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Beyond nature conservation? Perceived benefits and role of the ecosystem services framework in protected landscape areas in the Czech Republic

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ABSTRACT

Protected areas safeguard species and habitats, but also provide ecosystem services (ES) and quite often simultaneously protect landscape character and associated cultural values. Exploratory qualitative research and interviews specifically have been rarely used to investigate benefits of protected areas and associated challenges in their delivery as perceived by their managers. There is also a lack of attention to the potential role of the ES framework in nature conservation decision-making in protected areas. We address the gaps by identifying: (1) perceived benefits (by their managers) that protected landscape areas provide; (2) challenges and trade-offs that protected landscape areas face in delivering these benefits; (3) role of the ES framework in protected landscape areas decision-making. We conducted a qualitative analysis of 20 semi-structured interviews with heads of Protected Landscape Areas Administrations in the Czech Republic. Cultural or non-material benefits were the most referenced group closely followed by regulating benefits. However, the single most frequently referenced benefit was Habitat creation and maintenance, emphasizing the role of protected landscape areas in protecting and managing habitats and ecosystems. The positive and negative themes showed a key role of various types of land-use management (esp. agriculture and forestry) and their enhancing or deteriorating effects on specific benefits (esp. Habitat creation and maintenance). All respondents perceived future implementation of the ES framework as a possible contribution to support goals of nature conservation and decision-making in protected landscape areas. This study provides empirical evidence for a strong societal role of protected landscape areas by safeguarding specific benefits and their essential role in nature conservation. The use of the ES framework sheds light on key benefits of protected landscape areas but also key challenges and trade-offs in delivering these benefits.

1. Introduction

Despite increasing human pressures on ecosystems and widespread decline of ecosystem services (ES) (IPBES, 2019), protected areas still represent an essential conservation strategy to protect biodiversity and ecosystems (Hoffmann et al., 2018). While in Europe protected areas have sufficient coverage, they are not free of human pressures. For example, Natura 2000 as the largest protected area network worldwide covers over 18 % of the terrestrial area in the European Union (Müller et al., 2018). However, the state of nature within protected areas has been deteriorating, mainly due to agriculture, urban sprawl and leisure activities and unsustainable forestry activities (EEA, 2020). The critical

components of protected areas are therefore not only coverage and composition of ecosystems, but also management and threats abatement (Rodrigues and Cazalis, 2020).

The governance of protected areas and associated management interventions (i.e., “principles, policies and rules regarding decision-making” and “what is done in pursuit of given objectives” – see Borrini-Feyerabend et al., 2013, p. 10-11), together with the individual biophysical and socio-economic context, play an important role in ES delivery (Spangenberg et al., 2014; Eastwood et al., 2016). In general, the complex relationship between nature conservation and delivery of ES has been studied in many different contexts (see for example Maes et al., 2012; Durán et al., 2013; Ziv et al., 2018). However, studies on protected areas

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often apply quantitative data analysis focusing e.g. on management effectiveness or congruence of biodiversity conservation and ES protection objectives (Lecina-Diaz et al., 2019; Xu et al., 2017). Evaluation of major barriers and opportunities associated with the adoption of ES approach has rarely been analysed from the perspective of protected area managers (cf. García-Llorente et al., 2018). There is a lack of attention to what ES are delivered by protected areas and what influences the flow of these societal benefits, also referred to as the ES governance (Winkler et al., 2021). Furthermore, there is a demand to explore the implementation gap between ES science and policy and decision-making applications in the conservation field (Blicharska and Hilding-Rydevik, 2018; Ruhl et al., 2021).

Our aim was to explore the role of the ES framework in protected areas decision-making in the Czech Republic. Research exists that explores the roles, opportunities and challenges of incorporating ES into such decision-making (e.g. Schirpke et al., 2017). However, increasing the contribution of evidence from Central and Eastern Europe is important because countries here can embody different knowledge cultures, land-use pressures, or stakeholders' perceptions. Indeed, conservation in Eastern Europe faces different pressures to Western Europe, e.g. due to more extensive farmland environment than in Western Europe (Fischer et al., 2012; Tryjanowski et al., 2011). Governance has also evolved differently under path dependencies from transition from socialist regime to EU member, and the adoption of EU institutions, norms and policy instruments (Yakusheva, 2019). Further, a recent review on the use of interviews in conservation decision-making concluded they have been applied worldwide but still present a blind spot in the Czech Republic (Young et al., 2018).

We apply our aim in a case study of protected landscape areas which are, together with national parks, a major form of large-scale nature conservation in the Czech Republic. The International Union for Conservation of Nature's (IUCN) international classification distinguishes six categories of protected areas based on their management objectives and ranges from strict nature reserves or wilderness areas (categories Ia and Ib) to generally large areas allowing multiple land-use other than nature conservation (category VI) (Borrini-Feyerabend et al., 2013). Protected landscape areas would fit in Category V: Protected Landscape/Seascape. There are currently 26 protected landscape areas covering nearly 14 % of the territory of the Czech Republic. They allow coexistence of nature conservation with human use and according to national law (Act no. 114/1992 Coll. on Nature and Landscape Protection) are defined as extensive territories having a harmoniously formed landscape, a characteristically developed relief, a significant share of natural ecosystems of forest and permanent grasslands, with abundant wood species, or with preserved monuments of historical settlement. Protected landscape areas represent a mixture of smaller strict nature reserves, Natura 2000 sites protecting habitat and species of European importance, as well as landscapes with specific character, cultural heritage, and agricultural and other use. Protected landscape areas are important not only from a biodiversity conservation perspective but also provide a wide array of ES, including provisioning, regulating and cultural benefits. Protected landscape areas cover multiple values, from intrinsic to instrumental (Palomo et al., 2014) and therefore, are a particular hotspot of challenges of decision-making where the ES framework might be useful.

In order to answer our aim, we identify perceived benefits delivered by protected landscape areas and challenges that these areas and their managers face in delivering these benefits. As the main conceptual approach, we used the ES framework which has proven useful to inform environmental management and planning (Daily et al., 2009). This framework enables the involvement of stakeholders in ES assessment and management (Lopes and Videira, 2016) and can foster integration of multiple values of ES (Jacobs et al., 2016; Lopes and Videira, 2019). In the context of protected areas, the ES framework holds promise to better integrate the social dimension into decision-making (García-Llorente et al., 2018). We therefore focus our attention on the perceptions of the

managers of protected areas as the key actors responsible for making decisions. We have three specific objectives: 1) to identify the perceived benefits (by their managers) that protected landscape areas provide; 2) to identify the challenges (including trade-offs) that managers face in delivering these benefits; and 3) to highlight the perceived role of the ES framework in nature conservation decision-making in protected landscape areas.

