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# International Expert Workshop on Economic Aspects of Nature Restoration

Harry Gölz (Ed.)

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# **International Expert Workshop on Economic Aspects of Nature Restoration**

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## Preface

Everyday life in globally integrated industrial nations is characterized by technical systems and a large selection of consumer goods is available all year round. The illusion arises that the satisfaction of our needs is largely independent of nature and that our ecosystems are seemingly unlimited. But this appearance is deceptive. On the one hand, ecosystems provide numerous goods and services that give us humans direct or indirect economic, health or psychological benefits. On the other hand, the performance of ecosystems is limited and is increasingly coming under pressure from human activities, so that numerous ecosystems are currently in a degraded or even destroyed state. In order to improve the condition of already damaged ecosystems, the implementation of suitable restoration measures as well as an efficient system of economic incentives are required to motivate stakeholders to voluntarily invest in sustainable management methods. The urgency of intensifying nature restoration has already been recognized at various political levels and different measures are currently being implemented as part of various initiatives.

The UN Decade on Ecosystem Restoration (2021-2030) urges member states to mobilize research on the restoration of degraded ecosystems and to develop policies to encourage and scale up restoration initiatives. The EU Biodiversity Strategy 2030 includes an ambitious EU Nature Restoration Plan that aims to protect the long-term value of natural capital, reconcile economic activities with nature conservation and secure jobs. The long-term goal is to fully restore the degraded ecosystems by 2050. The core element for achieving this goal is the EU Nature Restoration Law, the draft of which has been presented in June 2022. As an actor at the science-policy interface, the German Federal Agency for Nature Conservation (BfN) contributes with this workshop to shed light on the socio-economic parameters of restoration of degraded ecosystems in order to be able to carefully advice recent political initiatives.

The international expert workshop "Economic Aspects of Nature Restoration" was organized by the BfN and took place from October 13th to 16th 2021 as a hybrid event at the International Academy for Nature Conservation Isle of Vilm (INA), Germany. Around 30 people, including policy makers, economists and ecologists, from about 10 countries, participated in the interdisciplinary and transdisciplinary workshop. The event provided a platform on which current research work and projects based on plural approaches and methods were presented.

The keynote lecture of the workshop presented the design of the EU Nature Restoration Law and a policy impact assessment study which calculates societal net benefits of the restoration of various ecosystems. The first thematic block of the workshop dealt with the role of governance structures and economic instruments for restoring nature. Whereas the second part of the workshop dealt with the question of how to convince people of restoration measures and to involve them more strategically. Afterwards, three case studies from Hungary, Poland and Slovenia were presented, which deal with the restoration of industrial regions, former mining regions and peri-urban landscapes. The concluding part of the workshop dealt with the restoration of rivers, lakes, peatlands and coasts.

It is expected that the EU Restoration law will set binding targets for restoring numerous ecosystems. In order to be able to achieve these targets, it is particularly relevant to evaluate restoration measures that have already been carried out and to carefully plan upcoming projects. It is particularly relevant to assess the costs and benefits of these measures as far as possible. The workshop clarified the need to look at the relationships between people and nature from two sides and hence to integrate relational values into assessments and valuations.

The workshop participants agreed that an investment in nature restoration is worthwhile in most cases. The main problem from an economic point of view is that the social benefits of restoration arise with a time lag and are massively underestimated, since the resulting ecosystem services are largely freely accessible to the general public. However, the resulting costs for restoration arise directly and can be recorded via market prices.

The organization team would like to thank the participants for their excellent presentations and the inspiring discussions during the workshop. The organizers and participants of the expert workshop were able to gain new insights on how to support and justify restoration initiatives economically. With the proceedings of the workshop we try to further strengthen the interdisciplinary exchange and to inform other stakeholders about economic aspects of nature restoration.

Harry Götz

German Federal Agency for Nature Conservation (BfN)

# 1 Restoration of ecosystem services through Indigenous fire management – A case study from northern Australia<sup>1</sup>

Kamaljit K. Sangha<sup>2</sup>

## Abstract

Indigenous land management in tropical savannas of northern Australia, covering 1.9 million km<sup>2</sup>, presents a unique exemplar of the application of traditional knowledges and modern technologies. This study estimated the value of ecosystem services delivered from fine-scale, fire and land management practised by the Indigenous peoples on their lands covering an area of approximately 18 million ha, at about USD 7.29 billion per annum. Currently, the main ecosystem service valued and traded in the market, under the Australian Government's recognised abatement scheme – 'Savanna Burning' methodology, is the mitigation of greenhouse gas emissions from wildfires. This practice has generated about USD 9 million to date, since the implementation of the methodology in 2012, for reducing greenhouse gas emissions from Indigenously managed land. This study demonstrates the importance of Indigenous land management practices, and encourages policy makers, locally and globally, to develop incentivised mechanisms for enabling Indigenous peoples to better manage their lands that can deliver a wide range of ecosystem services to the regional and global populations.

Key words: Ecosystem services, Indigenous land management, Indigenous fire management, value of ecosystem services, tropical savannas.

## 1.1 Introduction

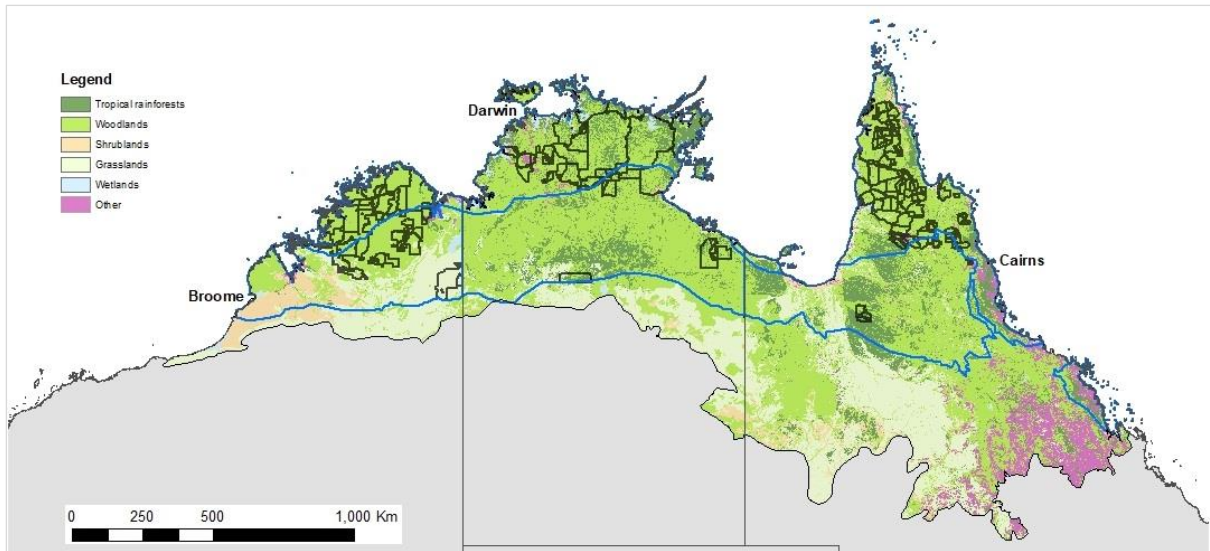
In Australia, ongoing Indigenous connections with the savanna landscape, covering an area of 1.9 million km<sup>2</sup> across three northern jurisdictions i.e. the Northern Territory, Western Australia, and North Queensland, offer special insights into the management of this vast region over millennia. Tropical savannas in northern Australia, cover almost a quarter of the Australian landmass, supporting a diverse range of vegetation types including open grasslands, shrublands, savanna woodlands, and tropical forests (Woinarski et al. 2007; Fig. 1). This vast landscape has traditionally been managed by Indigenous peoples over millennia through implementation of fine-scale mosaic burning, and protects diverse flora and fauna, and soil and water resources (Woinarski et al. 2009). As a result, Australia's northern savanna ecosystems support an array of services delivered to local, regional and global populations (Russell-Smith et al. 2019; Sangha et al. 2017a).

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<sup>1</sup> This paper includes a subset of data and sections of the manuscript published in the journal *Ecosystem Services*: Sangha, K.K., Evans, J., Edwards, A., Russell-Smith, J., Fisher, R., Yates, C., Costanza, R., 2021. Assessing the value of ecosystem services delivered by pre-scribed fire management in Australian tropical savannas *Ecosystem Services* 51 (101343). <https://doi.org/10.1016/j.ecoser.2021.101343>

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**Fig. 1. Dominant vegetation types (following the Australian National Vegetation Information System dataset) across tropical savannas in northern Australia. The black outlined areas represent the carbon projects (land parcels) where Indigenous fire management is actively practised by the land managers (as per Australian Government Clean Energy Regulator; Source: Sangha et al. 2021a).**

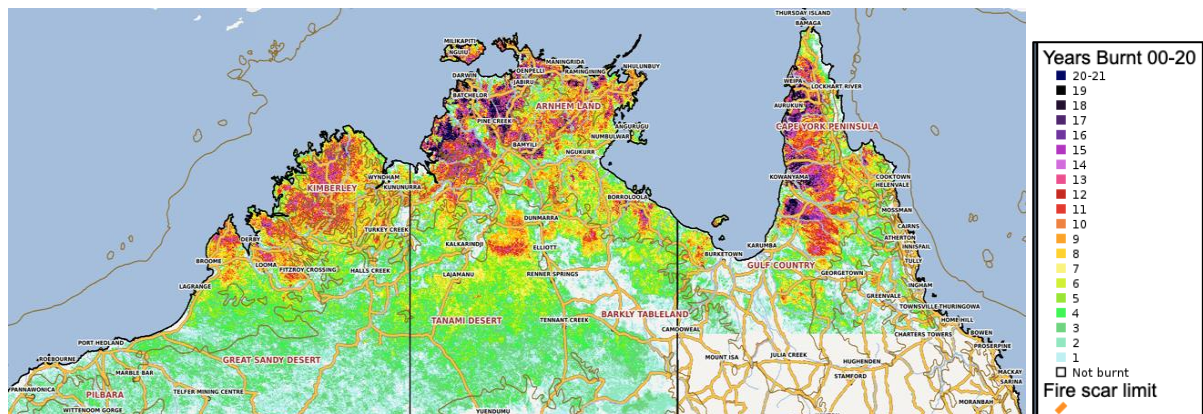
In the past, traditional burning practices in northern Australia - characterised by small, multi hectare-scale, patchy, cool fires (Fig. 2) - formed part of Indigenous people's lifestyles to afford their livelihoods and many other aspects of their lives. These practices were undertaken ritually when people traversed their estates for a variety of hunting, gathering, cultural, and spiritual purposes (Garde et al. 2009; Ritchie 2009). As a result, over time the savanna landscape has co-evolved with fire, including the influence of Indigenous management practised over millennia (Bird et al. 2005).



**Fig. 2. A satellite view of traditional burning, showing small, patchy, mosaic fire scars across the landscape.**

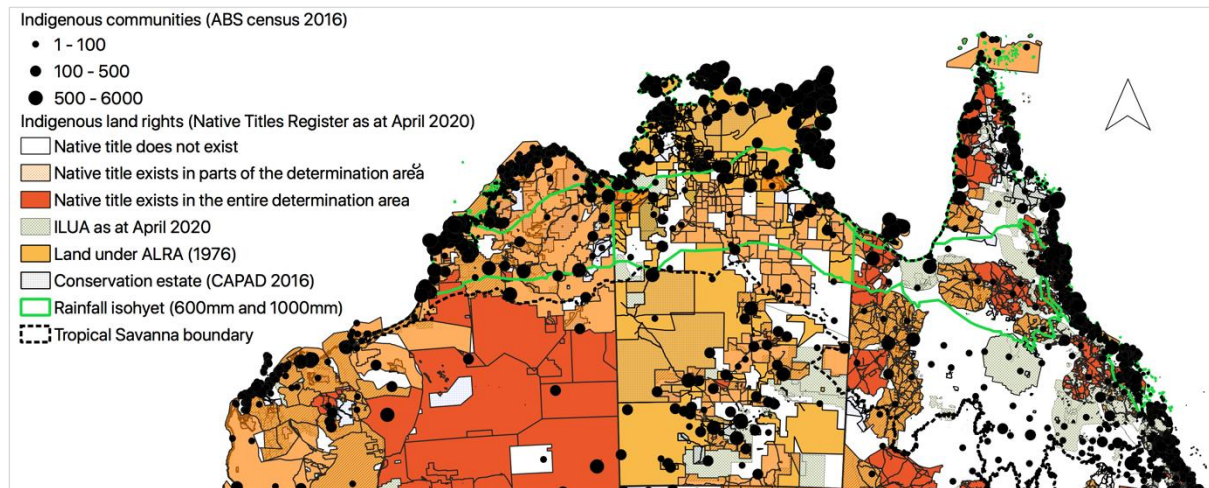
However, traditional fire management across northern Australia was markedly disrupted by European colonisation from the mid-1800s. It also affected traditional governance systems and relationships among and between different clan groups (Richie 2009; Fache and Moizo 2015). With the Commonwealth of Australia's Aboriginal Land Rights Act 1976 (ALRA) in the Northern Territory, and later in other northern jurisdictions under the Commonwealth of Australia's 1992 Native Title legislation, Aboriginal people were able to start reclaiming their traditional lands which enabled them to traditional knowledges and skills (Altman and Markham 2014; Dodson 1997).

With colonisation and subsequently the abandoning of traditional fire management, northern Australia started experiencing hot, destructive, wildfires, almost every year, that spread over vast areas covering thousands of square kilometres (Fig. 3; Sangha et al. 2019, 2021a&b). These fires are often lit by lightening, arsenals or by accidents as the vegetation dries up during the dry season, from April until August-September, with little to no rain. In August, with the onset of hot, dry weather, these fires once lit spread over large areas. Such a spread of wildfires further threatens the lives of many Indigenous peoples who reside across the northern landscape in >200 remote communities (Fig. 4). However, the government support to manage these wildfires was minimal until recently. Only, when the Australian Government ratified the Kyoto Protocol in 2008, and committed to reduce Australia's greenhouse gas (GHG) emissions, there was realisation that savanna wildfires in northern Australia contribute about 3-4% of the national GHG emissions inventory (Russell-Smith et al. 2013). The efforts then commenced to understand and value Indigenous practices of managing wildfires, to reduce GHG emissions.



**Fig. 3. Fire frequency from 2000-2020. Red and purple coloured areas are burnt almost every year and yellow coloured areas every second year (Source: North Australia Fire Information website).**

Since 2000s, Indigenous customary fire management has evolved into a well-recognised fire management practice with wider scientific and political support, commonly referred to as 'prescribed burning' or 'savanna burning' (Russell-Smith et al. 2009, 2013). Prescribed burning may differ from traditional management approaches by focusing on strategic management of fuel loads, whereas traditional management approaches focus more generally on sustainable resource management on clan estates throughout the seasonal cycle (Yibarbuk et al. 2001). The contemporary fire management across the north involves application of traditional knowledge and use of modern technology such as incendiaries, satellite imagery, and updated fire information from the North Australia Fire Information website (<https://firenorth.org.au/nafi3/>).



**Fig. 4. Distribution of Indigenous communities (ABS census 2016), Indigenous land rights under Native title, Indigenous Land Use Agreement (ILUA), Aboriginal Land Rights Act (1976; ALRA), and conservation estate above the 600mm rainfall isohyet where ‘savanna burning’ methodology is currently applicable (Source: Sangha et al. 2021a).**

This revival of Indigenous fire management practice has contributed significantly to the protection and management of savanna landscapes (Edwards et al. 2021), especially for reducing the impacts of extensive, severe late dry season wildfires ignited both by people and lightning. Strategic application of small, patchy burns as firebreaks, and more generally to reduce fuel loads, in the early dry season (March-July) mitigates the risk of extensive wildfires that can occur during August to December, which causes huge losses to various natural and man-made assets, and contribute to climate change (Sangha et al. 2019, 2021b).

In the Indigenous vernacular, prescribed burning is often described as ‘cleaning-up country’, by which people mean to clear the rank (senescent) grass and protect land and water resources. By doing so, savanna landscape delivers a number of ecosystem services (ES) that benefit the local Indigenous people and the broader Australian and global public.

## 1.2 Indigenous fire management and the delivery of ecosystem services

Managing the vast savanna landscape from wildfires, at a fine-scale, by applying traditional and modern land management practices provides ES such as GHG emission abatement, carbon sequestration, water regulation, biodiversity protection, in addition to enhancing social and cultural learning, and creating jobs for Indigenous peoples on country (Russell-Smith et al. 2013; Sangha et al. 2021a).

Since 2012 (after ratifying the Kyoto Protocol in 2008), the Australian Government, under the ‘Savanna Burning’ methodology i.e. applying fine-scale fire management, started supporting the abatement of GHG emissions from wildfires in the eligible savanna region that is above the 600 mm rainfall isohyet (i.e. 1.2 million km<sup>2</sup>, area above the green line in Fig 1&4). The total area that is currently managed from wildfires by the Indigenous peoples alone in northern Australia (across all the three northern jurisdictions) is about 18 million ha (Table 1), which is registered as 27 different carbon projects (land parcels) under the government’s ‘savanna burning’ methodology (see black outlined areas in Fig.1; details in Sangha et al. 2021a).

These formally recognised 27 carbon projects now abate more than five million tonnes of GHG emissions since the implementation of the methodology in 2012, from Indigenous lands alone (pastoral and conservation are the other main land use sectors that abate another two million tonnes of GHG emissions). The estimated value of GHG emissions abatement accounts is about USD 9 million per annum (applying the recent carbon price of USD 10.4 per tonne abatement of GHG emissions; Table 1).

To support the implementation of ‘Savanna Burning’ methodology and other GHG emissions abatement methodologies, the Australian Government established an Emissions Reduction Fund (ERF) in 2012 (of USD 2.55 billion) to purchase the lowest cost of abatement from a range of abatement sources (soils, cattle, farming, wildfires, industry, etc.; with >70 methods including ‘Savanna Burning methodology’) (<https://www.industry.gov.au/policies-and-initiatives/emissions-reduction-fund>). In 2019, this scheme was further extended with an additional investment of USD 2 billion, and rebadged as ‘Climate Solutions Fund’. The only drawback of the ERF/Climate Solutions Fund is that it is public money, and the scheme fails to tax/penalise the agents/actors who are responsible for GHG emissions.

For many remote Indigenous communities, residing in remote areas, typically hundreds of kilometres away from urban areas, with little economic opportunities, ‘Savanna Burning’ methodology has created a new economy, popularly called ‘carbon economy’. However, the total value of the other ES is far beyond the abatement of GHG emissions value (mentioned above) that Indigenous land managers currently obtain. Sangha et al. (2021a) recently assessed the total value of ES, as a bundle, that are delivered by fine-scale, fire management on Indigenous lands, at USD 7.29 billion per annum, applying local and standard valuation approaches (Table 2; details in Sangha et al. 2021a).

**Table 1. Total area (ha) managed for fire and related carbon credits earned by the Indigenous peoples across northern Australia. Under the ‘Savanna Burning’ methodology, a land parcel is registered as a carbon project that through fire management, generates Australian Carbon Credit Units for each tonne of GHG emissions abatement.**

	Northern Territory	Queensland	Western Australia	Total for three jurisdictions
<b>Area (ha) under Indigenous fire management</b>	10,326,370	3,304,735	4,300,534	17,931,639
<b>Total number of projects registered under ‘Savanna Burning’ methodology</b>	11	11	5	27
<b>Number of Australian Carbon Credit Units (ACCUs) earned from fire management on Indigenous lands (1 tonne of GHG emissions abatement = 1 ACCU)</b>	3,445,652	893,554	833,725	5,172,931
<b>Average value (USD)/year (@USD10.4/ACCU)*</b>	5,972,463	1,548,826	1,445,123	8,966,412
<b>Jobs (number of people employed)</b>	>400	>100	>100	>600

\*values in USD, applying recent C price from government auction at AUD 16.14, and a conversion rate of 0.64 on 19 May 2020 i.e. @ USD 10.40/tonne of GHG abatement

**Table 2. Annual value of ES from fire managed land area as registered under 27 Indigenously managed carbon projects in tropical savannas of Australia (as of May 2020).**

Dominant land use	Ecosystem type	ES value (USD values in 2020)/ ha/yr	Northern Territory			Queensland			Western Australia		
			Ecosystem area (ha)	Total value of ES (USD million)	Fire management-related ES values (1/4th of the total ES values) (USD million)	Ecosystem (area in ha)	Total value of ES (USD million)	Fire management-related ES values (1/4th of the total ES values) (USD million)	Ecosystem (area in ha)	Total value of ES (USD million)	Fire management-related ES values (1/4th of the total ES values) (USD million)
<b>Indigenous</b>	Tropical rainforest	4158	3,722,094	15,476.47	3,869.12	223,864	930.83	232.71	57,113	237.48	59.37
	Woodlands	896	6,103,949	5,469.14	1,367.28	2,814,343	2,521.65	630.41	4,007,239	3,590.49	897.62
	Shrublands	448	137,537	61.62	15.40	44,837	20.09	5.02	0	0.00	0.00
	Grasslands	445	41,548	18.49	4.62	43,679	19.44	4.86	137,319	61.11	15.28
	Wetlands	2078	187,909	390.47	97.62	155,242	322.59	80.65	0	0.00	0.00
	Others	223	133,333	29.73	7.43	22,770	5.08	1.27	98,863	22.05	5.51
	<b>Total</b>		<b>10,326,370</b>	<b>21,445.92</b>	<b>5,361.48</b>	<b>3,304,735</b>	<b>3,819.67</b>	<b>954.92</b>	<b>4,300,534</b>	<b>3,911.12</b>	<b>977.78</b>

### 1.3 Challenges

The wide range of benefits derived from managing fires across the savanna landscape are well recognised now, yet largely under-valued for supporting further Indigenous land management. The work is required to consider a broader perspective of fire management for delivering not only GHG emissions abatement, but also many other vital ES such as biodiversity protection, water regulation, cultural learning, etc. (Russell-Smith et al. 2019; Ansell et al. 2019; Evans and Russell-Smith 2020; Edwards et al. 2021). Managing wildfires across the vast savanna landscape, with sparse human population, presents a singular challenge for land managers and for many organisations involved in land and emergency management related services across the north.

