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Achieving Robust and Socially Acceptable Environmental Policy Recommendations: Lessons from Combining the Choice Experiment Method and Institutional Analysis Focused on Cultural Ecosystem Services

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Abstract: The reflection of ecosystem services in environmental policy has recently become a key aspect in solving environmental problems occurring as a consequence of their overburdening. However, decision makers often pay attention predominantly to results of quantitative (monetary valuation) methods. This article explores a new way of combining quantitative and qualitative methods that has proven to be a useful practice for achieving better environmental governance. We combine the (quantitative) choice experiment method and (qualitative) institutional analysis as full and equal complements. In our approach, the goal of qualitative institutional analysis is not to verify the adequacy of willingness-to-pay results but rather to better address cultural and social perspectives of society representatives. Such an approach increases the robustness of policy recommendations and their acceptance in comparison with isolated applications of both methods. To verify this general premise, both methods were applied in the territory of the Eastern Ore Mountains in the Czech Republic to capture preferences and attitudes of local stakeholders as well as tourists towards small-scale ecosystems. The results confirm that preference calculations regarding aesthetic values of ecosystems need to be complemented with facts about institutional settings and barriers in order to better address locally relevant recommendations for decision makers, such as the introduction of new economic instruments (e.g., local taxes or entrance fees). The findings of this study can also be considered for governance of larger local, common-pool resources such as (public) forests or protected areas.

Keywords: choice experiment; ecosystem services; institutional analysis; environmental governance; mixed-method research; small-scale ecosystems

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1. Introduction

The concept of ecosystem services (ES), defined as benefits that people obtain from ecosystems [1] or as the direct and indirect contributions of ecosystems to human well-being [2], focuses on the identification of benefits that arise for human society from undamaged natural systems and on ways to reflect these benefits in decision-making processes.

Social well-being is influenced by changes in the structure and functioning of ecosystems and the services provided by them [1]; the value of ecosystems is still consistently underestimated in land-use planning and decision-making processes, or they are typically not considered as a precious good, which affects the resulting environmental policy [3], especially when speaking about cultural ES [4]. The reflection of ES in environmental policy has recently become a key aspect in solving environmental problems occurring as a consequence of their overburdening. Among social science researchers, an emphasis is put primarily on analysing economic and institutional aspects of the ES concept in connection with an effort to reflect the concept in specific environmental policy tools in the area of nature and natural resource conservation.

Although pure decentralisation of decision making is not viewed as a panacea [5], it has been confirmed that participation of different types of resource users results in better acceptance of existing policies, and to some extent, they shape individual values towards greater sustainability [6–8]. Therefore, bringing local stakeholders (such as municipal representatives and policy makers, local nature protection experts, non-governmental organizations (NGOs), land owners or entrepreneurs) and citizens to the table is considered a necessary step to achieve successful and socially acceptable environmental governance [9–13], as well as identifying and evaluating conflicts among various ES user groups [14]. However, solely qualitative analysis cannot reveal the strength of the preferences, and sometimes it is hard to address the environmental policy priorities properly only on the basis of qualitative analysis. According to Busch et al. [15], a lack of explicitness and accountability is one of the important shortcomings of qualitative methods (for a further discussion about the limitations of using qualitative analysis outputs for policy making and qualitative research in general, see [16,17]). The same is true of using solely quantitative (valuation) methods as an input for environmental policy recommendations. As Moran et al. [18] point out, in many research papers, "there is a conviction that monetary valuation methods and cost–benefit analysis often limit the decision-making process and that alternative deliberative or multicriteria methods can be more fruitful in terms of the information that can be derived for policy making" (p. 42). According to van den Bergh [19], "a quantitative analysis is often unable to offer more informative insight than a qualitative analysis" (p. 392). Especially in the case of cultural ES, the monetary valuation based on neoclassical economics is seen by some scholars as an inappropriate valuation framework [20] because it may be difficult for people to assign value to them [21].

A combination of multiple research methods in order to address complex environmental problems properly has been advocated by numerous scholars [15,22–24]; when speaking specifically about cultural ES, Cabana et al. [25], among others, draw attention to mixed-method research. In this paper, we combine the choice experiment (CE) method and qualitative institutional analysis (IA). Our approach differs from other authors in the sense that both applied methods represent full and equal complements. We argue that the combination of methods and their sequence suggested in this paper can open up new ways for research design. It could be useful in searching for more suitable and socially acceptable ways of improving environmental protection. The combination of methods could help to formulate robust policy recommendations that reflect in depth the context of the present situation on the site regarding the ecosystems in question and the understanding of people's preferences in their complexity, including cultural and social perspectives of society representatives. Monetary valuation can deliver a basic orientation in people's anthropocentric values (preferences) regarding ecosystems and the services they provide. Qualitative IA can deepen the scientific knowledge of reasons for sub-optimal management (i.e., why the real management disproves the preferences) and help to find effective tools for improvement, especially at the local level. The approach also intentionally follows the conclusions of Elinor Ostrom's research stressing the advantages of local governance schemes for common-pool resources [7].

1.1. Multiple Methods for Analysis of Local Governance Systems

Generally, the feature of multiple research methods has been surveyed within the fields of economics [26], sociology and psychology [27]. It is sometimes called methodological triangulation [28], the mixed-method or multi-strategy research [27], and it is centred on the complementarity of quantitative and qualitative research methods. Although some social scientists (especially economists) still emphasise a priori the superiority of quantitative research [29,30], it is becoming more apparent over time that a combination of methods not only is possible but that it also has important value added for (environmental) policy design. Some critical points against using outputs solely from quantitative valuation methods in decision-making processes are summarised in Tiermann and Ring [31] or Garmendia and Pascual [32]. Further limitations of economic valuation and its use for decision making

are discussed, e.g., in [33–36]. According to Zendehdel et al. [37], qualitative methods are more accurate for analysing environmental preferences of stakeholders than monetary approaches. Nevertheless, evidence of conscious methodologically triangulated or purely qualitative socio-economic research represents a minority among the published papers, which also holds true for economics of the environment represented by various schools of thought (see [38] for a general overview). Within economics, Downward and Mearman [28] justify mixed-method research on ontological grounds and Starr [26] offers a comprehensive survey of mixed-method papers. From Starr's survey, it is apparent that studies of the willingness to pay for environmental interventions represent one of the identified branches in which the acceptance of qualitative methods arises. However, there are also worries regarding combinations of both types of methods. As Olsen [39] summarises, research can be considered either intensive (qualitative) or extensive (quantitative) and, therefore, the methodologies are often viewed as incompatible. There are also objections against the qualitative data bias. Buchanan [40] sees the main problem in transformation of qualitative data into the quantitative format.

