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Unravelling Diverse Values of Ecosystem Services: A Socio-Cultural Valuation Using Q Methodology in Messenia, Greece

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Abstract: People perceive the importance of benefits from ecosystem services in different ways, depending on their values, beliefs, and needs. Acknowledging and integrating this diversity into decision-making processes can support informed natural resource management. Our empirical study unpicks the multiple ways stakeholder groups perceive the benefits derived from wetland ecosystem services (WES) in the area surrounding the "Gialova" coastal wetland in Messenia, Greece. The inhabitants from this region benefit from a range of WES, and most livelihoods are closely linked to agriculture and tourism. We aim to understand the patterns in commonly held stakeholder views on WES using "Q methodology", a participatory mixed-methods approach. We identified five distinct perspectives on WES from a sample of 32 stakeholders. Alongside diverse perceptions of the relative importance of different WES, we observed a range of explanations of why certain WES are important and analyzed these through the lens of "value pluralism". This identified tension between relational and instrumental values. Such analyses move beyond ecosystem service identification towards an understanding of value justifications and conflicts, and can support the deliberation of conflicted views, and policy design in alignment with people's values.

Keywords: non-monetary valuation; wetland ecosystem services; perceptions; values; Q methodology

1. Introduction

Effective, just, and publicly supported environmental policies need to account for the complexity and interconnections of environmental processes and human society [1]. A growing body of literature from the nexus of sustainability research and ecological economics centers around the following two points: First, people conceptualize the benefits from ecosystem services (ES) in different ways due to their unique experiences, identities, values, and needs. As a result, the same ecological information is perceived differently, depending on who the observer is [2,3]. Second, a broader understanding of this plurality of views could improve the development and implementation of natural resource management (NRM) strategies [4–6]. Therefore, for policy-making to be informed by a broad value base, we need to develop appropriate ways to elicit and integrate multiple perspectives as a basis for sound environmental management strategies.

The UN-based Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has greatly contributed to the understanding of environmental values [7–9]. Academics have approached the topic of environmental/ES valuation from slightly different angles. Some have focused on the operationalization of ES research [10–13], others on monetary

and non-monetary ES valuation techniques [2,10,14,15], and others on the integration of diverse valuation methods [10,16,17]. Many researchers have focused on a specific set of values—relational values [18–20], transcendental/contextual values and shared/social values [21,22], plural values [23], biocultural values [24], place-based values [25]—as well as how values are formed, motivated, and deliberated [26,27]. There are also several empirical case studies of ES perception assessments [28–30]. Recently, Kenter at al. [31] provided a summary of the theoretical developments in the field in their overview article of the Special Issue "Theoretical traditions in social values for sustainability".

Our paper contributes to this non-monetary ES-valuation literature through a novel combination of Q methodology as an elicitation approach and the IPBES value dimensions as a framework for analyzing environmental values. Our empirical case study of a coastal wetland in southwest rural Greece is characterized by tensions between different uses of natural resources, such as for agriculture and touristic activities.

Ecosystem services are frequently defined as "the benefits people obtain from ecosystems" [32] (p. 5) and classified as provisioning, regulating, supporting, or cultural services. Wetland ecosystems provide a great variety of benefits, such as water regulation services and habitats for diverse species. In this study, wetland ecosystem services are defined broadly and relate both to the physical structure and the water provided by wetlands in the area. We use the ES framework because it is increasingly being used to create stronger links between sustainability research and policy-making [12], and thus met our purpose to provide policy-relevant information that could contribute to an improved management of the Gialova wetland ecosystem. In order to examine the importance people place on WES, we employ Q methodology [33], a mixed-methods approach, which has been identified as a suitable socio-cultural method for eliciting ES values [2,14,27,34]. Q methodology offers a systematic way to study viewpoints that are commonly held among participants of a study. Value pluralism is our analytical lens, defined as an axiological position [27] that suggests that (i) there is not a single measure of value such as money, energy, or labor; and (ii) diverse values should neither be reduced nor substituted for each other [35]. In this study, values are defined sensu Diaz et al. as "those actions, processes, entities or objects that are worthy or important" [8] (p. 13), and are classified as anthropocentric and non-anthropocentric and justified as intrinsic, relational, and instrumental [9,31]. We draw on the IPBES [9], Kenter et al. [31], and Arias-Arévalo et al. [23] to conceptualize values, ethics, and how they are associated with ES (Table 1).

Table 1. Relations between ethics, values, and ecosystem services.

Ethics	Value Justifications	Definition	ES Association	Illustrative Example
Non-anthropocentric	Intrinsic	The intrinsic value of something is the importance that people believe a thing has unto itself, regardless of the interests of people or others [9] (p. 18).	Regulating and supporting	A nesting habitat for fish has value for its own sake.
Anthropocentric	Instrumental	The value attributed to something as a means to achieve a particular end [9] (p. 21).	Provisioning and regulating	A nesting habitat for fish has value because people can fish there.
Anthropocentric	Relational	The value of relationships between people and nature, including relationships that are between people but involve nature [18] (p. 1462).	Cultural	A nesting habitat for fish has value because the older generations of people teach the younger ones how to fish.