### 1.4 Discussion

The incentivised fire management, applying traditional burning practices, on Indigenous lands across the tropical savannas of northern Australia, is delivering a range of ES as well as socio-economic outcomes including income, employment, improved health, rebuilding relationships among clan groups, enhancing peoples' connection to country, relearning traditional ceremonies and practices in situ (Burgess et al. 2009; Sangha et al. 2017a&b, 2021a; Social Ventures Australia 2016). An Indigenous Elder recently commented:

**“This fire management program has been successful on so many levels: culturally, economically and environmentally. Through reinstating traditional burning practices, new generations of landowners have been trained in traditional and western fire management, hundreds of thousands of tonnes of greenhouse gas have been abated, and the landscape is being managed in the right way.”**

Dean Yibarbuk (Fire ecologist and Senior Traditional Owner, West Arnhem Land), Savanna Fire Forum, 9-11 Feb 2020, Charles Darwin University.

By highlighting the total value of ES delivered from fine-scale fire management, this study underlines the potential returns that could incur to the Australian Governments (including State/Territory Governments) if a wider Payments for Ecosystem Services (PES) mechanism approach is developed and supported by the government policies.

Implementation of incentivised fire management on 18 million ha of Indigenous lands (and additional 11 million ha of pastoral and conservation lands) across north Australian savannas has demonstrated that fire regimes are transformed across the north, resulting in at least 30% less GHG emissions, and better conservation and land management outcomes. Subsequently, better management of the savanna landscape (including lands managed by non-Indigenous people) will further deliver a diverse range of ES, total value estimated at USD 10.54 billion/yr (Sangha et al. 2021a). The need is to extend the current incentivised carbon program to a broader ES program so that land managers are able to manage natural resources in a holistic way, for considering ecological (such as biodiversity, water regulation) and socio-cultural outcomes.

This study demonstrates the importance of Indigenous fire management and encourages policy makers to appropriately invest in and incentivise Indigenous fire and land management programs, and build Indigenous and local capabilities and knowledges, not just in Australia but across the globe.

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## 2 The diversity of values – An ethical analysis of the EU Biodiversity Strategy 2030<sup>1</sup>

Stefan Knauß<sup>2,3</sup>

### Abstract

Values are key to biodiversity governance. Good political strategies rely on value pluralism, a broad discursive spectrum of values of nature. The EU Biodiversity Strategy 2030 contains at least 77 statements about the values of nature. Analysing these statements with descriptive environmental ethics shows that they cover anthropocentric, relational and physiocentric valuations of nature. In total 28 physiocentric, 16 relational and 33 anthropocentric valuations of nature have been examined. The physiocentric value of ecosystem integrity is mentioned 11 times, followed by the anthropocentric demand for equity, justice and regulation (10 times) and the instrumentality of biodiversity for human health and wellbeing (9 times). The variety of biodiversity values within the EU Biodiversity Strategy is an example of value pluralism although the European Commission is often criticized for being a rather technocratic, intransparent institution with a lack of democratic legitimacy. The variety of value statements demonstrates a tendency of an ever-growing wealth of different biodiversity values. This is a condition sine qua non for integrative nature–people scenarios.

Keywords: Biodiversity, Values, Governance, Environmental Ethics

### 2.1 Introduction

The process and the results of biodiversity governance are driven by values of biodiversity. Protection and restoration of biodiversity depends on the discursive status of non-human natural entities. The ways in which human individuals, collectives and institutions perceive and conceptualize biodiversity is expressed through values of biodiversity. “Biodiversity” was coined in the 1980s to draw attention to the anthropogenic destruction of non-human species. The international legal document Convention on Biological Diversity (United Nations 1992) defined three levels of consideration (genes, species, ecosystems) and three political goals (protection, sustainable use, equitable sharing of benefits). Biodiversity is a value-laden concept, intertwining descriptive and normative aspects, an “epistemic-moral hybrid” (Potthast & Ott 2016: 58). “Biodiversity Value” is the explicit and differentiated worth of the variety of non-human natural entities attributed by human individuals, societies and institutions. Biodiversity values create a frame of reference for action. Biodiversity values do provoke or hinder actions relevant to biodiversity. They determine the interpretation, motivation and justification of policy making. “Mainstreaming Biodiversity” is the process of making the multiplicity of non-human natural entities count as goal of political governance. “Good Biodiversity Governance” is the process of realizing a significant amount of these biodiversity goals by designing effective political regimes. Typical political actions in favour of biodiversity are the protection and restoration of natural variety. The present analysis explores and categorizes the discursive status of non-human natural entities within the EU Biodiversity Strategy 2030.

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<sup>1</sup> This text is based on the presentation „Sustainable Corporate Governance and Biodiversity Commitments – Approaching Politics and Ethics in the EU Biodiversity Strategy 2030“ (International Expert Workshop „Economic Aspects of Nature Restoration“, October 13-16, 2021, Vilm, Germany) and part of the MLU and iDiv project BIOdiversity GOVERNANCE and VALUES (BioGoValues).

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The EU Biodiversity Strategy 2030 was released by the European Commission (EC) in May 2020. It has the significant subtitle “Bringing nature back into our lives” and is meant to inform important political bodies of the European Union (EU) such as the Council, the European Economic and Social Committee and the Committee of Regions. The Document consists of a general introduction to unfold both a) the Importance of Biodiversity, e.g. for human beings “We need nature in our lives” and b) the Urgency of Action in order to prevent future socio-economical cost (EC 2020: 2-4). The second part “Protecting and restoring nature in the European Union” lays out strategies and action plans for nature conservancy and restoration for ecosystems across land and sea. Special focusses are for agriculture (EC 2020: 7), land take (EC 2020: 9), forestry (EC 2020: 10), energy generation (EC 2020: 10), marine ecosystems (EC 2020: 10), fresh water (EC 2020: 12), urban and peri-urban spaces (EC 2020: 13), pollution (EC 2020: 14) and invasive species (EC 2020: 14). All strategies are clearly placed within the legal framework of the EU and normatively directed to stop and even reverse the loss of biodiversity. The subchapter entails the EU Nature Restoration Plan with 14 key commitments by 2030 (EC 2020: 15).

## 2.2 Methodology

The EU Biodiversity Strategy is analysed with a methodology of descriptive environmental ethics. Eser et al. (2011) found that ethical views are explicitly or implicitly part of biodiversity strategies. Following Ott et al. (2016), descriptive environmental ethics depicts “the factual values and moral concepts of different groups [...] with regard to the environment, animals and nature” (Ott et al. 2016: 5). Part of descriptive environmental ethics is also to observe and explain changes in these valuations like the nature awareness studies of the Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz (BMUV) and the Bundesamt für Naturschutz (BfN) (BMUV & BfN 2016, 2018, 2020, 2021).

The philosophical study of value is called axiology (from Greek ἀξία, axia: “value, worth”; and -λογία, -logia: “study of”). It includes questions about the origin and the classification of values and about what kinds of things have value. Regarding the origin of values, two different axiological positions can be distinguished: value objectivism and value subjectivism. Whereas for value objectivists values exist objectively and thus independently of recognition by valuing beings, value subjectivists argue that values arise in the eye of the valuing subject as judgments about certain characteristics of the objects of valuation. In the first case, values precede value judgments and are insofar a condition for value judgments, whereas in the second case, values are the result of valuation processes (Chan et. al 2016: 1462).

Axiology commonly classifies intrinsic and extrinsic values. Something is intrinsically valuable if it is good in itself or good for its own sake. From the viewpoint of value objectivism intrinsic values depend on certain features of the valuable entity, not the valuing entity. Human beings are seen as intrinsic values for possessing human dignity. Extrinsic value, is instead ascribed to things that are valuable only as a means to something else.

There have been different proposals to structure the multitude of valuations of nature within environmental ethics. Anthropocentric approaches deny intrinsic values of non-human natural entities. These entities are only valuable insofar, they are instrumental for human beings. Physiocentric approaches see intrinsic values in non-human natural beings. The four most important physiocentric positions are sentientism, biocentrism, ecocentrism and holism (see Ott et al. 2016: 11).

Anthropocentric values of nature are instrumental values of nature according to human needs. Physiocentric values are values of nature not primarily focussing on the needs of human beings. Environmental ethicists have been arguing that anthropocentric values of

nature are a) much easier to justify according to established standards of rationality and b) superior in terms of motivation. “[N]ature conservation is probably best justified on the basis of their own elementary survival interests” (Wuketits 2006: 143). Although humans may appreciate nature as a partner worth to care for (see relational values) or a pristine paradise that should be preserved in its original condition (see physiocentrism), the potential future benefit of natural resources might be the better argument. To what parts of nature (individuals, species and areas) we connect emotionally to worship them as partners ultimately relies on an arbitrary choice.

According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) dominant approaches tend to emphasize the “dichotomy between instrumental (anthropocentric) vs. intrinsic (physiocentric) dimensions of nature” (IPBES 2021). Environmental ethicists have been highlighting a third category of values. Relational values of nature are anthropocentric by origin and can be physiocentric by orientation. They address human nature relationships significant for human wellbeing but connected a non-instrumental view or treatment of natural entities. A relational value perspective “tends to emphasize the value of interactions between people and nature and those among individuals in society” (IPBES 2021). Coming from a neo-Aristotelian position, human well-being includes strong affective connections to different non-human natural entities and intrinsic value projections in human-nature relationships. Accordingly, well-being “cannot be reduced to the reception of benefits” because it “derives from positive agency including caring for nature” (Jax et al. 2018: 2). A “broader and richer set of human relations with nature [...] does not only consider the question what nature does for people but also acknowledges a diverse set of other relationships with nature and the values associated with it” (Jax et al. 2018: 3).

Inspired by the discourse ethics of Apel and Habermas (Habermas 1983) environmental ethics have been characterized as a universe of discourse (Ott et al. 2016: 11) aiming for the rational reconstruction and the critical review of our ethical intuitions within human-nature relationships (Ott et al. 2016: 3). Environmental ethics would then be a “discursive process of clarification of primary concerns” (Ott et al. 2017: 7). According to Beate Jessel, from 2007 to 2021 president of the BfN, the ethical view is not just one line of argumentation among many others. Accepting “Ethical arguments [...] is a matter of adopting a point of view for ordering and weighing all arguments relevant to nature conservation” (Jessel 2011: 7). The “ordering and weighing” of arguments is based on the attempt “to formulate reasons for the protection of biodiversity that can be generally accepted” (Jessel 2011: 7). Political biodiversity governance is not only informed by environmental ethics. Consequently, biodiversity values are not always “ordered and weighted” by ethical arguments. Political needs and preferences, as well as power structures are part of the real world universe of discourse. The presence and public recognition of diverse and sometimes conflicting values seems to be an inevitable aspect of Governance. According to contrasting approaches to values and valuation (IPBES 2021) value pluralism is desirable for biodiversity policy. Value pluralism refers to two different but intertwined elements: a) relational values (based on interaction) as a third category of values between instrumental (anthropocentric) vs. intrinsic (physiocentric) values and b) a policy of integration of values representing “a multitude of different worldviews instead of a single one”. Understanding value pluralism as a policy of integration is very much in line with the concept of transformative governance.

According to Razzaque and Visseren-Hamakers (2019), the authors of IPBES Global Assessment Chapter 6: Options for Decision Makers, transformative governance requires integrative, inclusive, informed and adaptive strategies. “Inclusive Elements” acknowledge the plurality of values as well as demands of law and justice for the distribution of the benefits of land use. The inclusion of a plurality of values and the addressing of equity and fairness is

one of the crucial elements of transformative governance as conceptualized by IPBES-authors.

Given the factual value pluralism of human nature relationships and the normative demand of an inclusive biodiversity governance IPBES advanced to a critique of the ecosystem services (ES) approach. ES have become popular through the Millennium Ecosystem Assessment (MEA) in 2005, the Millennium Development Goals (MDGs) and The Economics of Ecosystems and Biodiversity (TEEB). The reception of ES within the IPBES led to the conceptual novelty of nature's contributions to people (NCP)<sup>4</sup> (Díaz et al. 2018). NCP are connected to "people's quality of life" as the origin of the specific quality of natural features. What nature means cannot be objectified or reduced to one cultural or disciplinary frame. The dominance of Western economists' and ecologists' views on nature, given by the concept of ecosystem services seemed to downplay perceptions of nature as an end in itself. The value of natural features is culturally and locally specified. The more inclusive approach of nature's contributions to people (NCP) "recognizes the central and pervasive role that culture plays in defining all links between people and nature" and "elevates, emphasizes, and operationalizes the role of Indigenous and local knowledge in understanding nature's contribution to people" (Díaz et al. 2018: 270). Taken together the IPBES authors are arguing for the primacy a) of values and not arguments and b) a politically open process of valuation. This is very much in line with descriptive environmental ethics used as tool to analyse the multiplicity of value statements about natural entities. It is beyond the scope of normative environmental ethics, strongly focussing on arguments and the criterion of rational justification.

### 2.3 Results

Seen from the methodological perspective of descriptive environmental ethics the EU Biodiversity Strategy 2030 seems to reflect value pluralism as a policy of integrating "a multitude of different worldviews instead of a single one" (IPBES 2021). The document includes at least 77 different normative perspectives on nature within the three main categories anthropocentric, relational and physiocentric valuations of nature. Most of the normative perspectives are anthropocentric (33), followed by physiocentric (28), and relational values (16). On the other hand, the EC is a completely different type of political body than the IPBES Network and the local stakeholder integration scenarios envisioned by the participating scientists.

Part of the ethical analyses is to distinguish "facts" and "values". Factual statements are indicating causal relations like: "Pollution is a key driver of biodiversity loss" (EC 2020: 14), explanations: "Soil is one of the most complex of all ecosystems" (EC 2020: 9) and definitions: "Biodiversity is the extraordinary variety of life on Earth" (EC 2020: 2). Explaining the complexity of soil and defining biodiversity as "the extraordinary variety of life" may prepare or already contain evaluative components. Nevertheless, values do contain explicitly normative vocabulary like: "Soil is [...] a habitat in its own right" (EC 2020: 9) or "environmental duty of care" (EC 2020: 17) or metaphors and analogies like "Soil is [...] home to an incredible diversity of organisms" (EC 2020: 8). Talking about rights and duties is obviously part of ethics. Determining soil as a "home" is an anthropomorphism with a normative impact. Calling a place as a home means relating it to the own identity, often by indicating that a home cannot be changed easily.

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<sup>4</sup> "NCP are all the contributions, both positive and negative, of living nature (diversity of organisms, ecosystems, and their associated ecological and evolutionary processes) to people's quality of life (Díaz et al. 2018: 270)".

Among the physiocentric statements there was one reference to the rights of nature. A cluster of 11 descriptions referring a specific holism or ecocentrism. Naming the normative status of ecosystems directly as “health” (EC 2020: 6,9,10) or “good status” (EC 2020: 12), identifying them as “collapsing” (EC 2020: 3), “suffering” (EC 2020: 14) or in “a state of crisis” (EC 2020: 3). In a less metaphorical way, ecosystems are ascribed functions (EC 2020: 9, 10, 12) or seen as a category of reference for management (EC 2020: 12). Calling ecosystems, a home for organisms relates to their functionality for non-human beings. The idea of “restoration” (EC 2020: 6) and “recovery” (EC 2020: 6) of nature and its ecosystem refers to a normative status quo of ecosystems and leads to strategies of an “reversal” of loss of biodiversity. Protecting the resilience of ecosystems presupposes attributes an “inner ability” of these holistic entities to “defend” their current functionality against “disturbances from outside”. Similar is the idea of planetary boundaries (and “ecological criteria”) as objective limits of human interaction with nature.

Relational values are explicit descriptions of human-nature relationships that attribute a strong value to non-human natural entities. Being “part of”, “in synergy with”, or “ally of nature” is one important cluster of this category. It carries an implicit normative claim about the equality of humans and nature. Attributions of “Guardianship” and a “Duty of Care” for Nature are explicit in determining human obligations towards nature. The “good of the environment” acknowledges the presence of the objective nature as a subjective meaningful human environment that nevertheless has a “good on its own”. This demonstrates the bridge function of relational values between anthropocentric and physiocentric values. The idea that we “lost nature” is the classic romantic decay history about a vice versa alienation in human-nature relationships. The “dependency on nature” is another prominent way to describe a relation of humans and nature. It might have a normative impetus and a relational “flavor” although it can be a rather mere causal description and/or a part of purely anthropocentric values.

The anthropocentric values that are mentioned the most are contributions of biodiversity for physical and mental human health and wellbeing and the valuation of nature in normative terms of equity, justice and regulation. Since biodiversity is seen as instrumental for long-term human wellbeing, not as an intrinsic good in visions of the good life it can clearly be distinguished from the relational approach to biodiversity values. The latter would mean to attribute biodiversity a value per se as an integral part of healthy and meaningful human life. The hints to equity, justice and regulation could entail valuations of nature as an end within the moral, legal or political discourse. Since the political role of the EC is to stress the legal and technocratic perspective of European policy making, valuing biodiversity in terms of justice was interpreted pragmatically: Setting in place regulations and laws is the role of the EC not a deep conviction or a strong sense of nature as a subject of justice in the first place.

**Table 1. Analyses of Value Statements in the EU Biodiversity Strategy 2030 (EC 2020).**

Category	Sub-Cluster		“Example” / (page)
Physiocentric	Rights of Nature	1	“Soil is [...] a habitat in its own right” (EC 2020: 9).
	Holism / Ecocentrism	11	“restoring soil health and functions” (EC 2020: 12).
	Home for Organisms	2	„Soil is [...] home to an incredible diversity of organisms” (EC 2020: 8)
	Restoration	2	“To reverse biodiversity loss [...] needs [...] nature restoration” (EC 2020: 6).
	Resilience	5	“More resilient forests can support a more resilient economy” (EC 2020: 10).
	Planetary Boundaries, Ecolog. Criteria	2	“the need for [...] consumption patterns that do not exceed planetary boundaries” (EC 2020: 2).
	Sustainability	5	“long-term sustainability of both nature and farming” (EC 2020: 8).
Relational	Part of..., Synergy with..., Ally of Nature	4	“We humans are part of [...] this web of life” (EC 2020: 1).
	Guardianship, Duty of Care	2	“As guardians of our land, farmers play a vital role in preserving” (EC 2020: 7).
	“Good” of Environment	4	“bad conservation status or not in good environmental status” (EC 2020: 1).
	“We lost Nature”	2	“Bringing nature back into our lives” (EC 2020: 1).
	Dependency on Nature	4	“We humans are [...] fully dependent on, this web of life” (EC 2020: 2).
Anthropocentric	Food Security	3	“Biodiversity loss threatens our food systems, putting our food security and nutrition at risk” (EC 2020: 6).
	Benefits and Ressources	4	“Green urban spaces [...] provide a wide range of benefits for people” (EC 2020: 12).
	Human Health and Wellbeing	9	“Protecting and restoring biodiversity is the only way to preserve the quality and continuity of human life on Earth” (EC 2020: 22).
	Equity, Justice and Regulation	10	“Every Member State will have to do its fair share of the effort based on objective ecological criteria [...]” (EC 2020: 5)
	Economy and Bussiness	7	“Biodiversity conservation has potential direct economic benefits for many sectors of the economy” (EC 2020: 3).