Despite the evidence mentioned, conscious mixed-method research is rarely applied in research practice. Furthermore, in most of the cases, the qualitative method represents only a supplementary tool for verification of quantitative (extensive) research. This is, for instance, the case of Powe et al. [41], who use a post-questionnaire focus group analysis to increase the relevance of stated preferences revealed through the CE method. For the authors, qualitative methods are useful "to explore the public acceptance of the valuation exercise" [41] (p. 514). A similar approach was taken by Clark et al. [42], except using the contingent valuation method. Contrarily, Ahlheim et al. [23] used so-called citizen expert groups for the survey design to justify the contingent valuation method undertaken via mail. In Table 1, we further summarise the mixed-method environmental research undertaken that we consider the most relevant for our approach.

Table 1. Forms of mixed-method research containing willingness-to-pay concerns (source: authors).

Author, Year	Quantitative Method	Qualitative Method	Relationship between Qualitative and Quantitative Methods	Topic
Powe et al. 2005 [41] Austin et al. 2010 [43]	Choice experiment	Focus groups	Qualitative method as a supplement to quantitative method	Water services Biodiversity management
Ahlheim et al. 2010 [23]	Contingent valuation	Citizen expert groups	Qualitative method as a supplement to quantitative method	Drinking water services
Clark et al. 2000 [42]	Contingent valuation	In-depth discussion and focus groups	Qualitative method as a supplement to quantitative method	Nature conservation
Desaigues 2001 [44]	Contingent valuation	In-depth interviews	Qualitative method as a supplement to quantitative method	Air quality
Feucht and Zander 2018 [45]	Choice experiment	In-depth interviews	Qualitative method as a supplement to quantitative method	Climate change
Our approach	Choice experiment	Institutional analysis	Qualitative method as a full and equal complement to quantitative method	Small-scale ecosystem management

The CE method used in our approach is currently the most reliable stated preference method [46], and it is widely applied to numerous environmental issues by both environmental and ecological economists (e.g., [47–51] or [52]). Regarding the theoretical background of the method, discrete choice modelling complies with Lancaster's approach to the individual utility maximisation problem in consumer theory [53] and also with random utility theory [54]. Random utility theory [55,56] then postulates that utility is a latent construction that exists in the consumer's mind and cannot be observed directly.

The renaissance of various types of IA in natural resource governance studies began in the 1990s, together with the new focus of ecological economists ([57,58]) and other scientists dealing with resource use and protection [7]. The main goal was to understand how institutions evolve and how they shape the behaviour of resource users. The method itself is less formalised; data collection is often undertaken via desk research, field observations and

interviews or focus groups with stakeholders. Therefore, various analytical frameworks to cluster gathered information have been developed (e.g., Petursson and Vedeld [59] representing the typical application). Our approach followed Elinor Ostrom's research stressing the advantages of local governance schemes for common-pool resources [7]. The information (on actors and their positions, institutional arrangements, community attributes) gathered in the IA and CE method was clustered according to the main categories of the Institutional Analysis and Development (IAD) Framework (for the entire scheme and explanation, see, e.g., [60]).

1.2. Aims and Objectives

Many arguments and complaints have been raised regarding the insufficient use of the ES valuation for decision making (e.g., [61–63]) and about incorporating cultural ES into environmental assessment [64] and landscape management and planning [52,65,66]. It is often pointed out that policy recommendations based on monetary valuation results are made without "being either explicit or contextualized, and without concrete examples being provided or analyzed" [62] (p. 217). This paper focuses on a combination of two research methods—the quantitative choice experiment and qualitative institutional analysis. We apply both methods in a case study realised in the Eastern Ore Mountains region of the Czech Republic to capture preferences and attitudes of local stakeholders as well as tourists towards small-scale ecosystems. The goal of this field research was to investigate how the combination of methods could be used for achieving a more sustainable management of these ecosystems at the local level and for better presenting their ecological importance to local stakeholders and citizens (visitors). However, for the purpose of this paper, we intend to use the research results to answer the following questions: How, if at all, are outputs of qualitative analysis able to support monetary valuation results (both done in the same territory)? How, if at all, does the combination of methods increase the robustness of conclusions and their acceptance for policy makers? Answering these questions could bring valuable inputs for (local) common-pool resource governance, such as streams and rivers, mountain meadows and pastures or forests. This is especially true for countries where a large share of land is owned by the public sector (e.g., more than 72% of the forests in the Czech Republic are owned by the state or municipalities).

2. Materials and Methods

2.1. Overview

The field research was designed to capture the preferences and attitudes of local stakeholders and tourists towards local specific small-scale ecosystems (mountain meadows, mountain streams and clearance cairns) and to find ways for their more sustainable management. The application of the different methods proceeded in the following steps: (I) quantitative analysis using the CE method to identify the site visitors' willingness to pay for a specific state, or change of state of a specific ecosystem. (II) Parallel to that, qualitative IA in order to identify determinants of management practices regarding the small-scale ecosystems in focus. The goal of the IA was not to verify the adequacy of the willingness-to-pay results but rather to better address cultural and social perspectives of society representatives and to reveal institutional failures that lead to the mismanagement of ecosystems in focus. (III) Finally, the valuation analysis results (CE) were combined with the IA findings and recommendations for local representatives were derived.

2.2. Study Area

The case study was undertaken in the Eastern Ore Mountains (*východní Krušné hory*). The region in focus is situated in the northern part of the Czech Republic (Figure 1). It has a strong cross-border aspect, because the German border traverses the mountain peaks. On the Czech side (where the research was undertaken), the extent of the area is 200 sq. km and the altitude varies between 350 and 850 metres above sea level. In the Eastern Ore Mountains, there are two nature reserves with dozens of specially protected fauna and

flora species (Černá Louka, 130 ha, and Špičák, 72 ha). These two nature reserves were the special focus of our research.

