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SPECIAL FEATURE: ORIGINAL ARTICLE

Valuation of Nature and Nature's Contributions to People

Linking multiple values of nature with future impacts: value-based participatory scenario development for sustainable landscape governance

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Abstract

Reaching sustainable and just futures for people and nature requires tackling complex social-ecological challenges across multiple scales, from local to global. Pathways towards such futures are largely driven by people's decisions and actions, underpinned by multiple types of motivations and values. Thus, understanding the link between potential futures and the values underpinning them represents a key question of current sustainability research, recently embraced by the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES). Particularly the understanding of causal chains leading from values to futures across different contexts and scales is vital to identify which sustainability pathways to collectively pursue. In this study, we build on a transdisciplinary knowledge co-creation process in an array of local case studies in protected areas in the Czechia (Central Europe). We apply the Life Framework of Values and the Three Horizons framework in an innovative value-based participatory scenario building process to explore the relationships between (1) multiple types of values, (2) actions taken by different types of stakeholders, and (3) their potential impacts on nature, nature's contributions to people (including ecosystem services) and good quality of life. The resulting local-scale value-based pathways show the complex relationship between multiple types of values for nature and potential future trajectories. Finally, we reflect on the utility of value-based participatory scenario planning as a means to strengthen sustainable governance. We highlight that if participatory deliberation of values is to support decision-making processes, its design needs to carefully reflect local context and institutional set-up.

Keywords Social-ecological values · Human-nature relationships · Participatory scenario building · Future pathways · IPBES · Sustainability governance

Introduction

Futures thinking represents an approach helping people to understand and tackle complex sustainability challenges (IPBES 2016). Future scenarios and pathways developed within academia and beyond have been regularly used to assess the link between various types of anthropogenic drivers and their potential future impacts on nature, nature's contributions people and good quality of life (Kabaya et al. 2019; Raudsepp-Hearne et al. 2020). However, scenarios have rarely expanded their scope to the root causes of human decisions and actions, leading to unsustainable social-ecological development among others, the types of values held for nature (Saito et al. 2019; Sandström et al. 2020). This study aims to address this gap through the design and

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implementation of a local-scale participatory value-based scenario building process.

The field of futures studies recognizes various types of techniques which facilitate nuanced thinking about current and future dynamics and potential future development. In this respect, one of the most frequently developed types of futures works are exploratory scenarios. Exploratory scenarios have been developed to propose, describe and assess a wide variety of plausible futures in a given context, usually while incorporating the knowledge and insights of multiple types of stakeholders and experts (IPBES 2016). Elements and driving forces incorporated in exploratory scenarios have been frequently limited to those that are possible to assess with models (for instance, demography, economics, technology, institutional change and social-cultural change among so called "indirect" or "underlying" drivers, and climate change, land use change, natural resource use, pollution and invasive species among so called "direct" or "proximate" drivers) (Rosa et al. 2020; Geist and Lambin 2002). Thus, phenomena underpinning human actions such as values and motivations, which are difficult to capture in models, have been incorporated only scarcely in exploratory scenarios and the call for their incorporation has been building up only lately (Rosa et al. 2017). On the contrary, qualitative elements have been frequently incorporated in future pathways, i.e. "alternative trajectories of intervention and change, supported by narratives, entwined with politics and power" (Leach et al. 2010). Future pathways of potential courses of events and actions thus provide a suitable tool to explore the link with values (Demeritt et al. 2011; Geels et al. 2015; Fazey et al. 2016; Luederitz et al. 2017; Scoones et al. 2018). An example of a recent approach striving to bridge the exploratory and pathway-development aspects of futures thinking has been the Three Horizons framework, a tool for stakeholder-based exploration of futures supporting adaptive and transformative agency of involved actors (Sharpe et al. 2016).

Recent sustainability research suggests that the values which people hold for nature, nature's contributions to people (including ecosystem services) and good quality of life, may be one of the key factors for how nature and natural resources are used and sustained (Ives and Kendal 2014; Pascual et al. 2017; Kenter et al. 2019); values (together with other types of motivations) translate into decisions and actions affecting the natural environment, which in turn threatens to lose its ability to provide society with contributions vital for human well-being and good quality of life (Díaz et al. 2020). At the same time, a wide range of social science research has shown that the role of people's values in their environmental behaviour needs to be considered carefully in the light of constraints posed by the larger system as well as interactions with others and the wider social context (Dietz et al. 2005; Leventon 2015). In addition, the influence of values on decisions is by no means direct (cf. the values-beliefs-norms theory, Stern 2000). Finally, considerations of values in sustainability research need to be sensitive to the multiple types and meanings of values (Dietz et al. 2005; Raymond and Kenter 2016), as well as the multifaceted role of values and value change in leveraging sustainable behaviours (Bardi and Goodwin 2011; Larsson and Holmberg 2018).

Multiple frameworks have been developed to incorporate thinking about values into sustainability research (Raymond et al. 2019). Among others, van Egmond and de Vries (2011) presented a framework organizing major value orientations in the population, and Schwartz et al. (2012) proposed a refined framework of 19 basic individual values, organized along several gradients. Recently, a comprehensive endeavour has been developed to bridge various types of thinking about values and their understanding across disciplines, resulting in the Life Framework of Values (O'Connor and Kenter 2019). This framework proposes a space outlined by four broad types of values for nature and nature contributions to people as a boundary object to communicate values in settings including a variety of stakeholders and perspectives. As yet another example, a parallel framework has been proposed within the Intergovernmental Science-policy Platform for Biodiversity and Ecosystem Services (IPBES) as an attempt to bridge different perceptions of the value of nature–the Nature Futures Framework (Lundquist et al. 2017; Pereira et al. 2020).

Interestingly, recent large-scale reviews of future scenarios and pathways carried out within science-policy interfaces (e.g. IPBES' assessments) have shown that the explicit link between values and future development has been missing in a vast majority of reviewed future scenarios across scales, geographies and contexts (Shin et al. 2019). For instance, the IPBES Regional Assessment for Europe and Central Asia has concluded that the concept of values (referring to intrinsic, instrumental and relational values) was considered in only 30% of scenario studies reviewed for Europe and Central Asia, with 19% including values explicitly and only 11% implicitly (Harrison et al. 2018). Values tend to be incorporated in scenarios through participatory scenario building, i.e. a process engaging the stakeholders whose futures are being discussed in the scenario development (Reed et al. 2013). However, examples of value-based scenario planning have been only rare (e.g. studies by Rawluk et al. 2018 and Sandström et al. 2020). In this study, we aim to address this gap and expand current scenario literature with an explicit focus on values. We apply a value-based participatory scenario building approach in an array of case studies, combining state-of-the-art conceptual frameworks and approaches to link participatory elicitation of values with exploration of future pathways. Specifically, we present one of the first empirical applications of the Life Framework of Values

(O'Connor and Kenter 2019) in a novel integration with the Three Horizons framework (Sharpe et al. 2016) (both frameworks detailed in the Methods section). To our knowledge, this represents the first participatory scenario development process linking these two frameworks to implement a values-based scenarios approach. We report the results of the approach and discuss insights gained through its implementation. In addition, we reflect on the context-specific application of value-based participatory scenario development in Central Europe, a region vastly understudied from the perspective of futures research.