## 2.4 Conclusion

Values are part of governance conceptions like the EU Biodiversity Strategy 2030. Three different types of values of nature (relational, instrumental and intrinsic values) could be identified. According to the IPBES guidance on multiple values of nature, intrinsic values refer to physiocentric values associated with nature and its contributions to people. Instrumental values refer to the value attributed to something as a means to achieve a particular end. Relational values reflect relationships “with natural entities to the extent that such relationships are embedded in people's identity” (IPBES 2021), (Pereira et al. 2020: 12, 13).

The EU Biodiversity Strategy 2030 contains at least 77 statements of the values of nature. Analysing these statements with descriptive environmental ethics shows that they cover anthropocentric, relational and physiocentric valuations of nature. In total 28 physiocentric, 16 relational and 33 anthropocentric valuations of nature have been examined. The physiocentric value of ecosystem integrity is mentioned 11 times, followed by the anthropocentric demand for equity, justice and regulation (10 times) and the instrumentality of biodiversity for human health and wellbeing (9 times). The variety of biodiversity values within the strategy is an example of value pluralism a policy of integrating “a multitude of different worldviews instead of a single one” (IPBES 2021). Given the institutional character of the EC often criticized as technocratic, intransparent and undemocratic with a lack of democratic legitimacy this might be surprising. There seems to be a tendency towards a greater discursive variety of biodiversity values variety. Discursive variety is a necessary condition for integrative biodiversity governance.

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### **3 Mainstreaming forest conservation and restoration through fiscal policies in India**

Amarendra Das<sup>1</sup>

#### **3.1 Introduction**

India is a party to the United Nations Framework Convention on Climate Change (UNFCCC). The National Action Plan on Climate Change (NAPCC) of India states that India adopts a multi-dimensional approach to minimize the risks of climate change. Being a developing country, India has the urgent responsibility of lifting millions of people from abject poverty and providing a decent livelihood for the 1.4 billion population. In this regard, the need for faster economic growth is warranted. However, being a responsible democratic and welfare nation, India seeks to increase wealth and human welfare without damaging the environment. Keeping given these needs, the NAPCC of India has laid down, among other things, the following principles: (i) Protecting the poor and vulnerable sections of society through sustainable development strategies that are sensitive to climate change and, (ii) Achieving national growth targets by means that enhance ecological sustainability (Gol, 2018).

In order to achieve the goals set by UNFCCC, the Government of India has launched the National NAPCC on 30 June 2008 by outlining eight National Missions on climate change. These include (1) National Solar Mission, (2) National Mission for Enhanced Energy Efficiency, (3) National Mission on Sustainable Habitat, (4) National Water Mission, (5) National Mission for Sustaining the Himalayan Ecosystem, (6) National Mission for a Green India, (7) National Mission for Sustainable Agriculture and, (8) National Mission on Strategic Knowledge for Climate Change. India is progressively striving to reduce the carbon footprints of economic growth. India's emission intensity of Gross Domestic Product (GDP) has reduced by 24 percent between 2005 and 2016 (Gol, 2021). Therefore, India is on track to meet its voluntary declaration to reduce the emission intensity of GDP by 20-25 percent from 2005 levels by 2020.

The United Nations has declared 2021-2030 as the Decade on Ecosystem Restoration. In this context, in this paper, I have examined the efforts taken up by India for the conservation and restoration of degraded forest lands.

#### **3.2 Greening India Mission**

The Greening India Mission envisages a holistic view of greening and focuses on multiple ecosystem services, such as higher provisioning services for the local communities and regulating services like carbon sequestration and emission reduction that benefits the entire globe. The objectives of the Greening India Mission are (1) Increased forest/tree cover and improved quality of the existing forest cover, (2) Improved ecosystem services including biodiversity, hydrological services, and carbon sequestration, and (3) Increased forest-based livelihood income of households living in and around the forests.

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### **3.3 Conservation and restoration of forests**

India accounted for 2 percent of the total global forest area in 2020, according to the Global Forest Resources Assessment (GFRA) by Food and Agriculture Organization (FAO). India's share in the global forest area ranks at 10<sup>th</sup> place. GFRA 2020 reported that between 2010 and 2020, India added the third largest areas under forest cover. During this time, India added 266 hectares of forest every year (FAO, 2020). Keeping in view the importance of forests for achieving the environmental balance, the National Forest Policy 1952 aims to bring 33 percent of the land under forest cover. The Forest (Conservation) Act 1980 laid the foundation for protecting and conserving the country's natural forests. The Compensatory Afforestation Fund Act 2016 has made compensatory afforestation mandatory in the diversion of forest land to non-forestry uses. Similarly, the Compensatory Afforestation Fund Management and Planning Authorities (CAMPAs) at both the Union and States ensures expeditious and transparent utilization of amounts realized from forest land diverted for non-forestry purposes.

In order to promote afforestation, tree planting, ecological restoration and eco-development activities in the country, the National Afforestation and Eco-Development Board (NAEB) was set up in August 1992. NAEB gives special attention to the regeneration of degraded forest areas and adjoining areas, national parks, sanctuaries, and other protected areas, as well as the ecologically fragile areas like the Western Himalayas, Aravallis, and the Western Ghats, etc. (Gol, 2021).

### **3.4 Property rights and regulatory authority over forest conservations**

In India, the ownership over the forest is with the state governments. However, the regulatory authority over these forests lies with the Union Government. For the diversion of forests for developmental purposes, the concerned agencies need to obtain clearances from both the state and national governments. Keeping given the conservation of wild lives and biodiversity hotspots, the Government of India also declares specific forest regions, national parks, and sanctuaries. To protect and conserve these notable category forests, the national governments also provide special financial assistance.

29 State Forest Department Agency projects are currently operating in the country with a total expenditure of INR 38.20 billion to treat an area of 2.19 million ha till 2018-19 under the National Afforestation Programme. Each state government has a forest department for forest conservation that recruits forest guards at local levels. Officers with specialized skills are also appointed at the sub-divisional, district, and state levels to plan and develop forests and wild lives. However, the forest guards are not sufficient to protect forests and wild lives. Government officials involve local communities to form Joint Forest Management Committees for the protection and development of forests.

### **3.5 National goals for forest conservation and challenges**

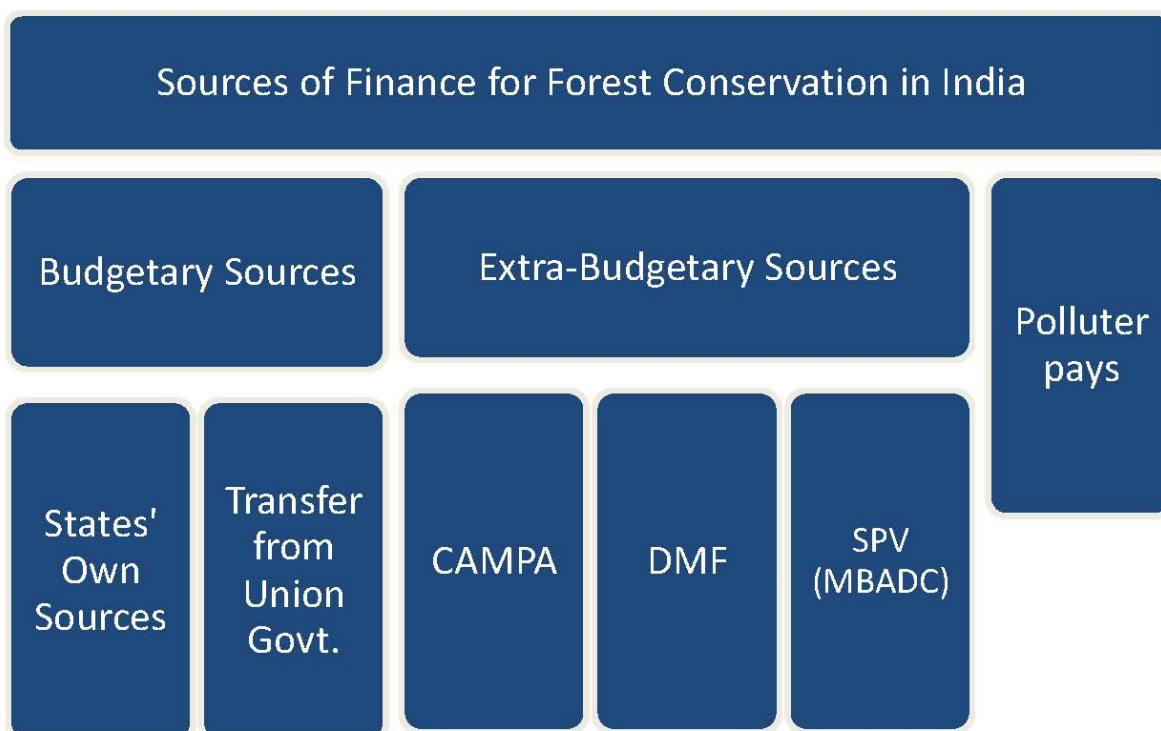
In its order of 12 December 1996, the Supreme Court restricted irregular felling of forests and mandated management of forests according to a scientifically prepared working plan approved by the Gol. Harvesting of forests was allowed only within the prescriptions of the working plan, with additional restrictions on felling in high-altitude regions. After this judiciary restriction, the revenue generation from forest departments has declined drastically. The department is seen as a net spending department. Moreover, due to strict regulations for the diversion of forests, states consider the forest land as a net liability on the state government. States argue that forest lands have substantial opportunity costs for various reasons. (1) States need to spend much money for forest conservation, (2) These lands cannot be used for any industrial activities or other developmental projects that would increase the tax and

non-tax revenue collections and, (3) States that protect forests are contributing to the national and global community with several ecological benefits. Therefore, they should be compensated for these services.

### **3.6 Financing the conservation and regeneration of forests in India**

Under the Greening India Mission, India aims to regenerate 6 million hectares of degraded forest land with Joint Forest Management Committees (JFMCs). (1) The funds for forest regeneration are generated from multiple sources. India has accumulated nearly US\$ 8 billion from the additional funds for compensatory afforestation under a decision of the Supreme Court in respect of forest lands diverted to non-forest use (Gol, 2018). (2) The Government of India has set up two dedicated funds at the national level: the National Clean Energy Fund financed by a carbon tax of INR 400 (US\$ 5.15) on each ton of coal, and the National Adaptation Fund with an initial allocation of INR 3,500 million (US\$ 55.6 million) to address the cost of adopting cleaner technology in sectors such as agriculture, fisheries, water, and forestry. (3) The Government of India has institutionalized the fiscal incentives for the sub-national governments for their efforts towards forest conservation.

Fig. 1 provides the summary picture of the sources of finance for forest conservation in India. There are budgetary sources and extra-budgetary sources of funds provisioned by the national and state governments. The national and sub-national governments allocate a part of the consolidated funds for the forest departments in the budget. The state governments are collecting ten percent of the profits of the mining companies for the development of the mining locality (District Mineral Foundation (DMF)). A part of this fund is utilized to conserve and restore forest lands. In case of the diversion of the forest lands for development projects, the concerned agencies are required to deposit a specific amount of money into the CAMPA funds. These funds are utilized for compensatory afforestation. Keeping given the illegal mining in forest areas, the supreme court of India directed the states to collect a specific amount of penalties from the companies and use it for the development of the mining region through the establishment of a Special Purpose Vehicle (SPV) or Mineral Area Development Corporation (MBADC). These specific purpose funds do not go to the consolidated funds of the state or country. That is why they are called extra-budgetary resources. In case of the approval of the projects where forest land diversion is involved, the legal provisions in India require that the concerned agency undertakes compensatory afforestation measures. After completing the project, the agency has to reclaim the land to its original condition. States allocate their funds for the forest departments and receive financial assistance from the Union Government for forest conservation and development.



**Fig. 1. Sources of Finance for Forest Conservation in India**

### **3.7 Fiscal transfer for forest conservation and restoration**

The fiscal architecture of India has provided more revenue-raising capacity and relatively minor expenditure obligations to the Union Government. The state governments have more expenditure obligations but less revenue-raising capacity. Keeping given this vertical fiscal imbalance, the architecture of the Constitution of India has made provision for the appointment of a Finance Commission at the national level by the President of India to recommend a formula for vertical devolution (transfer money from Union to States) and horizontal devolution (distribute this among states). On the sidelines of the launch of the NAPCC in 2008, the President of India asked the Thirteenth Finance Commission to consider factors like “the need to manage ecology, environment and climate change consistent with sustainable development while recommending a formula for the vertical and horizontal fiscal transfer. Following this reference from the President of India, the Finance Commissions starting from the 12<sup>th</sup> Finance Commission have awarded grants to the states. Table 1 provides a summary picture of the recommendations of the various Finance Commissions for fiscal transfer for conservation of forests and ecology.

**Table 1. Recommendations of the Finance Commissions on the Fiscal Transfer to States for Ecology and Conservation and Restoration of the Environment**

12 <sup>th</sup> Finance Commission	<p>Recommended Rs. 1000 crore (US\$ 1.32 billion) grant spread over the award period 2005-10 for maintenance of forests.</p> <p>This would be added over and above what the states have been spending through their forest departments.</p> <p>This amount was distributed among the states based on their forest area.</p> <p>The money should be spent on the preservation of forest wealth.</p>
13 <sup>th</sup> Finance Commission	<p>Recommended Rs. 5000 crore (US\$ 6.58 billion) grants for the conservation of forests.</p> <p>Grants for the first two years are untied.</p> <p>From the third year onwards, states were required to submit the working plans for all forest divisions in the state.</p> <p>The release of the grant within a state's entitlement is linked to the number of approved working plans.</p> <p>Of the total released, 75 percent can be used by states for development purposes. The remaining 25 percent of the grants in these three years is for the preservation of forest wealth and is meant to be an addition to the states' budget for the development of forestry and wildlife.</p>
14 <sup>th</sup> Finance Commission	<p>Assigned 7.5 percent weight to the forest cover in the horizontal distribution of funds.</p>
15 <sup>th</sup> Finance Commission	<p>Assigned 10 percent weight for the forest and ecology criterion for the horizontal distribution of funds.</p> <p>The increase in weight is also a recognition of the forest, a global public good, as a resource that ought to be preserved and expanded through afforestation of degraded and open forests for the national benefit and to meet our international commitments.</p>
<p>Source: Reports from 12<sup>th</sup> to 15<sup>th</sup> Finance Commission of India</p>	

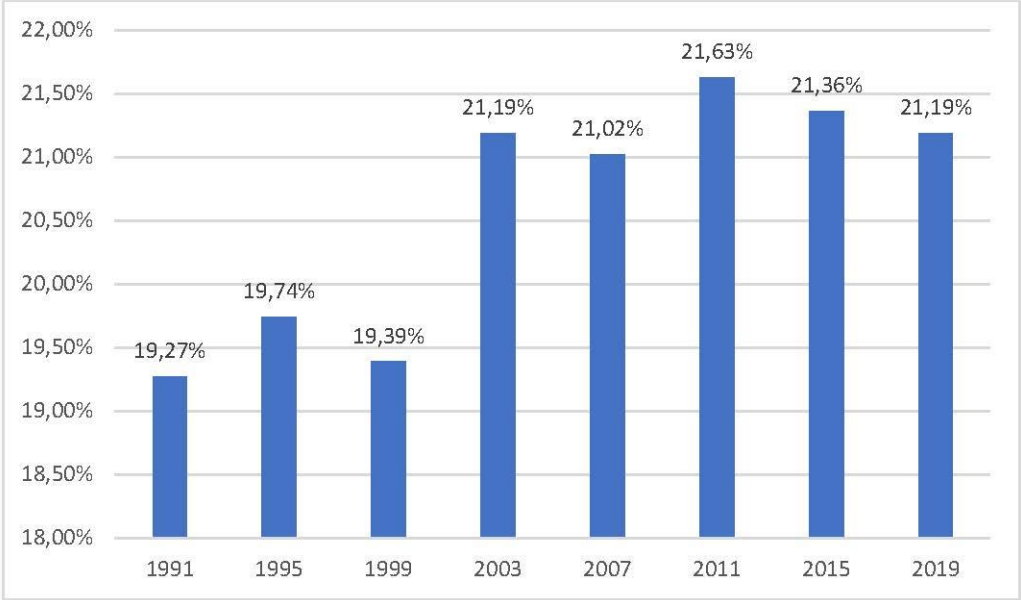
### 3.8 Role of communities in the restoration of forests

As per the Forest Policy of the Government of India, 1988, the participation of local communities living in and around the forest areas is an imperative need for the conservation and development of forests. In order to implement this policy, the Government of India issued a clear guideline in June 1990 to develop and manage degraded forest land under the custody of state forest departments with the help of the local community and voluntary organizations. In pursuance of this guideline, states came out with their resolutions, which facilitated the expansion of JFM in the state. Most of the State Forest Departments notified their resolutions in the early 1990s. Thousands of JFMCs were constituted all over the country to develop and manage millions of hectares of degraded forest lands. It could get further impetus in the states implementing donor-assisted forestry projects. Similarly, through its NAEB, the Government of India also gave a 100% central grant for Forest Development Agency (FDA), which is a federated body of JFMCs and State Forest Development Agency (SFDA), which is the consolidated body of FDAs in the state. For the management of the Wildlife Protected Areas, Eco-Development Committees (EDCs) are also formed to ensure participation of people in wildlife conservation (Gol, unspecified). As of 2011, 118,213 JFMCs were formed in the country that protected 229,388.14 square kilometers of forests.

FAO (2020) reports that the area of public forests supervised by public administrations decreased in India. The area managed by local, tribal, and indigenous communities increased mainly due to the implementation of JFM in India.

### 3.9 Improvement in forest cover

The multi-pronged approach of the national and subnational governments has driven the growth of forest coverage. Fig. 2 shows the change in the forest cover in India between 1991 and 2019. The forest cover as a percentage of the total land in India has gone up from 19.27 percent in 1991 to 21.19 percent in 2019. However, if we consider both the forest and tree cover it has increased from 23.4% in 2005 to 24.5% of the geographical area in 2019. India’s carbon stock has increased from 6,662.6 million tons in 2005 to 7,124.6 million tons in 2019.



**Fig. 2. Percentage of Land under Forest Cover in India from 1991 to 2019 (Source: Own Compilation based on the data from Forest Survey of India)**

### 3.10 Conclusion

India has been trying its best to reduce the carbon foot prints and restore the degraded ecosystems. The Government of India has set up two dedicated funds at the national level: the National Clean Energy Fund financed by a carbon tax on coal, and the National Adaptation Fund to bear the cost of adopting cleaner technology and restore degraded ecosystems. The Finance Commission of India has been asked to incentivize the states for managing ecology, environment and climate change consistent with sustainable development. In this regard the Eleventh Finance Commission (2000-05) was the first to recommend fiscal transfer to states for preparing work plans that utilized scientific principles for the management of forests. The twelfth Finance Commission (2005-10) provided grants proportional to the share of the national forest cover accounted for by a particular state. The states were asked to develop working plans for each of the forest zones. The idea of including forest cover as a criterion for horizontal devolution was first employed by the fourteenth Finance Commission (2015-20). The fourteenth Finance Commission assigned a weight of 7.5% to forest cover in the horizontal devolution formula. The fifteenth Finance Commission increased the weightage of the forest criterion to 10% to reflect the urgency of our current situation in the light of the ever-increasing global warming and climate change.

The fiscal transfer from the Union Government to state governments seem to have made positive impacts on the forest and tree cover of states. The forest and tree cover in India has increased from 23.4% in 2005 to 24.5% of the geographical area in 2019. India’s carbon stock has increased from 6,662.6 million tons in 2005 to 7,124.6 million tons in 2019.

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## 4 How ecosystem services accounts can support ecosystem restoration projects

Alessandra La Notte<sup>1</sup>

### 4.1 Introduction

The importance of biodiversity is well set in the new European strategies, and a number of measures (e.g. improve knowledge, finance and investment, sustainable public and corporate decision making) have been suggested to prompt sustainable. As intangible asset, biodiversity is essential for ecosystem functioning and provides direct and indirect benefits, supporting the production of many essential goods (e.g. timber, fruits) and services (e.g. recreation) but also offers spiritual or intrinsic benefits. Specifically, ecosystem services (ES) are flows that connect ecosystems to the economy and society. They depend directly on the ecological status and condition of ecosystems: the more degraded the ecosystem, the lower the number and extend of services provided. **It is important to understand where and how to act to properly maintain and restore the capacity of ecosystems to provide services.**

There can be many approaches to map and assess the state of ecosystem health and eventually its need for restoration. Among them, natural capital accounts combine an ecological side that is strictly related to ecosystems *per se*, with a socio-economic dimension that is already embedded into policy making conventional practices. In March 2021 the System of Integrated Environmental and Economic Accounting – Ecosystem Accounting (SEEA EA) was adopted as a standard by the United Nations Statistical Commission (United Nations, 2021). In Europe the approach developed through the Knowledge Innovation Project on an Integrated System for Natural Capital Accounting (KIP INCA), was set by the European Commission (including Eurostat, Joint Research Centre (JRC), and the European Commission Directorates (DG) on Environment, and on Research and Innovation) and the European Environment Agency (EEA) to design and implement an integrated accounting system for ecosystems and their services which is compliant with the SEEA EA (Vysna et al., 2021).

