences and revealed-preferences methods, they seem more at ease with the restoration-cost method. Yet, this approach cannot pass the efficiency test due to many reasons (e.g., uncertainties regarding baseline conditions or the real remediation of impaired sites). From an economic standpoint, inaccuracy in the assessment of damages can provide polluters with efficient incentives to avoid accidents only in case of small accidents. But large accidents would need to be assessed through more accurate methods in order to make sure that future potential polluters will receive adequate incentives to avoid their occurrence. Apparently, the ecosystem services approach would provide a possible way forward to make liability laws more efficient and effective. Courts have discussed its application is some recent cases (e.g., the Deepwater Horizon or the Costa Rica case) and many issues of validity have been raised. After identifying the specific bottlenecks in the judicial decision-making, the last aim of the author is to investigate how the ES approach (e.g., what types of classifications) could enhance the likelihood of judges of introducing it in litigation, hence raising the deterrent effect of environmental liability laws.

Keywords: liability, accidents, courts, environmental damage assessment, ecosystem services approach

9. Hedonic analysis of biodiverse urban green: a survey-based case study of 14 German cities

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By offering various benefits, natural amenities play a significant role in enhancing the well-being of urban citizens whose city life is often associated with hecticness and stress. Urban green spaces serve citizens with recreational opportunities, aesthetic enjoyment, contribute to public health, climate regulations, cooling effect, and have an impact on the attractiveness of neighborhoods and housing prices. Thus, in view of global urbanization and biodiversity loss, the valuation of urban green spaces becomes increasingly essential.

We analyzed the impact of biodiverse urban green spaces on rental prices across 14 German cities by applying a hedonic pricing analysis. This analysis complements the existing literature by including the diverse measurements of urban green spaces and their biodiversity that we innovatively cluster as 'perceived' -variables retrieved from an online survey and 'objective' -variables, i.e. spatial data computed from satellite images. Furthermore, we analyzed rental prices in contrast to most studies that consider selling property prices. Finally, we incorporated an online survey as a source of perception data with a monetary valuation method. The key preliminary results at the aggregated level suggest that: (i) rental prices are positively correlated with the distance to the next urban green space. This raises the question of whether standard hedonic pricing analysis suffers from omitted variables bias – at least in this case – due to unobserved amenities in cities that are negatively correlated with UGS. (ii) Biodiversity of the UGS as well as around the flat have a positive, albeit not significant, effect on rental prices.

Keywords: hedonic pricing, valuation, urban green spaces, biodiversity, ecosystem services

10. Socioeconomic values of ecosystem services as a tool in decision-making in Estonia

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In 2018–2023, country-wide assessment and mapping of terrestrial ecosystems was carried out in Estonia (national MAES project ELME, co-financed by the European Union Cohesion Fund). The follow-up work, including implementation and reassessments are led by the Estonian Environment Agency.

Resulting from this work, spatially explicit map layers of ecosystem extent, condition and ecosystem services have been created and made publicly available (see the map catalogue here: https://arcg.is/WuW9). Along with the biophysical values, socioeconomic values of the ecosystem services were assessed and mapped.

These map layers (including the ones with monetary values) have been already implemented in real-world decision-making processes, including the exercises addressing the spatial aspect.

An important field of implementation of the layers with monetary values has been nature conservation planning. ELME layers provide numerical and spatially explicit proof of nature values giving a solid basis for justifying and zonation of the nature protection areas, and compiling sound protection rules for them. The second example of the successfully implemented use is the agri-environmental financial subsidy for enhancing ecosystem services in agro-ecosystems. This subsidy is now in force in Estonia and is based on the ELME methodology for assessing the ecological condition of agro-ecosystems. The layers with monetary values of ecosystem services have also been used to analyze how to achieve biodiversity and climate-related goals (incl. deforestation issues, afforestation, restoration, etc.) based on the data on ecosystem values. The recent success in the real-world uptake of the concept is illustrated by the Estonian Supreme Court's decision which obliged the decision makers to better consider the values of nature (and explicitly ELME results) before issuing the peat extraction permissions. The latter has led to even more and potentially influential actions towards more effective inclusion of the (monetary) values of ecosystem services in the real-world decision-making processes.