Materials and methods

The value-based participatory scenario-building processes were conducted in three Protected Landscape Areas (PLAs) located in Czechia, within the wider region of Central Europe. PLAs in Czechia are protected by the national legislation for their characteristic landscapes and relief, high proportion of natural ecosystems (e.g. forests, grasslands) and sustained historical or architectural heritage. The management of these areas is extensive in order to maintain or improve their environmental condition and ecosystem functions. Recreational use of PLAs is allowed, provided it does not negatively affect local natural assets.

The parallel emphasis of PLAs in Czechia on both natural and socio-cultural assets and heritage means that most local actors regularly face considerations of intertwined social-ecological dynamics. In addition, tensions around the optimal way of landscape management and the strictness of nature and landscape protection has been rather frequent in these areas. These factors provided a rich starting ground for the exploration of social-ecological processes and participatory scenario building in this study.

Case studies

The selection of the case studies followed a two-stage process. In the first phase in 2018, we conducted a series of semi-structured interviews with the chief officers of 20 Czech PLAs to (1) get an in-depth qualitative information on the benefits of the PLAs for local stakeholders and potential conflicts over ecosystem services, (2) identify the most relevant local actors from various sectors (e.g. forestry, agriculture, NGOs), and (3) elicit the willingness of the PLA administration to take part in the participatory scenario workshops (Daněk et al. in prep.). Consequently, we consulted the interview results with the National Conservation Agency of the Czech Republic (NCA) as the central nature conservation governmental body on the national level to elicit its preferences for a case study selection. The general aim was to select different types of protected areas, representing various landscapes and conflicts over ecosystem services across sectors (forestry, agriculture, water quality and quantity, biodiversity protection, recreation and tourism). As a result, three PLAs were selected: Moravský kras (a "karst" PLA), Kokořínsko—Máchův kraj (a "sandstone" PLA) and Žďárské vrchy (a "highlands" PLA) (Fig. 1 and Box S1 in the online Supplementary material). One whole-day

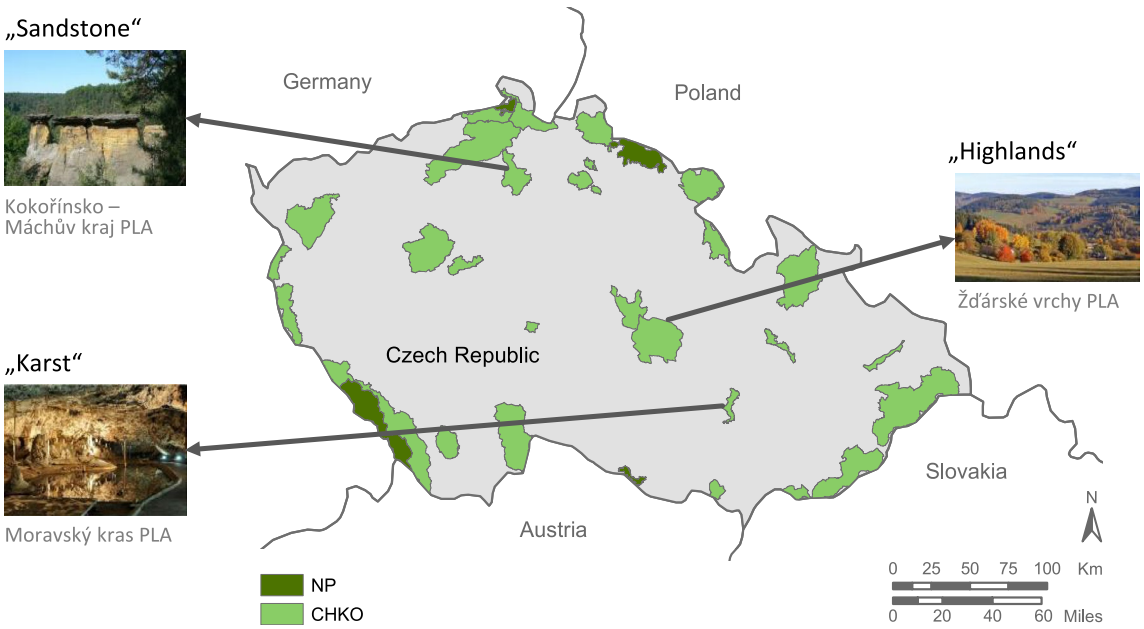

Fig. 1 Location of the three case studies: Kokořínsko – Máchův kraj PLA, Moravský kras PLA and Žďárské vrchy PLA

participatory workshop was conducted in each case study area in 2019.

Stakeholder involvement and the selection of participants

As the representation of different types of stakeholders is key for participatory scenario-building processes, key stakeholders were identified during preparatory interviews with the chief officers of the PLA administration (see above). The identified stakeholders were categorized into key stakeholder groups: municipality representatives, farmers, foresters, tourism agencies or entrepreneurs, NGOs, other entrepreneurs and other institutions including the national administration (e.g. the national administrative body responsible for issues related to water management). We further complemented the preliminary list of stakeholders with internet searches for other relevant actors (e.g. through the websites of local citizen action groups).

During the phase of inviting stakeholders to the participatory workshops, we strived to invite stakeholders from each group to reach their equal representation. In addition, we aimed for equal representation of genders among workshop participants. Stakeholders were invited via email (between 29 and 65 invitations per PLA) and we circulated regular registration reminders. The primary reasons for declining participation were stakeholders' unavailability, other commitments, time constraints, general reluctance to join participatory processes (e.g. from the side of large businesses), and lack of reimbursement for a day spent in a workshop (e.g. freelancers and entrepreneurs not getting paid for a day off their regular professional activities). As a result, stakeholder groups whose professional focus directly benefited from the participatory process reached highest representation. Although some groups remained under-represented, we consider the resulting representation sufficient to inclusively involve stakeholders of distinct interests (Figure S1 in the online Supplementary material).