In this paper, the INCA approach is briefly presented and some of its outcomes, that can be relevant for the purpose of restoration, will be shown. More details on and future developments of INCA are available on the dedicated website (<https://ecosystem-accounts.jrc.ec.europa.eu/>).

### 4.2 INCA conceptual scheme

Ecosystem accounts are composed of several modules. Among them, we focus on ecosystem services accounts, and specifically on Supply and Use Tables (SUT). As already stated, the INCA approach is compliant with the SEEA EA in the way the ES actual flow is reported within SUT. However, INCA proposes a conceptual framework behind the assessment of ES actual flow that considers (i) the identification of ES potential and demand and (ii) the types and typologies of ES.

According to INCA, to assess and value the use (i.e. actual flow) of ecosystem services (ES) we need to:

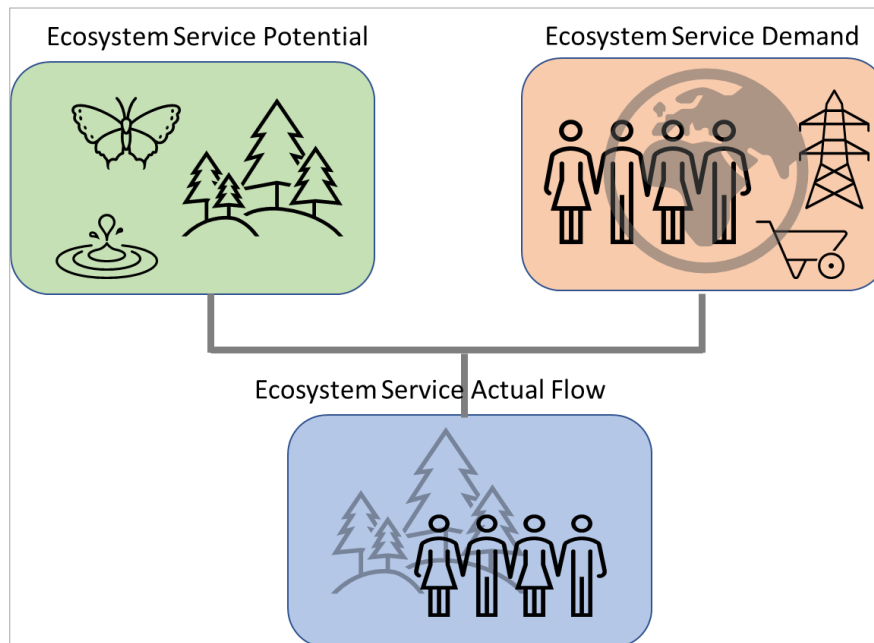
- quantify in physical and monetary terms the “ES potential”, i.e. what ecosystems are able to provide (independently of their use);

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- quantify in physical and monetary terms the “ES demand”, i.e. who is going to use the ES (i.e. economic sectors and/or households).

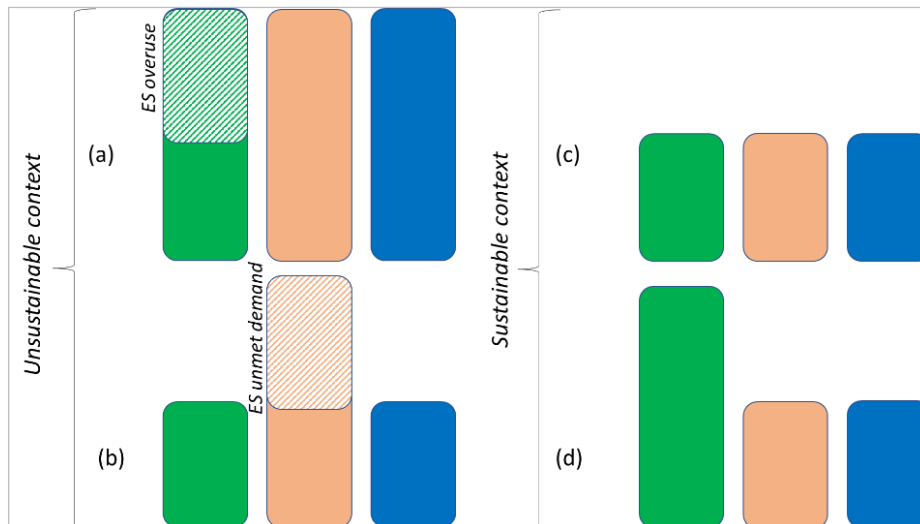
Fig. 1 shows that the interaction between ES potential and ES demand generates ES actual flow. The specific identification, assessing and mapping of ES potential and demand allows not only to see and count where they generate ES actual flow, but also where they mismatch generating unsustainability contexts.



**Fig. 1. Visual simplification of the conceptual framework behind ES assessment**

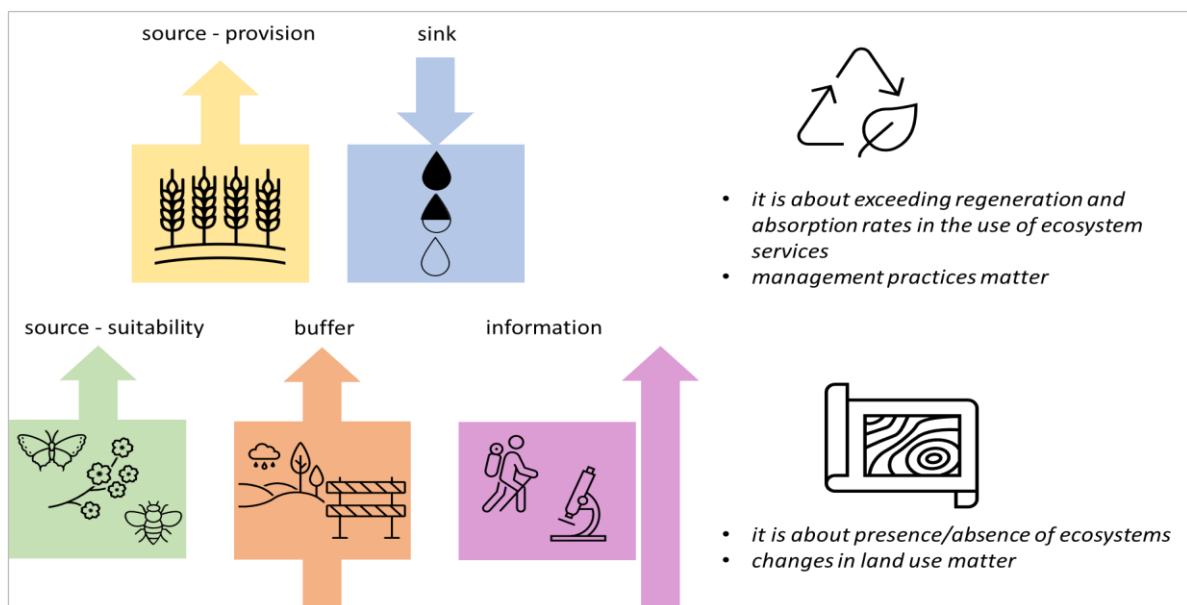
ES actual flow occurs when ES potential meets ES demand. In fact, when we face the case where ES potential is greater than ES demand. Fig. 2 shows in green ES potential, in orange ES demand and in blue ES actual flow: for cases (c) and (d) the ability of ecosystem to provide the same amount of ES flow remains unchanged. However, the mismatch where ES potential is smaller than ES demand (i.e. we have an excess of demand) may occur in two different contexts:

- for those ES where there is a regeneration rate for biomass extraction, and an absorption rate for pollutant removals, a higher demand generates an overuse of the ecosystem service (ref. Fig. 2 (a)), that eventually leads to degradation. In this case the major driver of change lies in management practices and the overuse eventually leads to ecosystem degradation;
- for all the other ES, a higher ES demand cannot be satisfied when ecosystems providing the services needed are not there. The need from the demand will remain unsatisfied (ref. Fig. 2 (b)). In this case, the major driver of change lies in land cover/use conversion: to restore ecosystems able to provide the services needed will meet the demand gap.



**Fig. 2. Match and mismatch between ES potential and ES demand**

The ecosystem services characterized by regeneration rates (e.g. timber provision) belong to the accounting cluster “source – provision”; the services characterized by absorption rates (e.g. water purification) belong to the accounting cluster “sink”; according to role ecosystems play in delivering the services three other clusters can be identified (La Notte et al., 2019) and for all of them what matters is current land cover/use. Fig. 3 provides a visual summary of the five accounting clusters. An example for “source – suitability” is pollination: the absence of habitat suitable for the nesting of wild pollinators. Flood control is an example for the “buffer” cluster, because the role of ecosystems is to reduce magnitude of matter and energy. Finally, nature-based recreation is an example for the “information” cluster that corresponds to what MA, TEEB and CICES identifies as “cultural service”.



**Fig. 3. Types of ecosystem services**

The identification of different ecosystem types is particularly important when (i) identifying the driver of change and (ii) assessing ecosystem capacity.

The driver of change could in fact depend on management practices (e.g. emitting a load of nitrogen into water bodies that exceed the sustainability threshold concerning the eutrophication issue), or the land use (e.g. converting cropland into urban, or forest into cropland). Policy guidelines and strategic directions are clearly very different when addressing one set of issues (sustainable practices) or the other (land use planning). About ecosystem capacity, the ability of ecosystems to keep on providing ES in the future must be assessed considering whether overuse is taking place rather than considering actual flows, because actual flows may be unsustainable and this is causing ecosystem degradation. Overuse takes place for source – provision and sink services only.

### **4.3 ES accounting: where to restore and why**

While the ES actual flow should be officially reported in the Supply and Use accounting tables, overuse and unmet demand, that only the INCA approach assesses among many ecosystem accounting applications, are part of complementary information. It is this complementary information that can provide ecological and economic justification for restoration projects. In fact, ES accounting not only assesses the ecological side (which ecosystems provide the services) but also the socio-economic side (which economic sectors need the services). Few examples follow that connect the need for restoration to specific uses and needs. The sources of all these examples are the JRC Technical Reports, where the methodological approach and the assessment techniques are explained in detail:

- “Ecosystem services accounting: Part I - Outdoor recreation and crop pollination” (Vallecillo et al., 2018);
- “Ecosystem services accounting: Part II - Pilot accounts for crop and timber provision, global climate regulation and flood control” (Vallecillo et al., 2019);
- Ecosystem Services Accounting: Part III - Pilot accounts for habitat and species maintenance, on-site soil retention and water purification (La Notte et al., 2021).

### **4.4 Where to restore habitats to have more resilient agri-food systems?**

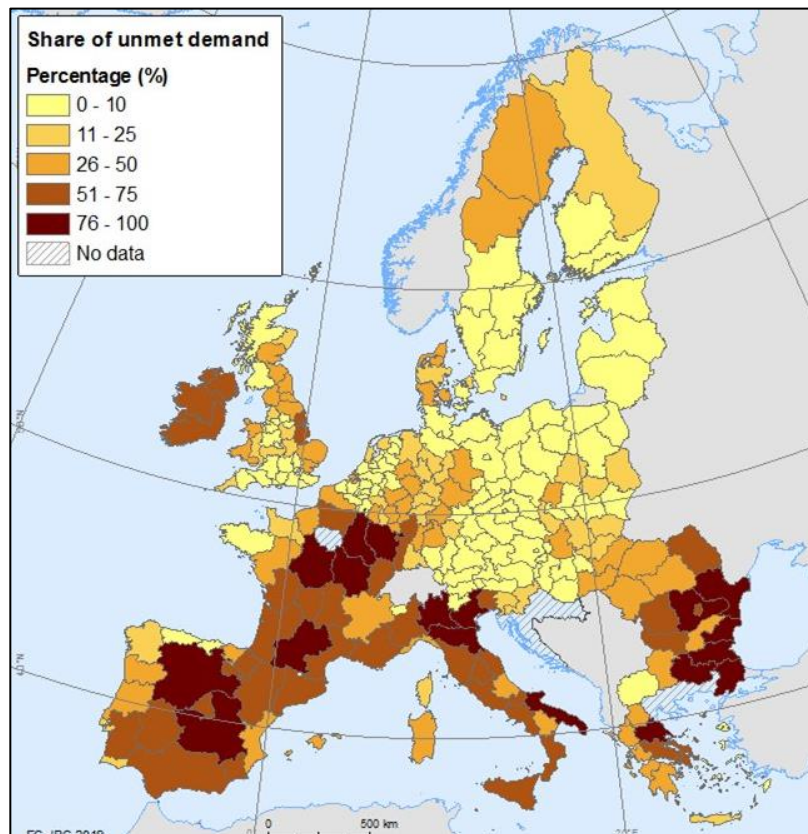
To address this question, we need to consider ecosystem services such as:

- crop provision, specifically where ecosystem contribution is almost null, because yields depend almost entirely on human inputs (Fig. 4);
- crop pollination, specifically the areas where there are pollination dependent crops, but no habitats suitable for pollinators (Fig. 5);
- soil retention, specifically the areas where soil is not adequately retained and erosion can occur (Fig. 6).

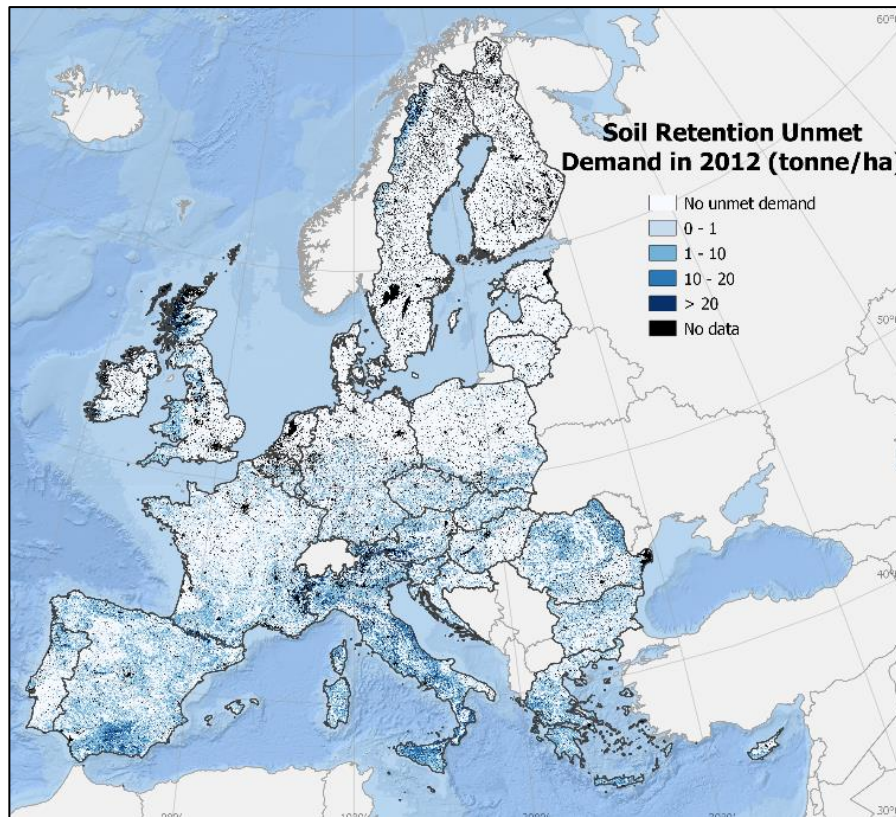
In the case of crop provision, there is an unsustainable use of ES; in the case of crop pollination and soil retention there are clear cases of ES unmet demand.



**Fig. 4. Crop provision ecosystem contribution, 2012 (Source: Vallecillo et al. (2019))**



**Fig. 5. Crop pollination mismatch between ES potential and ES demand, 2012 (Source: Vallecillo et al. (2018))**



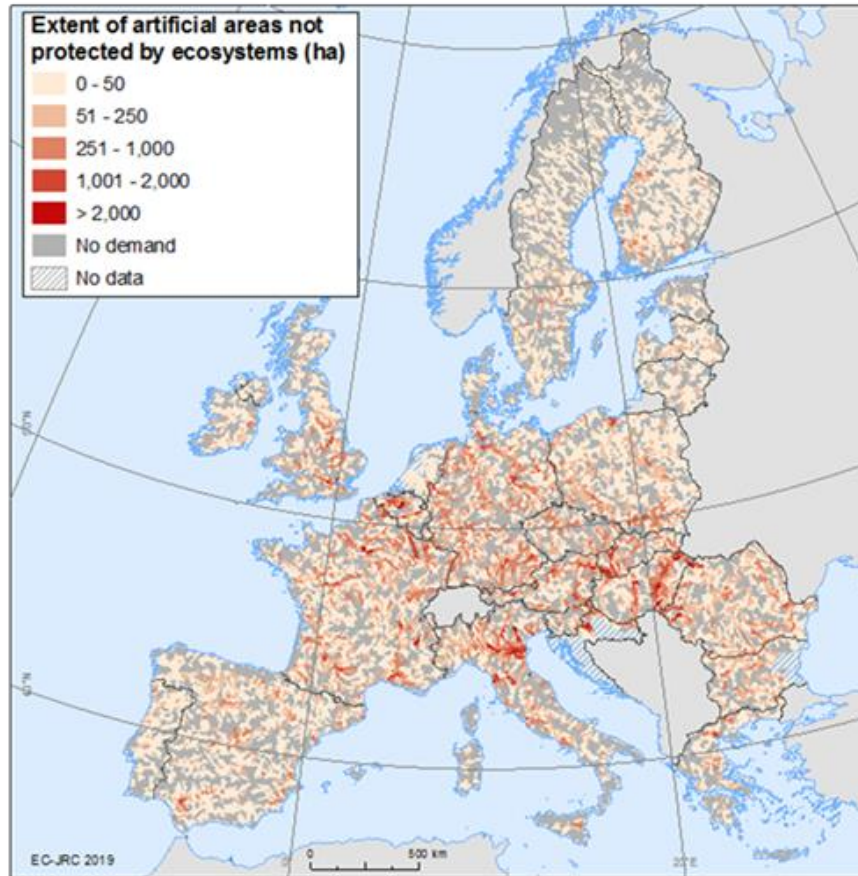
**Fig. 6. Soil retention mismatch between ES potential and ES demand, 2012 (Source: La Notte et al. (2021))**

#### **4.5 Where to restore habitats to address climate change adaptation?**

We are already facing some of the consequences of climate change. Among extreme events, flooding is becoming an emergency that we need to address each year more often than expected. The protection against the risk of flooding is a service that can be provided by human (grey) infrastructures, by ecosystems or by a combination of both. In some cases, although there is a need for protection by economic assets or human settlements, there is no ecosystem providing this service: this is the case where ES unmet demand takes place (Fig. 7).

Where there are grey infrastructures, a decrease of flood control by ecosystems would require investing more in defence measures and guarantee the same level of protection; on the other hand, in areas without artificial defence measure, the ES flow represents the only protection against flooding available.

Without ES providing areas, the amount of unmet demand would raise, and as a consequence, also the exposure to potential floods. The restoration and maintenance of ES providing areas would thus reduce the risk of flooding.



**Fig. 7. Flood control mismatch between ES potential and ES demand, 2012 (Source: Vallecillo et al. (2019))**

#### **4.6 Where to restore habitats to reduce ecosystem degradation?**

In freshwater ecosystems, eutrophication is predominantly caused by human actions due to their dependence on using nitrate and phosphate fertilizers. The assessment of nitrogen concentration above its sustainability threshold of 1 mgN/l (Fig. 8) enables to identify where ecosystems are getting too degraded and thus not able to remove nitrogen. Restoration of freshwater ecosystems should first stop (or at least mitigate in the short run) the degradation process, and then (in the long run) enhance ecological conditions.