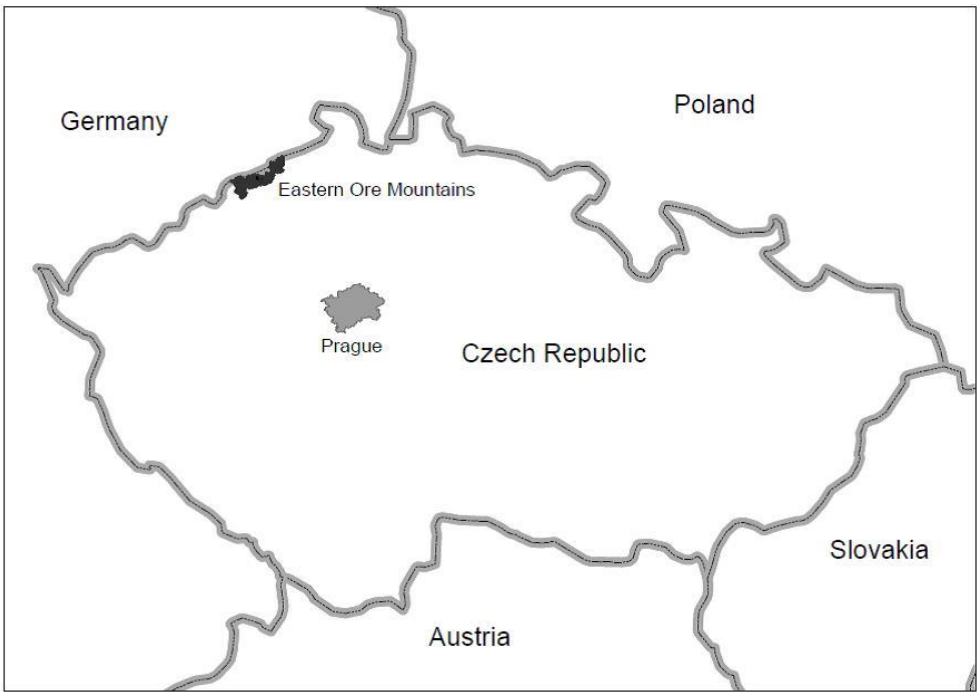

Figure 1. Location of the Eastern Ore Mountains in the Czech Republic (source: authors).

Thanks to the strong deforestation in the past, a part of the case study area is open, with many lookouts into the surrounding landscape or covered by young mixed forests. The landscape of the case study region contains several small-scale ecosystems that make the countryside ecologically and aesthetically valuable, such as mountain meadows with high flora diversity, mountain streams and so-called clearance cairns. These cairns are strips 2–4 m wide and 1 m tall that historically arose in the 18th and 19th centuries as stones were shifted away from fields (stone hedges were created analogously, e.g., in England and Wales). Mountain meadows cover more than 59% of the area, and large re-naturalisation of a stream was undertaken in one of the reserves.

The mountain region of the Eastern Ore Mountains is affected by economic decline (with more than 15% unemployment). The municipalities have mostly 850–1250 inhabitants, but they are each spread across several distinct settlements (population density < 25 inhabitants/sq.km). The average age of inhabitants is 39 years, and the population age of 15–64 years makes up 67% of the total. Due to a large population displacement after 1945, the cultural evolution of the area has been interrupted, but it has slowly been recovering since then.

The high concentration of heavy industry in the lowlands affected the mountain forest ecosystems negatively (mainly through sulphur dioxide emissions) as well as intensive agricultural industry, which resulted, e.g., in the channelisation of many mountain streams. The fall of the Communist regime (1989) brought a decline of the heavy industry and the intensive agricultural industry. The economic exploitation of the region (especially the highlands) has shrunk, and the environmental quality of the mountain region has improved rapidly [67].

Nowadays, the main economic activity in the area is pastoralism, but the region is slowly reorienting to tourism (walking, cycling and skiing). There are plans to re-establish some of the defunct mountain settlements, but the tourist infrastructure is rather underdeveloped due to the overall economic decline. The region is not subject to nature protection as a whole, but some parts belong to small-scale nature reserves. However, the ecological quality (but also aesthetic beauty) of the small-scale ecosystems mentioned

above is dependent on regular management, such as grass mowing (often with scythes), clearing of the cairns and re-naturalisation of artificially regulated channels of the streams.

2.3. Choice Experiment—Data Collection, Survey Design and Data Analysis

The study population was the people interviewed in the Eastern Ore Mountains, specifically at two sampling sites situated on crucial hiking crossroads in the area. For the purpose of the survey, a questionnaire was constructed and tested in two rounds (the first pilot survey included 15 respondents, the second one 40) in order to finalise the questionnaire and also to test it for ease of understanding. The sampling strategy was also tested in the terrain during these questionnaire test phases.

The interviews were done by trained interviewers face-to-face and took approximately 12 to 15 min. The target population was the Czech visitors of the Eastern Ore Mountains. The survey resulted in a total of 214 valid questionnaires for the CE. The questionnaire consisted of 47 questions (including 9 pairs of cards—see below) and had several parts (e.g., data inquiries for the travel cost method and the contingent valuation method, scenic beauty, respondents' attitudes to different mountain development options, sociodemographic characteristics, etc.). In this paper, we only discuss the choice experiment data analysis results.

The objective in discrete choice modelling in general is to analyse the individual's choice in relation to the characteristics (attributes) of the product (in our research, the product in question was weekend recreation). Therefore, several hypothetical weekend recreation sites described in terms of their attributes were offered to respondents.

One of the attributes in the choice experiment has to be always the price of the product or a similar measure of its value (so-called payment vehicle), otherwise the willingness to pay cannot be estimated. In our research, the price/payment vehicle was the travel cost for the weekend recreation in the site (i.e., one-way costs of the trip for one person).

The so-called opt-out/status quo alternative has to be offered as well; otherwise, the choice experiment would not be conforming to neoclassical welfare theory (see, e.g., [47,48,68]. In our case, this choice was presented as "I would not choose any of the offered alternatives".

In the choice experiment, all the alternatives offered to the respondents are described by the same attributes, but the level of the attributes varies. The consumers/respondents then have to make a trade-off between the changes in attribute levels (also including the payment vehicle, i.e., price of the product).

Our product (weekend recreation) was characterised by the differing appearance of the small-scale ecosystems in question (meadows, streams and clearance cairns). The corresponding attribute levels were defined with respect to the environmental stressors in question (Table 2). An orthogonal main-effects design was used for the combinations of levels on the CE cards (see [69] for details).

At first, different ecosystems and their possible forms were introduced to respondents. Then, they were asked to imagine that they are at home and deciding where to go for a weekend trip to the mountains. They had several alternatives that differed only in terms of the form of the ecosystems discussed and the distance to the site (and therefore the costs of transportation). Each respondent was then asked to make a choice among three possible alternatives: Site 1, Site 2 and the opt-out option. The opt-out option was presented as choosing neither of the offered alternatives. Each respondent made 9 decisions in a row using cards specially developed for this survey (9 pairs or cards; see Figure 2 for an example of a choice set/card pair). The pilot surveys confirmed that respondents were able to cope with 9 choice triplets each, as choice set attributes were previously introduced to the respondents and then graphically demonstrated in the choice experiment for cognitive ease of the decision [46]).