The resulting numbers of stakeholders participating in the workshops were 25 in the karst PLA (Moravský kras), 23 in the sandstone PLA (Kokořínsko-Máchův kraj) and 21 in the highlands PLA (Žďárské vrchy). Figure S1 shows the number of stakeholders from each group participating in the workshops. The key stakeholders involved in the processes were:

- Foresters (e.g. Czech State Forests, a state-owned company),
- Local farmers (e.g. local farming businesses),
- Public administration of nature protection (e.g. administrations of the PLAs, Nature Conservation Agency of the Czech Republic)
- Public water management and monitoring bodies (e.g. Czech Geological Service, Czech Hydrometeorological Institute)
- Local administrations and municipality representatives (e.g. town and village mayors)
- Local entrepreneurs (e.g. in tourism and education)
- NGOs (e.g. focusing on nature protection and education)
- Researchers from Czech universities and public research institutes.

Across all case studies, it proved most difficult to represent larger businesses, particularly agricultural and forestry ones, which may have been related to the general reluctance of businesses and higher-level actors towards participation in the Czech context. Freelancers and entrepreneurs were another underrepresented group, presumably due to concerns regarding the reimbursement for a lost workday. In the karst PLA (Moravský kras), the participation of state officials was particularly high as this workshop was the first one in the series and was attended by representatives of the Nature Conservation Agency of the Czech Republic as a project partner.

All involved stakeholders received and signed an informed consent confirming that they were sufficiently informed about the content of the research, were willing to take part in the workshop, agreed with further use of workshop materials for research purposes, and agreed to appear in recorded visual materials. The research was conducted following the Ethical Codex of the Global Change Research Institute of the Czech Academy of Sciences (internal directive n. 1/2017).

Process design

The knowledge co-creation process involving the participants and researchers in value-based participatory scenario building was designed based on current approaches developed within the fields of sustainability research and futures studies, and in relation to IPBES. Thus, the sequence of participatory exercises in each workshop built on (a) the recent Life Framework of Values (Arias-Arévalo et al. 2018; O'Connor and Kenter 2019), and (b) the Three Horizons framework for futures exploration (Sharpe et al. 2016; Aguiar et al. 2019). In addition, we aimed to address themes identified as understudied in recent scenario literature, particularly the role of underlying or indirect drivers (i.e. fundamental social processes that underpin the proximate causes of current sustainability challenges; cf. Geist and Lambin, 2002) (Rawluk et al. 2018; Burton et al. 2019; Raudsepp-Hearne et al. 2020).

The Life Framework of Values (Fig. 2a) was selected as a comprehensive yet easy to communicate framework focusing on values of nature, embracing the continuum between

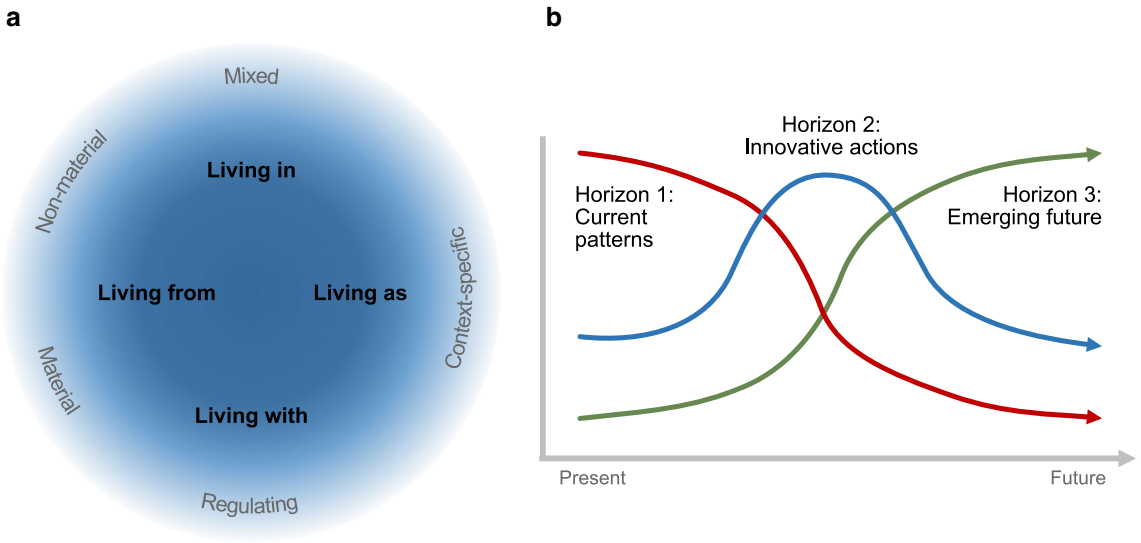

Fig. 2 Simplified representations of the conceptual frameworks applied in the value-based scenario building processes. **a** Life Framework of Values (adapted based on O'Connor and Kenter 2019). The four types of values (Living in, Living as, Living with and Living from) are symbolically linked to respective types of nature's contributions to people (the outer ring of text). The colour gradient has been applied to emphasise the continuous value space and the lack of crisp boundaries between value categories in the framework. b) The Three Horizons framework (adapted based on Sharpe et al. 2016)

different types of values and their fluid boundaries, which seemed to well reflect the context of our case studies. It distinguishes four broad types of values as ways in which people relate to nature, which frame a continuous space where different types of values can be located (Arias-Arévalo et al. 2018; O'Connor and Kenter 2019). The framework has been designed to serve both as a conceptual framework and a boundary object for elicitation of values in different contexts. The "Living from" part of the framework symbolizes relating to nature as a resource of material and non-material nature's contributions (e.g. food, space for research and learning). The "Living in" part symbolizes relating to nature as the setting of human lives, a space for living and recreation, while "Living as" includes the practices and understandings connecting nature and self as a part of one whole. Finally, "Living with" represents relating to nature as a space defining our living conditions and the extent to which they are conducive for life (e.g. regulating nature's contributions) (O'Connor and Kenter 2019).

The Three Horizons framework (Fig. 2b), originating in business management, has been increasingly applied in scenario building to explore new ways of thinking about how to move from the current state to a desired future (Sharpe et al. 2016; Colloff et al. 2017; Pereira et al. 2018). The framework is symbolized by a diagram with three lines, representing (1) current patterns of a system, which may decline in the future (Horizon 1), (2) the future, potentially emerging from certain already existing patterns (Horizon 3), and (3) actions that may help achieve desired futures through incremental innovations or transformative change (Horizon 2). We selected the Three Horizons framework due to our previous experience with its application as a visual facilitation tool guiding participatory scenario-building exercises, in which it proved intuitive and conducive for exploring future pathways in heterogenous stakeholder groups (Aguiar et al. 2019, 2020). In our current adoption of the approach, we focused particularly on Horizon 3 (current actions and the future these may lead to) and Horizons 2 (potential innovative actions that may be influential for the future).