The aim of this paper is to highlight the diversity of values people hold in relation to the environment, demonstrate a methodology for assessing these, and argue that diverse ES value conceptualizations can benefit NRM. Using the context of Messenia as a case study, we ask: "How do different stakeholders perceive the importance of a range of wetland-based ecosystem services?". More specifically, we aim to identify the patterns that emerge when stakeholders rank the WES, examine how participants motivate their preferences and, consequently, which value dimensions

are reflected through the identified patterns of importance. Last, we draw some insights for environmental management.

The methods section describes the case study and presents the research design and the links between Q methodology and the value justification analysis. The results present a diversity of perspectives held by the participants of the study by highlighting five key perspectives. We map the diverse perspectives onto the IPBES [9] dimensions of value justifications (relational, instrumental, and intrinsic), and provide a nuanced understanding of why divergent views on values exist between the participants of the study. In the discussion section, it is proposed that diverse value conceptualizations have the potential to contribute to better NRM. Last, it is concluded that decision-making would benefit from broadening its value-base by integrating multiple ES values into NRM.

2. Materials and Methods

2.1. Study Area

The study area is situated in Messenia, Southwest Greece, a coastal-rural area with a Mediterranean climate. We focus on a sub-area (170 km^2) of the Pylos-Nestor municipality (Figure 1), which is one of the six municipalities that comprise the Messenia regional unit.

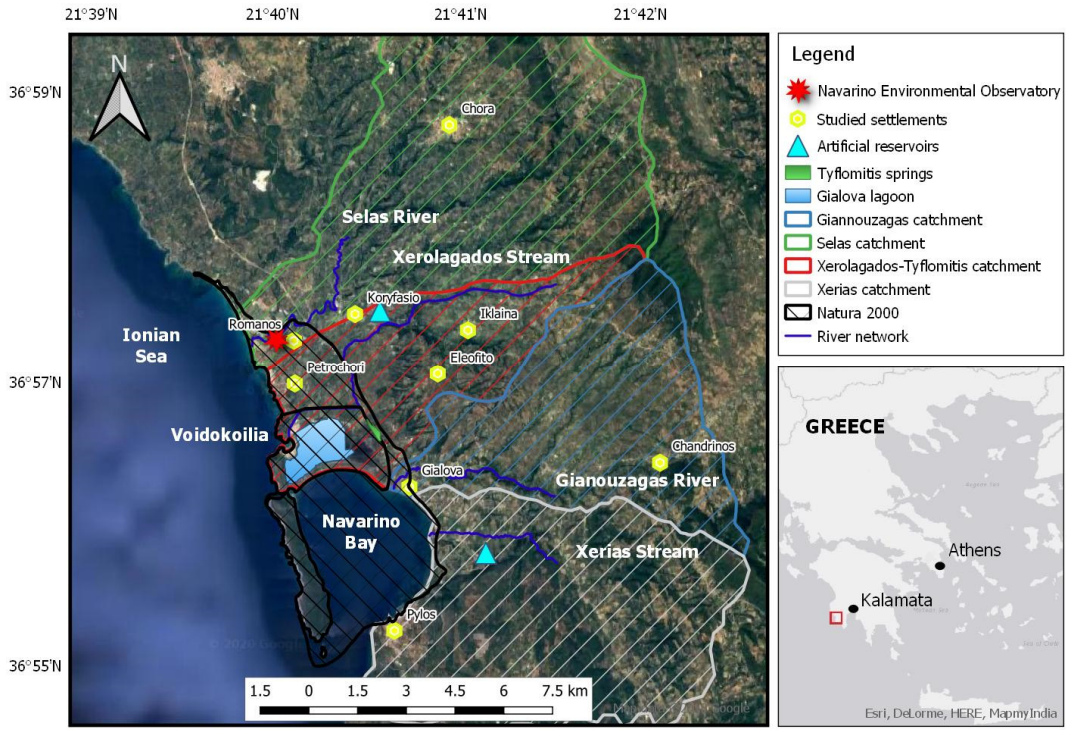

Figure 1. Map of the study area in Pylos-Nestoros municipality, Messenia, Greece. The field survey was conducted in collaboration with the "Navarino Environmental Observatory".

Currently, the two main economic activities in the region are agriculture and tourism. Agricultural land, mostly olive groves, covers about 80% of the study area, and about half of the population are predominantly farmers [36]. Many farmers use conventional farming techniques [37] and groundwater-based irrigation to increase their yields. The second largest main economic activity, tourism, has been increasing exponentially since the establishment of the Costa Navarino hotel in 2010. Costa Navarino is one of the largest resorts in the Mediterranean region, with several golf courses and two artificial water reservoirs to irrigate the hotel's green infrastructure [38]. Many local and seasonal workers engage with tourism-related activities, either working at the Costa Navarino or owning small hotels, restaurants, and shops. These tourism activities, together with agriculture,

cause seasonal pressure on the water resources (high water demand combined with low water supply during July–August) [39], because both water supply and irrigation depend on groundwater resources. Local livelihoods depend on a reliable supply of water, and thus its management is of crucial importance.