2. Methodology

2.1. Conceptual framing

To frame the identified benefits that protected landscape areas provide we have created a classification largely based on the Nature's Contributions to People framework (NCP - Díaz et al., 2018). While we appreciate the broad theoretical foundations for non-material NCP (see also Gould et al., 2020) we find it very limiting that the classification consists of only three specific categories (Physical & psychological experiences, Learning & inspiration, Supporting identities; or four with the Maintenance of options which also belongs to the regulating and material group). Therefore, we followed the same categories only for regulating and material NCP. For non-material NCP we used a more detailed distinction of specific benefits inspired by the Common International Classification of Ecosystem Services (CICES) framework (Czúcz et al., 2018) and the cultural ES classification developed in the "CultES" project focused on sociocultural valuation and participatory mapping of cultural ES in landscape. We distinguished following categories of benefits within each NCP: Learning & inspiration NCP – Educational, Inspiration, Entertainment and Scientific benefits; Physical & psychological experiences NCP – Recreation, Aesthetics, Therapeutic benefits; Supporting identities NCP – Heritage, Cultural identity, Sense of place, Existence, Spiritual benefits. This is in line with efforts to make the group of cultural ES more inclusive and diversified to support a more comprehensive capture of non-material benefits (Asah et al., 2012; Gould and Lincoln, 2017). Such an approach is especially suitable for processing qualitative data from open ended questions to better reflect on qualitative in-depth information provided by individual perceptions. Otherwise, significant detailed information would be lost inside a coarse classification system. For the purpose of our analysis, we refer mainly to the broader term 'benefits' delivered by protected landscape areas which also include ES (or NCP) categories. In general, we use benefits and ES (or NCP) interchangeably but for the classification of specific categories of benefits we use either the NCP framework or an extended version of it in the case of our frequency analysis.

There are different types of trade-offs that are likely to be relevant while analysing benefits of protected landscape areas - e.g. between categories of ES, between conservation and human well-being, between land cover and land use change (de Groot et al., 2010; Eastwood et al., 2016; Maes et al., 2012; McShane et al., 2011). We used an inductive analytical approach to identify these trade-offs, and distilled broader categories directly (separately) drawn out from the qualitative dataset. Some trade-offs are overlapping with ES, but mostly they reflect a type of land-use, activity or management intervention.

3. Research areas

Conservation in protected landscape areas in the Czech Republic is executed by the Nature Conservation Agency of the Czech Republic through its regional administration offices. Protected landscape areas vary in the number of years they have been operating, with the oldest being established in 1955 (Bohemian Paradise) and the youngest in 2016 (Brdy) and in their size as well. The smallest protected landscape areas has 40 km² (Blaník Hill) and the largest covers an area of 1160 km² (Beskids Mountains).

3.1. Data collection

We conducted semi-structured interviews with the heads of the Protected Landscape Areas Administrations in the Czech Republic to gather in-depth information on the respondent's views and perspectives on the topic of interest (Newing, 2011). In each protected landscape area, we followed a purposive sampling strategy (Bryman, 2016) and selected chief officers responsible for their management as targeted respondents. We refer to them as protected areas managers but they have broader responsibilities also in decision-making and governance of these areas (for the distinction between governance and management see Borrini-Feyerabend et al., 2013). Potential respondents were first contacted by the headquarters of the Nature Conservation Agency, a superior body to Protected Landscape Areas Administrations, which recommended participating in these interviews. The Nature Conservation Agency was interested in using the results of this research for their further work and therefore, helped us to reach selected respondents (see also Harmáčková et al., 2021). After consultation with the Nature Conservation Agency, 22 out of 26 protected landscape areas were recommended as targeted research areas for further inquiry. The described sampling process assured a very high response rate – 20 out of 22 representatives of protected landscape areas were willing to participate in the interviews. We consider all respondents as highly skilled professionals who have been working for the Nature Conservation Agency for at least 8 years, with 35 % working for the institution longer than 20 years. Nearly half (45 %) of all respondents have been in the leading position for more than 10 years. Regarding gender composition of our sample, 19 respondents were men and one was a woman. They all hold a university degree.

The interviews were conducted between June and September 2018 and took place locally in the offices of Protected Landscape Areas Administrations with one exception, when the interview took place in the headquarters of the Nature Conservation Agency in Prague. Two researchers conducted the interviews independently. Each researcher undertook half of the interviews, with the division of areas running approximately between the east and west of the Czech Republic. When we contacted respondents, we framed the interview as research about the current state of protected landscape areas in the context of social-ecological interactions between society and ecosystems. In the beginning of each interview the project and aim of the interview were briefly introduced and the respondents were asked to read and sign informed consent regarding their participation in the research. All interviews were audio-recorded to enable consequent transcription and analysis. Duration of interviews ranged between 47 and 142 min. A map of the protected landscape area was provided for a better orientation in the study area and to help respondents make a location specific reference when describing some local facts or stories.

The interview protocol consisted of five parts: a) Introductory part with self-identification of the respondent in the context of a particular protected landscape area; b) Contributions of the protected landscape area to society and to nature itself; c) Problems in the protected landscape areas with a focus on related human activities and stakeholders engaged; d) Barriers and relationships which included identifying all stakeholders that the protected landscape area administration is dealing with; e) The ecosystem services framework. The complete interview protocol translated from Czech to English is presented in Appendix A.

In order to avoid biases in pre-understanding of the ES concept (Raymond et al., 2013), we omitted using the term “ecosystem services” until the last part of the interview. Instead, we asked about perceived benefits or contributions more broadly, e.g. “What do you think is the most important benefit of this protected landscape area for nature itself?” or “What do you think is the most important contribution of this protected landscape area for society?”.