Table 2. Choice experiment attributes and levels (source: authors).

Attribute	Levels
Meadows	-Blooming/not blooming -With farm animals or without -Overgrown or not
Clearance cairns	-Maintained -Overgrown (neglected)
Mountain streams	-With natural channels (natural streams) -With regulated channels
Travel cost (one-way/per trip/per person)	-400 CZK- (20 USD **) -800 CZK (40 USD) -1100 CZK (55 USD)

Note: ** CZK—Czech Koruna; USD—United States Dollar.

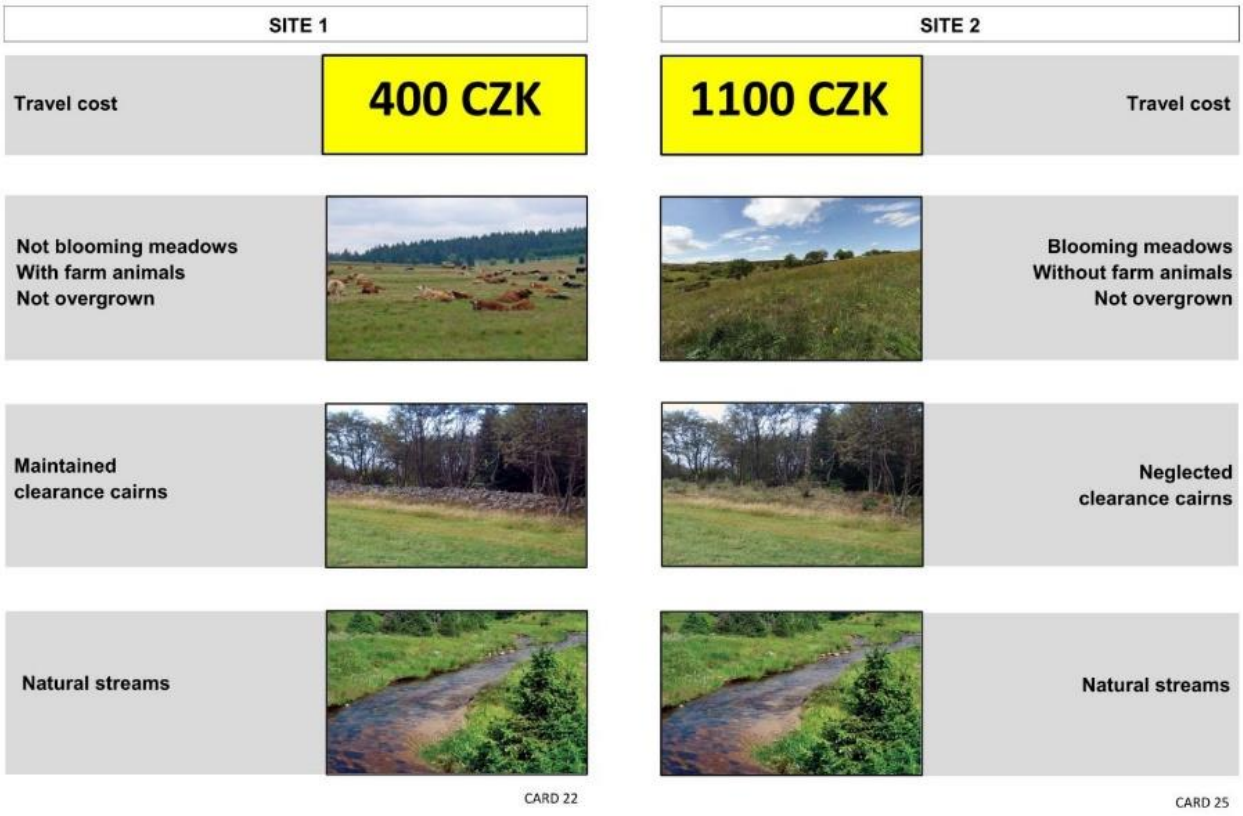

Figure 2. Example of the choice set (source: authors).

The CE data were analysed using discrete choice models ([49,70]). The data were analysed using different models and specifications (multinomial logit model, nested logit model and random parameter logit model). The parameter estimates for the main attributes in question were similar, and therefore, the multinomial logit model results are presented in the paper for the sake of simplicity.

Each respondent in the research chooses among a set of J options. A dependent variable Y, a discrete variable with a countable number of J values, represents the outcome of the decision. The goal of the analysis is to understand what variables influence this choice and to what extent. The utility of the alternative for the respondent i can be expressed as a linear combination of the observed (non-random) factors $(X_{i1}, X_{i2}, \ldots, X_{iH}) = x'_i$ with

parameters $\beta' = (\beta_0, \beta_1, \ldots, \beta_H)$, and the unobserved, random factors (ε_{ij}), j =1, 2, . . . , J. These factors together represent the utility

$$U_{ij} = V_{ij} + \varepsilon_{ij}, j = 1, 2, \ldots, J. \quad (1)$$

If the respondent chooses the alternative that brings the greatest utility to them, then the probability of the choice of the alternative j over j'

$$\pi_{ij} = P(V_{ij} + \varepsilon_{ij} > V_{ij'} + \varepsilon_{ij'}) = P(\varepsilon_{ij'} - \varepsilon_{ij} < V_{ij} - V_{ij'}), \quad (2)$$

is the cumulative distribution function of the random variable $\varepsilon_{ij'} - \varepsilon_{ij} = \varepsilon^*_{ijj'}$. Different discrete choice models are obtained from different assumptions about this probability distribution. The multinomial logit model is a discrete choice model, which is the most widely used. It is derived under the assumption that each ε_{ij}, j = 1, 2, . . . , J, in (1) has a so-called Gumbel (or type I extreme value) distribution with the cumulative distribution function

$$F(\varepsilon_{ij}) = \exp[-\exp(\varepsilon_{ij})] \quad (3)$$

and with the variance of $\pi^2/6$. If these random variables are distributed identically and independently (IID) and follow the Gumbel (type I extreme value) distribution, then their difference follows the logistic distribution [54,71] with a zero mean and the variance of $\pi^2/3$. As can be proven, the probability of choice of the alternative j by the individual i is then

$$\pi_{ij} = \frac{\exp(V_{ij})}{\sum_j \exp(V_{ij})} = \frac{\exp\left(x'_{ij}\beta\right)}{\sum_j \exp\left(x'_{ij}\beta\right)} \quad (4)$$

where x_{ij} denotes the values of the H explanatory variables for the subject i and the response choice j. The presented multinomial model was tested for the IIA assumption using the Hausman–McFadden test [54,72]. The test criterion is the chi-square distributed with the degrees of freedom given by the number of estimated parameters.