Keywords: ecosystem services, monetary values, socioeconomic values, planning, biodiversity and climate goals

11. Integrated climate change adaptation for resilient coastal communities: An ecosystem service valuation approach

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Current coastal erosion adaptation strategies typically focus on local measures, even though the real costs, impacts and benefits are influenced by combined adaptation measures implemented at the landscape scale. Therefore, adaptation measures should be identified, planned and managed comprehensively across time and space in order to maximize social, environmental, and economic benefits. This study aims to develop and apply a spatially-explicit analysis at the landscape scale that allows for the identification of efficient and welfare maximizing coastal erosion adaptation strategies from 2020 until 2100. A case study is developed for the North-West Portuguese coast, a region renowned for being one of the most erosion-prone and vulnerable areas in Europe. This study applies an Integrated Coastal Climate Change Adaptation (INCCA) approach, which combines environmental modelling with cost-benefit analysis techniques. The shoreline evolution model LTC (Long-Term Configuration) is used to simulate shoreline changes along the coast in accordance with the RCP 8.5 sea level rise scenario. Then, meta-analytic value function transfer is used to estimate local Provisioning, Regulating & Maintenance and Cultural ecosystem service values with the SSP 3 socio-economic scenario. Finally, the COAST model (Coast Optimization ASsessment Tool) is used to explore the types, dimensions and locations of coastal erosion adaptation measures that provide the largest welfare gains. Results emphasize the complex factors that influence the most beneficial beach nourishment options, which depend on site-specific conditions, land use types, ecosystem service values, and primary goals of the intervention.

Keywords: Shoreline evolution, Numerical modelling, Coastal adaptation measures, Environmental cost-benefit analysis, Meta-analysis

12. Biodiversity and Ecosystem Services: Economic Analysis for Decision-making

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For public agencies and industries managing land, measuring and evaluating biodiversity and ecosystem services, and any related impacts, is becoming increasingly important. External reporting venues such as the Taskforce on Nature-related Financial Disclosures (TNFD), the Global Reporting Initiative (GRI), or the Carbon Disclosure Project (CDP) have developed a variety of resources to help companies measure and report biodiversity impacts. The United States government recently published a national strategy to put nature on the system of national accounts, to augment current methods of cost benefit analysis to include natural capital accounting for ecosystem services and the environment. While scientists are focused on defining and monitoring biodiversity, the focus for public agencies and industry experts is on valuing and reporting changes in and impacts to biodiversity and ecosystem services to a variety of projects across their territories. We propose a spatially explicit, risk-informed approach that can be used to evaluate biodiversity and ecosystem services across different scenarios. It can be used by both public and private decision-makers to evaluate plans across their landscapes, define impacts and co-benefits, measure and report outcomes, engage with stakeholders, and manage risk associated with biodiversity investment decisions, ecosystem restoration, community and habitat protection, and climate impacts. The methodology presented can be applied to a variety of scales, bringing insight to the key question of value transfer. Case studies from New York, Ohio, Tennessee, Arizona, and California illustrate how the approach was applied to evaluate several electric power company restoration and infrastructure building activities.

Keywords: Ecosystem Service Valuation, Biodiversity, Value Transfer, Industry Decision Support, Scenarios

13. Potentiating the transformation to legume-based farming systems through private and social ecosystem service valuation