3.2. Data analysis and interpretation

Data were analysed with the qualitative data analysis software MAXQDA (maxqda.com). The interviews, transcriptions and the analysis were done by the same two researchers (the first two authors). We applied two different approaches to qualitative content analysis - conventional and directed content analysis (Hsieh and Shannon, 2005). For the conventional content analysis, we used an open coding approach (inductive), i.e., going through all transcripts and coding the information with newly originated codes as they appeared. A directed (or theory-driven; Bryman, 2016) approach to content analysis was then used to extract information related to predefined categories of ES. Conducting the content analysis as a reflective process, we reworked our data in several rounds to reflect on the initial analysis and consolidated codes and categories (Saldaña, 2016). During this iterative process we discussed our coding system to assess and improve the inter-coder reliability between the two researchers (Erlingsson and Brysiewicz, 2017). Depending on the transcript, approx. 5 to 15 % of codes needed clarification and had to be done repeatedly to synchronise the coding system. The final code scheme consisted of 2369 coded segments which were organized into seven code categories: 1) Positive aspects; 2) Negative aspects or conflicts; 3) Trade-offs; 4) Ecosystem services; 5) Status quo information / Miscellaneous; 6) Stakeholders; 7) Legislation.

To identify the perceived benefits that protected landscape areas provide (objective 1), we analysed data in two different ways. Firstly, by following a deductive approach to content analysis, we looked for relative importance of ES by counting the number of times respondents referred to specific benefits in the whole dataset (frequency of occurrence analysis). These benefits were translated from a common language into predefined categories (O'Connor and Kenter, 2019) and we refer to them as benefits that people receive from protected landscape areas. This is a valid inquiry of importance because it reflects saturation of the information in the dataset (in this case ES categories). For the inductive approach to content analysis, we linked specific codes to a specific topic and extracted positive themes that pertained to decision-making in protected landscape areas. These themes emerged around the topics we asked (forestry, tourism, etc.) but also spontaneously as we wanted to leave enough space for issues that respondents had felt that were important in a particular protected landscape area. Consequently, all themes were content analysed for any explicit connection to ES categories. Drawing on the contextual meaning described in the interview, ES reflected in positive themes were understood as being enhanced or playing a key role in delivering referred positive effects (e.g. quote: “We are good at providing the places with tourist infrastructure, with making the places accessible. We constructed a bird observatory and people like to go there.” under the theme Advantages of protected areas management allowed to assign Physical & psychological experiences benefit that was being positively influenced). Because of the relatively low amount of data, we used the NCP classification in this exercise for linking narratives to specific benefits because it has relatively few and broad categories.

To identify the challenges (including trade-offs) that managers face in delivering these benefits (objective 2), we looked for references to trade-offs and challenges encountered in protected landscape areas decision-making as part of the inductive content analysis. Following the same process as for the positive themes, we linked specific codes to a specific topic and extracted negative themes that pertained to challenges that protected landscape areas and their managers face in various areas (conservation, water management, etc.). Consequently, ES found in negative themes were understood as being under pressure or deteriorated by specific aspects of each theme (e.g. quote “When the grassland is mowed in a short period of time, the corncrake is being killed and also the insects have no time and place where to escape” under the theme Conventional agriculture allowed to assign Habitat creation & maintenance benefit that was being negatively affected). Independently from analysing positive and negative themes or frequency of occurrence of

specific benefits we extracted trade-offs that mostly reflect relations between types of land-use, management or activities. We did not explicitly ask respondents about trade-offs but in the initial phases of coding we found many references to existing nonlinear relations and therefore, decided to include trade-offs as part of answering the objective about challenges. During the iterative coding process, we grouped similar trade-offs into broader categories. Similarly to the frequency analysis of ES, we counted the frequency of occurrence of trade-offs which reflects its saturation in the dataset (Fig. 1).

To highlight the perceived role of the ES framework in nature conservation decision-making in protected landscape areas (objective 3), we followed an inductive coding approach and extracted themes related to familiarity and experiences with the ES framework and potential areas in protected landscape areas decision-making where the ES framework could be implemented (e.g. planning, conservation management, raising awareness). Drawing on the saturation of codes and categories in the dataset, we established key themes related to potential implementation of the ES framework and perceived barriers for implementation and linked them to similar topics in existing literature. We organized our findings as responses to the following two questions: a) How could the ES framework support the goals of nature and landscape protection? b) What are the main barriers in integrating the ES framework in protected landscape areas decision-making?

4. Results

4.1. Perceived benefits provided by protected landscape areas

With regard to perceived benefits provided by protected landscape areas, the answers of the respondents reflected mainly cultural and regulating benefits of these protected areas (Fig. 2). The most frequently mentioned group of benefits were non-material or cultural benefits ($n = 270$), highlighting the importance of protected landscape areas for people's interactions with nature, mainly as a space for recreation and education and with cultural heritage values. Second, respondents talked about protected landscape areas as areas which provide a range of essential regulating benefits ($n = 198$), mostly as habitats for species or

water regulation. This reflects the perceived importance of protected landscape areas for maintenance of natural processes. Material benefits were also mentioned ($n = 36$), mainly in the context of food and feed and materials provision.

The most frequently referenced category of benefits was Habitat creation and maintenance ($n = 122$) reflecting that protected landscape areas and their management interventions are able to provide suitable habitats for certain (often rare) species. The second most frequently referenced benefit was Recreation ($n = 89$), as many respondents were clearly stating the importance of the recreation function: "protected landscape area is for people, for recreation" or "with this mission it was designated, that it is a specific quiet zone for nature but also for recreation". Protecting a characteristic landscape together with relics of historical settlement is an essential part of protected landscape areas role and as such was underlined by the next benefit, Heritage ($n = 50$). Nearly similar importance can be assigned to Educational benefits of PLAs ($n = 47$). The so-called Houses of Nature or educational paths play a key role in ecological education: "We can positively influence the public, we have the educational path there, the House of nature, so they learn that this protected landscape area is nice and that we take care of it, so it is worth having this protected landscape area".

Reflecting positive aspects of the actual existence of protected landscape areas, including their governance and management, four themes which appeared in more than 25 % of PLAs were established: 1) Advantages of protected landscape areas governance; 2) Nature friendly forestry and farming; 3) Unique biodiversity; 4) Finances for conservation (Table 1). All themes are described in more detail with quotes providing contextual information in Appendix B.