However, the management of water resources is "as complex and interconnected as the hydrological processes it aims to influence." [40] (p. 1085). The hydrological system of the study area is complex due to the inter-dependencies and interconnections of a high diversity of different wetland ecosystems. There are surface, underground, and transitional waters, each affecting the flows and stocks of other water ecosystems (streams and rivers, a lagoon, groundwater aquifers, and artificial reservoirs), which are managed by different management bodies (see Appendix A for a summary of the main biophysical elements of the studied area and their management status). Past ill-suited management decisions, such as the attempt to drain the Gialova wetland by diverting its natural freshwater supply systems (1960s), have led to a potentially irreversible shift of the lagoon biota from freshwater/brackish to saline/hypersaline species [41]. The lack of clear and inclusive natural resource management has triggered conflicts in the area [41], and this study aims to contribute to a better understanding of the underpinning socio-ecological dynamics.

2.2. Research Design

In order to elicit stakeholders' diverse conceptualizations of the benefits provided by the regional wetland ecosystem services, we employed Q methodology. Q methodology was developed by physicist William Stephenson in the 1930s to study human subjectivity [42]. The underpinning idea is that a group's views regarding a topic cluster into a relatively small number of key viewpoints (also called "patterns in thinking" and "perspectives") when people express their opinion on a topic [43]. The process of deriving these viewpoints includes the ranking a set of objects (usually written statements) by the participants of the study, and the later by-person intercorrelation of the rankings to cluster together the participants, who sorted the items, in a similar way. An important distinction compared to the common R factor analysis is that Q inverts the analysis and the participants become the variables [42].

Q methodology was chosen as an appropriate method for the objectives of this study for a number of reasons. First, it is a suitable method to explore phenomena that are contested. Barry and Proops [43] argue that environmental issues are often contested and that Q-studies allow for a comparison of the key viewpoints, which leads to the identification of differences and commonalities between them. In the studied context, water use and, conversely, misuse, is a contested topic, as explained in the case study description. Second, Q methodology "forces" participants to rank items relative to each other. This is not the case in other methods, such as Likert-scale surveys. As a result, the participants have to make choices and consider trade-offs [44] when prioritizing WES, in the same way policy-makers need to prioritize in a management scheme, which can shorten the gap between policy and citizen engagement [44]. Third, Q methodology results in holistic results, because the whole pattern of the ranked items is taken into consideration during the data analysis, and not only the items that scored the highest. This results in a "prioritization of items within a broader picture" and allows the researcher to gain a nuanced understanding of how people think [42].

Some common methods employed by researchers who conduct socio-cultural evaluations are face-to-face questionnaires, interviews, focus groups, and multi-criteria evaluation assessments [14]. Surveys were not used because they require a large number of participants to produce robust findings, whereas Q methodology does not [42]. Although the results from surveys can be generalized to the population, our aim was to obtain a nuanced understand without aiming to generalize to the larger community of people. Social multi-criteria evaluation [45], focus groups, and deliberative methods [26] could have been used and would have provided insights into the deliberation process. However, due to the limited resources and the fact that the COASTAL [46] research program used the method of Multi-Actor Labs, we decided to follow a different approach as a complement to the ongoing

sustainability work in the region. Last, methods that use visual stimuli, such as photovoice [47], could have been used to elicit preferences. Nevertheless, Q methodology works in a similar way, since it first draws the attention of the participants to the ranking exercise and then directs the focus of the discussion to the items, rather than the interviewee. Consequently, the ranked items become a stimulus for conversation, allowing the participant to become familiarized with the interview setting, and therefore create a comfortable environment, similarly to the photovoice method [48]. Moreover, the items can assist the researcher to redirect the focus of the discussion to the items, if needed.

Some of the disadvantages of using Q methodology are the following. Q methodology is time-consuming in the preparation, collection, and analysis phases. It has been criticized for validity, reliability, and transparency issues, similarly to several qualitative methodologies [42]. As far as the results it produces, they provide a snapshot of the present, individual, and local scale, and thus fail to capture the dynamic nature of values, a limitation addressed in the discussion.

The standardized steps of Q methodology were followed and are briefly described in the following section (Figure 2). For more information on the method, see Brown [33] and Watts and Stenner [42]. For additional methodological details, consult Maniatakou [49].