The derived estimates of the model parameters were used to calculate welfare changes (particularly the willingness to pay (WTP)) caused by different levels of attributes. The estimation of the WTP caused by changes in the attribute levels can be calculated as follows:

$$WTP_{\Delta X} = \beta / \gamma \quad (5)$$

where β is the variable coefficient and γ is the marginal utility of income (travel cost variable coefficient) (see, e.g., [73] for more). The point estimates of the WTP for a change calculated as the marginal rates of substitution between the change in a given attribute and the price attribute express the rate at which the respondent is willing to trade off money for the preferred condition of the ecosystem in question.

2.4. Institutional Analysis—Data Collection Design

For the purpose of the IA, we selected two nature reserves in the Eastern Ore Mountains (Černá Louka and Špičák) containing all the small-scale ecosystems in focus to be able to capture the nature conservation aspect of the territory. The information about actors and their positions, institutional arrangements and community attributes was gathered through the qualitative research design. It followed the structure of the IAD Framework [60]. First, we reviewed available documents (acts of law, management plans of nature reserves, regional yearbooks on nature protection, websites, etc.) and identified all stakeholders who interfere with selected territories, they being landowners, land managers, neighbouring land users and others interested in their status quo. As such, we found seven stakeholders. Another three were identified using the snowball sampling method [74] during interviews. No sampling was applied—we intended to interview all the identified stakeholders. Qualitative interviews consisted of open-ended questions focused on (a) the specification of

positions and information particular actors had regarding the natural reserves, (b) the extent to which various actors cooperated with one another, (c) their specific roles in nature protection and regional development and (d) the reconciliation methods employed to resolve conflicts.

In total, 8 (out of 10) interviews were undertaken successfully. The number of qualitative interviews seems to be quite low, but we were not able to increase it despite a rigorous search for more relevant stakeholders. There were several reasons for this:

1. Two out of the three environmental NGOs identified had terminated their activities and their representatives were unavailable.
2. The nature protection undertaken by regional authorities is centralised, and one employee is responsible for numerous nature reserves.
3. The Eastern Ore Mountains are rather sparsely settled with limited economic exploitation (mostly pasturing), so the interaction of potential stakeholders with the nature reserves is rather low.

In our sample, we interviewed three municipal representatives (interviewees 1, 4 and 5, marked as I1, I4 and I5 in Section 3.2), one regional nature conservationist (I2), two nature protection experts employed by the national agency (I6 and I8), one NGO representative (I3) and one local entrepreneur (farmer, I7). The face-to-face interviews were recorded, transcribed and coded manually with the use of thematic content analysis [75]. The positions and roles of particular stakeholders were captured directly from the stakeholder answers. Key patterns of interactions among stakeholders were detected from answers on cooperation and conflict occurrence and reconciliation (see Section 3.2).

Furthermore, position answers and travel patterns of the 214 respondents surveyed within the CE were used as additional data input for the IA.

3. Results

3.1. Choice Experiment—Sample Description and WTP Results

As mentioned above, the survey resulted in 214 completed questionnaires for the choice experiment. The rejection rate was 15%. All the Czech visitors present on both data collection sites during the data collection moment were interviewed.

Figure 3 shows the respondents' age structure. A total of 50% of the respondents were under 40 years of age.

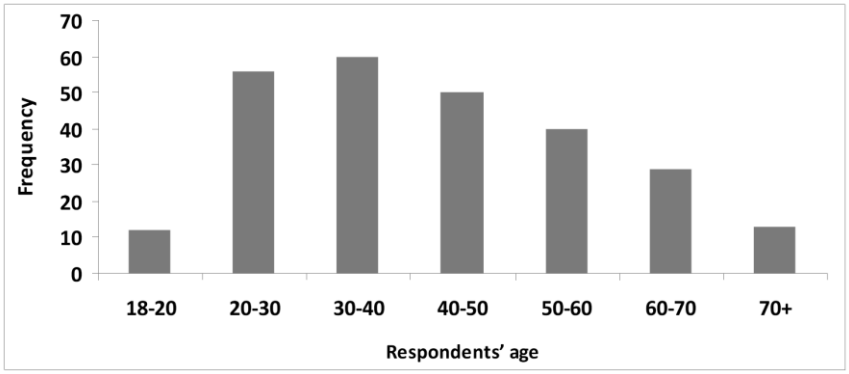

Figure 3. Respondent age structure (source: authors).

Table 3 shows the respondents' answers to the question "Please name the municipality where you currently live". The majority of the respondents live within 50 km of the data collection places.

Table 3. Names of municipalities where respondents live (source: authors).

Place of Residence	Number of Respondents	Distance from Data Collection Sites (in km)
Jirkov	11	14
Děčín	11	36
Chomutov	16	21
Praha	18	124
Most	20	29
Teplice	22	12
Ústí nad Labem	31	24
Other locals *	45	Within 50 km
Other visitors **	28	More than 50 km

Note: */** Sum of all other visitors living within/more than 50 km from data collection sites whose place of residence was mentioned less than 10 times.

The data analysis showed that all the parameters of the multinomial logit model are significant at the 1% level and have the expected signs, except the variable clearance cairns, where an insignificant estimate of the parameter was expected. Respondents prefer blooming meadows over succession meadows or meadows with farm animals. They also have negative preferences towards streams with regulated channels and overgrown clearance cairns. In general, people prefer lower travel costs. The model is statistically significant with the RsqAdj of 0.0667. The model passes the Hausman–McFadden test of the assumption of independence of irrelevant alternatives [54,72]. Table 4 shows the basic multinomial logit model estimates. Nlogit4 software was used for the analysis.

Table 4. Parameter estimates within the multinomial logit model (source: authors).

Variable	Coefficient	Standard Error	b/Standard Error	P (|Z| > z)	Expected Sign
Clearance cairns not overgrowing	0.780 ***	0.680	−6.159	0.000	Not significant
Natural streams	0.617 ***	0.079	8.639	0.000	+
Meadows with farm animals	−0.376 ***	0.095	−25.703	0.000	−
Overgrown meadows	−0.569 ***	0.090	−22.115	0.000	−
Travel costs	0.001 ***	0.001	−14.335	0.000	−
Opt-out	0.780 ***	0.122	−22.463	0.000	+/−

Note: *** Significance at the 1% level; + we expected positive willingness to pay for the attribute level; − we expected negative willingness to pay for the attribute level; +/− no expectation for the attribute level.