All positive themes referred to some extent to the most frequently mentioned benefit Habitat creation and maintenance. Therefore, the ability to govern protected landscape areas, the existence of unique biodiversity, nature friendly forestry and farming practices and the availability of finances for conservation can be understood as enhancing or providing conditions for delivery of this key benefit (in the context of protected areas). The next important benefit emphasized in three out of four themes was Maintenance of options. Other benefits have a singular appearance in one of the positive themes and are equally distributed into

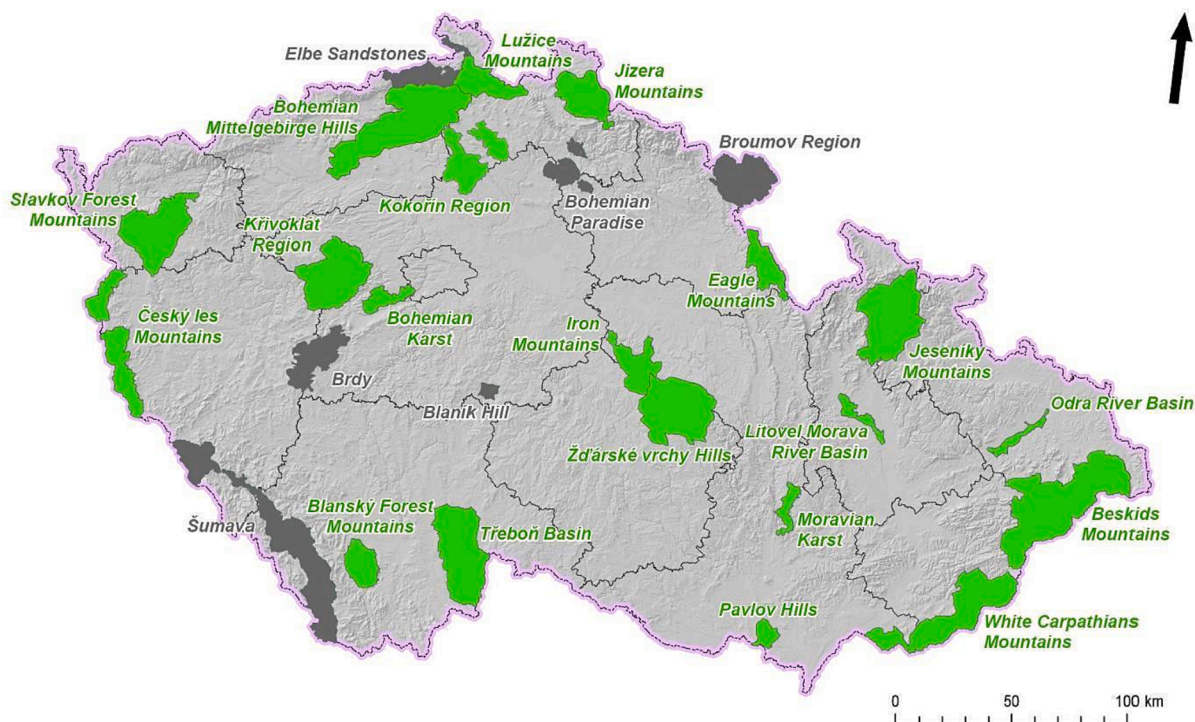


Fig. 1. Map of protected landscape areas in the Czech Republic presenting 20 researched areas (in green colour). Grey colour line depicts borders of regions.