Based on these background conceptual frameworks, we followed a series of three participatory exercises within each workshop process:

1. Exercise 1: identification of participants' values for nature and ways of relating to nature and landscape in their local PLA. This exercise combined individual contemplation and brainstorming, placing post-it notes on a shared diagram of Life Framework of Values and discussing them in plenary.
2. Exercise 2: identification of current individual and institutional attitudes and actions stemming from the previously elicited values, and their potential future impacts on nature, ecosystem services/nature's contributions to people and good quality of life. Exploration of convergences and divergences among the identified future pathway elements. This exercise took place in several break-out group sessions and included placing post-it notes with participants' contributions along Horizon 3 of the Three Horizons diagram. The exercise was complemented by a continuous discussion, further highlighting

the convergences and divergences of envisioned future impacts. Some participants partly transitioned to focusing on innovative measures and actions that may be needed to induce or speed up some of the envisioned future impacts (Horizon 2).

3. Exercise 3: elicitation of underlying drivers perceived by the participants as particularly influential for the outlined future development. This exercise was initiated by individual brainstorming guided by a simple form listing suggestions of such drivers (for the complete list of drivers, see Fig. 5). Participants were invited to allocate to assess the level of importance to each of the drivers on a scale "zero importance"—"low importance"—"high importance"—"crucial importance". Finally, the participants moved to a shared flipchart with an identical list of drivers, and divided six scoring stickers to three drivers which they perceived as most influential. This exercise was followed up by a plenary deliberation of the resulting scores and discussion of differences between participants' individual scores and the group scoring.

Processing of workshop materials

All materials from the workshops were transcribed and photo-documented, and processed as follows:

1. Post-it transcripts from the participatory diagrams of the Life Framework of Values and the Three Horizons were inductively coded (Thomas 2006). The codes were transferred to a spreadsheet database to (1) categorize them into several hierarchical levels of thematic categories, (2) facilitate their comparison within and across studied PLAs to identify thematic convergences and divergences, and (3) calculate descriptive statistics. Finally, dominant themes were further connected into qualitative pathway narratives.
2. The group scoring of underlying drivers was transferred to a spreadsheet editor. We calculated descriptive statistics and complemented the results with qualitative detail from related discussion notes.
3. The flipchart notes from all plenary discussions served as a guide to interpret the representation of values and pathway elements and add qualitative nuance to the resulting pathways.

Results

Values and related actions

The values and related actions identified by the participants in Exercises 1 and 2 were highly similar across all studied PLAs. Thus, we present the results as an aggregated summary of key points for all three PLAs.

In all workshops, participants strongly preferred utilizing the full value space of the Life Framework of Values (Figure S2). They repeatedly emphasised that most of their values cannot fit in a single value type and lie somewhere on the gradient between different value types. Accordingly, the highest proportion of value post-its was allocated in the centre of the value framework in two out of three PLAs (Figure S3), only in the PLA characterized by sandstone towers and lakes (Kokořínsko), values related to "living with" nature were predominant. Interestingly, "living from" nature was represented by almost twice as much value post-its in the highlands PLA (Žďárské vrchy) compared to the other studied PLAs. In terms of represented themes, the highest proportion of values was related to water provision and water cycle; nature in connection with cultural and historical heritage; recreation, relaxation and solitude; and care for nature and nature protection (Figure S4).

It is important to note that different participants often placed values with very similar meaning into distinct parts of the framework, e.g. for some, "space for relaxation" was closer to the "living in" perspective, while for others, it was perceived as "living as". While this did not pose an issue for presenting the results in Figures S3 and S4 (which report values as originally allocated by the participants), it was problematic further on when aggregating the values into broader types and summarizing their links with related actions (e.g. in Fig. 3). At this stage of processing the results, we aggregated the elicited values following the interpretation of the framework by O'Connor and Kenter (2019) in order to resolve participants' diverse allocation of similar values.

The links between different types of values held by the participants for their local PLA and related identified actions are summarized in Fig. 3, ordered according to the general types of values from the Life Framework of Values. In all studied PLAs, the participants emphasised that most of their values have both social and ecological aspects (e.g.

Type of value	Values	Related actions
Living in 	A place for human life, everyday living and work Space to experience adventure, freedom and humbleness, curiosity and inspiration Landscape openness and accessibility Connection to historical and cultural heritage Space nurturing social and cultural values Space for recreation and relaxation	To maintain traditions and traditional architecture To facilitate access to the landscape and natural sites To promote understanding to nature through in-situ, nature-based experiential education and awareness-raising To expand recreation opportunities
Living as 	Connection to specific and unique ecosystems, species, places and their characteristics Space for spiritual enrichment, solitude and thinking, experiencing calmness and energy Space to observe the cycle of life Nature as a "source of everything" Space to feel as a part of nature	No actions mentioned
Living with 	Care for nature, nature protection and conservation Respect for animals and plants Biodiversity, ecosystems, habitats, assemblages, processes, ecological links Diversity and richness of nature and landscapes Ability to adapt to changes and cope with catastrophes Regulation of pollution and micro-climate	To care for, protect and conserve the most vulnerable species, habitats and parts of nature To minimize human impact in protected areas To limit disturbance and pollution To monitor species and populations To restore ecosystems and habitats To limit waste production and improve waste management To improve waste-water treatment
Living from 	A vital condition for a healthy life A source of local livelihoods and economic welfare Sustainable use of nature and natural resources, sustainable agriculture Provision of food, water and energy Clean water and healthy soils Provision of genetic resources Healthy environment Space for learning, education and research Space for tourism and sports	To improve water retention in the landscape, implement measures against water pollution from agriculture, restore small-scale water bodies, wetlands and marshes To limit soil erosion on arable land To deliberate the balance between agricultural sustainability and profitability To enhance sustainable management of forests, their age and species diversity To embrace both the production- and the non-production function of forests To limit the pressures of large-scale, concentrated tourism To promote soft tourism and agritourism To promote low-carbon means of transport
Centre 	A "harmonic", "friendly" and diverse rural landscape Typical landscape character Balance between different types of values Balance between wilderness and cultural landscapes	To maintain balance between different groups of interests and values To promote the sense of care To enhance sustainable management, forestry and agriculture To protect and sustain typical landscapes To be aware of the complex links between nature and human activities To consider climate change in sustainable management To restore pathways

Fig. 3 Summary of values and related actions elicited from workshop participants, ordered based on the Life Framework of Values

maintaining local traditions and sense of place is related to protecting both specific local natural sites and local architecture), and thus require multifaceted actions.