The WTP for maintained clearance cairns is positive, amounting to USD 38 per weekend trip. In the case of meadows, their blooming form was selected as the basic attribute level. Therefore, compared to blooming meadows, the WTP for meadows with cattle is negative, amounting to USD 18. The WTP for overgrown meadows is negative as well, amounting to USD 28. Analogously, people are willing to pay an additional USD 30 for a weekend trip (one-way/person) to see mountain streams with natural channels. Figure 4 presents the marginal WTP for the attribute level changes.

The data were analysed for heterogeneity [49,72] in preferences using a random parameter logit model. The sample of respondents was clustered according to their distance from the site of the interview (indicated in the questionnaire) and also other socio economic variables (respondent's age, sex, education, etc.). The purpose of this clustering was to identify differences in preferences among different groups. The analysis did not reveal any significant heterogeneity regarding the distance from the respondents' place of residence. Most of the respondents belonged to the region (the distance was up to 30 km). A different WTP regarding maintained clearance cairns and meadows with livestock was expressed only by people coming from the capital Prague, but they represented only 9% of the respondents in the sample [76].

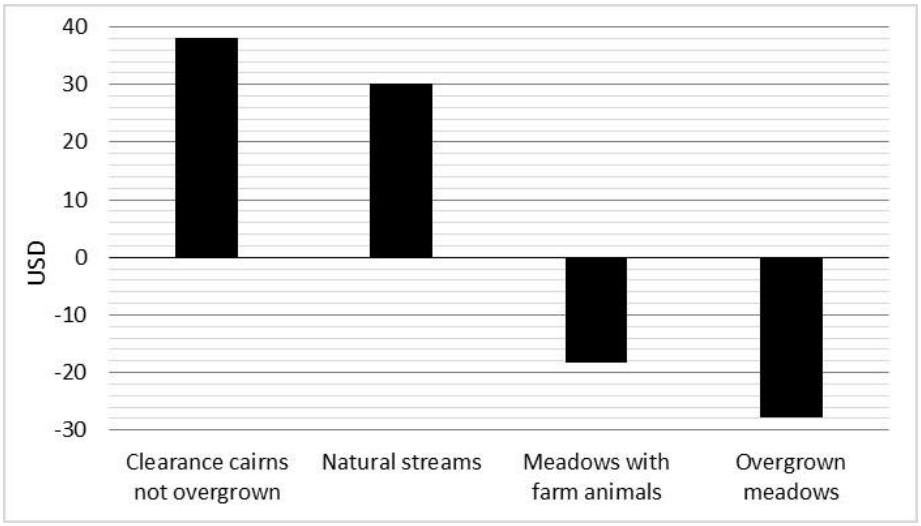

Figure 4. Marginal willingness to pay for the attribute change (in USD per one-way trip/person) (source: authors).

The main results of the choice experiment analysis can be summarised as follows. Respondents distinguish among different forms of the small-scale ecosystems. Visitors to the Eastern Ore Mountains prefer a natural/close-to-natural state of the landscape and ecosystems studied. The preferences among visitors to the study site were relatively unambiguous: the visitors clearly distinguished among various ecosystem forms, quite unambiguously preferring those options where the form of the ecosystem was close to its contemporary state (and that is consistent with high fauna and flora diversity), i.e., scythed mountain meadows (but without farm animals), maintained clearance cairns and mountain streams with natural channels. A surprising result was the willingness to pay for clearance cairns not overgrowing. Not only that (in spite of our expectation), the willingness to pay was significant, but it was also high in its monetary expression in the context of the other evaluated attributes. This result is probably related to the fact that the larger part of the Czech visitors to the Eastern Ore Mountains are people from the near vicinity of the sites of the data collection. Clearance cairns are a relatively precious landscape element on the Czech Republic's scale, and as it turned out during the interviews, the locals associate the clearance cairns with their previous visits and often also with childhood memories. This leads us to the hypothesis that the clearance cairns contribute to local inhabitants' identification with the Eastern Ore Mountains landscape [76]. The presented results are valid for all Czech visitors to the site, as we found no significant heterogeneity in the target population.

Regarding further use of valuation outcomes in general, Laurans et al. [62] mention decisive, technical and informative aspects. Valuation studies usually bring some kind of recommendations for policy makers (regardless of whether and how they are applied in the end). A good example is the establishment of the optimal level of damage compensation where those economic entities responsible for ecosystem degradation are made to pay for the damage [77,78]. Similarly, the willingness to pay and the willingness to receive compensations may be used as a background for the introduction of entrance fees to a particular site [79]. In other cases, economic values are used as a supportive argument for prioritisation of environmental measures when public resources for the management are limited or when current policy needs to be publicly justified [61,62].

Our recommendations for landscape management and planning based on the choice experiment results indicate that (i) small-scale ecosystems in the Eastern Ore Mountains are of high value for the site visitors, and therefore, it is efficient to manage them so as to keep their high aesthetic (as well as ecological) value, and (ii) the form of the clearance cairns should become a management priority (since respondents expressed the highest WTP for this feature).

3.2. Institutional Analysis and Contextual Features

For the purpose of this paper, we do not present the full scale of the information gathered in the IA. Our intention is to describe positions of different stakeholders as provided by themselves during interviews and to introduce patterns of interaction among stakeholders that resulted from the interview text coding.

The studied territory of two nature reserves is 100% state-owned (low conflict potential), and management is undertaken by regional nature protectors under supervision of the state nature protection agency. Regular management (mostly mowing of meadows) is contracted out to external service providers. Since financial resources shrink over time, management activities decrease and monitoring of conservation effects is limited (proper management in future might be endangered). Municipalities in whose territories reserves are situated have about 1000 inhabitants.