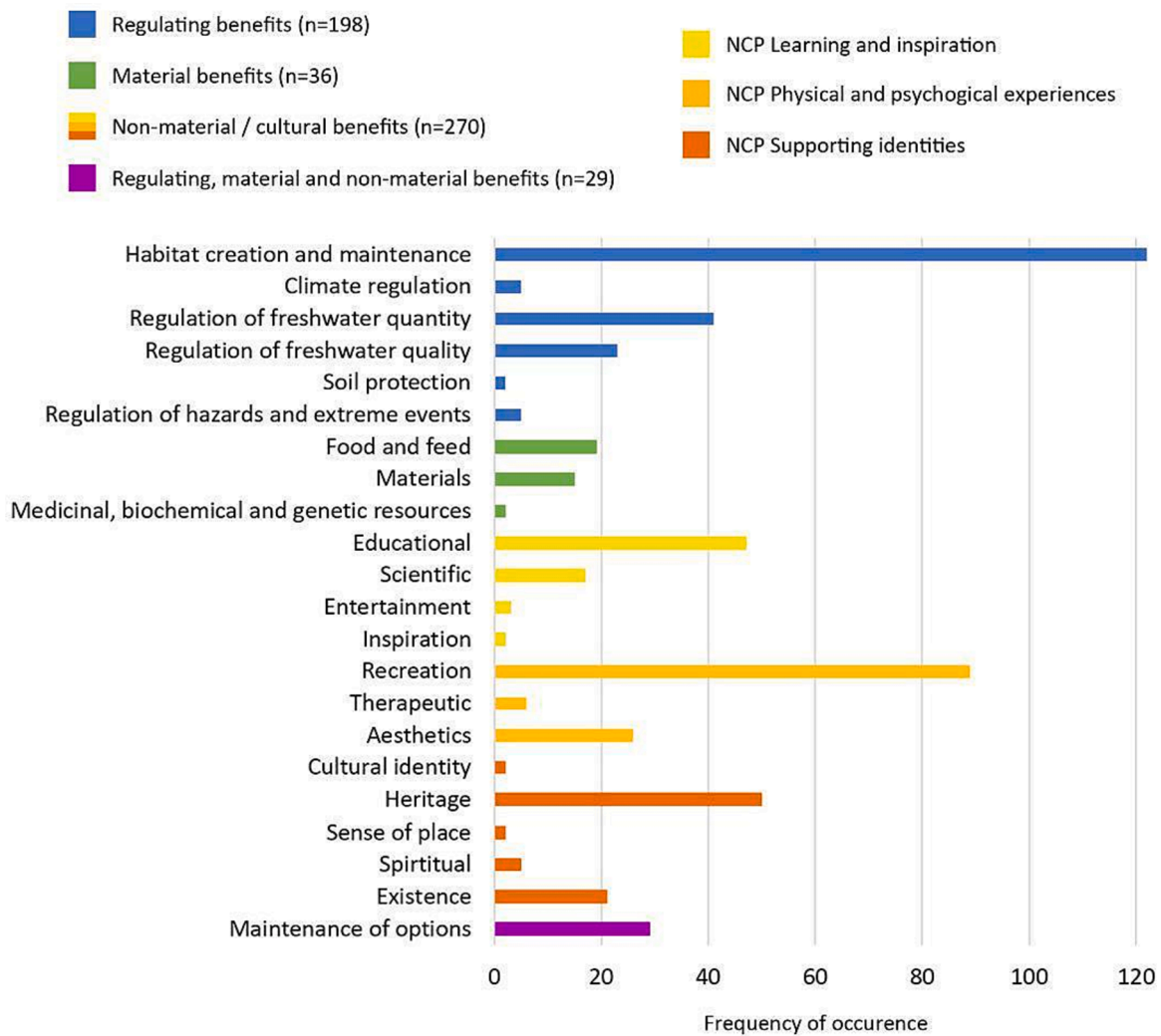


Fig. 2. Summary of all benefits of protected landscape areas coded into specific ES categories as mentioned by respondents in the data set. Groups of ES (distinguished by different colours) are presented according to the NCP classification which is deliberately extended in case of non-material or cultural benefits.

regulating and non-material / cultural groups. Material benefits were not mentioned in the content of the four positive themes.

4.2. Challenges encountered in protected landscape areas decision-making

The managers of protected landscape areas referred to a multiplicity of challenges they face in their areas. They are presented within seven negative themes which appeared in more than 50 % of protected landscape areas: 1) Conventional agriculture; 2) Regional planning issues; 3) Overtourism; 4) Water shortage; 5) Forestry for profit; 6) Conservation conflicts; 7) Urbanisation pressure (Table 2). All themes are described in more detail with quotes providing contextual information in Appendix B.

Stemming from the content of negative themes, Habitat creation and maintenance and Supporting identities were two of the most negatively influenced benefits which were referenced in five out of seven themes. Delivery of the Habitat creation and maintenance benefit is under pressure mainly from conventional agriculture, forestry for profit and conservation issues but also from water shortage and overtourism. On the other hand, the Supporting identities benefit is affected by aspects of urbanization and regional planning, overtourism but also conventional agriculture and forestry for profit. These are followed by Regulation of water quantity which was mentioned in four themes - conventional agriculture, forestry for profit, water shortage and conservation issues.

In two cases (water shortage; conservation issues) the delivery of material benefit Food and feed is affected. In general, negative themes are referenced more often (than positive themes) to specific benefits, possibly due to more information in the dataset.

Trade-off analysis resulted in a total of 39 different trade-offs with varying frequencies of occurrence (from 1 to 24) and therefore, varying levels of saturation of the topics in the dataset. Here, we only present trade-offs that appeared in more than two protected landscape areas. The most significant trade-offs were connected to the basic role of protected landscape areas primarily safeguarding space for nature conservation (Fig. 3). Protecting species and habitats was referred to as being mainly traded-off against tourism followed by sport activities, building and roads development and agriculture. These represent the most imbalanced types of land-use, management or activities. For example, there are a variety of aspects of tourism which are perceived as detrimental or contradictory to nature conservation. Respondents mentioned issues such as overtourism in both terrestrial ecosystems: "...the influence of tourists at the most interesting places would be really devastating." or "It will probably never happen [due to overtourism] that there would be a breeding place for some bigger species of birds which would theoretically be there." but also in aquatic ecosystems: "...there are efforts to use the lake over its limit which would have an impact on parts of the shore which are naturally valuable.". Increase in landscape fragmentation (due to developments of tourist infrastructure) or simply appearance of humans in

Table 1

Summary of positive themes with their key topics which are linked to specific benefits (using the original NCP framework).

Positive themes and their key topics	Benefits (NCP) enhanced
Advantages of protected landscape areas governance (ability to govern and manage nature's use)	● Habitat creation & maintenance
Management interventions in ecosystems	● Learning & inspiration
Regulation of construction and building activities	● Physical & psychological experiences
Regulatory power and independence of the Nature Conservation Agency	● Supporting identities
Public relations and education	● Maintenance of options
Providing protected places with tourist infrastructure	
Nature friendly forestry and farming	● Habitat creation & maintenance
Close-to-nature forestry and regeneration of forests	● Water quality
Environmentally friendly agricultural management in cooperation with the Nature Conservation Agency	● Soil protection
Small extensively managed agricultural areas	● Pests regulation
Lower chemical pollution from agriculture	
Management type is more suitable for certain places	
Unique biodiversity	● Habitat creation & maintenance
Unique species and habitats	● Maintenance of options
Critically endangered species or endemics	
Specific bedrock, geological and pedological diversity	
Protected landscape areas provide sensitive species with suitable habitats	
Finances for conservation	● Habitat creation & maintenance
Payments for management	● Maintenance of options
Compensations for farmers for nature protection	
Options when Nature Conservation Agency is owner of the land	

areas where they disturb specially protected species are other disturbing aspects of tourism in some protected landscape areas. In general, all trade-offs presented here have on one side various goals of protected landscape areas management - nature conservation, aim to increase forest diversity, preference of non-production forests, protection of water and cave systems and also landscape character preservation.

4.3. The perceived role of ES as a framework supporting decision-making in protected landscape areas

When asking respondents about familiarity with the ES framework, only one response (out of 20) was negative. However, many respondents familiar with the framework described their knowledge as general, partial or limited: *"I heard something, but it is a wide theme, so not much"* or *"Sure I've heard about it, but I don't know it in detail"*. Only two respondents were classified as having a good or advanced knowledge of the ES framework and could provide some detailed examples. Some of the respondents referred to the framework mainly or solely from the economic point of view: *"the framework is about putting services of nature into numbers, if I'm right"*.

Experiences with using the ES framework in any form of protected landscape areas decision-making were limited. Only one respondent used the framework at work but *"not in decision-making, mainly in the national Man and Biosphere Committee"*. However, some respondents pointed out that they have already been considering things in a similar way: *"Possibly we use it often, but we don't use the term"* or *"Maybe we use it unintentionally, when we talk about water for drinking, water as a biotope..."*.

Regarding potential implementation, 15 out of 20 respondents expressed openness and willingness to use the ES framework: *"It seems a logical thing which should be used in our decision-making,"* or *"I can't imagine anything specific... but generally I understand that it will be necessary and that there is a reason for it"*. Five specific themes related to implementation of the ES framework in the context of protected

Table 2

Summary of negative themes with their key topics which are linked to specific benefits (using the original NCP framework).