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Production and consumption of legumes and legume-based products across Europe has slowly increased over the last decade. While the potential ecosystem functions, services and values (provisioning; regulating & maintenance; cultural) from legume-based systems are recognized and complex, evidence on and realization of these benefits has proven difficult. Yet, these ecosystem services (ES) can assist stakeholders in steering transformation to legume-based systems by providing them with knowledge on how such systems can address climate change, biodiversity loss, and nutritional deficiencies. The objective of this study is to assess the state-of-knowledge on the multiple private and social ecosystem service values provided by legume-based systems. Hence, a systematic literature review (SLR) is performed, using the SCOPUS database, artificial intelligence (AI) review tools, and content analysis and synthesis. Over 3,700 papers were retrieved, of which almost 1,200 papers were considered relevant. Results show that private provisioning (mainly food and feed) and regulating & maintenance (mainly nitrogen fixation, soil quality and pollination) ES values are widely studied, and that ES values are typically assessed using direct market pricing (food and feed provision), avoided/replacement cost (nitrogen and soil quality regulation) and production function (pollination regulation) valuation methods. Social regulating & maintenance (mainly climate and water quality regulation, and biodiversity maintenance) ES values are less widely studied, where ES values are typically assessed using direct market pricing (climate regulation), avoided/replacement cost (water quality regulation) and stated preference (biodiversity maintenance) valuation methods. Social cultural (mainly aesthetics and culinary) ES values are hardly studied, using revealed and stated preference valuation methods. Transformation towards legume-based systems in Europe has the potential for the realization of these multiple ES values, and requires: i) evidence on and awareness of all ES values, ii) mapping of ES costs and benefits across benefactors and beneficiaries, and iii) creation of markets for non-market ES values.

Keywords: Legumes, Ecosystem services values, Private, Social, Systematic literature review (SLR)

14. Market-based approaches to quantify and value recreation related ecosystem services

First authors(s): Liisa Saikkonen
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We develop market-based approaches drawn from simulated exchange value SEV method to spatially quantify and value freshwater recreation related services in Finland, taking into account travel costs, ecosystem condition, and the institutional context . The institutional context includes for example ownership of areas and their ecosystem services, demographic variables, and legislation that affects the use and markets of ecosystem services. We will further evaluate the applicability of the SEV based methods on marine and coastal recreation related services using recent data and models combining travel costs and contingent behavior. The work advances the methods to compile physical and monetary accounts on nature based daily recreation and marine ecosystem services and in general contributes to the methods to compile physical and monetary accounts on nature-based tourism and recreation in consideration of environmental factors and the institutional context.

Keywords: natural capital accounting, ecosystem service valuation, monetary ecosystem accounts, physical ecosystem accounts, aquatic ecosystem services

15. The multifunctionality of irrigation water: an economic valuation of the ecosystem services provided by irrigation water canals in the Veneto region, Northeastern Italy.

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Traditional flow-irrigation systems relying on water canals have been recognized as nature-based solutions for their capacity to deliver ecosystem services (ES). Besides food provision, most of the ES provided by these systems remain neglected in the decision-making processes,

rarely having an explicit economic value. Moreover, the preservation of traditional flow-irrigation systems may not be fully aligned with current policies targeting water efficiency in agriculture through technological and infrastructural improvements (e.g., drip irrigation).

This research contributes to demonstrate the multifunctionality of traditional flow-irrigation systems by accounting the economic value of ES provided by the irrigation canals managed by land reclamation consortia the Veneto region (Northeastern Italy).

Eight ES have been identified involving relevant stakeholders at regional level. Provisioning services (aquaculture and hydroelectric production) have been valuated through the market price method, while regulating services (water quality and groundwater recharge) via the replacement cost method. For the cultural services (recreational activities, cultural identity, aesthetic value) and for supporting services (habitat maintenance) a Discrete Choice Experiment was implemented to evaluate the willingness to pay of the residents for the supply of these ES.

The total economic value estimated for targeted ES is 642 million €/year (35,68 €/m of canal). Although developed primarily to support agriculture, the role of irrigation canals goes beyond this representing a multifunctional component shaping Veneto lowlands. Indeed, cultural identity shows the highest value, confirming irrigation water canals are a key element of local landscapes. The economic value attached to groundwater recharge supports the idea that even if traditional irrigation systems are not as efficient as modern ones in crop irrigation, water losses ultimately feed the water table providing water for other uses.

ES assessment may inform public decision-makers in reconciling urgent challenges with sustainable water management. In particular, these results may support land reclamation consortia in the bargaining process for the renewal of the water diversion permits and regional government bodies in the application of relevant EU Directives and Regulations.