The positions of the different actors regarding natural reserves can be characterised briefly as follows:

- Regional and state nature protectors: They possess capacities for nature protection and management. They do not support tourists seeing protected ecosystems—people can go elsewhere. They are convinced that available information and their communication with other stakeholders are sufficient—to do more is not their job (I2).
- Mayors/municipal representatives: They want to promote the mountains as a region with a high-quality environment, but they do not consider small-scale ecosystems and small nature reserves tools for increasing the attractiveness of the area (I1, I5). They have zero or limited information about them, and they do not want to interfere with nature protectors unless necessary (I4, I5). Further, I1 and I5 expressed negative attitudes against nature protection as undertaken in the Czech Republic—they see it only as an agenda incurring costs to other actors without offering any benefits/alternatives for development.
- Environmental NGO: According to I3, the NGO supplements the effort of the nature protectors in the region, but it does so mostly on small sites that it has bought out and manages as private reserves. Its resources come from private donors, and volunteering is an integral part of its efforts (this is also confirmed by evidence in [80]). I3 further stated that his organisation had wanted to gain public resources and to undertake the same activities in national reserves, but it had not succeeded in public calls. He said that he would encourage people to see protected ecosystems to value them even more (I3).
- Local entrepreneur: His interest is to re-develop a partly defunct mountain settlement, and he is contributing part of his profits to make it happen (launching a small zoo and tourist office next to his farm). He would support the development of new pathways around and through the nature reserves to attract more people. He has objections against the development approaches of municipal representatives from the lowlands that do not see mountain settlements as their priority (I7).
- Tourists: Based on the responses of 214 tourists gathered within the choice experiment survey, the majority visit the mountains repeatedly in one year and just for a one-day visit, mainly because the mountains are close and are a natural area. Prevailing activities during the summer are walking and cycling.

Patterns of interactions are defined as repeated-action situations—i.e., how different actors behave regarding the ecosystems in focus and how their behaviour and interactions can influence their quality [60]. The following crucial patterns have been identified. They represent the interpreted results of the interview coding:

- Low participation: The decentralised efforts of local people (e.g., local NGO—I3; local entrepreneur—I7) to jointly address the environmental, economic and social sustainability of the area are apparent from their actions. Private resources and volunteering are important factors supporting these efforts. This is in strong contrast with plans of municipal representatives that view large (subsidised) infrastructural

projects—such as skiing resorts—as the only means of development (I4, I1). There is also little communication between the state/regional nature protectors and local people's initiatives, although they often have similar goals regarding the protection of the aesthetic beauty and biodiversity of the small-scale ecosystems (I6, I3).

- Bad image: There is a general bad image of state/regional nature protectors in the views of municipal representatives (I1, I5). They are not willing to continuously disseminate information or to work with the public to gain support for nature protection in the area. They mostly use power tools to conserve the existing protected land (I2, I8).

The IA revealed a threat to the current biodiversity management in the Eastern Ore Mountains: due to financial limitations and the mutual attitudes and relationships of key actors, it might be difficult to improve or even sustain the quality of the small-scale ecosystems in the near future. Low cooperation of actors results in a waste of local capacities (financial, personal) that could be used for self-management of the ecosystems (on a voluntary or non-profit basis) but also for sustainable development of the area, which could gain from high ecosystem quality. The absence of cooperation among key actors (including the low participation of local people in any kind of decision making) and numerous misunderstandings regarding mutual values and interests are key barriers to better environmental governance in the region studied. These results confirm previous findings of numerous other authors (e.g., [7,81]).

Recommendations based on the IA results are as follows:

- In general, to initiate/support local cooperation and participation processes in order to develop a shared understanding of economic and environmental issues between decision makers (nature protectors, mayors, etc.) and citizens (including entrepreneurs and NGO representatives).
- In particular, to jointly develop a local sustainable development strategy based on ecosystem quality and capacities of local people and organisations (which are already in place). Do not rely excessively on external interventions (such as subsidies) to solve local problems.

In the next section, these findings are triangulated with the CE results.

3.3. Triangulation of Findings from the Choice Experiment and Institutional Analysis

The CE results showed the strength of the respondents' preferences. The strongest preference was expressed towards area-specific maintenance of the clearance cairns. The important conclusion is that respondents (mainly people from the region) prefer small-scale ecosystems with high biological value because they are also aesthetically beautiful (from their point of view). Biodiversity protection was therefore proven to be an important social activity that should be supported in future. In addition to meadow mowing and re-naturalisation projects, better mapping and maintenance of cairns should be undertaken.

The IA confirmed that these revealed preferences are implicitly contained in the spontaneous decentralised efforts of local people (NGOs, individuals), which complement the state biodiversity protection and initiate sustainable development activities. The involvement of private resources and volunteering in the area is another piece of evidence. However, it was also revealed that the public administration does not support these activities to the extent needed. Superiority is given to the development of larger infrastructural projects (which can potentially be funded on an external basis). Furthermore, there is a strong miscommunication between the nature protection representatives and the local people's initiatives (despite similar goals of both stakeholder groups—protection of biodiversity and aesthetic beauty). This miscommunication results in a waste of the goodwill of local actors, who have a clear sentiment towards the specific countryside of the Eastern Ore Mountains.

The following recommendations for future environmental policy arise based on the interpretation of the results of both the methods in combination:

- Decision makers at various levels should pursue a policy focused on small-scale ecosystem protection based on people's stated preferences.
- Due to people's clear sentiment towards the specific Eastern Ore Mountains countryside, local resources for biodiversity management support should be activated (especially regarding those small-scale ecosystems situated outside nature reserves and therefore enjoying no formal protection).
- The biodiversity protection model in the area should be built on participatory principles—local people should be treated as insiders of the planning and management processes.
- The interest in and acceptance of the biodiversity protection of small-scale ecosystems within the participatory principle model would be increased by putting an effort into the preferred ecosystems.
- Proposals for traditional top-down instruments of environmental regulation (administrative or market-oriented), if any, should be treated with care and with respect to the local context.

The last point refers to the use of economic instruments of environmental protection (local taxes, entrance fees), which are frequently proposed based on valuation method applications—they make users pay and bring extra money for the biodiversity management. However, based on the socio-ecological characteristics of the area and local people's perceptions, we can conclude that the introduction of such instruments in the Eastern Ore Mountains would worsen the current situation. Firstly, there is a low tradition regarding the use of such instruments in biodiversity protection in the whole of the Czech Republic. Secondly, with respect to the visitor profile, such measures could be understood as taking the mountains away from the people living nearby. As a result, the people's expressed strong affiliation to the area could be distorted. Therefore, based on the mixed-method research outputs and understanding the site situation and context, the policy recommendation is to establish the biodiversity protection model on the participatory principles where local people are treated as insiders of the planning and management processes.

4. Discussion and Conclusions

The mixed-method research introduced in the paper explores a novel way of combining quantitative and qualitative methods, which is considered a useful practice for reaching better environmental governance. We combined the choice experiment method and institutional analysis in order to test whether the robustness of policy recommendations and their acceptance could be increased in comparison with their isolated applications. Differently from other research, we do not consider both methods supplementary to each other, but they represent full and equal complements in terms of the ultimate results.