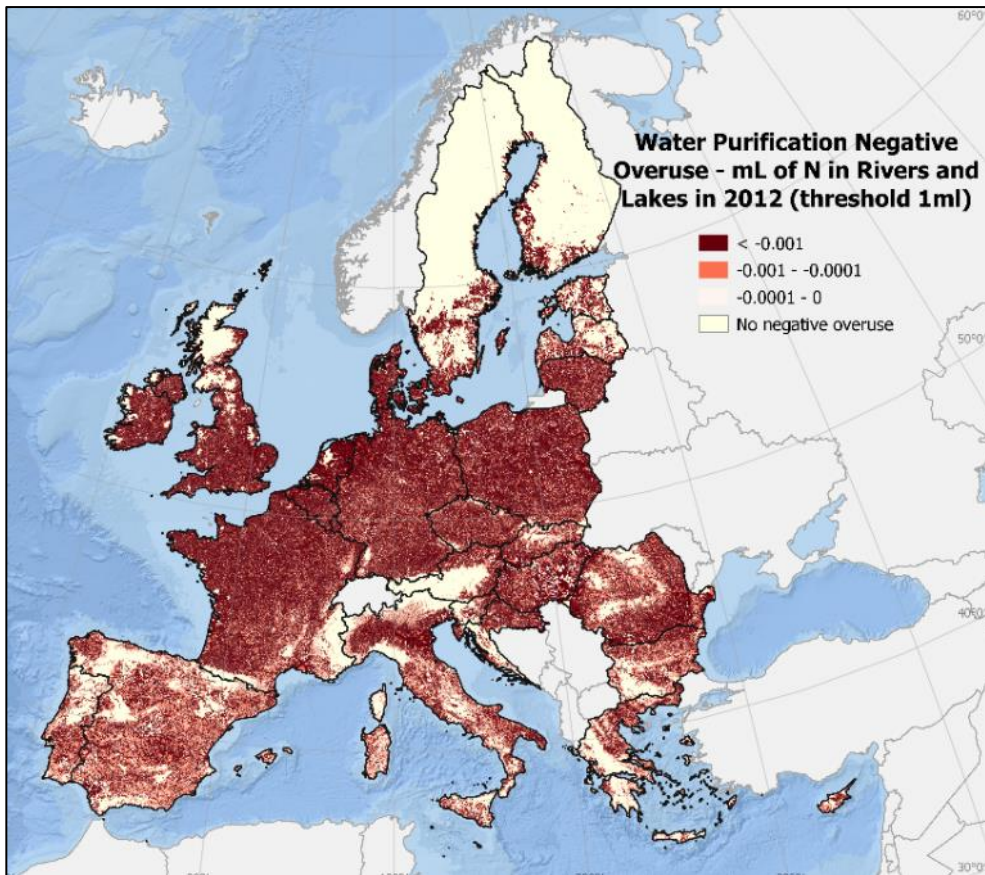


Fig. 8. Water purification overuse, 2012 (Source: La Notte et al. (2021))

#### 4.7 Where to restore habitats to improve the quality of life?

The presence of natural areas accessible for recreational purposes can positively affect the quality-of-life perception by residents. Where natural areas are too far to be quickly accessed, recreation is not a daily opportunity offered to residents (Fig. 9).

Restoration and maintenance of green and blue-areas, of green and blue infrastructures can offer recreation opportunities to people. Although indirect with respect to economic activities, physical and psychological wellbeing of people is a critical feature of an overall well-functioning society.

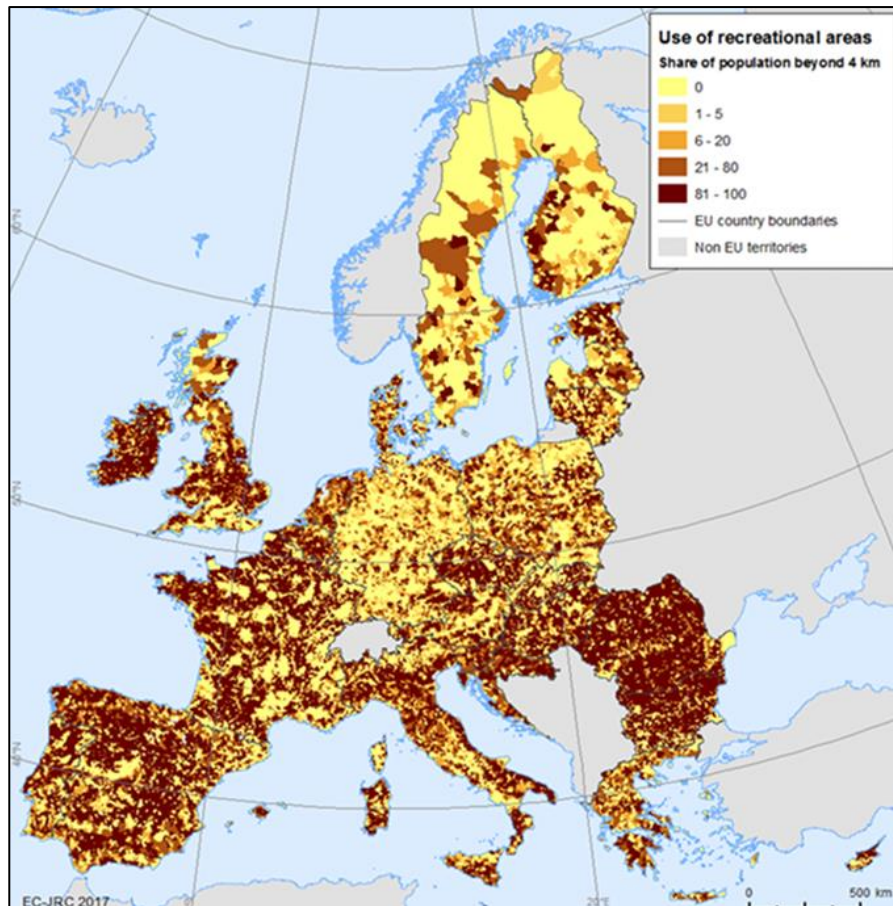
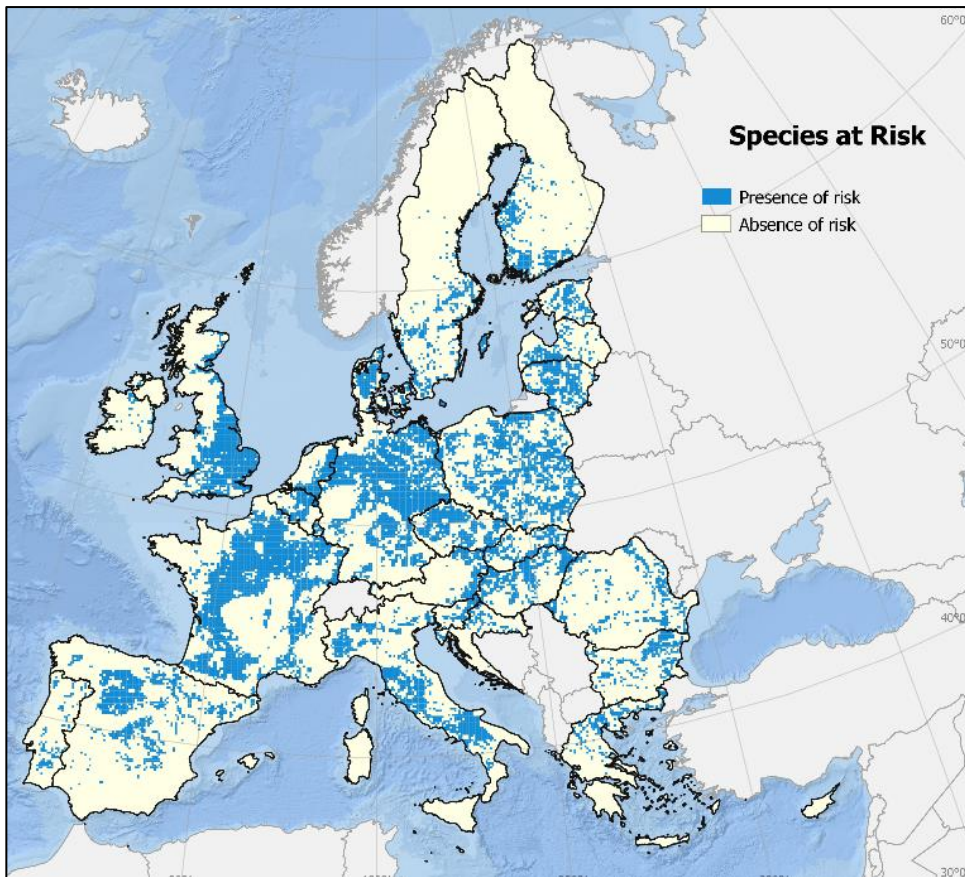


Fig. 9. Nature-based recreation mismatch between ES potential and ES demand, 2012 (Source: Vallecillo et al. (2018))

#### 4.8 Where to restore habitats to contribute to overarching environmental targets?

Examples of overarching environmental targets are climate change mitigation (whose reference ecosystem service can be carbon sequestration) and biodiversity loss (whose reference ecosystem service can be habitat and species maintenance). Under the current condition there is a flow of services that does not reach the global society because of bad management practices of the territory or because ecosystems are absent or degraded. Restoration actions are, for example, needed where species are at risk (Fig. 10).



**Fig. 10. Habitat and species maintenance mismatch between ES potential flow and ES demand, 2012 (Source: La Notte et al. (2021))**

#### **4.9 Concluding remarks**

According to the report "State of Nature in the EU", published in October 2020 by the EEA, Europe has failed to fully achieve the objectives set by the Biodiversity Strategy. The EEA report draws the conclusion that despite the positive efforts made, biodiversity continues to decline and faces deteriorating trends in most of European member states. Most habitats (81%) and protected species (over 60%) are at risk or in less-than-ideal condition due to overexploitation and unsustainable management practices.

As shown in the reported examples, agriculture and forestry land are recognized as pivot in protecting and restoring biodiversity as together they represent more than two thirds of the entire territorial area of the EU. The need to guarantee sustainable agricultural land uses and biodiversity protection, was reinforced by the European Parliament in December 2019 during the launch of the "Green Deal".

The Green Deal promotes an efficient and sustainable growth strategy that aims to combat climate change and protect the environment, with the final aim to improve people's well-being and make Europe climate neutral by 2050. One of the EU Green Deal pillars is focused on biodiversity and in May 2020, the European Commission adopted the new "Biodiversity Strategy for 2030" which represents a long-term, global, systematic plan to safeguard nature and reverse the trend towards ecosystems degradation. Among the main elements of the EU Biodiversity Strategy for 2030, there is the target to restore degraded terrestrial and marine ecosystems, by at least 30%, through a series of concrete commitments and actions as well as their sustainable management. The key factors for recovery include:

- an increase in organic farming (that concerns the crop provision service);
- the arrest and reversal of the decline of pollinators (that concerns the pollination service);
- the reduction of the use and harmfulness of pesticides by 50 percent (that concerns the water purification service);
- the restoration of 25,000 kilometres of rivers (that concerns the water purification service);
- the planting of at least three billion trees by 2030 (reference to the flood control service).

Thanks to ES accounting, and specifically to the INCA approach that not only assesses ES actual flow, but also their unmet demand and overuse, it is possible **to understand where and how to act to properly maintain and restore the capacity of ecosystems to provide services**. Since the concept of ES connects ecosystems with the needs of economy and society, it is also possible **to understand and justify why to restore**.

One of the next steps which might be undertaken is to translate the mis-match between ES potential and ES demand (that at the moment is only available in physical flows) also in monetary terms, through a variety of valuation techniques, ranging from adapted market prices (e.g. for crop provision and pollination) to replacement costs (for water purification and soil retention) to avoided damage costs (flood control) or the more complex preference-based techniques (such as choice experiments used for habitat and species maintenance). An estimate of the ES flows that are currently missed (because there are no ecosystems able to provide them) would justify the high costs of ecosystem restoration actions.

## Acknowledgements

The mapping and assessment of the ES here reported has been undertaken together with the JRC colleagues Sara Vallecillo, Chiara Polce, Grazia Zulian, Bruna Grizzetti, Carlo Rega, Maria Luisa Paracchini and Joachim Maes.

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## 5 Forest landscape restoration as direct economic contribution for smallholder farmers living around protected areas: A case study from Amaro special woreda, southern Ethiopia

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### Abstract

Recent studies show that an investment on achieving Bonn Challenge of restoring 350 million hectares land by 2030 would generate a net benefit between \$0.7 and \$9 trillion. Forests play an important role in the livelihood of many rural communities in Ethiopia. As forest landscape restoration is taking place in degraded as well as agricultural lands of smallholder farmers, the contribution of restoration goes beyond ecological benefits. This study analyses economic effects of restoration practices in the frame of GIZ, Biodiversity and Forestry Program operational site, Amaro special woreda in southern Ethiopia, communities living in the surrounding of Nechisar National Park. Data analyses are based on primary data collected by GIZ and internal report data produced for the sake of monitoring and evaluation of project output. The collected data is extrapolated considering the local situation and studies in the area of operation. In this area of study, grafted fruit seedlings of 2000 Apple-Mango, 500 seedlings of Guava and 1000 seedlings of Moringa-stenopetala have been distributed to beneficiaries. Amongst the beneficiary smallholder farmers, 60 female headed households planted six grafted Apple-Mango and five Guava seedlings each. Additionally, 50 households who own farm close to a river bank planted 32 mango seedlings on each farm plot. Considering 85% survival of planted seedlings, results show that at maturity level of these fruit-trees, a production of 410,000 kg fruits can be produced per year which has a market value of about 77,400 Euro without calculating management costs and interest rate. GIZ Biodiversity and forestry Program follows a result-based payment plantation scheme where tree planters receive a subsidized payment after conducting a survival assessment one year after plantation. Forest landscape restoration initiatives should consider the local situation of possible options with direct economic benefit to the community and engage the direct beneficiaries in the planning process.

**Key Words:** Restoration, Economic Benefit, Plantation, Agroforestry, Fruit Trees, Nursery

### 5.1 Introduction

Livelihood of rural people is highly affected by land degradation which highly contributes to the reduction of good quality water supply and impact food and nutrition security (Hillbrand et al. 2017). Restoration of degraded landscapes is an important tool to enhance the livelihood of rural communities and support a sustainable rural development. The Bonn Challenge and regional initiatives have mobilized political support towards realization of restoring 150 million ha of forest landscapes by 2020 and 350 million ha by 2030 on a global scale (Stanturf et al. 2019). The area of land potentially available for landscape restoration has been

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estimated at 2.2 billion ha whereby 1.5 billion ha are best suited to integration of trees on the farming landscapes such as agroforestry (Hillbrand et al. 2017).

Restoration approaches implicated in the Bonn Challenge have given equal priority to human livelihoods and biodiversity with eco-centric ecological restoration. (Mansourian 2005; Stanturf et al. 2014). Thereby, restoration options implemented in a given area should not only focus on restoring degraded lands but also on supporting the livelihood of the community. Investments on achieving Bonn Challenge of restoring 350 million ha of land would generate a net benefit between \$0.7 and \$9 trillion (Verdone and Seidl 2017).

In response to the Bonn Challenge to restore degraded landscapes, Africa pledged 100 million ha under the African Forest Landscape Restoration Initiative (AFR100) (Dave et al. 2017). As part of this commitment, Ethiopia has pledged to restore 15 million ha of land by 2030. Forests play an important role in the livelihood of many rural communities in Ethiopia and the country has established various priority forest areas where a maximum level of forest protection is practiced. These protected areas and national parks remain endangered due to pressure from the surrounding local community, grazing, logging and agricultural expansion. In order to protect the natural forests and reducing land degradation, Forest Landscape Restoration (FLR) is considered as paramount approach. The restoration process should provide dual impact: Increase the functionality of the degraded land and improve community well-being. Especially in the parts of Ethiopia, where subsistence farming and human activities have been changing the landscape for centuries (Lemenih et al. 2014).

The Biodiversity and Forestry Program (BFP) of the German Corporation for International Cooperation (GIZ) in Ethiopia is implementing FLR by also taking into account the support of the local communities' livelihood. As an implementation strategy, GIZ-BFP is using a Result-Based Payment (RBP) strategy to involve the local community in plantation establishment to be integrated in their farm land or land allocated for the establishment of plantation forest; as individual farmer or a group forming community plantation. Those who are part of the RBP plantation scheme, receive an incentive agreed during pre-planting whereby they are required to plant and have a survival of at least 625 trees per ha whereas 25% of the trees are either indigenous species or long-term rotation. The farmers have absolute decision power to select the species to be planted, but they have to fulfil the required ratio of incorporating 25% of long-term rotation or indigenous species to qualify for incentive payment. Survival assessment of planted seedlings is conducted during 12 to 15 months after plantation by impartial consultants and their eligibility for the payment is decided based on the respective assessment report.

Households living in the surrounding of the Nechisar National Park are part of the project implementation site. Intervening FLR through agroforestry practice highly contributes to the livelihood of the community and supports food security while fulfilling the commitment to restore landscapes. Thereby, fruit trees as one FLR option provide economic and ecological benefits for the community living in the catchment and beyond. Contributions of restoration activity need to be studied not only in relation to ecological impacts but also studied from an economic and social perspective; whereby this study focuses on the economic perspective as a means to enhance smallholder livelihoods. Most studies focus on ecological contributions of restoration on degraded lands whereas the direct economic contribution is not well documented. This study gives an overview of how direct economic benefits can be communicated to the local community and involved stakeholders in the FLR initiative taking place especially on farming landscapes. The research addresses the following two objectives:

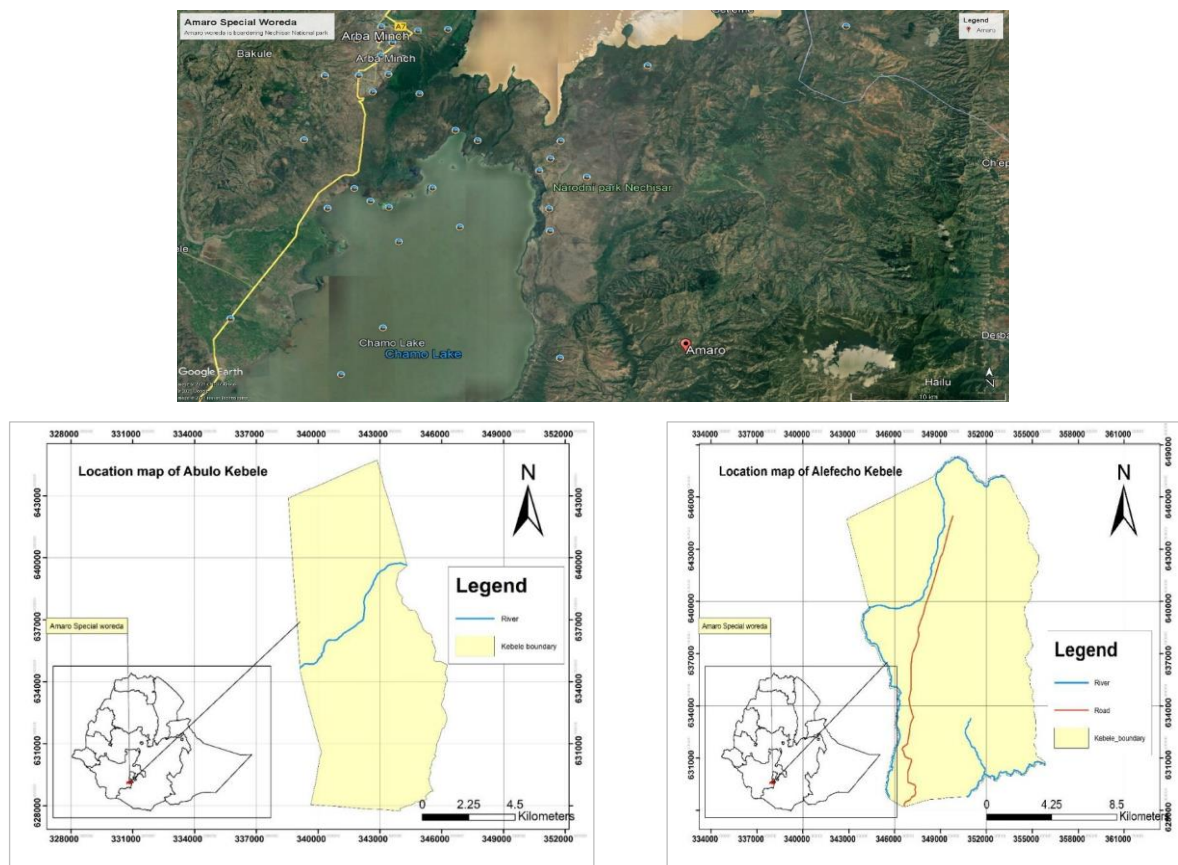
1. To evaluate economic benefits of selected afforestation and restoration options
2. To monetize the benefits of planting fruit trees as FLR options

## 5.2 Methodology

### 5.2.1 Study Area

FLR activities analysed in the frame of this study are implemented in two different areas of Ethiopia. The study sites are located in the southern part of Ethiopia, surrounding Nechisar National Park. The area of implementation is administratively located in the Southern Nations Nationalities and Peoples Region (SNNPR), Gamo Zone, Amaro special woreda (district) in the Kebele (village) called Abulo and Alfecho (Fig. 1). The agroecology of Abulo is predominantly Kolla (warm semi-arid) agroecology and only a small part of it falls in the Weyna Dega (sub-humid mid highland) agroecological zone. Metrological record from the nearest station shows average annual temperature of 21.8 °C and average annual rainfall of 818 mm. These agroecologies are very suitable for cereal crops such as teff, haricot beans, soybeans and sorghum. When moisture is not limiting it is also highly suitable for tropical fruits such as banana, mango and papaya production, which is so for Abulo Kebele in part of the Kebele adjacent to Lake Chamo.