Keywords: Economic valuation, agro-ecosystem, irrigation, water.

16. Reporting and Quality Standard for Environmental Economic Valuation to Support Meta-Analyses and Benefit Transfer

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The environmental economics literature on the value of ecosystem services and natural capital has expanded substantially over the past 20 years and continues to develop in terms of methodology and diversity of primary applications. Attempts to synthesise these research findings, particularly using meta-analytic techniques, to investigate the effects of methodological choices and study object characteristics on the study results are, however, hampered by incomplete reporting and documentation within valuation studies. Successful meta-analysis requires accounting for all relevant methodological and study-object characteristics that affect the value estimate. Non-standardised reporting in the existing literature makes gathering this information from multiple studies a time-consuming and challenging procedure. Incomplete reporting on relevant methodological and study-object characteristics results either in a reduced sample size or in missing covariates within the meta-analytic model.

To overcome this obstacle, we develop a reporting standard for environmental economic valuation studies, which we propose as an obligatory appendix for all submissions and publications in the field of environmental economic valuation. The reporting template is intended to improve environmental economic valuation studies by: I) encouraging authors to thoroughly and explicitly consider their methodological choices; II) facilitating and improving the review process; III) aiding the use of valuation results in meta-analysis and benefit transfer; IV) improving the quality of meta-analytic value transfer for informing decision-making; and finally V) supporting the development of environmental valuation through the provision of richer and more precise datasets on primary studies, which is a necessary condition for a deeper discussion on which factors affect the values of ecosystem services.

Keywords: Environmental economic valuation, meta-analysis, benefit transfer / value transfer, quality standard, reporting standard

17. Economic valuation of ecosystems services provided by vultures in Southern Africa

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Africa is home to eleven species of vultures. Seven face the risk of extinction, listed as Vulnerable, Endangered or Critically endangered on the IUCN Red List. The major threats are poisoning, belief-based use and electrocutions and collisions. The loss of vultures in Asia provided a window into a catastrophic scenario without vultures and the impact of the loss of the ecosystem services they provide. In the African context, there is a knowledge gap on the importance of vultures to humans and the impact that a loss of vultures would have. To address this gap, this paper presents an economic valuation of the ecosystem services provided by vultures in Southern Africa, with a focus on Botswana, Zambia and Zimbabwe. Data were collected through four surveys targeting different beneficiary groups: 1. local communities in the Kavango Zambezi Transfrontier Conservation Area; 2. the general public within each country; 3. the international public; and 4. rangers and park managers. The ecosystem services addressed in the assessment include provisioning, regulating and cultural services. The total economic value of ecosystem services in the three countries is estimated to be just over USD 250 million per year. This is largely attributed to existence and bequest values and the sanitation and pest control service provided by vultures. Thus, although vultures are not as charismatic as the other species of interest in the continent, their conservation is highly important to the welfare and health of humans. Further work is required to be able to quantify the full value of vultures in controlling diseases in livestock and wildlife, which would enable a holistic One Health perspective on the value of this ecosystem service.

Keywords: vultures, Africa, ecosystem services, economic valuation

18. Assessing the dependence on ecosystems of the economic and financial system, using the new ENCORE database

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One the targets of the CBD Global Biodiversity Framework is to promote that businesses and financial institutes assess their impacts and dependencies on nature. The ENCORE database was developed to enable the assessment of dependencies, by compiling information on links between economic production processes and the different goods and services that ecosystems supply. It is used for screening large financial and investment portfolios, to identifying where the strongest dependencies occur. Such analyses of exposure to biodiversity issues have been done by central banks throughout the world.

The objective of this paper is taking the next step, by adding the risks of ecological degradation. It is done by combing the ENCORE dependencies with geospatial information on the ecological status of ecosystems. This combination of information makes it possible to integrate ecological degradation into financial risk analysis, adding towards the mainstreaming of nature's values in business and finance.