Our research showed that outputs from each of the methods used separately are insufficient for decision making regarding sustainable management of (small-scale) ecosystems in some aspects. Therefore, it is difficult to prioritise the environmental policy targets based solely on findings from either quantitative (valuation) methods or qualitative methods.

Specifically, techniques to value the environment (such as the CE) are able, when correctly applied, to reveal respondents' preferences and to demonstrate the value of ES to decision makers [4], but they do not offer any case-specific explanations of environmental degradation causes. They also do not take into account conflicts of interests of different social actors [32], and in some cases, they may even limit the decision-making process [18,30]. In contrast, qualitative approaches (such as IA) are valuable for providing an overview, indicating trends and trade-offs [15]; identifying key determinants of current management practices, institutional barriers and actors' perceptions; or conceptualising conflicts among users of natural resources. However, they are not able to provide us with information about the strength of people's preferences towards the different ecosystem forms or the value of particular ES. That is why the formulation of comprehensive environmental policy recommendations focused on the ecosystems in question requires both (i) knowledge of preferences of users the ecosystems and their form and priorities for their management,

which are captured in the case of the choice experiment in the form of the willingness to pay for changes in the form of the ecosystems (each reflecting a specific method of management of these ecosystems), and (ii) knowledge of the complex institutional environment in which policy is made and that has its limitations (e.g., legislative), customs and relationships (among actors). Only knowing this information, is it possible to formulate an effective environmental policy that (i) respects management priorities for the areas defined by their users and (ii) respects the rules and limitations of the existing institutional setting, without the cooperation of which successful policy implementation is impossible.

Particularly, our empirical analysis results strongly support these general statements. The main results of the triangulation are presented in Section 3.3. This triangulation demonstrates the complexity of understanding the aspects of possible environmental policy design. It turns out, among other things, that the resulting recommendations for environmental policy design when using each of the methods separately would be different from those achieved using the combination of both methods followed by their triangulation.

In our case study region, people strongly prefer well-managed ecosystems that provide them with an aesthetic experience and, at the same time, are valuable from the biodiversity point of view. The results of the qualitative CE, i.e., a high willingness to pay for well-maintained ecosystems (and thus for the cultural ES provided by them) may be used as an argument for introducing new local taxes or entrance fees to a particular site, which could be used to finance the ecosystem management activities (as proposed, e.g., by Alpízar [79]). However, in our case, the qualitative IA results showed that the introduction of such new economic instruments, which could hypothetically solve the budget constraint problem, is rather unacceptable because of cultural and social reasons. This is in line with Segura et al., Cabana et al. and Plieninger et al. [12,25,66], who stated that information about differentiated perceptions of local populations and other multiple stakeholders is important for the development of sustainable land management strategies and that mixed-method research enables us to capture the issue of (cultural) ES assessment in its whole complexity.

Although the literature provides only little evidence about using methodological triangulation for designing robust environmental policy recommendations in practice, many scholars claim that a combination of research methods could help to address the complexity of environmental problems [22–24] and that the different (and often competing) insights of diverse social actors and stakeholders should be taken into account during the decision-making process [32].

Following the discussion of the relevance of monetary valuation results in environmental governance (as brought up, e.g., by Rewitzer et al., Van den Bergh, Hansjürgens, Zendehdel et al. and Laurans et al. [4,19,36,37,62]), we have proven that mixed-method research can substantially increase the practical applicability of valuation studies. The logic of the valuation research design implies that the sole anthropocentric value of ES does not bring any information about the causes of environmental degradation, about attitudes of key stakeholders and about barriers and institutional settings influencing the environmental governance. Identification of these factors as well as the capturing of complex linkages in socio-ecological systems need to be undertaken via qualitative methods such as IA. Without acknowledging them, policy reforms can be designed in a way that may not address the actual problem or that may even worsen it (as shown at the end of Section 3.3). Similar conclusions, but in a context of climate change policy, were reached by Van den Bergh [19]. However, the informative aspect of monetary valuation is significant and should not be rejected. It helps to not only shape policy and management priorities but also provide the key rationale for environmental protection per se. This is in line with the statement of Scharks and Masuda [82], who claim that the role of economic valuation "is best understood as being complementary to other methods for advancing conservation, including moral arguments" (p. 4), and with Busch et al. [15], who stated that a combination of quantitative and qualitative methods could provide a holistic picture of the potential impact assessment of introduced measures on ecosystem services.

According to our understanding, the goal of qualitative IA is not to verify the adequacy of the willingness-to-pay results (as carried out, e.g., in Clark et al. and Austin et al. [42,43]) but rather to better address cultural and social perspectives of society representatives, to reveal institutional failures that lead to the mismanagement of ecosystems and to understand conflicts among stakeholders that limit the planning and decision-making process [14]. Such knowledge helps to create an acceptable and robust environmental policy with a better prioritisation of management goals having the quantitative results in the background. For decision makers, quantification of social values may also often represent the crucial argument for action (since analysis of visitors' preferences improves decision-makers' awareness of the importance of ES [83]). What action to pursue should depend on the outcome of the qualitative analysis (such as IA).

In our view, the one method is not supplementary to the other, but they represent full and equal complements in terms of the ultimate results. This conclusion is in line with Phelps et al. [84], who stated that "close analysis of institutional mechanics is a critical step to overcoming the policy-practice rift between valuation tools and data and improved environmental governance" (p. 24), and with Cabana et al. [25], who argue that, especially in the case of cultural ES, "a set of complementary mixed methods aiming to capture the complexity of the various links (e.g., physical, intellectual, spiritual, social . . .)" (p. 2) is needed for its evaluation. In addition, Rewitzer et al. [4] stated that economic valuation cannot replace discussions about the reasons for ES conservation, but the demonstration of their value to stakeholders makes them more visible in planning processes.

Based on the presented case study, it was empirically confirmed that preference calculations regarding (aesthetic) values of ecosystems need to be complemented with facts about institutional settings, barriers and diverse social factors in order to better address locally relevant recommendations for decision makers.

We claim that the combination of qualitative and quantitative methods (where both methods are seen as complements rather than supplements to each other) and their sequence as presented in this paper can bring valuable inputs for planning and decision making, resulting in more sustainable environmental governance. Benefits of such an approach could be evident, especially in cases where a wide range of stakeholders and natural resources users are concerned by the management of ecosystems, such as urban forests, protected areas or attractive tourist sites.

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