Alfecho is located in a more or less similar agroecological zone as Abulo covering an area of 18,117 ha. The topography of Alfecho shows two distinct features: About half of the landmass in the west is flat and about half of the area in the east is hilly and rugged topography. Alfecho is endowed with a suitable environment for production of a range of food crops and fruits.



**Fig. 1. Location of the study area; Feature of the area on google earth (top), FLR implementation sites in Abulo (bottom left) and Alfecho (bottom right) village**



## **5.2.2 Data type and analysis**

From the GIZ-BFP beneficiaries in the area, 50 female headed households and 60 households owning land by the riverbank were selected to estimate the potential economic benefit of planting 2,000 Grafted Mango-Apple seedlings, 500 Guava seedlings and 1000 Moringa stenopetala seedlings. Fig. 2 shows the typical land use practice of the study area and the green strips indicate the line of perineal plants along the river bank where the 60 selected households planted fruit trees. A total of 110 households has been beneficiaries who agreed to be considered in BFP's RBP plantation scheme in the area.

This study considered all participating households to estimate potential income generation to the area through FLR initiatives. Planted seedlings have been considered to have 85% survival rate and production of fruits from single tree at the time of tree maturity has been estimated following the study conducted by Hussen and Yimer (2013). Following studies by Hussen and Yimer (2013) and Neguse (2019), this study conducts an analysis of potential benefits of the fruit trees in monetary terms based on average production per tree per year at maturity. Descriptive analysis for the production of fruits from each surviving tree at maturity level has been estimated using the current market price and results presented using a summary table and descriptive texts.

## **5.3 Results and discussion**

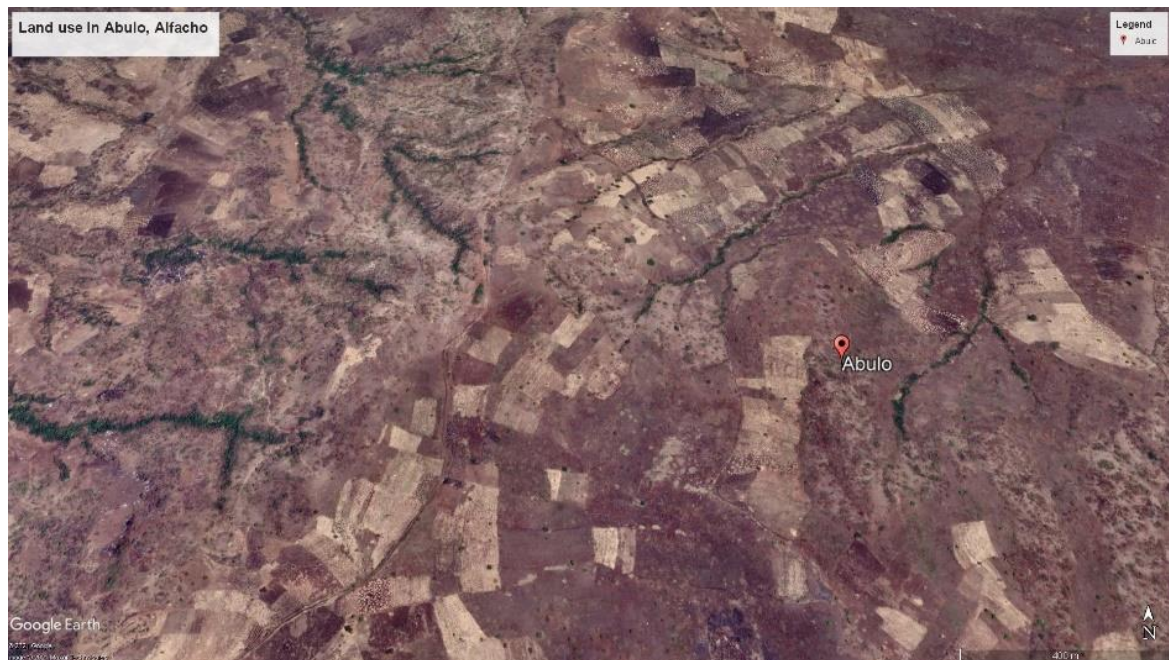
### **5.3.1 Contribution of FLR initiatives to livelihood of local community**

This study shows that degraded land of the area is not an ideal farming land for optimal crop production. The land cover area from google earth pinned in Fig. 2 shows a non-tree-based landscape of the area. Data from GIZ-BFP's RBP scheme shows afforestation and reforestation of 764 ha of land which has been planted with about 1 million seedlings planted in different operational sites of BFP in Ethiopia within a 3 years period. 56% of the planters were illegible for payment which is about 4,710.00 Euro for 54,976 Indigenous plus long-rotation seedlings, 122,106 exotic short rotation species. A total of 167,082 seedlings have been considered eligible for incentive payment. This number does not include the seedlings survived but not considered for the incentive payment as they fail to fulfil the ratio of indigenous or long rotation species as per agreement under the RBP scheme.

The restoration scheme followed provides direct economic benefits for the community practicing plantation on abandoned and grazing lands using agroforestry practice. The results from ground restoration assessment show that the use of the selected restoration option has a significant economic contribution for the smallholder farmers. On the other hand, it reduces pressure on the existing forests and enhance biodiversity. The other restoration option mostly followed by the government is campaign plantation whereby seedlings are distributed to the community to plant in a communal land without considering ownership. This type of plantation scheme reduces the survival rate of seedlings as no responsibility is granted to manage the seedlings. Within RBP plantation scheme, the FLR implementation has supported the local livelihood through subsidizing the trade-offs between farming and tree plantation at least for the first year.

GIZ-BFP's initiative to restore landscape through RBP method was found to be successful as the plantation scheme follows a clear ownership of land by private farmers or groups. Hence, the scheme is a successful restoration mechanism both as income generation and ecological restoration. Additionally, the incentive motivates the local community to engage in FLR which makes it more successful as compared to campaign plantations. The FLR approach implemented in the area can be even of higher interest when it comes to fruit trees

and species like *Moringa stenopetala* which provides direct economic benefit from a living tree. As the waiting period for this species is not too long for the farming community, the integration of fruit trees and moringa can be used to generate income and has a potential to support the wellbeing of the smallholder farmers.



**Fig. 2. Land use in the study area**

### **5.3.2 Estimation of direct economic benefit of FLR in monetary terms**

The number of trees distributed to the beneficiaries in the area from the restoration project of GIZ-BFP has been estimated to illustrate potential benefit of forest landscape restoration through fruit trees which provide direct economic benefit to the community. The benefit estimation calculated in table 1 is done based on the fruit trees and *Moringa* seedlings distributed to 110 households in Abulo and Alfecho Kebele (Fig. 1). As per estimation, by the next 3 to 5 years, about 77,400 Euro income can be generated by the community who participated in the plantation of fruit trees through RBP plantation scheme implemented by GIZ-BFP in the area. This income generation continues in a yearly bases as long as the trees are well managed. A study conducted in Ethiopia shows that average mango fruit production per tree ranges from 200 to 300 kg fruits per tree which is between 5.5 to 33 tons/ha depending on factors such as variety, tree age, tree size, seasonal conditions, management and previous cropping history (Griesbach 2003; Hussen and Yimer 2013; Rajesh 2014). To reach maturity and bear fruits, grafted mango needs 3 to 5 years (Crane 2006; Neguse 2019).

**Table 1. Fruit production and possible cash income from fruit tree plantation in Amaro special Woreda**

Fruit trees	Planted Trees (No)	Average fruits production per tree (kg)/year	Fruit production at maturity from (kg)/tree	Average price/kg at farm level in (Euro)	Average income sell (Euro)
Guava	500	20	10,000	0.54	5,400.00
Mango (Mango-Apple grafted)	2000	200	400,000	0.18	72,000.00
<b>Total</b>	<b>2,500</b>		<b>410,000</b>		<b>77,400.00</b>

1000 seedlings of *Moringa stenopetala* have been distributed to be planted by the beneficiaries. The leaf of the plant is dried and 200 g of the powder have a market value of 2.20 Euro. Additionally, the leaf is used as a substitute for cabbage in the local diet and animal feed. Fig. 3 shows, how the *Moringa stenopetala* tree is pruned in demand of the leaves.



**Fig. 3. Moringa-stenopetala tree (Photo: Shibire Bekele, 2020)**

## 5.4 Conclusion and recommendation

FLR has the potential to not only benefit the environment/landscape but can also contribute towards farmers' livelihoods/wellbeing as the goods and services provided in the whole landscape will be enhanced. To implement the FLR initiatives in the area, restoring the landscape with tree species of direct economic benefit to the smallholder farmers proves crucial to avoid the economical trade-off between cropping and tree-based landscape restoration. The FLR approach, especially on small scale intervention (e.g. home gardening, private agroforestry systems) must be linked to markets for increased income and the establishment of value chains. The existing market linkages must be kept and non-existing established. The community must benefit directly from the FLR activities to ensure sustainability. Communication of FLR methods and benefits has to be revised in a way that the local communities better understand the approach with its multiple possible gains and develop a clear understanding figures in monetary terms of how much the tree they are incorporating in their farm land worth to contribute to their wellbeing. Furthermore, smallholder farmers' contribution towards fulfilling the country's commitment to restore 22 million ha of land by 2030 must be highly recognized as most FLR initiatives are taking place on the farming landscapes.

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## 6 Enabling rewilding: society and nature

Elsa Maria Cardona Santos<sup>1</sup>

### 6.1 Introduction

Social health and well-being depend on the services provided by nature. Human activities are leading to a massive degradation of ecosystems, an overexploitation of resources and to the loss of biodiversity. Hence, nature is losing its potential to provide those services. In 2020, the United Nations (UN) declared a Decade on Ecosystem Restoration, claiming that there has never been a more urgent need to revive damaged ecosystems than now.

In their book “Rewilding European Landscapes”, Pereira and Navarro (2015) present “rewilding” as a new conservation strategy to restore lost biodiversity and degraded ecosystem functions. Instead of setting fixed goals for how landscape and biodiversity should look, rewilding is described as nature-led restoration, whereby natural ecological processes and dynamics are enabled to occur independently of human designs or interventions. To differentiate their approach from other rewilding approaches, the authors refer to it as “ecological rewilding”. This approach recognizes humans as a component of landscapes, embedded in complex socio-ecological systems. Its strategies are based on historical information and ecological knowledge; and they can imply active management at the beginning to create enabling conditions for nature to take the lead. Reducing human control of ecological processes and allowing wildlife to thrive will restore ecosystems and non-extractive ecosystem services.

The concept of rewilding suggests something to be made wild again. The “wild” can be understood as nature completely set apart from humans or it can refer to more inclusive strategies that allow for new human-nature interactions. Thus, there is no consensus about the definition of rewilding, which can refer to different goals and types of interventions, from abandoning agricultural fields to introducing missing species (Jørgensen, 2015). While rewilding has been regarded by some as a discourse seeking to erase human history and involvement with land, flora and fauna, leaving no place for human beings (Jørgensen, 2015); it can also refer to inclusive approaches where community involvement plays a central role, acknowledging the interlinkages between humans and other forms of life (Prior and Ward, 2016).

This article presents the rewilding approach in the Oder Delta in Germany and Poland and considers the institutional, social and economic settings of this region to explore the potential for society to rewild large and diverse landscapes.

### 6.2 Rewilding the Oder-Delta

The Oder Delta is located on the Baltic coast, on the Polish-German border. It is composed of terrestrial, marine and freshwater ecosystems, including naturally flowing rivers, heathlands, freshwater, brackish and saltwater marshes, vast reed beds, alluvial and riparian forests, grasslands, bogs and fens, coastal dunes, sand beaches and the open sea. The area is also an important stopover site for migratory birds (waterfowl, wader) and is an important wildlife corridor for many large mammal species whose populations are expanding in Poland and moving into Germany (elk, lynx, wolf). The Oder Delta is also home to 75,000 inhabitants, with a growing tourism economy and significant agricultural and forestry sectors.

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“Rewilding Oder Delta<sup>2</sup>”, an independent association based in Germany and founded in 2019, has initiated numerous projects based on an approach aiming to link nature conservation with ecologically oriented economic interests. Rewilding Oder Delta is one of nine rewilding areas across Europe<sup>3</sup> and part of the “Rewilding Europe Network”, a platform that allows rewilding initiatives to exchange information and practical experiences. The rewilding approach at the Oder Delta promotes a “nature-based economy”, based on the distribution of regional products, nature-friendly tourism, as well as natural and ecological agriculture and forestry.

The Oder Delta rewilding area comprises 70,000 ha of the Stettin Lagoon and 380,000 ha of surrounding forests and open landscapes. Nature is evolving without human intervention in some parts of the Oder Delta, allowing wildlife to return and recover. Stricter protection from persecution, rewetting of wet pastures in Germany and the abandonment of peat-cutting in Poland have enabled the comeback of species, such as the white-tailed eagle, crane, otter, beaver, salmon, and sea trout. This area is the habitat of elk, wolf and rare species of fish, including sturgeon. Grey seal and lynx are slowly returning, and the European bison can be found in the plains of Western Pomerania. The delta is also an important step in the East Atlantic Flyway for migratory birds.

In this context, the vision of Rewilding Oder Delta is to give nature more space, to enable native wildlife to return and to allow natural processes to shape the landscape undisturbed. This rewilding approach acknowledges the key role of humans both as enablers for natural processes and as beneficiaries. Here, human intervention is considered necessary to restore and reconnect natural habitats which serve as natural corridors for wildlife. This can in turn create new sources of income for local communities, improving their quality of life and securing the conservation of wild areas in the long-term.

The rewilding approach for the Oder Delta is similar to the proposition by Pereira and Navarro (2015): even if active management is necessary at the beginning, it aims at allowing for natural processes without human intervention. However, apart from ecosystem restoration and the restoration of non-extractive services, it also envisions a sustainable extraction of resources (e.g. fish and non-timber products) and the development of a sustainable economy, based on these wild areas.

Measures are required to address both the restoration of ecosystems and the engagement of society. To transform areas with intensive forestry to more natural (wilder) forests, Rewilding Oder Delta proposes measures such as: adopting continuous cover forestry and low impact logging methods, establishing non-extractive zones in areas with high conservation value, increasing the diversity of tree species and the share of old trees, leaving dead woods and allowing for natural forest regeneration (e.g., windthrow, beavers, flooding). The re-immigration of ecosystem engineers such as elk and bison requires conflict-reducing and acceptance-increasing measures. Pastureland can be rewilded by encouraging natural grazing by herbivores like semi-wild konik horses or cattle, by increasing the diversity of the landscape structure and by establishing hunting free zones.

Climate change is leading to persistent droughts or heavy rainfall. In dry periods, there is a decrease in the level of groundwater. This affects surrounding forests and agricultural land. During heavy rains, the regulated and embanked river flows become excessively high,

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<sup>2</sup> The description of the rewilding approach of Rewilding Oder Delta e.V. used in this article is based on the information provided on the association’s website (<https://rewilding-oder-delta.com/>).

<sup>3</sup> <https://rewildingeurope.com/areas/>.

potentially causing catastrophic floods as in 1995. Restoring rivers and associated wetlands and peatlands in the Oder Delta can contribute to regulating the water supply in the region and to reducing nutrient loads, protecting endangered habitats and species. Rewetting peatlands by closing drainage ditches and peat channels allows for natural hydrological cycles to recover and reduces nutrient inputs from and into the Szczecin Lagoon (Stettiner Haff). Peatland rewetting goes hand in hand with the removal of dams and other obstacles to free, wilder rivers, many of which have been channeled outside of their historical courses.

The rewilding measures that have been implemented on the German side of the Oder Delta allow nature to recover undisturbed: about 10,000 ha along the Peene river have been restored; peatlands have been rewetted for hydrological revitalization as part of a large-scale nature conservation project of the Federal Agency for Nature Conservation (BfN); around 8,000 ha of forest areas and heathlands grow nearly undisturbed in the military training area Jägerbrück; the eastern Ueckermünde Heath, including lakes, is part of the 9,000 ha of former military training areas which were handed over by the federal government to the German Federal Environment Foundation (DBU); and the Anklamer Stadtbruch is rewilding since it was naturally flooded in 1995 (1,360 ha were bought by the NABU Natural Heritage Foundation in 2017 and are now managed as a wilderness area).

### **6.3 The willingness to rewild: social costs and benefits of rewilding**

Societal support is needed to successfully implement rewilding measures and to ensure the long-term conservation of rewilded areas. Rewilding Oder Delta addresses residents, land and natural resource users and policy makers to show the advantages rewilding can bring both for nature and people and to integrate this ecosystem restoration approach in regional and local development strategies.

Rewilded areas provide a wide range of benefits for society. Ecosystem services contribute to sustaining and fulfilling human life through the maintenance of biodiversity, ecosystem conditions and processes and the production of goods (Daily, 1997). Rewilded areas provide benefits beyond the goods that could be traded in what Rewilding Oder Delta refers to as a “nature-based economy”, such as wild berries, mushrooms and fish. Restored ecosystems would have a higher capacity to store excess water, naturally and cost-effectively filter it and to release it during dry spells. Society can benefit from other regulating services such as the reduction of nutrient load, pollution and soil erosion. The vegetation and soil of these ecosystems would contribute to the mitigation of climate change through a higher capacity to absorb CO<sub>2</sub> and to the protection of human settlements from the consequences of climate change, such as floods and droughts.

Society could also benefit from the provision of “cultural services”, which refers to experiencing rewilded areas for recreation, inspiration, physical exercise, aesthetic appreciation, a sense of natural heritage or even spirituality. These services contribute to human well-being and health. Their provision increases the attractiveness of the area and opens possibilities for the emergence of an economy based on sustainable tourism, diversifying and expanding the income possibilities of the locals.

Infrastructure is often required to make rewilded areas accessible. Rewilding Oder Delta promotes tours offered by so called “nature guides”: locals that offer their knowledge on the region through wildlife watching, hiking tours or tours on solar boats or canoes. This can attract further investments, for example in the hospitality and gastronomy industries.

Rewilding Oder Delta envisions the development of an economy based on sustainable tourism and even the development of a regional branding to promote locally produced goods.



However, such an economy does not necessarily emerge automatically after restoring ecosystems. The emergence of such a market requires a demand for these services and their supply requires investments. A marketing strategy for the region might be needed, as well as financial support for local investments.

Creating accessibility to the rewilded areas implies a trade-off between benefiting from cultural services and letting nature recover undisturbed. The successful return of wild animal species is put at risk by the increase in tourist infrastructure, including the expansion of motorized transport. It is also important to avoid negative effects of activities in adjacent areas. The construction of infrastructure such as roads and railways, or the building of industrial and commercial sites, could for example endanger habitats or species and generate new obstacles to animal movement. On the other hand, avoiding such projects can imply high opportunity costs for society such as forgone profit or forgone benefits of mobility.

The costs of rewilding go beyond the investment costs on ecosystem restoration. Rewilding often implies a decrease in provisioning services because of a decrease in resource extraction or a decrease in production, implying high opportunity costs through foregone profits. Because of a lack of internalization of external costs in the market, unsustainably produced crops can be more profitable. It is often more attractive for land users to allocate their land to conventional agriculture because they are not expected to pay for the high social costs this implies, such as the costs related to a decrease in natural pollination, or the damage caused through the pollution of water. Therefore, there is a fundamental alignment of rewilding with initiatives to promote environmental policies for the agricultural, forest and fishery sectors. This includes economic incentives through regulations, subsidies and new environmental markets.

Rewilding contributes to a higher provision of regulating services, such as the mitigation of climate change. The physical nature of these services makes it difficult to provide a socially optimal level through the market. Once provided, nobody can be excluded from the benefits of these “public goods” (Olson, 1965). Cultural services can also have a public good character if the access to rewilded areas cannot be easily controlled. Land users will have an incentive to provide these services if their private benefits overcome their private costs. Thus, if the social benefits overcome the private costs, a compensation for land users would be socially desirable to ensure their provision. For example, the sale of “carbon credits” is one way to organize payments for environmental services from rewilded land.

Rewilding can imply negative externalities, including the destruction of crops or accidents involving wildlife. This can cause social costs (Buchanan, 1962). In some cases, these losses can be prevented through the construction of infrastructure such as fences. This however can also imply high costs.

If the net social benefits of an ecosystem restoration approach such as rewilding are positive, it is socially desirable to implement them. Yet, additional policies might be necessary to account for the unequal distribution of costs and benefits (some segments of society benefit while others incur the costs). Nature can be seen as a form of capital and thus the restoration and conservation of ecosystems as an investment. This is also stressed by Dasgupta in his Review on the Economics of Biodiversity (Dasgupta, 2021). The underinvestment in natural assets is the result of market and institutional failures. Market prices (e.g. for provisioning services) do not reflect the true value of ecosystem services and governments often subsidize activities leading to nature degradation, such as unsustainable agricultural production.