We will present the results of a first case study on the dependence of the Dutch economic and financial system. We used the new version of ENCORE, that contains more detailed information on economic production processes. Further, aggregated information on supply-chains is used, derived from a spatially detailed input/output model. This makes it possible to not only show direct dependencies within an economic sector, but also indirect dependencies of other sectors, mediated by global trade between sectors worldwide.

Different allocation and valuation methods are used to provide information to business and finance on the relevance of ecosystems and on potential consequences of biodiversity loss. This information can be used for awareness raising and decision making by economic and financial actors, either by central market authorities that act at a general economic level, or by individual financial institutes like banks, pension funds and investors that act on the level of individual businesses.

Keywords: mainstreaming biodiversity, financial risk analysis, ecosystem dependencies, ENCORE, supply chains, decision making

19. From dimes to decisions – Applying monetary values in local public decision making in the Netherlands

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In this session, we will explore the challenges and opportunities of applying monetary valuation data in municipal decision-making, using a recent pilot project conducted for the Dutch municipality of Eindhoven.

In 2022, the Eindhoven city council decided to purchase the Wielewaal estate (142-hectares) for 30 million euros. In addition to her ecological richness and role in biodiversity conservation, the Wielewaal also aims to serve a public function in a time and place where green spaces are under pressure. Keeping this in mind, the purpose of the municipality of Eindhoven was to comprehensively illustrate the societal benefits of the Wielewaal for the broader community through the development of a social business case

Collaborating with the Dutch Bureau of Statistics (CBS) and the National Institute for Public Health and the Environment (RIVM), the Foundation for Sustainable Development (FSD) conducted an assessment to value the ecosystem services of the Wielewaal in monetary terms. This assessment compared two scenarios: a freely accessible Wielewaal versus a closed Wielewaal.

The results showed the large public benefits related to health and existence values. More importantly, the project underscored the complexities involved in applying monetary valuation in a real-world context.

Several challenges emerged during the project. Some related to aligning data flows from RIVM, CBS, and FSD. Other challenges arose in linking biodiversity to ecosystem services. Finally, after a publication in the National Newspaper on the project and several highly engaging LinkedIn discussions (here by a thought leader in the field and here by the councilor for Nature in the

municipality of Eindhoven), the pilot project sparked the debate about when and how to apply monetary valuation data.

This session will delve into these challenges and debates, offering insights and lessons learned from the Eindhoven project to inform future applications of monetary valuation in municipal contexts.

Keywords: Monetary valuation, application, barriers, public decision-making

20. Considering wider peatland values

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Assessment of ecosystem condition is intrinsically tied to the elements of the ecosystem which we value. Land management strategies provide one option for landscape or ecosystem management which promotes a particular value or set of values (e.g., fire risk reduction).

Peatlands are an iconic landscape which, when in good condition, provide a wide range of ecosystem services. Peatlands are internationally important for their carbon storage potential, are nationally and regionally important for their role in fire risk reduction, and locally vital for energy provision, livestock grazing and culture, to name just a few.

In Scotland “good condition” peatland is recognised through its contributions to carbon and biodiversity. The management of peatland for carbon and biodiversity is a key policy area, present in the Climate Change Plan, Scottish Biodiversity Strategy, and National Planning Framework. In addition to promoting private finance options for peatland management, the Scottish Government has pledged £250 million to target peatland management in areas with the most potential for reducing greenhouse gas emissions. The value and condition of Scottish peatlands is recognised through their carbon storage within Scotland’s natural capital accounts. However, this presents only a partial understanding of the value of peatlands.

The benefits of expanding accounting of peatland condition to integrate additional services, such as fire risk reduction, are widely recognised within Scottish land management and policy.

We present results of a literature review of the current extent of valuation of wider peatland services, and how these are integrated with the policy aims of management for carbon and biodiversity. Working with key stakeholders we identify additional services not yet valued, and highlight where demand for peatland services may intersect spatially. Finally, we use data collected across Europe to highlight where socio-economic policies may promote land management strategies, in particular for peatland management for fire risk reduction.

Keywords: Peatland, carbon, economic valuation, fire risk, biodiversity