Negative themes and their key topics	Benefits (NCP) impacted
Conventional agriculture	● Habitat creation & maintenance
● Big size of fields	● Regulation of water quantity
● Intensive agricultural practices	● Regulation of water quality
● Heavy machinery compacting soils	● Soil protection
● Declining water retention ability	● Supporting identities
● Inappropriate agricultural subsidies	
Regional planning issues	● Supporting identities
● Too many development intentions	
● Unsuitable development projects	
● Industrial zones / detention basins	
● Destroying landscape character	
Overtourism	● Habitat creation & maintenance
● Increasing number of visitors	● Physical & psychological experiences
● Lacking infrastructure	● Supporting identities
● Loss of authenticity	
● Freeloading on public infrastructure	
● Damage on ecosystems	
Water shortage	● Habitat creation & maintenance
● Impact on ecosystems	● Regulation of water quantity
● Rivers and streams drying out	● Regulation of water quality
● Social and economic dependence on water	● Food & feed
● Issues with drinking water supply	● Physical & psychological experiences
● Species decline	● Supporting identities
Forestry for profit	● Habitat creation & maintenance
● Unsuitable forest structure	● Climate regulation
● Management for economic profit	● Regulation of water quantity
● Forest policy against conservation	● Soil protection
● Insensitive forest works	● Pests regulation
● Overpopulated game impacts forest quality	● Physical & psychological experiences
Conservation issues	● Habitat creation & maintenance
● Visitors digging out rare orchids	● Regulation of water quantity
● Meadows overgrowing into forests	● Hazards regulation
● Conflicts with protected species	● Pests regulation
● Overpopulated game	● Food & feed
	● Maintenance of options
Urbanisation pressure	● Supporting identities
● Large pressure close to cities and highways	
● No control in 4th zones	
● Destroying village character	

landscape areas decision-making together with three specific themes presenting main barriers in integrating the ES framework into protected landscape areas decision-making were identified and are described in Table 4 with supporting quotes. Each theme is then linked to an example of a relevant topic in existing literature (and does not represent a complete list of a recent or ongoing research). The ES framework could provide another justification for the protection of nature, raise awareness about benefits of nature to society, and provide a suitable vehicle to inform stakeholders and public about trade-offs in land-use management. Furthermore, it could also provide protected landscape areas managers with economic arguments which could be (in some cases) better understood than conservation arguments. Generally, the ES framework could help decrease the level of subjectivity in decision-making. Regarding main barriers in integrating the ES framework into protected landscape areas decision-making, respondents mentioned the need for a suitable administrative or regulatory framework which is currently missing. Other key barriers were insufficient knowledge about the ES framework and also insufficient capacities in their everyday work. Results in this chapter suggests implementation of the ES framework in protected landscape areas management or decision-making is still at the very beginning but as one respondent suggested, protected landscape areas might be the right institutions to start with: *"but we should be the institution which uses it first"*.

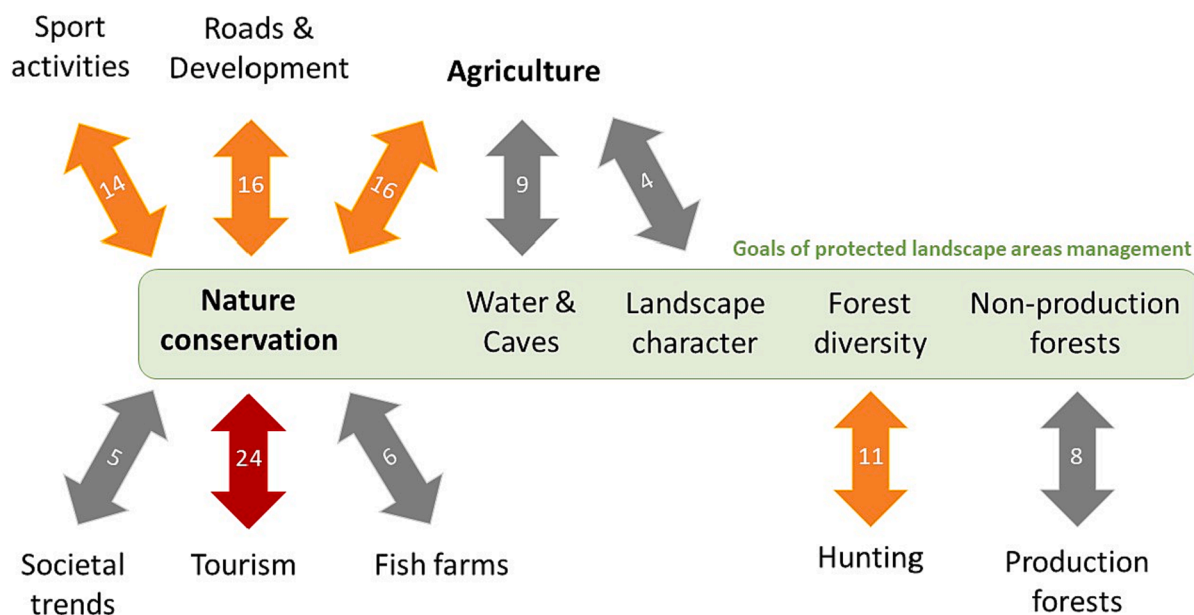


Fig. 3. Trade-offs between the various aspects of protected landscape areas (type of land-use, management or activities). The numbers in the arrows represent the frequency of trade-offs coded in the data set. The colour of the arrows reflects the assigned level of importance of the trade-off based on its saturation in the data set: red - high importance; orange - medium importance; grey - low importance.

5. Discussion

Our results highlight the importance of cultural or non-material benefits delivered by nature and landscape in large-scale protected areas. Overall it was a more referenced group of benefits than the regulating benefits which traditionally underpin conservation goals by protecting habitats suitable for targeted species (Durán et al., 2013). Nevertheless, the joint major significance of both cultural and regulating benefits fulfil the role of protected landscape areas defined by IUCN (Borrini-Feyerabend et al., 2013): *A protected area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.* Similar findings were reported by Hummel et al. (2017) when interviewing protected areas managers about the importance of ES where cultural benefits (leisure activities, education and research) slightly outweighed regulating benefits (habitat for feeding and breeding). Furthermore, the links between benefits and positive themes highlight what works and to what benefit (e.g., Nature friendly forestry and farming supports following benefits: Habitat creation & maintenance, Water quality, Soil protection, Pests regulation), which provides insights into societal functions of protected landscape areas in other than traditional conservation values or economic terms (see also Daněk et al., 2017). However, it should be noted that perceived benefits would probably differ when asking the beneficiaries such as visitors or locals or other groups of stakeholders (García-Llorente et al., 2018; Lopes and Videira, 2016).