## 6.4 Integrating rewilding in the local socio-economic context

Restoration activities and the conservation of rewilded areas can be influenced by different social, economic and political factors over time. Therefore, this rewilding approach requires the collaboration of several stakeholders, for example civil society, landowners, the local population, local and national governments, the administration, NGOs and the private sector. Restoration projects can suffer significant setbacks if there is a lack of local participation, which can affect the possibilities to scale up restoration efforts (Murcia et al., 2016).

The implementation of an ecosystem restoration approach with no or little extraction of resources like this form of rewilding is not likely to be the result of market dynamics. Markets will fail to provide a socially optimal level of ecosystem services if these have the characteristics of public goods, such as many regulating and cultural services. Such services could be provided as a side effect if ecosystem restoration would be profitable for land users for example through the provision of other types of ecosystem services. However, other less sustainable land uses might be more profitable.

Society faces both an intergenerational and an intragenerational inequality in the distribution of costs and benefits related to the restoration of ecosystems. The segments of society paying for the provision of ecosystem services are not necessarily those benefiting from them. While local land users might be those incurring the costs of rewilding, those benefiting from the services might be visitors from all over the world, locals providing touristic offers or even future generations. The extension of rewilded areas, the successful comeback of wildlife, as well as the provision of ecosystem services through rewilding, are constrained by the extent to which the costs can be balanced, shared, or compensated for. The fact that the segment of society benefiting from ecosystem services might not necessarily be aware of it, imposes an additional challenge.

The initial investment for rewilding such as the acquisition of land and the implementation of restoration measures might require an intervention of an entity like the state, which has the capacity to redistribute resources, divert them into sustainable activities and set the right incentives for land users. Land users willing to restore the ecosystems on their land could for example be compensated for their foregone profit through payments, ensuring the social benefits of the provision of ecosystem services (Wunder, 2005).

The local population can profit from the business opportunities arising through the provision of ecosystem services by rewilded areas. A “nature-based economy” such as the one envisioned by Rewilding Oder Delta can be enabled through market dynamics in the presence of what Rode et al. (2016) refer to as “ecosystem service opportunities”, but this is by no means a process that takes place automatically. Economic instruments can promote pro-conservation behavior based on an ecosystem services perspective (Rode et al., 2016).

A high demand for sustainable tourism, goods and services in that region can lead to an incentive to increase their supply. This can increase the expected profitability of private investments in infrastructure to provide these goods and services, such as hotels or restaurants, especially if the region is attractive for people from other parts of the world.

Developing and implementing a communication strategy for the area might be necessary for the development of such a nature-based economy. The communication of positive examples of how rewilding can offer locals new income possibilities is important to promote the development of nature-based businesses. Moreover, the region might need to be advertised to increase demand.

Awareness about the value of rewilded areas among the population is key for the success of rewilding. An information campaign might be necessary to raise awareness on the need of ecosystem restoration and to inform society about the value of rewilded areas. Inviting the locals to the sites could allow them to experience the value of their cultural services and even to identify these areas as part of their natural and cultural heritage. This could increase their likelihood to support both the implementation of rewilding measures and the long-term conservation of rewilded areas. Education in schools plays an important role in this respect; educating children can increase their intrinsic incentive to ensure rewilding through a cultural identification with the rewilded sites. An information campaign can increase the social support of the rewilding process. The support of society is also key for demanding public policies that ensure the provision of ecosystem services and for campaigning against unsustainable subsidies and infrastructure development in and around the area.

An institutional framework is necessary to support the development of a “nature-based economy” and to incentivize ecosystem restoration, the conservation of restored land and the sustainable use of land. Institutions are defined as constraints on behavior (North, 1984). They can take the form of governmental rules and regulations, enhancing the integration of ecosystem services in decision making (Scarlett and Boyd, 2015).

Institutions in the form of traditions, behavioral codes, moral or ethical norms can also influence the potential to implement the rewilding approach. For example, regional traditions to practice certain land uses can undermine entrepreneurship and innovation concerning rewilding (Jepson et al., 2018). The awareness of the value of rewilded areas for society can support the influence on such institutions and shape the relationship between society and wild nature, reframe the dynamics between rewilded areas and adjacent areas and thus support the integration of rewilded areas and their services into the local economy. The institutional context is key for enhancing and scaling-up rewilding (Jepson et al., 2018).

Financing is a challenge for rewilding (Jepson et al., 2018). There is a need for financial resources to undertake rewilding activities and land reallocation, but also to support private businesses. The latter might be a necessary condition for the development of a sustainable economy in the region that is based on the ecosystem services of rewilded areas. This can be in form of investments, accessible loans or governmental support such as subsidies or lower taxes for sustainable activities.

Involving the local population is important for the successful implementation of a restoration project (Walters et al., 2021). Through a participative process, locals can be involved in the decision making of institutional arrangements, strategies and activities to support ecosystem restoration and the adaptation to the restoration process. Understanding local institutions and stakeholders’ needs and expectations is also decisive.

The challenges of integrating ecosystem services in a socio-economic context include educational, scientific, legal and economic aspects (Salzman et al., 2001). A key challenge for the integration of ecosystem services is education, as the critical role of ecosystems for human wellbeing is largely ignored. In addition, there is a need for more scientific research to understand the complex linkages between the functions of ecosystems and their services, as well as the linkages between social, ecological and economic dimensions. Regulatory instruments to incentivize the restoration and protection of ecosystems are needed, as well as to channel both private and public financial resources to economic activities that enhance the protection and restoration of ecosystems and their services. Assessing and mainstreaming the value of rewilded areas for society is important for the success of such a restoration approach.

## 6.5 Concluding thoughts

Rewilding Oder Delta offers a vision to restore nature, based on the integration of wild nature and its ecosystem services in the local economy for the mutual benefit of nature and people. This ecosystem restoration approach promotes the recovery of natural ecosystems without human intervention and without fixed end goals. Rewilding Oder Delta offers an inclusive approach where society is encouraged to interact with nature, rather than being excluded from it.

The approach of Rewilding Oder Delta can help society meet its needs and respond to the biodiversity and climate crises. However, a successful integration of this approach in the socio-economic context will highly depend on the ability to make the value of the environmental services of rewilding visible for both private and public decision makers and on the potential and capacity to create an adequate institutional framework.

While the restoration of ecosystems and their services offers economic opportunities, nature-based economies are unlikely to generate revenues in the short term that are higher than alternative land use options. Institutions enhancing investments in sustainable activities and policies supporting ecosystem restoration and conservation, such as market-based instruments, can support the development of a nature-based economy.

Public awareness of the value of rewilded areas for society must be encouraged. Rewilding requires the support and engagement of the local population and could profit from inclusive and participatory processes with involved stakeholders. Public concerns must be addressed to ensure acceptance as a condition for peaceful co-existence between society and nature.

The socio-economic context of the region shapes the rewilding process, but the areas already rewilded can also shape the socio-economic context. Encouraging the population to experience the rewilded sites can strengthen cultural heritage and increase the likelihood of acceptance of rewilding activities and engagement in the rewilding process. Demonstrating that rewilding can generate new economic opportunities for the region is also key for the development of a nature-based economy.

Rewilding actions must target both nature and society. The rewilded sites in the Oder Delta already provide examples of how wild nature can be integrated in local economic activities. Rewilding Oder Delta is already taking action to scaffold the necessary infrastructure for the development of sustainable tourism in the region and to address society at large. Scaling-up these initiatives will require more support of civil society and a stronger engagement of the public sector.

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## 7 Implementing green infrastructures concept to protect peri-urban open spaces. Example from Gorenjska region, Slovenia.

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### 7.1 Introduction

Several forces, mostly related to social-ecological processes, such as increasing urbanization and investments beyond the city boundaries, are constantly driving changes in the landscapes around us. According to the European Environment Agency, between 2000 and 2006 land take was more than 1000 km<sup>2</sup>. Between 2012 and 2018, even though a reduction has been observed at European level (EU28), the land takes still amounted to 539 km<sup>2</sup>/year (EEA 2019).

Together with urban growth, which is the most relevant of these processes of change and is characterised mostly by additional housing, industry, roads, or recreational purposes, also the process of peri-urbanisation is receiving more attention (Mortoja et al. 2020; Shaw et al. 2020; Žlender 2021). Scholars primarily define this dynamic process as the transformation of natural, semi-natural, or agricultural areas into artificial areas. This has a significant impact on peri-urban open spaces (PUOS), which are terrestrial areas immediately adjacent to a city or urban areas where the land cover/use is unrelated to artificial surfaces and the soil is not sealed (forest areas, grasslands, wetlands) (Spyra et al. 2021). PUOS are located inside peri-urban landscapes (PULs) that are situated at peripheral locations of cities, often beyond their administrative boundaries. Build-up areas, such as new housing estates, leisure and industrial areas, communal infrastructure as well as valuable PUOS, such as green spaces, brown-fields, or agricultural fields, can also be found here. PUOS provide multiple important ecosystem services (ES), to both tourists and residents of the region, and they can play an important role in ensuring landscape sustainability (Spyra et al. 2020). Peri-urbanisation and the resulting land cover changes, land take, and land degradation, on the other hand, have an impact on biodiversity through habitat loss and fragmentation of peri-urban ecosystems. According to data from CORINE Land Cover (CLC) inventory, PUOS are decreasing in most of the European regions. Mostly (non-irrigated) arable land has been transformed into non-peri-urban open space (Spyra et al. 2021). Several studies address these issues and emphasize the importance of preserving PUOS to ensure the provision of ES, more sustainable development and improvement in the quality of life (Spyra et al. 2021; Verdú-Vázquez et al. 2021; Narain 2017).

According to the European Commission, the concept of green infrastructure (GI) enables the delivery of a wide range of ES in both rural and urban settings through the creation of a network of natural and semi-natural areas, as well as other environmental features (COM 2013). There is need for further research about the impact of GI on urban and peri-urban contexts as well as for further incorporation of the concept of GI into planning instruments and governance approaches (Verdú-Vázquez et al. 2021; Wooster et al. 2022; Ying et al.

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2021). This research looks at the protection of PUOS from the standpoint of various governance measures that policy makers may apply to regulate spatial development of PULs without endangering the natural heritage of PUOS. The aim of our research is twofold: a) to present selected policy instruments because of their potential role in the protection of natural heritage of PUOS and b) to introduce specific recommendations on how to use the GI concept for the development of sustainable tourism in the extend of PUL in the Gorenjska region in Slovenia. The policy instruments have been selected and discussed during one session of knowledge exchange in the frame of INTERREG Europe RENATUR project (<https://www.interregeurope.eu/renatur/>).

## **7.2 Methods**

Methods implemented in our research are based on the inter-regional learning process that has been implemented in the frame of INTERREG Europe RENATUR project. RENATUR brings together regional policy actors from different partner regions located in six European countries (Basque Country – Spain, Flanders – Belgium, Saxony-Anhalt – Germany, Hajdú-Bihar County – Hungary, Mazovia – Poland, Gorenjska – Slovenia) all of which are affected by a reduction in the PUOS but on a different scale and with different dynamics over time. The six partner regions of the RENATUR project intend to improve regional policies for a better protection of the natural heritage of PUOS. The project focuses on the enhancement of regional policies for the protection and conservation of natural heritage of PUOS. Thus, the main goal of the RENATUR project is to translate scientific information about sustainable governance of PULs into policy recommendations that policy makers can adopt and implement. The main objectives of the project are to: a) better protect peri-urban ecosystems and their services; b) better conserve biodiversity and reduce the biodiversity loss in the extend of peri-urban areas; c) reduce the soil sealing in peri-urban areas; d) work against further fragmentation of natural ecosystems in the extend of peri-urban areas and improve natural ecosystems connectivity; e) better introduce the GI concept in land-use planning of peri-urban landscapes. In the framework of the RENATUR project, the six partner regions cooperate with each other for exchanging experiences and knowledge also about policy actions that can promote the concept of GI potentially relevant for strengthening biological diversity in PULs. Each RENATUR partner region has selected a specific policy instrument to be improved based on the knowledge exchange implemented in the frame of the project. Therefore, the main project challenge is to integrate these improvements into the policy instruments. These actions must contribute to the protection of natural heritage of PUOS at regional level and, for this reason, they must be developed considering the characteristics of each partner region.

This article focuses on the outcomes of the interregional thematic workshop hosted online in November 2020 by RENATUR partner Business Support Centre Ltd. (BSC-Kranj), which is the regional development agency of Gorenjska region in Slovenia. Results of this workshop will be utilized by BSC-Kranj to develop an action plan, which is a document describing specific changes in regional policy instrument (Fig. 1). This document will offer guidelines for the local policy makers for the implementation of specific actions meant to improve the regional policies related to the protection of natural heritage. The changes should make the policy instrument more effective in protecting natural heritage of PUOS in Gorenjska. The submission of the action plan will be done by the end of phase 1, in July 2022.

### **7.2.1 The case study area**

In this article, we focus on the case study of PUL located between Bohinj and Škofja Loka cities. Both cities are located in the region of Gorenjska, which is an alpine region in the north-

west of Slovenia, bordering with Austria and Italy. In the Gorenjska region, the bigger towns and cities are located in the valleys, while on the mountains there are only small settlements and individual households. An important constituent of the peri-urbanisation process, that has intensified in recent years in Gorenjska, is an increasing percentage of people, who have been settling in the region's valleys, close to the highway axis, joining the border with Austria to the capital city of Ljubljana (across Jesenice and Kranj). There is a significant growth in the number of residents in cities and suburban areas, where most of the working places are located. At the same time, people are moving from cities to PULs and local communities, that are located along the highway axis. This process results with a merging of individual settlements into bigger ones. Therefore, especially big cities and their suburbs, that are interesting from the point of view of investors, are facing the challenge of losing their PUOS (e.g. Kranj, Skofja Loka and Jesenice). PUOS and local green areas are rather scarce resources due to historical development, when green areas were used for new buildings and parking plots. The remaining PUOS are mostly grasslands with few trees. They are owned by the local communities and sometimes maintained by the municipal service, but for a considerable amount of them a strategic management/development plan is missing.

### **7.2.2 Learning from good practices: implementation of the online interregional thematic workshop with a Peer-Review Session**

The interregional thematic workshop was hosted online by the Slovenian partner over a 4-days period from 16-19 November 2020. The overall aim of the workshop was to identify policy good practices (approaches) supporting the implementation of the GI concept to protect natural heritage of PUOS. Experts from all RENATUR regions took part in the workshop. The workshop contained two main and interlinked elements: charrette and peer-review sessions (Fig. 1). Charrette session was based on a discussion related to existing policy approaches in the RENATUR regions helpful to implement GI concept for protection of natural heritage of PUOS. In the frame of the peer review session experts from RENATUR partner regions analyzed the local situation in Gorenjska challenges linked to the workshop topic and proposed interventions to improve the workshop host's policy instrument. In this way the regional experts helped the workshop host to identify good practices, ideas or solutions to problems and issues related to the implementation of GI for protection of PUOS natural heritage. The whole workshop was a mutual learning process, as the external experts also sharpen their knowledge and capacities on the policy practices of the workshop host.



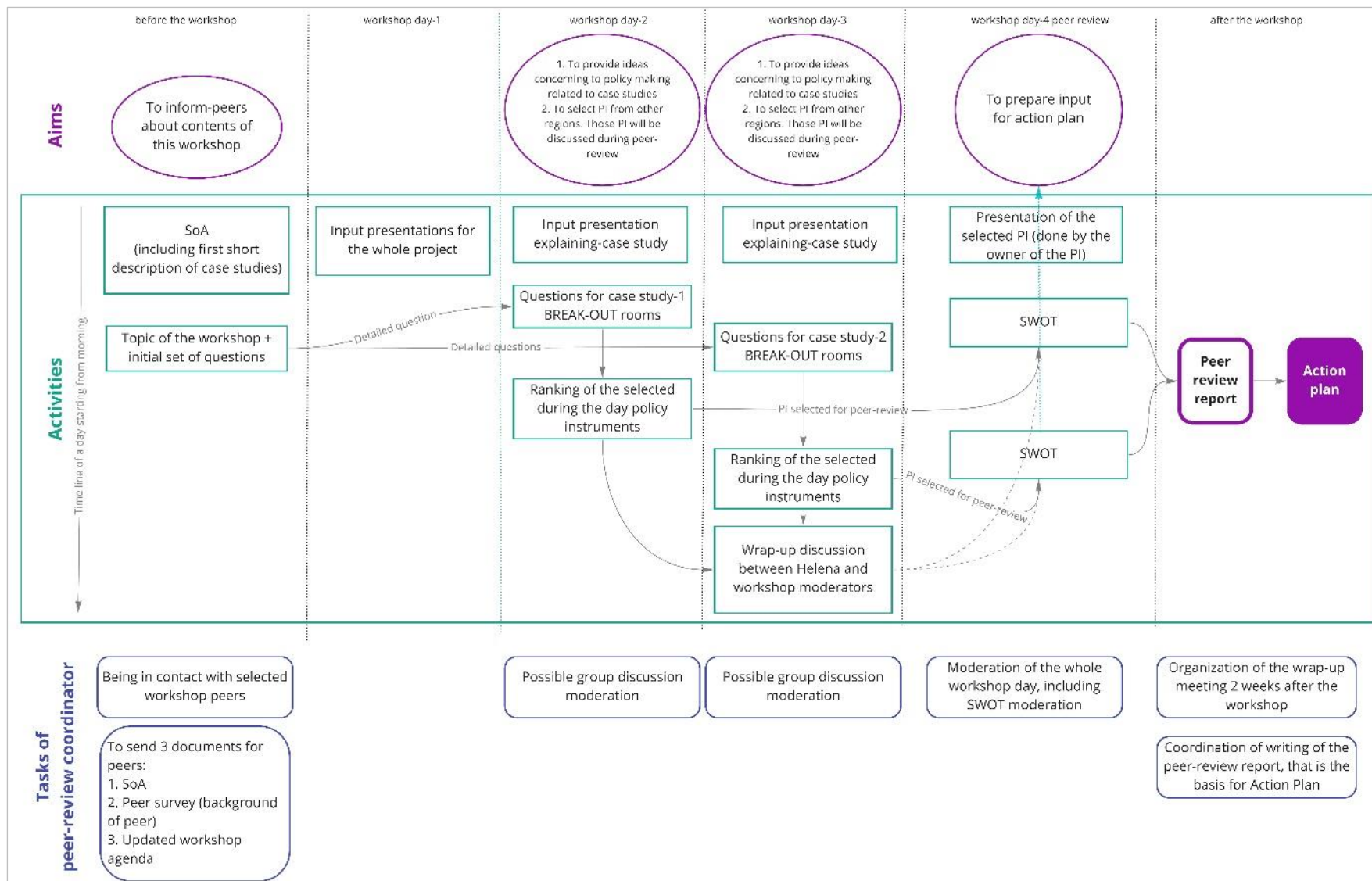


Fig. 1. Overview on RENATUR online workshop methodology

Charrette sessions took the first three days of the workshop. The first day was dedicated to brief introduction about the RENATUR project, the aim and methodology of the workshop, together with the state of the art related to Gorenjska region. On the second and third day, two different case study areas (Bohinj and Škofja Loka) were presented. Each presentation was followed by a group discussion. This offered a possibility to gather a first list of seven suitable policy approaches for fulfilling the workshop aims. Later, from the set of seven policy approaches a short list of three most pertinent was selected by all workshop peers. The short list was selected based on a participatory scoring exercise including two questions: (1) how helpful they are to protect natural heritage of PUOS and (2) how easy they are to implement (Fig. 2 and 3). The three selected policy approaches, were: 1) Strategic approach from the Kleinwalsertal; 2) Analysis of the GI and mobility in the city of Vitoria-Gasteiz; 3) Participatory budgets for the development of GI.

The peer review session took place on the fourth day of the workshop. During this session the three selected on Charrette session policy instruments were analysed in detail by all workshop experts according to the SWOT (Strengths Weaknesses Opportunities Threats) approach. Thanks to the peer-review session, it was possible to draw detailed recommendations on how to incorporate the GI concept into policy making in the Gorenjska region to protect natural heritage of local PUOS.