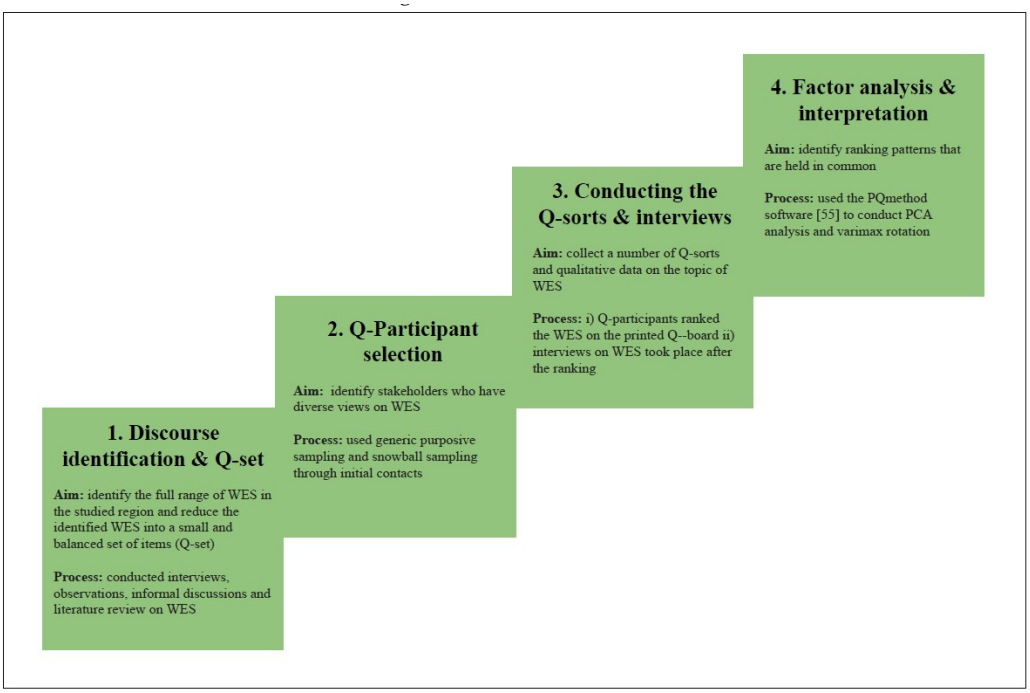

Figure 2. Q methodology steps conducted for the current study.

2.2.1. Discourse Identification and Q-Set

The first step of Q methodology is to gain a good understanding of the discourse and gather all possible information related to the research objective. Our aim was to record and itemize the full range of benefits provided by the regional wetland ecosystem services (WES). The authors' previous research on sustainability issues in the same context [37,41,49–51], informal discussions with local people and a review of WES literature [52,53] were used to collect a list of WES, which was later revised and reduced into a manageable and comprehensive set of items (Q-set) that the participants would rank during the rank-ordering exercise. Pilot interviews were conducted to test the final list of the 25 WES, which resulted in the refinement of the description of the WES.

2.2.2. Participants Selection in the Q-Study

We used generic purposive sampling to select interviewees because of their association with the pre-defined stakeholder groupings [54]. We hypothesized that different stakeholder groups would

hold diverse views on which WES benefits are the most important, and that they all either directly impact water resources through their actions and decisions and/or depend on these resources for their livelihood [55]. In reality, stakeholders have different levels of dependence and influence on WES and policymaking. For example, farmers´ livelihoods are strongly dependent on groundwater resources. Water use from agriculture and tourism has an effect on groundwater resources and thus on the WES. The private sector (e.g., tourism-related stakeholders) might have more potential to influence public policy, because tourism drives the economic development of the region. Fishers (who fish in the lagoon) may be affected by water use for agriculture and tourism, especially during summer when fresh inflows to the wetland are needed but limited. We followed a balanced approach and selected stakeholders with varying opinions and abilities to influence the WES, including marginalized actors of the pre-defined stakeholder groups. The group identification was based on a former stakeholder analysis conducted by the EU H2020 research project COASTAL. Table 2 describes the stakeholder groupings according to their use of the ecosystem, as suggested by Felipe-Lucia [29]. The majority of the stakeholders lived in the villages indicated in Figure 1, whereas five of the participants lived outside the region but worked in the area.

Table 2. Stakeholder groupings and their engagement during the data collection phase.

Stakeholder Groups	Description of Stakeholder Groups	No. of Interviews for the Creation of the Q-Set	No. of Completed Q-Sorts & Follow-up Interviews	In-Text Reference and Gender
Farmers	This group consists of conventional and organic farmers. Farmers use WES for irrigation (drills provide groundwater). Excessive usage of chemical fertilizers and pesticides might affect the provision of other WES.	3	12	**Female:** P19 **Male:** P5, P6, P7, P8, P9, P10, P12, P14, P15, P16, P18
Fishers	This group consists of a fisher and a fish trader. Their livelihoods depend on the WES. They are knowledgeable of the state of the coastal WES.	0	2	**Male:** P3, P20
Private sector	This group includes people who work in the tourism sector. They are either local people, seasonal employees and regular work-related visitors. They either work or own hotels and restaurants. They use water for the operation of the services they provide.	4	5	**Female:** P2, P4, P11 **Male:** P25, P32
Public sector	This group includes people who work at the Pylos-Nestoros municipality and coastguard department. The majority resides in the case study area and some commute daily from Kalamata city. They are knowledgeable of the state and management of water resources.	1	7	**Female:** P27, P28 **Male:** P21, P22, P23, P24, P26
Industry	There are about 20 olive mills in the region, which use water for their operations. For many years the wastewater from the operations was disposed into the rivers, although they are legally obliged to dispose the wastewater to special treatment plants.	0	2	**Female:** P13 **Male:** P17
Researchers	This group consists of environmental researchers who have conducted studies on climate research (e.g., hydrology, agriculture, biodiversity). The majority of them is connected to the Navarino Environmental Observatory located in the area. The researchers provide a good understanding of how WES are linked to the natural functions of the region.	13	1	**Male:** P31
Institutions	This group refers to the "Captain Vassilis Foundation" that promotes sustainable development in Messenia region through educational and entrepreneurship trainings. They collaborate with farmers and are also linked to the touristic sector.	0	1	**Male:** P1