Some of the negative themes (esp. those related to agriculture and forestry, urbanization, tourism) have been reported on the national (Petřík et al., 2015) but also the European level (EEA, 2020) as contributing to nature and landscape deterioration. We suggest that our linking of themes to benefits, especially in the case of negative themes, provides important insights into ES-related challenges and conflicts in protected areas, which is still rare in the literature (Kovács et al., 2015; Niedziakowski et al., 2014). In this context, conservation conflicts entail inherent trade-offs and hard-choices (McShane et al., 2011) and represent a critical issue to understand (Redpath et al., 2013). Our findings from the trade-off analysis stress the problematic role of tourism and some recreation activities that undermine the goals of protected landscape areas management (such as increasing diversity of birds etc.).

Such trade-offs present a significant challenge that protected landscape areas managers face. According to Ziv et al. (2018) similar trade-offs between recreation activities and nature conservation were reported in a large study in the cross-European context (in Natura 2000 sites). This is also in line with results from a study conducted in South African national parks which uncovered potential discrepancies between cultural ES delivery and biodiversity conservation (Roux et al., 2020). In our case, it is important to note that we were not able to assign specific benefits that would be impaired by specific trade-offs. Such analysis would require explicit prompts on trade-offs as part of the data collection which was out of the scope of our research design. Nevertheless, our results still point to some similarities in trade-offs regarding nature conservation in protected areas placing our Central European case study within a broader global context (Roux et al., 2020; Ziv et al., 2018).

Keeping in mind the main goal of nature conservation, we suggest paying attention to existing studies that focus on the relationship between biodiversity (or species conservation) and ES as both synergies and trade-offs can occur (Chan et al., 2006; Roux et al., 2020; Xu et al., 2017; Ziv et al., 2018). Also, a higher degree of protection does not always results in more ES and higher biodiversity (Lecina-Diaz et al., 2019). Therefore, refocusing too much on ES might end up being disadvantageous to biodiversity (Chan et al., 2006; Ramel et al., 2020) or other socio-economic benefits that protected landscape areas might want to provide. However, our research design did not allow us to explore relationships between ES and biodiversity and it still remains a key knowledge gap (Ziv et al., 2018).

Referring to the ES framework only from the economic perspective is a known myth (misrepresentation of the concept) in the ES literature (Ainscough et al., 2019). Nonetheless, the majority of respondents perceive the implementation of the ES framework as a possible contribution to enhance various aspects of nature protection or sustainable development (e.g., by justifying values of nature and reasons for its protection, decreasing the level of subjectivity in decision-making, etc.) of the area (see also Harmáčková et al., 2021). However, it should be noted that most respondents reported rather basic knowledge about the ES framework and therefore our findings are not comparable to other studies focused on forerunners regarding ES work (e.g. Blicharska and Hilding-Rydevik, 2018). Several lessons for implementation of the ES framework into policy and practise can be drawn out from a rich body of

Table 4

Key themes related to potential implementation of the ES framework and perceived barriers for implementation by respondents summarized and linked to relevant topics in existing literature.

How could the ES framework support the goals of nature and landscape protection?	Similar themes recognized in the ES literature
Justifying values of nature and reasons for its protection by bringing convincing arguments: „One day it could convince the public about our targets and intentions, but mainly the importance of what we protect and the importance of the landscape“ or emphasizing the importance of habitats (e.g. wetlands): „...especially now it's the period of drought and its impacts... especially the importance of wetlands can be presented very well and clarified by this concept“	- understanding social and cultural values in policy and decision-making (e.g., Ainscough et al., 2019)
Decreasing the level of subjectivity in decision-making: „They often blame us, rightly, that we make subjective decisions“ or „And we would need it [ES concept] so we could make decisions without conflicts, so it would be convincing and somehow defined“	- decision-making aid (e.g., Ainscough et al., 2019)
Informing about trade-offs in land-use management: “damaging this area means that you destroy ecosystem services of this value, then it would be easier for public and for the mayors to understand that their cadastre provides certain ecosystem services”	- trade-offs in social-ecological systems (e.g., Lu et al., 2021)
Raising awareness about benefits of nature to society: “It can be used well in the field of presentation, importance of habitats, reasoning...” or „The more we will talk about and emphasize everything that ecosystems and semi-natural ecosystems give us and what all we don't realize and don't see, the more the public will take nature protection more seriously... and we might also have more finances... and better arguments and more people will listen to us“	- awareness raising metaphor (e.g., Ainscough et al., 2019)
Bring economic arguments which could be better understood than conservation arguments: “So it is necessary to tell them that regulation functions of natural rivers, natural floodplains and wetlands in protected landscape areas include the unique ability to retain 50 to 100 years floods and could be estimated to 50 billion [Czech Crowns] a year”	- concerns with the use of economic valuation (e.g., Ainscough et al., 2019)
What are the main barriers in integrating the ES framework in protected landscape areas decision-making?	
Missing regulation or methodology which would provide protected landscape areas with suitable legal or administrative framework: “the concept can't be really used in current decision-making, because the law is not build in such a way“ or “It would be good if we would know how to use it, but we don't know”	- lack of standardisation and the user-friendliness (e.g., Ainscough et al., 2019) - a problem of methodological inconsistency (e.g., Tusznió et al., 2020) - develop standards, routines and templates for ES work (e.g., Blicharska and Hilding-Rydevik, 2018)
Insufficient knowledge: “Higher popularization of the ES concept is needed, because many people have different imagination of what it is about“ or “If only the concept would be generally accepted, because so far it is still rather some chimera of ecologists,	- a problem of precise wording of ES (e.g., Tusznió et al., 2020) - ability to comprehend the general theory of the ES concept (e.g., Tusznió et al., 2020) - clarify terms and classifications (e.g., Blicharska and Hilding-Rydevik, 2018)

Table 4 (continued)