A term frequently mentioned by the participants when commenting on their values and related actions was "balance", mostly allocated to the centre of the framework (Fig. 3). Participants referred to "balance" as a desirable state of landscapes in which all types of values for nature are accommodated in parallel, i.e. landscapes are managed to provide space for nature and its contributions, historical and cultural heritage, space for economic development and recreation, as well as rural lifestyles. A related aspect of "balance" was providing space for both wilderness and managed/cultural landscapes. It was apparent that this represented an ideal requiring the resolution of divergences and trade-offs among participants' interests. The identified actions and management styles related to the value of "balance" were e.g. to pursue sustainable nature-based landscape management, to embrace the stewardship aspect of managing the land, to sustain livelihoods while not exploiting nature, to support harmony between the values of the locals and the visitors, and to provide conditions for people and nature to "influence each other in a positive way". However, it also became apparent that there are two relatively opposite preferences for the management and governance of the PLAs: on the one hand, some participants prioritized protecting natural environment, traditional landscape and architecture, including stricter rules for construction and limits to access to selected natural areas (often stemming from the "living with" value frame; Fig. 3). On the other hand, other participants warned against tendencies to "seal" the current state of both the environment and local municipalities, and against preventing ecosystems and communities from developing further (often related to the "living from" frame and the centre of the framework; Fig. 3). The "living in" value frame was linked to the elements of both of these management preferences.

Future impacts

These divergences among perspectives became even more apparent in Exercise 2 using the Three Horizons diagram (Figure S2), exploring potential future impacts of previously elicited values and actions on nature, ecosystem services/nature's contributions to people and good quality of life. As in Exercise 1, similarities emerged across the studied PLAs both in terms of the envisioned causal chains between impacts on nature, ecosystem services/nature's contributions to people and good quality of life, and in terms of the recurrent divergences between participants' perspectives within each group.

The divergences between envisioned future impacts were centred around six key themes: (1) tourism, (2) PLA conservation, (3) landscape management, (4) water retention in the landscape, (5) education as a precondition for sustainable governance, and (6) community, livelihoods and well-being. Thus, for each of these themes, we present participants' input aggregated to distinct future pathways summarized in Fig. 4 and detailed in Box S2.

The explored pathways included multiple social-ecological trade-offs, identified by the participants. These were primarily between the need to sustain local livelihoods and expand space for personal and economic development, while maintaining the traditional character of local landscapes, pristine nature and extensive management. Participants were particularly divided around the question whether further intensification of local agriculture is necessary or desirable and whether local agricultural practices do or do not have negative impact on the environment. Furthermore, the trade-offs often linked potential future state of the landscape ("harmonic and balanced" vs. "intensive and overexploited") with the state of local communities (active, seeking deliberation and consensus vs. disengaged and prioritizing siloed group interests).

Underlying drivers

Finally, in Exercise 3, the participants indicated which underlying drivers they deem strongly influential for the future development of their local PLA. This exercise revealed which factors the participants perceived as particularly important in terms of which of the previously explored future pathways may be taken and which trends may prevail.

Among the highest scored drivers were relationship with nature; the type of sustainability discourse in the society; and the level of cross-sectoral and cross-institutional collaboration (Fig. 5). Particularly the lack of collaboration between institutions, different governmental administrative bodies and the lack of multi-actor platforms facilitating deliberation between different sectors was mentioned as a barrier to sustainable management of the PLAs, frequently hampering the efforts of local citizen initiatives. In addition, the power of large external (primarily agricultural) corporations and economic actors was mentioned as an important factor, influencing whether local agriculture will follow a diversified, extensive and sustainable pathway, or will further intensify regardless of the unique conditions of the local PLAs. Another highly scored factor was path dependency and the role of local historical development.

The scoring of some of the underlying factors differed among the PLAs. While the level of individualism was deemed influential for future development in the sandstone PLA (Kokořínsko) and the highlands PLA (Žďárské vrchy), it did not score highly in the karst PLA (Moravský kras) (Fig. 5). A similar pattern was present for the role of power