Table 2. *Cont.*

Stakeholder Groups	Description of Stakeholder Groups	No. of Interviews for the Creation of the Q-Set	No. of Completed Q-Sorts & Follow-up Interviews	In-Text Reference and Gender
Local community	This group consists of people who use water for their everyday uses. They consume water for drinking and non-drinking purposes (e.g., watering the garden, cleaning). They are either self-employed or freelancers.	0	2	**Female:** P30 **Male:** P29
Total		20	32	F (8), M (24)

2.2.3. Conducting the Q-sorts and Interviews

The third step of Q methodology is for the respondents to rank the items. Individual sessions were held with the 32 participants, except for a few occasions when there was more than one person from the same stakeholder group (see Table 2 for the participants´ stakeholder group and gender). A three-phase process guided the sessions with the participants. First, an introduction to the purposes of the study was made and some background questions were asked. Then, the participants were instructed to rank the 25 WES items in order of importance onto a printed grid, with 25 spots (one for each of the 25 items)—see Figure 3. They were asked to place those WES whose importance they had strong opinions about on the extremes of the distribution, and to place those WES whose importance they were relatively indifferent to in the middle. The instructions encouraged the participants to communicate their reflections on the 25 statements during the ranking exercise, and the sessions were ended with semi-structured interviews and discussions, which included open-ended questions—e.g., asking them to elaborate on their decision on the importance of the different WES. All the interviews were conducted in Greek by the first author. The participants signed consent forms before interviews and the research ethics of the study were reviewed by the Stockholm Resilience Centre research ethics subcommittee.

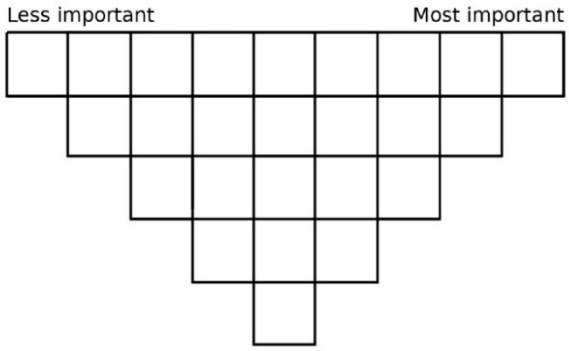

Figure 3. The Q-board. The ranking refers to the horizontal axis. The vertical columns indicate the number of items that can be placed under each column. All 25 cards had to be used in the ranking.

2.2.4. Factor Analysis and Interpretation

Factor analysis was used to compile similarly ranked Q-sorts into factors. Two out of the 32 completed Q-sorts were removed (P18, P25) from the analysis, because these two participants were not focused or did not fully understand the given instructions. The remaining 30 Q-sorts were inter-correlated and factor-analyzed using the free software package PQ Method [56]. Principal component analysis (PCA) was used to extract factors from the correlation matrix, which were rotated with varimax rotation to maximize the variance of the factors. Similar Q-sorts (the ranking of the items was similar) were clustered around a factor that they became significantly associated with. The analysis of the factors was conducted with the support of the qualitative data gathered during the interviews, guided by the methods of Watts and Stenner [42].

In addition to supporting the factor interpretation, the interviews were also transcribed and coded thematically using the software NVivo 12. One of the themes the data was coded for was the overarching theme "value", which was fine-grained into the following subcategories: intrinsic, instrumental, and relational. The coding structure used by Arias-Arévalo et al. [27] guided the classification of the respondents' value expressions of: (i) monetary terms as "instrumental", (ii) non-anthropocentric or moral terms as "intrinsic", and (iii) anthropocentric but non-monetary terms as "relational".

Finally, the five factors were ranked as having low, medium, or high scores for the intrinsic, instrumental, and relational value, respectively. Scores on each axis were judged semi-quantitatively based on the WES rankings and additional interview data and observations. The combined conceptual values were illustrated in conceptual space diagrams, which often are used in Q-studies [42].

3. Results

This section presents the list of the 25 identified WES that were ranked by the participants, the five separate perspectives identified by the Q-analysis, and the interpretation of the findings through the value dimension framework of IPBES.

Five factors (Table 3) were deemed to be appropriate based on theoretical and objective reasons [30,33,42]. The five factor solution accounts for 63% of the study variance. A total of 23 of the 30 Q-sorts loaded significantly on one or more of the five factors, with factor loadings of +/− 0.52 or above being significant at the $p < 0.01$ level. The five factors had at least two Q-sorts that significantly loaded on each of them, implying factor stability [42]. The correlation between the factor scores was not high (<0.52), suggesting that the factors were indeed different, and thus that it was worth examining them separately. Factor 5 was significantly bipolar, which means that people either agreed or disagreed significantly with the way the cards were sorted. The analysis produced factors which we interpreted as different perspectives.