Fig. 2. Scoring of the proposed policy instruments on day 2

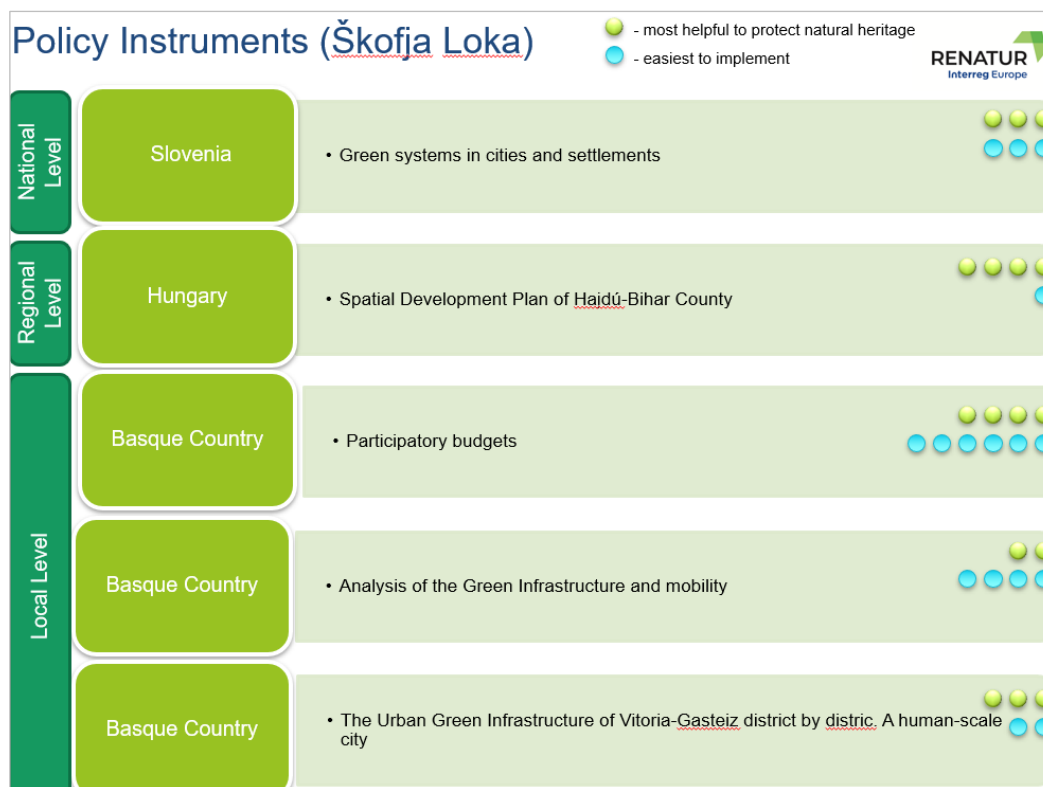


Fig. 3. Scoring of the proposed policy instruments on day 3

## 7.3 Results

### 7.3.1 Policy approach one: Strategic approach for the Kleinwalsertal

The policy approach “Strategic approach from the Kleinwalsertal” relates to the case study located in Austria and it deals with the joint management of pressures coming from leisure and touristic activities on the one hand and nature education on the other. Tourism is the main economic activity of this area, therefore it was selected for its similarities with Bohinj valley related to its socio-economic challenges, such as traffic management and for its approach aiming at combining management of several services in the region (e.g., tourism, traffic, building). To better manage the pressure from recreational activities and find a good balance with nature and habitat protection, the municipality of Mittelberg and the organization Kleinwalsertal Tourismus launched the project “Natur bewusst erleben” (Consciously experiencing nature), aiming at highlighting: a) the value of nature and natural resources and b) the need to make the sustainable use of leisure and living space a common priority in order to prevent possible conflicts in the management of sensitive landscape areas. The project was implemented with use of participatory planning approaches and incorporated opinions of local stakeholders and citizens.

### 7.3.2 Policy approach two: Analysis of Green Infrastructure and mobility in Vitoria-Gasteiz

A second policy approach selected by the panel of experts was the one used in the city of Vitoria-Gasteiz, capital of the Basque Country in northern Spain and first Spanish municipality to award the title of European Green Capital in 2012, due to the high proportion of green public areas. The purpose of this policy approach is to interweave GI and mobility by looking for integrated solutions and taking best decisions regarding new urban policies, buildings, environmental policies and mobility. Among other objectives, it seeks to improve and

revitalize public spaces including green areas. The policy approach is implemented with the help of several instruments where two of them are most important.

The first policy instrument is the Urban Green Infrastructure Strategy established in 2014 aiming to naturalize green spaces and other areas of opportunity, thus increasing biodiversity in the city and, consequently, ecosystem functions and services in the whole PUL. To develop this Strategy, a network system was first designed – the Vitoria-Gasteiz Urban Green Infrastructure System - to connect the main urban green spaces (nodes) with each other and with the Green Belt (core elements), through axes and tree-lined streets (connectors). The Green Belt has been a long-term project that started in 1980 and consolidated by the beginning of the 21st century. This is a network of urban parks with high ecological value, strategically linked by eco-recreational corridors. It is the result of an ambitious plan of restoration and reclamation on the outskirts of the city that seeks to recover the ecological and social value of this space through the creation of a nature tour around the city articulated by various enclaves of high ecological value and landscapes. Thanks to this network of peri-urban parks, it has been possible to reduce peri-urbanization related to the city of Vitoria-Gasteiz and to protect local PUOS.

The second policy instrument is the Sustainable Mobility and Public Space Plan (SUMPSP). It seeks to properly manage mobility needs and modes of transport in the city to reduce car-related impacts and increase public space for people. SUMPSP is providing an opportunity for the strengthening of Green Infrastructure and for the introduction of Nature-based Solutions (NBS) in the city. In this regard, many of the sustainable mobility actions being carried out, like free up space, previously occupied by the car, for the use and enjoyment of citizens, as well as introducing trees, creating new green areas, incorporating permeable pavements and other solutions that improve environmental quality and the city's living and walking spaces. Space previously used for cars has now been freed up for use as GI.

### **7.3.3 Policy approach three: Participatory budgets for the development of GI**

In the Basque Country, local municipalities reserve part of their annual budgets for participatory projects. This is a way of involving local citizens in real planning projects, that will be implemented and not just in a diagnostic phase of planning or policy making. The projects must be proposed by the citizens themselves. Every year there is a new call for proposals into a participatory budget.

This policy approach was selected mainly because it could be easily implemented at a local level in the Gorenjska region. Typically, local governments initiate the process and determine how much money is allocated and open a call for proposals afterwards. Citizens then make the proposals of possible ideas to be implemented in the frame of a participatory budget. The government collects and filters them, by checking their feasibility and legality. After this assessment is ready, the government assigns financial resources to the admitted ones. In the next round citizens are invited to vote - select one or more of the proposals. The winning projects are then announced and implemented.

The SWOT analysis undertaken at the interregional workshop allowed for the identification of more relevant strengths, weaknesses, opportunities, and threats for each of the three policy instruments chosen by experts (table 1).

**Table 1: Results of the SWOT analysis during the RENATUR workshop**

POLICY INSTRUMENTS	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
<p><b>STRATEGIC APPROACH FOR THE KLEINWALSERTAL</b></p>	<p>Similarity with Gorenjska region.</p> <p>Holistic approach that combines different views.</p> <p>Integration of opinions from external and internal experts.</p> <p>Participatory processes with inhabitants.</p> <p>Possibility to propose local level actions.</p> <p>Reduced need of resources Implementation at local scale.</p>	<p>Need of an effective monitoring system.</p> <p>Complex process to consensus.</p> <p>High potential for conflicting interests from different stakeholders involved in the participatory process.</p> <p>Lack of clear criteria for prioritization of opinion.</p> <p>Financial resources required.</p> <p>High influence from the political situation.</p> <p>Possible conflicts with policymaking on the national level.</p>	<p>Easy to be adopted.</p> <p>Acknowledging different opinions coming from diverse group of stakeholders.</p> <p>Active involvement of citizens in identifying policy solutions.</p> <p>Link between the sustainable development of the region and the overall concept of GI.</p> <p>Support to the idea of protecting nature and its biodiversity.</p> <p>Involvement of local communities in the policy making process.</p> <p>Support to the regions from the national government through the new Operational Programme.</p> <p>Creation of a platform of collaborating municipalities.</p>	<p>Need to adapt it to the Slovenian context.</p> <p>Need of considerable resources to facilitate and sustain the policy making process.</p> <p>Difficulties to motivate the participants to participate in rather complex process.</p> <p>Possible conflict with national policies (e.g. policies related to national parks).</p> <p>Lack of common understanding of the process and its background aims and concepts.</p> <p>Lack in Slovenia of a regional planning system concerning to the whole extend of PUOS and PULs.</p> <p>Difficulty to manage the intercommunal cooperation between the involved communes where PUOS is located.</p> <p>Different regulations among local communities.</p> <p>Difficulty to get a consensus among communities.</p>
<p><b>ANALYSIS OF GREEN INFRASTRUCTURE AND MOBILITY IN VITORIA-GASTEIZ</b></p>	<p>Complex understanding of the GI present in a region.</p> <p>Holistic approach towards different disciplines involved in the policy making process.</p>	<p>Complex policy approach not easy to be implemented.</p> <p>Need of initiative from the municipality.</p> <p>Need of an institution to play the role</p>	<p>Possibility to use the outcomes of this policy process to update the regulatory (binding) spatial plan related to the region.</p> <p>Potential to become a part of a policy instrument.</p>	<p>Duration of the policy process.</p> <p>Vulnerability related to different political process in the region.</p> <p>Financial resources needed to</p>

POLICY INSTRUMENTS	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
	<p>Direct involvement of the environmental agency of the city in the policy making process.</p> <p>Strict cooperation with the planning process related to the local GI.</p>	<p>of strong initiator of the policy process.</p> <p>Need of an interdisciplinary team.</p> <p>Need of a common understanding among experts with different backgrounds.</p> <p>Possible lack of understanding of the entire processes.</p> <p>Possible difficulties to translate the outcomes into binding legislation.</p>	<p>Limited need of resources and consequent replicability of the methodology in other regions with minor adjustments.</p> <p>Clarity of the document.</p> <p>Similar focus with Gorenjska Region about overcrowding of green areas.</p>	<p>implement and support the policy process.</p> <p>Dependency on the global political situation.</p>
<p><b>PARTICIPATORY BUDGETS FOR THE DEVELOPMENT OF GI</b></p>	<p>Possibility to involve citizens in the policy making process.</p> <p>Direct involvement of Inhabitants in the identification of policy solutions.</p> <p>Empowerment of local citizens.</p> <p>Rising awareness about financial resources needed to implement a specific policy idea.</p> <p>Active involvement of local groups of stakeholders in the policy process.</p> <p>Direct involvement in the implementation of actions in the space.</p>	<p>Limited financial resources available for the actions.</p> <p>Non-clarity about the decision-making process.</p> <p>Need of high transparency also in the process of prioritization of the proposals.</p> <p>Lack of effective communication in the process.</p> <p>Lack of coordination of the participatory budget with overall policy instruments.</p>	<p>Focus on local needs.</p> <p>Opportunity for relatively easy implementation (also in the context of action plan and its monitoring).</p> <p>Possibility to include diverse groups of stakeholders in the policy making process.</p> <p>Replicability in different cities and regions.</p>	<p>Lack of knowledge and resources for implementation.</p> <p>Lack of effective communication between parties involved in the process.</p> <p>Lack of awareness among people related to spatial planning and important concepts (like GI).</p> <p>Need of raising awareness to make inhabitants able to make suggestions.</p>

### 7.3.4 Final recommendations for the implementation of GI to better protect natural heritage of PUOS in Gorenjska region.

As a final follow-up in the peer review process, experts defined their joint four recommendations on how to incorporate GI into local policies in the Gorenjska region to protect natural heritage of PUOS.

The **first recommendation** points out the relevance of preparing a strategic planning document for GI as a tool to protect PUOS. During the workshops the need became clear to develop a good strategic planning approach. Such an approach can coordinate different activities and different stakeholders for implementing GI to protect the natural heritage of PUOS. This needs to include both long term goals (e.g. like The Green Belt in Vitoria Gasteiz), but also short terms gains. However, these projects need to fit within the larger strategy, that would be explained in detail in the separate document. Moreover, a good communication (participatory) plan needs to be developed since the beginning to raise awareness of local citizens related to the GI concept and importance of PUOS for human well-being. Such communication (participatory) plan will support the involvement of local citizens in the whole process. The initiative for a strategic planning document can be taken at the local level and it can be set up through a participatory process such as in the case of the Kleinwalsertal. As in the case of Kleinwalsertal, there could be an opportunity that universities or research institutes could support this process. The two pilot areas selected for the workshops could be frontrunners in it and could serve as a good example for other areas in the Gorenjska region. Like in the case of the Kleinwalsertal, EU funding could play an important part in this process.

The **second recommendation** focuses on the need to connect the concepts of GI and sustainable mobility. It is important that the concept of GI does not stand on its own. Like in the case of Vitoria-Gasteiz, it is important to connect the concept of GI with the concept of sustainable mobility to reduce conflicts related to car usage, since currently private cars are the main means of transportation in Gorenjska region. To achieve this goal, experts from this sector need to be involved actively in the planning and implementation process for GI (similarly as in Vitoria Gasteiz).

The **third recommendation** underlines the need to activate the private sector. The private sector plays an important role in Slovenia. However, at the moment they are not involved in the financing of GI. It is therefore important to look for possibilities to activate them (e.g. private companies) for the process of financing systemic solutions for GI.

The **last recommendation** is about promoting intercommunal cooperation. Typical for the Slovenian policy making process is the lack of a regional planning level situated between the national government and the local level (the municipalities). Municipalities also tend to be rather small, which means that they have limited resources to devote to strategic planning for GI. In order to make up for this, intercommunal cooperation could be promoted to better develop and implement new and effective policies. This could be done through setting up a network of local communities.

## 7.4 Discussion

The ES provided by nature, such as fertile soil, clean drinking water, protection from natural hazards and recreational functions, are of central importance for human life. It is a governance priority to counteract negative effects, produced by the increasing pressure on natural spaces like PUOS, related to peri-urbanisation processes. As the pressure on natural space increases, the ES become scarce. The multiple demands and pressures caused by use induce stress and, in certain cases, a threat to the natural foundations. The debate within the RENATUR project proved that a sustainable development of a landscape protecting the

nature and the ES is possible, but several challenges have to be recognised and faced.

The Slovenian region of Gorenjska is an example of a territory where the peri-urbanisation is becoming more and more evident and where the need to protect natural heritage of open spaces comes along with the need to support the local economy. Sustainable management of both touristic activities and protection of natural heritage represents an important challenge in several geographic areas where natural capital is highly valued.

In various landscapes characterised with different socio-economic features, PULs are playing more and more a relevant role in the socio-ecological development of the urban areas located nearby. More innovative planning and governance approaches, which can address the potential role of PUOS and the protection of natural heritage, need to be developed. More adequate policy instruments would allow to overcome current implementation deficits, also related to ES trade-offs (Spyra et al. 2020). For this reason, spatial planning and governance approaches need to include concepts that are relevant for promoting the protection and sustainable use of nature and landscape, such as ES and GI (Albert et al. 2021). The implementation of GI can support integration of natural areas in PULs and this also represents a good opportunity to improve the quality of life of city dwellers (Verdú-Vázquez et al. 2021). Moreover, some scholars propose a holistic approach to build urban resilience and GI that would be one important component of this approach (Vargas-Hernández & Zdunek-Wielgońska 2021).

In conclusion, policy makers must address the implementation of this method more effectively. This can play an important role in the socio-economic development of urban landscapes and PULs. However, a lack of agreement among scholars and practitioners on the PUL notion and PUL delimitation methods significantly hinders the process (Monteiro et al. 2020). This problem is similar to other “soft spaces” like PULs that are new, emerging, non-statutory, informal spaces that are overlapping, intersecting or complementing other spaces (Jacuniak-Suda et al. 2015; Purkarthofer et al. 2021). They differ from formal spaces, that are traditional statutory, well delimited spaces addressed by existing governance and planning legislation (Haughton & Allmendinger 2007).

## **7.5 Conclusion**

The implementation of the interregional thematic workshops within the RENATUR project gave the opportunity to identify common relevant challenges that need to be addressed in regional policy making. Eventually, thanks to the debate occurred during the workshop it was possible to select those good practices that better reply to the specific features of the case study area by providing knowledge and tools for the identification of possible solutions. As a result of this, some policy approaches suitable to protect PUOS with the help of GI implementation, together with practical and realistic recommendations, have been delivered. However, still a lack of initiative for implementing these approaches is missing and the absence of regional level in the planning system contributes to make the governance process even more disharmonic, ineffective, and inefficient.

Future research has to prove that a governance system based on the concepts of ES and GI can positively impact the economy in the long term.

During the interregional thematic workshops organised by the project partners, the experts have discussed about the need to identify more specific financial instruments able to support those policies that can produce a positive and necessary change. The knowledge exchange occurred during the workshops, also offered to the policy makers that participated in the event a good opportunity for learning more about innovative and more adequate policy approaches



and to identify new tools that can support the decision-making processes.

In the case of the workshop in Slovenia, particular attention has been dedicated to the possibility of incorporating the concepts of GI in the landscape governance for better protecting the natural heritage of PUOS. To allow measures that can effectively include the concept of GI, experts have highlighted some important aspects, such as the requirement to prepare a strategic planning document that explicitly addresses the role of GI in the preservation of PUOS. However, in order to reduce existing conflicts and become more effective and efficient, this strategic plan must address the GI approach as well as the concept of sustainable mobility. Furthermore, the private sector and intercommunal collaboration must be taken into account in order to better create and execute innovative and successful policies.

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## Annex

### Meeting Agenda

13 – 16 October 2021

Wednesday, 13.10.2021

16.10/17.10	Departure by boat from Lauterbach to Vilm
18.00	Dinner
19.30	Introduction – <b>Harry Gölz (German Federal Agency for Nature Conservation)</b>
20.00	Keynote: EU nature restoration law: Assessment of impacts – <b>Jakub Wejchert (EU DG ENVIRONMENT)</b>

Thursday, 14.10.2021

07.30	Breakfast
<b>Governing nature restoration</b>	
09.00	Development of culturally appropriate valuation mechanisms for indigenous and local communities – experience from Northern Australia – <b>Kamaljit K. Sangha (Charles Darwin University, Australia)</b>
10.00	Sustainable Corporate Governance and Biodiversity Commitments – Approaching Politics and Ethics in the EU Biodiversity Strategy 2030 – <b>Stefan Knauß (Martin-Luther-University Halle Wittenberg, Germany)</b>
11.00	Coffee break
11.30	Mainstreaming Forest Conservation and Restoration through fiscal policies in India – <b>Amarendra Das (National Institute of Science Education and Research Bhubaneswar, India)</b>
12.30	Lunch break
13.30	How ecosystem services accounts can support ecosystem restoration projects – <b>Alessandra La Notte (EU Commission Joint Research Centre)</b>
<b>Getting society on board</b>	
14.30	Forest Landscape Restoration as direct Economic contribution for smallholder farmers living around protected areas: A case Study from Amaro Special Woreda, Southern Ethiopia – <b>Shibire Bekele Eshetu (Leibniz Centre for Agricultural Landscape Research, Germany)</b>
15.30	Coffee break
16.00	Rewilding in Biodiversity Conservation - Getting society on board – <b>Julian Massenberg (Helmholtz Centre for Environmental Research, Germany)</b>
17.00	Socio-economic implications of rewilding activities at the Oder Delta – <b>Elsa Maria Cardona Santos (Deutsche Umwelthilfe, Germany)</b>

18.00	Dinner
19.00	Visit to the photo exhibition "Der Baum und ich (the tree and I)" by Volkmar Herre

### Friday, 15.10.2021

07.30	Breakfast
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#### Case studies on restoration and ecosystem services

09.00	Costs and benefits of grassland reconstruction as an alternative to landscaping in industrial areas – a case study from Hungary – <b>Anna Cseperke Csonka (Eötvös Loránd University, Hungary)</b>
10.00	Restoration of post-mining ecosystems for new social-ecological values - case studies from Polish Lowland – <b>Katarzyna Fagiewicz (Adam Mickiewicz University, Poland)</b>
11.00	Coffee break
11.30	Ecosystem Services of Peri-Urban Landscapes – Insights from the RENATUR project in Slovenia – <b>Nica Claudia Caló (Martin-Luther-University Halle Wittenberg, Germany)</b>
12.30	Lunch break
13.30	Guided hiking tour on the isle of Vilm (nature reserve)
15.30	Coffee break

#### Wetlands, river and coastal restoration

16.00	Restoring rivers can build resilience against floods – <b>Sabien Leemans (WWF Europe)</b>
16.50	Challenges of Ecosystem Services Assessment and Restoration in Small Islands of Inland Waters in Lithuania (LIFE TERNS) – <b>Vytautas Narusevicius (Lithuanian Ornithological Society, Lithuania)</b>
17.40	Ecosystem services as indicator for the effectiveness of peatlands restoration: methodology for countries with non-capitalised nature – <b>Tatiana Minayeva (Wetlands International)</b>
18.30	Dinner
19.30	Estimating the costs and benefits of protecting a coastal amenity from climate change-related hazards: Nature based solutions via oyster reef restoration versus grey infrastructure – <b>Stephen Hynes (National University of Ireland Galway, Ireland)</b>
20.30	Concluding remarks – <b>Harry Götz (German Federal Agency for Nature Conservation)</b>

### Saturday, 16.10.2021

07.30	Breakfast
09.20	Departure by boat from Vilm to Lauterbach