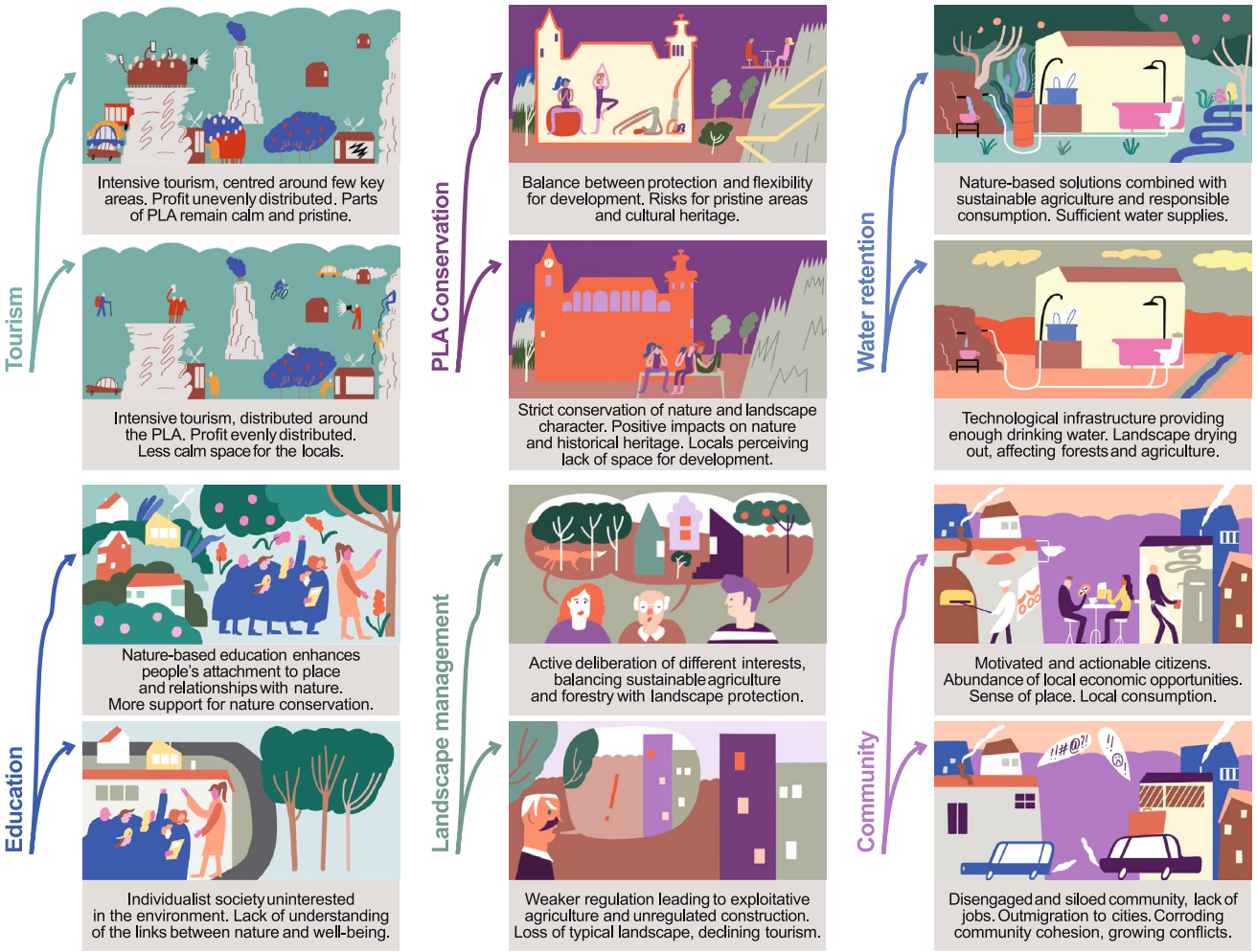

Fig. 4 Summary of elements of the explored future pathways, divided into six key themes of divergence among the participants' perspectives. (Illustration: Anastasia Stročkova)

imbalances and wealth distribution. Nevertheless, this was partly contradicted by some contributions in the following discussion, emphasising that lobbying represents a powerful tool to promote specific interests.

Interestingly, several factors were not perceived as influential according to the participants. Specifically, these were gender inequality; social networks; competition and overwhelming workload; as well as corruption and malignant governance.

The final discussion particularly highlighted several cross-cutting and cross-scale factors:

1. Mismatch between regulations and local realities. The participants emphasised existing mismatch between national-wide regulations and the specific situations faced in the PLAs in landscape management and planning. This was described as a major barrier hampering locally-specific sustainability solutions.
2. The level of openness of decision-making processes to public participation and citizen involvement. These were perceived as key aspects that may enhance the functioning of local communities and PLA management in the future, but also lead to general demotivation and fatigue of local citizens, if missing. Multi-actor platforms allowing for discussion and deliberation were identified as key yet absent tool. It was highlighted that a functional participatory model of the governance of the PLAs would include public consultations from the very beginning of decision-making processes. On the other hand, the participants highlighted that involving participants in the process while failing to incorporate their input in the implementation phases may also lead to negative results.
3. The design of subsidies. The participants repeatedly mentioned ill-designed incentives and subsidies as one of the reasons of unsustainable landscape management. In this respect, overly rigid regulations for the imple-

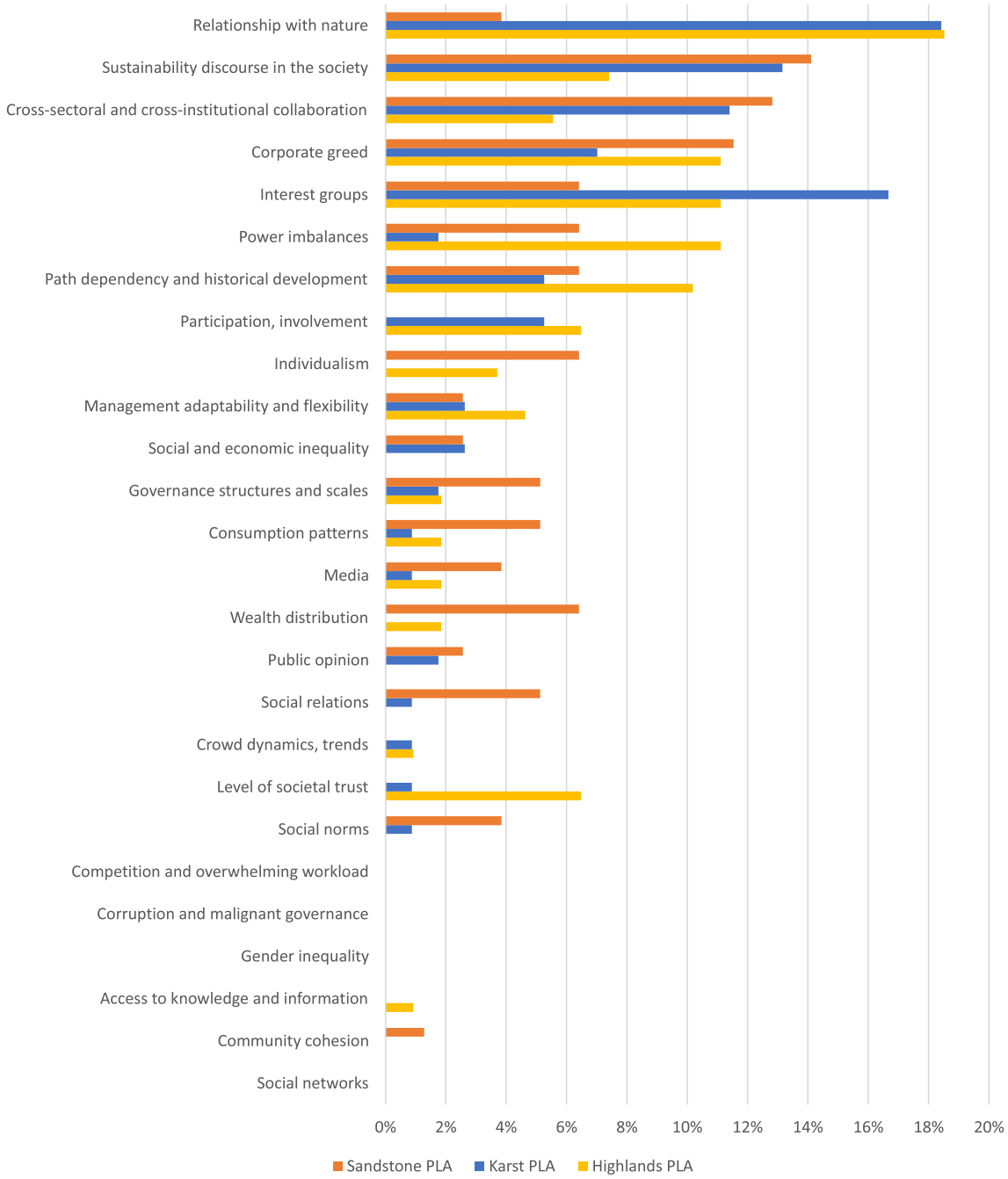

Fig. 5 Proportion of participants' votes allocated to the underlying drivers deemed as most influential for the future development of the local PLA

mentation of new nature-based measures was highlighted as a major barrier to e.g. enhancing water retention in the landscape.