Figure 4 presents archetypical Q-sorts from each of the five perspectives, allowing the transparent presentation of the factor analysis in the same format as the one used to collect the data. For each factor, the item that scored the highest z-score was positioned on the right extreme of the Q-board/factor array, the next two items that scored the second and third highest were placed on the next two spots of the factor array, and so on. The factors were named based on what was assessed as the best representation of the stakeholders´ perspective: "Basic needs first", "Us versus them", "Tradition and history", "Modern environmentalists", and an "Ecocentric" viewpoint.

Table 3. Overview of the perceived wetland ecosystem services, categorised as P (provisioning), R (regulating), S (supporting), C (cultural), or C/P (both cultural and provisioning). Exact factor scores in z-score units for each wetland ecosystem services (WES) are shown as weighted averages of the Q-sorts that define each factor. Thus, the highest z-score and corresponding colour gradient signifies the most important WES for each factor. Asterisks indicates the significance of each WES to each factor (* $p < 0.05$; ** $p < 0.01$).

ES Category	No	Wetland Ecosystem Services (WES)	In-Text Reference	Exact Factor Scores in Z-Score Units				
				Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
P	1	provide clean water for drinking	drinking water	3.06 **	0.34	0.02	−0.59	−0.94
P	2	provide water for domestic non-drinking purposes	domestic uses	1.05	−0.64	0.69	−1.93	−0.21
P	3	provide water for agriculture	irrigation	1.44	1.43	1.04	0.17	−0.17 *
P	4	provides habitats used for commercial fishing	fishing	−0.37	0.95	0.24	−0.97 *	−0.01
C/P	5	attract game species (hunting activities)	hunting	−1.42	−0.09	−0.88	−1.99	−0.42
S	6	provide habitat to rare, endangered species	rare species	0	0.07	−0.19 *	1.49	0.91
R	7	mediate pollutants such as pesticides and ch. fertilizers	pollutant mediation	−0.41	−0.93	0.84	−0.26	1.59
R	8	dilute olive mill wastewater	wastewater dilution	0.32 *	−0.58	−1.94	−1.68	0.71 *
R	9	create stable conditions for a healthy aquatic ecosystem	stable ecosystem	0.11 **	−0.77	−1.18	1.79	1.52
R	10	act as water reservoirs	water reservoirs	0.91	1.5	−1.63 **	0.1	0.56
R	11	provide flood control	flood control	0	−0.1	−0.95	−0.04	1.08
S	12	support nutrient cycling	nutrient cycling	0.07	−2.38 **	1.06	0.78	0.9
S	13	support a rich biodiversity	biodiversity	0.78	1.52	0.46	0.88	1.35
S	14	support green landscapes	green landscapes	0.98	−1.24	0.95	−0.18	0.21
C	15	provide locations that serve as environmental education	envir. education	−0.82 *	0.63	0.46	0.23	−0.06
C	16	attract researchers	research	−0.42	−0.38	−0.87	0.05	−0.23
C	17	are important for the history and tradition of the region	tradition	−0.82	0.38	2.19 **	−1.28	0.25
C	18	create spots for physical wellbeing	physical wellbeing	−1.14	0.85	−0.26	−0.11	0.18
C	19	contribute to psychological wellbeing	psych. wellbeing	−0.53	−0.74	1.14 **	0.52	−0.96 *
C	20	increase the region's beauty	aesthetic	−1.18	1.22	1.06	0.93	−0.43
C	21	provide spots for wildlife watching	wildlife watching	−0.4	−0.03	−0.19	−0.3	0.23
C	22	provide areas where people meet	social setting	−1.01 **	0.23	−0.44	−0.07	−0.28
C/P	23	attract tourists-visitors	visitors	−0.35	0.99	−0.27	1.03	−1.81 **
C/P	24	provide water for touristic infrastructure	basic tourist infras.	0.68	−1.16	−0.2	1.08	−2.13
C/P	25	provide water for luxurious touristic infrastructure	luxurious tourist inf.	−0.55	−1.06	−1.14	0.35 **	−1.83 *