How could the ES framework support the goals of nature and landscape protection?	Similar themes recognized in the ES literature
that some ecosystem services exists...“ or „It's still rather an academic thing“ Insufficient capacities: “I cannot even have experience with it, because we don't do it here... There is no time for it here, it's busy here”	- provide a mandate to work with ES and take others' time to work with ES (e.g., Blicharska and Hilding-Rydevik, 2018)

recently published literature (e.g. [Beaumont et al., 2018](#); [Dick et al., 2018](#); [Jax et al., 2018](#); [Blicharska and Hilding-Rydevik, 2018](#); [Honeck et al., 2021](#)). [Beaumont et al. \(2018\)](#) suggest primary barriers to successful implementation of the ES framework are not data gaps and resource limitations, but instead are organizational and communication-based issues. This is partly in contrast with our results suggesting the main barriers are insufficient knowledge and capacities followed by missing methodologies or regulatory frameworks. Therefore, our results help to fill the research gap in understanding the Czech context which varies from findings reported in Western Europe ([Beaumont et al., 2018](#)). A common element which is in line with our results is a lack of standardisation (e.g., ES regulation or methodologies) which was noted by [Ainscough et al. \(2019\)](#) as a key challenge in the science-policy interface.

The range of cultural or non-material benefits identified in our results is significant. A decision-making reflecting on the benefits that protected landscape areas provide could strengthen their societal role by adding an emphasize on (but not only to) anthropocentric values (see also [Loft et al., 2015](#)). It could also increase the relevance of these protected areas to people and human well-being, focusing for example on a relational approach to conservation ([García Rodrigues et al., 2021](#)). However, such an approach should be aligned to existing conservation goals with a systematic planning framework ([Chan et al., 2006](#)), e.g. to allow optimization for cultural ES delivery with biodiversity conservation ([Roux et al., 2020](#)). The use of transdisciplinary approaches that draw on participatory methods and collaborative practices might help to articulate different value dimension of ES ([Lopes and Videira, 2017](#)) but also facilitate the uptake of the ES approach across different stakeholders and contexts ([Ainscough et al., 2019](#); [Carmen et al., 2018](#)). Nevertheless, an inclusion of multiple, non-state actors in decision-making (a key component of the ES governance) brings various challenges such as dealing with vertical hierarchies and coordination mechanisms ([Loft et al., 2015](#)). While we did not specifically address the role of various stakeholders in ES provision, our links between themes and specific positively enhanced or negatively influenced benefits suggest key role of certain institutions or stakeholders (e.g. agricultural or forestry companies). Thus, future research could focus more explicitly on the role of various stakeholders and values in ES governance and its relationship with nature conservation ([Harmáčková et al., 2021](#)). Examples can be also drawn out from studies addressing e.g. governance for sustainable provision of forest ES ([Mann et al., 2021](#)).

Our results suggest there is a need to raise awareness on the role of the ES framework in conservation and protected landscape areas decision-making, and increase engagement of relevant actors. Protected areas managers and other officials could benefit from training on how the ES framework can contribute to planning and conservation. Implementation of the ES framework into protected landscape areas decision-making could enhance inclusion of various social aspects of the human-nature relationship and also provide another perspective to challenges in ES governance and conservation conflicts ([García-Llorente et al., 2018](#)). In the context of protected areas governance, there are various governance mechanisms which could benefit from stakeholder participation for a more inclusive conservation governance and decision-making ([López-Rodríguez et al., 2020](#)). However, we acknowledge that protected areas (various types) are complex social-ecological

systems (Cumming et al., 2015) within which ES are produced and used and that not all ecological or social management objectives can be clearly phrased or articulated as an ES problem (see De Vos et al., 2017).

Characteristics of our respondents underline the relevance of our research with regards to the specific Central European context. Reflecting their extensive work experience in the field, we consider our respondents as appropriate and reliable informants providing rich and robust information about various aspects of these protected areas including their management and decision-making. We are aware that our data reflect a significant gender bias in the leading positions of Protected Landscape Areas Administrations (except 1 woman, all our respondents were men). However, we were not able to influence structural gender inequality (Jones and Solomon, 2019) due to the nature of the purposive sampling process aiming at heads of the Protected Landscape Areas Administrations. Lastly, we would like to stress that the views of our respondents represent particular perspectives (of protected area managers) and not a general view or a view of different stakeholders. We acknowledge the importance of multi-stakeholder perspectives and therefore, this research was followed by a transdisciplinary knowledge co-creation process in selected protected landscape areas (Harmáčková et al., 2021).

6. Conclusions

This study provides evidence for a strong societal role of protected landscape areas and their important benefits for society but also confirms their essential role in large scale nature conservation. Application of the ES approach enables us to shed light on key benefits provided by protected landscape areas as well as key challenges protected landscape areas decision-making based on qualitative research approach. Such information could be used as a novel perspective for protected landscape areas governance providing insights on social-ecological links between various types of land-use, management or activities and their effects on specific benefits. The ES framework allows us to determine which benefits are being enhanced and by what but also which benefits are being negatively affected and by what. Lastly, we explored the potential for implementation of the ES framework in nature conservation and decision-making which resulted in a significant openness and willingness to use the ES approach (among our sample of protected areas managers). Addressing key issues and barriers identified (insufficient knowledge and capacities, missing regulation or methodologies) can help researchers and practitioners in integrating the ES framework into protected landscape areas decision-making. Thus, these results can pave the way for a more efficient process in building the science-policy interface in the area of ES research and its practical use (Ruhl et al., 2021).

Some studies suggest creating a new category of protected areas for sustaining the provision of ES for human well-being (Xu et al., 2017), or provide examples on governance innovations supporting sustainable provision of ES (Mann et al., 2021). In line with the expected goals of protected areas (protect biodiversity, ES and cultural values) we propose that protected landscape areas have all important institutional means to be able to reach these goals if their governance and management would be able to make better-informed decisions and planning especially with regards to ES. The inseparable landscape scope of protected landscape areas might help integrate the ES approach with nature conservation to deliver effective conservation policies (Lecina-Diaz et al., 2019). Drawing attention to ES does not have to make their provision a higher priority than nature conservation. While we recognize that the ES framework may not be an all-encompassing answer we suggest it presents an approach with the potential to balance arguments from both biocentric and anthropocentric paradigms which need to be considered carefully in each specific case.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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Appendix A. Supplementary data

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