4. Availability of small-scale funding for "seed" projects and experimental initiatives. According to the participants, this factor would allow for further diversification of economic and citizen activities in the PLAs and bring more flexibility to its management.
5. Link between ownership and responsibility. The participants highlighted that in the post-communist realities of Central and Eastern Europe the understanding of ownership (e.g. of land) as being tightly linked to responsibility towards the larger community has been only slowly developing.

Discussion

Reflections on the strengths and limitations of the approach

This study represents one of the first empirical applications of the Life Framework of Values and its first connection with the Three Horizons framework in participatory scenario development. In general, the approach connecting the two frameworks proved beneficial by providing a structured space to incorporate value elicitation within participatory co-creation of future pathways. In general, the approach was feasible to implement in the workshop design and intuitive to follow for the participants. While thinking about values and futures was perceived as rather complex by the participants, combining the Life Framework of Values and the Three Horizons framework seemed facilitative. The exercises related to both of the frameworks seemed relatively easy to comprehend for the participants and encouraging their engagement.

Regarding the Life Framework of Values, the participants appreciated the fluidity of the boundaries between the life frames, yet still, they frequently expressed that allocating their values to a particular place in the framework feels contrary to their perception that their values were multifaceted and spanned the "whole space" of the framework. Although the design of Exercise 1 allowed the participants to place an unlimited number of post-its to any part of the value space and it was clarified that there are no sharp boundaries between the value frames, the centre of the framework turned out to be an intuitive place for the participants to put their post-its to emphasise that some of their values span across multiple life frames.

Once explained, the life frames as conceived theoretically by O'Connor and Kenter (2019) were easy to understand by the participants, however, it remained unclear whether they would interpret their values differently without being faced with the framework from the very beginning. Our lesson learnt is that ideally, before framing the discussion on values with any framework, the process should start with participants' unconstrained reflection on values, so that their mindset is not influenced by the framework logic from the very start. Such an approach could include two steps: (1) an initial open reflection of values, to minimize restraining how participants consider and express their values, and (2) further exploration of values guided by the life frames as prompts to make sure that participants consider values relating to the full breadth of human-nature relations. In our point of view, this approach would combine the advantages of uninfluenced thinking with the structure and comprehensiveness provided by the framework.

In addition, it is important to note that while the participants seemed to understand the framework quite readily, they occasionally placed seemingly similar values into different parts of the framework. From the related discussions during the workshops, we understood that this was happening primarily due to participants' different interpretations of certain values, rather than potential misunderstanding of the dimensions of the framework.

In comparison with other available value frameworks, it seemed that the advantage of the Life Framework of Values lied in embracing participants' intuition and referencing their lived experience with nature, instead of relying on rather abstract thinking about values such as in the case of the intrinsic/instrumental/relational framing (e.g. Pascual et al. 2017). From the facilitation perspective, a key asset of the framework seemed to be its circular shape which reinforced the notion of the continuity of the value space and the fluidity of value boundaries. This seemed to help participants embrace the multidimensionality of their values and avoid gravitating towards the framework poles/extremes. In this respect, it has yet to be explored whether the latter might be an unintended consequence of a framework design containing linear edges and corners, cf. the Nature Futures Framework; Pereira et al. 2020.

The Three Horizons framework proved as intuitive for the participants, particularly due to the step-wise design of the process. While discriminating between the Horizons seemed easy for the participants, it was rather difficult for them to focus on one Horizon at a time (similarly to the dimensions of the Life Framework of Values). It was quite common that participants shifted back and forth between actions and future impacts while contributing to the diagram. However, in our understanding, this only strengthened participants' thinking about the connection between current and future dynamics. In addition, the participants quite commonly redirected their attention to barriers when talking about concrete steps to enact their value perspectives (e.g. poorly designed incentives preventing them from implementing nature-based solutions in the landscape).

Divergences and trade-offs: cross-scale and multidimensional

The participatory processes connecting the explorations of values and future pathways in three Czech PLAs illustrated that the relationships between multiple types of values for nature and potential future pathway trajectories are complex. Participants within and across the studied areas held diverse and multifaceted yet largely similar values for nature. They also related their values to mostly similar sets of actions. Nevertheless, several key divergences emerged

among participants within all PLAs in terms of what potential impacts these actions may have in the future on nature, ecosystem services/nature's contributions to people and good quality of life.

The resulting alternative pathways, outlined for each theme of divergence, illustrated that important multidimensional trade-offs may arise both between pathways and within them (Bremer et al. 2018). The dimensions of these trade-offs included (a) prioritizing different types of ecosystem services/nature's contributions to people, (b) prioritizing environmental protection vs. promoting profit-generating activities, (c) prioritizing benefits for different types of actors, (d) prioritizing different modes of functioning of local communities, and (e) promoting different forms of decision-making processes. The diverging pathways and their trade-offs highlighted that no potential pathway represents a purely win–win solution, and each one may have different winners and losers (Daw et al. 2015; Fauré et al. 2017). Potential reframing of the identified trade-offs as conflicts (Holland 2002) in order to further study their implications for local decision making was beyond the scope of this study but represents an important perspective on future pathway exploration in this context (Aguiar et al. 2020).

Importantly, the trade-offs were identified both on the local level, and when considering the interplay of local decision-making with higher-scale legislation and regulatory processes, institutional functioning and the influence of external large businesses (Armitage 2007; Gómez-Baggethun et al. 2013; Berkes 2017). These findings clearly highlighted that in addition to which values are held, it is important to consider by whom they are held, and how powerful different actors and institutions are in promoting pathways representing their priorities (Leach et al. 2018). This emphasises the role of power relations and inequality in values deliberation and in deciding which values will surface in the form of tangible actions, with subsequent influence on the future of nature, nature's contributions to people and good quality of life (Zafra-Calvo et al. 2020).

Thus, our results illustrate the importance of nurturing social and institutional processes controlling for power imbalances at all scales and leading to more effective deliberation of values and priorities across scales (Cloutier et al. 2015; Frantzeskaki and Kabisch 2016; Castro et al. 2019), particularly in the context of Central and Eastern Europe, where the tradition of combining top-down and bottom-up decision-making processes is only in its beginnings (Guasti 2016).