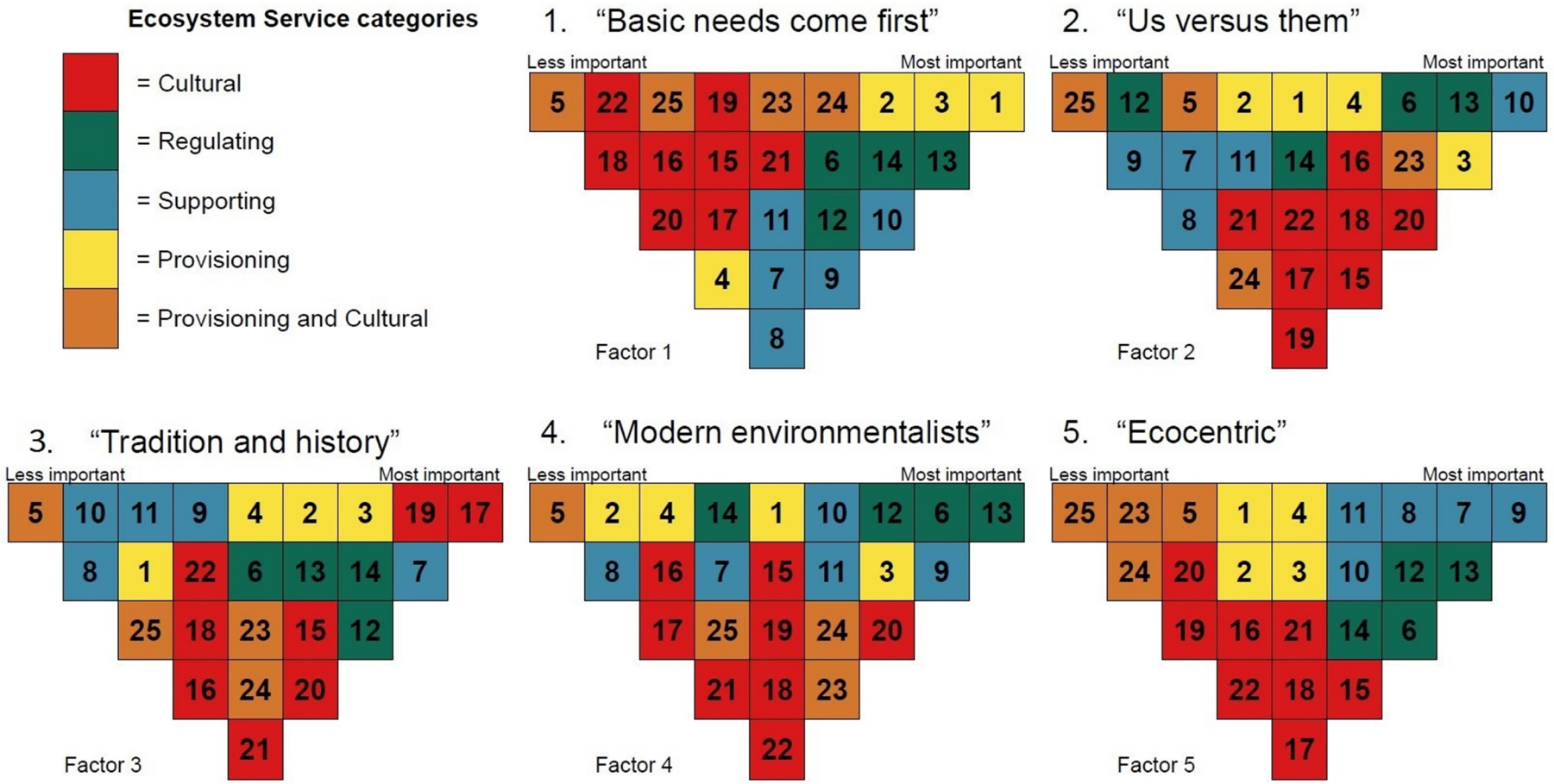

Figure 4. The five major perspectives of the participants as identified by the factor analysis and represented by archetypical Q-sorts for each perspective generated from the quantitative results. The numbers in the boxes correspond to the 25 WES in Table 3. The refer to the ecosystem service category.

3.1. Summaries of the Five Perspectives

Table 4 Shows the interview-informed interpretation of each of the five perspectives.

Table 4. Summary interpretation of the five perspectives.

Perspective	Summary Interpretation	Associated Q-Sorts	Percent Explanation of Variance
1. Basic needs come first	Providing water for drinking is the most important WES, followed by irrigation, as well as regulating and supporting WES, such as flood control and biodiversity. The cultural WES are valued as less important relative to the rest of the WES. There is a consensus that human activities put pressure on the WES and that better management and infrastructure—for example, the building of small dams is necessary to enhance some WES and to minimize the impact of human activities.	P13, P16, P17, P20, P21, P26, P27, P30, P31 *	19%
2. Us versus them	The "nutrient cycling" WES is not perceived as a benefit to the farmers who live upstream, because nutrients are transported downstream. In addition, the benefits of WES to act as "water reservoirs", to support fishing and other recreational activities, as well as to be attractive to researchers and other visitors are relatively highly valued.	P14, P15	8%
3. Tradition and history	WES and traditions of the region are inseparable. It is the only perspective that ranked cultural services as the most important WES. A central idea is that a profit-driven attitude is socially and ecologically unsustainable, which has negative implications for society (community relations). No special attention was given to the regulating and supporting WES.	P2, P11, P24	10%
4. Modern environmentalists	The functioning of the ecosystem is a prerequisite for all human activities. Win-win solutions are desirable, and a balance between the ecological, economical, and social spheres should be considered when managing water resources. WES that support the economic development of the region, such as tourism, are ranked higher than the cultural activities that refer to the local inhabitants. Technological innovations were considered necessary to enhance WES benefits, and emphasis was given to agricultural innovations, entrepreneurship training, and the building of small dams.	P4, P7, P12, P22	11%
5. Ecocentric viewpoint	The regulating and supporting processes are the most important WES. They are prerequisites for all the other WES. All human activities are perceived as putting pressure on the wetland ecosystems, however tourism has less potential to have a synergistic relationship with them.	P1, P3, P5, P6, P28, P31 *, P32 (-ve) **	14%

* indicates that P31 significant scored high on both factors; ** indicates that P32 scored significantly low on the "ecocentric" viewpoint, which indicates disagreement with this perspective.