Discontinuities in the causal chains between values, actions and impacts

The exploration of values and future pathways revealed multiple points of discontinuity in participants' understanding of the links between their values, current actions and future impacts. The discontinuity between held values and materialized actions has been thoroughly studied in the field of (environmental) psychology and is beyond the scope of this study (Kaiser et al. 1999; de Groot and Steg 2010). On the contrary, the discontinuity between participants' prioritization of actions and understanding of their potential future impacts represents an interesting issue within futures studies. In our study, participants tended to selectively focus on the positive impacts of their current actions or actions they deemed desirable (e.g. farmers naming more food and more profit as the result of intensified agriculture, while disregarding higher water pollution). In addition, some of the discontinuities stemmed from the way participants perceived their respective social-ecological systems: while in general, the participants seemed to have a profound understanding of systems structure (e.g. people, institutions, natural sites and species constituting the system), they often struggled with step-by-step exploration of systems links and causalities.

It is thus crucial to strengthen the explicit focus on social-ecological links in participatory scenario building processes, and move from participatory elicitation of scenario elements to the elicitation of their relationships. In this respect, the use of participatory systems diagrams in local-scale participatory futures exploration (Galafassi et al. 2017) represents a promising avenue for future scenario research (Videira et al. 2017; Allington et al. 2018).

Underlying drivers in the context of Central and Eastern Europe

How underlying drivers are perceived by various societal actors and how they influence future social-ecological dynamics represents an important gap in the scenario literature requiring further research (Raudsepp-Hearne et al. 2020).

The exploration of underlying drivers in this study showed that when asked to identify drivers particularly strongly influential for future dynamics in the PLAs, the participants scored several drivers particularly low, namely gender inequality, social networks, and corruption and malignant governance. These results are interesting in comparison with current scenario literature which considers these drivers as highly influential (cf. Frantzeskaki and Kabisch 2016; Rawluk et al. 2018; Burton et al. 2019).

The low scoring of gender inequality may have been caused by the fact that gender discourse in the Czech society has initiated relatively recently and the awareness of gender-related issues is generally low among the population (Libora Oates-Indruchová 2016). Patterns of interpersonal and societal dynamics thus tend to be attributed to factors other than gender.

Social networks, recognized as a key driver of recent socio-cultural and political developments (Vosoughi et al.

2018), were scored equally low. This may be attributed to the fact that (a) the participatory workshops were attended by age groups that do not belong to common users of social networks in the Czech population, and (b) all of the PLAs are set in primarily rural areas with lower level of subscription to social networks and related lower awareness of their influence over current social dynamics at the global scale.

Corruption and malignant governance were not perceived as a factor strongly influencing future dynamics in the PLAs. However, this contrasted with the identification of the role of power imbalances, influence of large businesses, corporations and interest groups as highly influential drivers. This discrepancy may have been caused by partly overlapping understanding of these phenomena by the participants. This ambiguity needs to be unpacked by further research as the characteristics of decision-making processes have been emphasised as a key leverage (and barrier, respectively) to sustainable governance of the PLAs by the participants.

On the contrary, there was substantial agreement on the strong role of human relationships with nature and the type of sustainability discourse in the society (Ives et al. 2018), particularly in relation to the "living in" value frame. The importance of these drivers for the participants was further corroborated by the previously identified actions–their large proportion was related to nurturing relationships with nature through nature-based experiences and education, and building awareness of sustainability issues through allowing people to visit and experience local landscapes with their social and ecological assets. We argue that these points of convergence should be prioritized and leveraged to strengthen local sustainable governance (Abson et al. 2017).

Participatory scenario building in the context of Central and Eastern Europe

Participatory processes have been acknowledged as a means to more just and legitimate scenario-building. Furthermore, they have been recognized as a means to give voice to multiple types of expertise, experience and opinions (Reed et al. 2013). However, the key aspect to the success of participatory scenario building is to ensure that the participants of the process are able to see tangible impacts of their scenario-building efforts (Reed 2008). Depending on the scale and context, this may mean e.g. the alteration of decision-making processes or incorporation in plans and strategies. However, for such outcomes, the larger governance system in which the participatory scenario-building exercise is nested, needs to be able to (a) align its processes with participation and (b) efficiently accommodate its results (Cvitanovic et al. 2019).

During the participatory processes within this study, the stakeholders have voiced their concerns that the results of similar participatory efforts do not tend to be effectively picked up by decision-makers and authorities, which makes participants' involvement a questionable investment of time and energy (cf. White 1996). This indicates that while participatory processes have been highly beneficial in numerous contexts and situations (Oteros-Rozas et al. 2015), in specific contexts including (Central and Eastern Europe), they can be burdened by socio-cultural and institutional barriers, as well as the legacy of the historical development and decision-making path-dependencies (Rose-Ackerman 2007). Specifically, in Czechia, deliberation of values and future pathways faces the lack of space for participatory processes in the general institutional frame, combined with the lack of bottom-up motivation to push the role of participation further (Hooghe and Quintelier 2014). All these factors may hamper the utility of value-based participatory scenario planning as a means to strengthen local-scale decision-making processes. Furthermore, this situation puts additional pressure on the involved researchers to avoid contributing to "participation fatigue" among involved participants.

In the light of these context-specific constraints to participatory scenario planning and participatory processes at large, we argue that it is vital to seek new ways how to increase the utility of participatory deliberation of values and future pathways within existing socio-cultural and institutional barriers, and unique social and institutional path dependencies (Leventon et al. 2019).

Conclusions

This paper summarizes the results and lessons learnt from an array of value-based participatory scenario-building processes in the context of PLAs in a Central European country. The results illustrate that explicitly incorporating values into scenario-building processes can help surface convergences and divergences among stakeholders' perspectives.

Participants across the PLAs held similar broad ranges of values for the natural environment and related them to similar sets of actions to promote these values in their area. However, the subsequent exploration of future pathways revealed several themes of divergence, where participants envisioned different potential impacts on nature, nature's contributions to people and good quality of life. Importantly, which pathways will be ultimately followed was attributed to a set of cross-scale and cross-sectoral underlying drivers, including relationship with nature; the type of sustainability discourse in the society; and the level of cross-sectoral and cross-institutional collaboration.

Although participatory processes tend to be recognized as a promising means to just decision-making and sustainability governance, this study illustrates that particularly in the context of post-communist Central and Eastern European countries, participation faces multiple challenges.

Alternative means of the deliberation of values and future pathways, better suited to these specific contexts, may be needed to effectively incorporate multiple types of values into landscape management, nature protection and sustainability governance.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical statement The research was conducted following the Ethical Codex of the Global Change Research Institute of the Czech Academy of Sciences (internal directive n. 1/2017). All involved participants were familiar with and signed an informed consent confirming that they were sufficiently informed about the content of the research, were willing to take part in related workshops, agreed with further use of workshop materials for research purposes, and agreed to appear in recorded visual materials.

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