3.2. Perspectives through the Value Dimensions Framework

This section presents how the perspectives align to different value dimensions. When analyzed through the IPBES [9] lens of intrinsic, instrumental, and relational values, the participants' interviews showed all three value dimensions. The majority of the participants, when they justified the assessment of the importance of WES in their Q-sort, presented mostly anthropocentric arguments. Few reasoned from a non-anthropocentric perspective. However, some values were emphasized more strongly,

clearly, or frequently by the participants of each perspective, which is visualized with a unique configuration of each factor in the conceptual space diagram.

3.2.1. "Basic Needs Come First" Perspective

People associated with the "Basic needs come first" perspective emphasized mostly instrumental values, some intrinsic values, and few relational values (Figure 5). Their underpinning line of argumentation was that the most important water use is for drinking and irrigation.

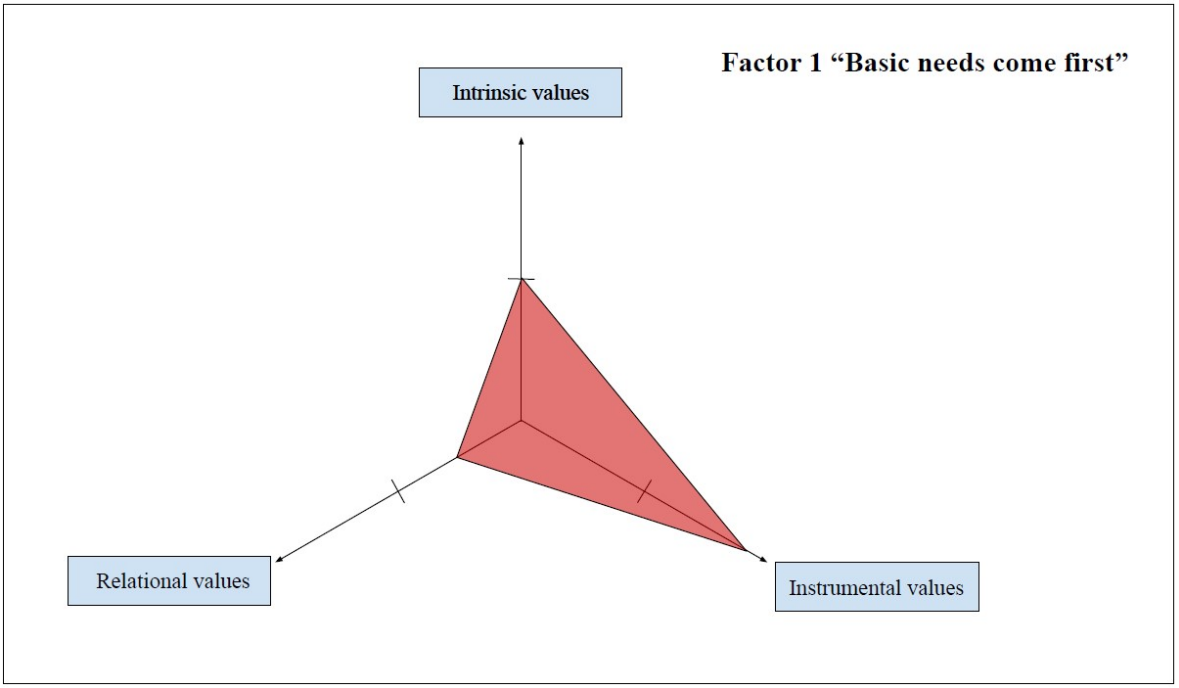

Figure 5. "Basic needs come first" conceptual space diagram.

> *"Are there any people who don't chose this card ["drinking water"] to rank first? [. . .] If we don't drink water, how are we going to live? Except if you buy it. But why would you buy it since it rains?" (P30)*

Moreover, water for irrigation was also emphasized by all the participants grouped in this perspective as a WES of high value to them, because the economy of the region mainly depends on the agricultural sector, as illustrated by this quote:

> *"Because this region depends on the agricultural sector, its development highly depends on water resources. Olive trees do not require irrigation; they will produce olives anyways. But I have another opinion. After the sunlight, comes water as an input. If you have a farm and if you want to call yourself a professional farmer, you must irrigate the trees." (P16)*

People aligned with this perspective highly ranked several regulating and supporting WES, which shows that they recognize the importance of several ecosystem functions and processes delivered by wetlands, as exemplified by the following quote:

> *"As most important, I have put everything that has to do with our livelihood's basic needs in this region. This is why I have put the animals on the right of the board* ["most important" side], *the fact that these ecosystems are habitats for rare species because it is very important to have rich biodiversity. In the middle, I have ranked tourism and secondary human needs. On the least important side, I have put everything that has to do with recreation and socialization." (P17)*

The above quote also illustrates that the relational values were not considered important by the people who are associated with this factor, and explains the low value on the relational dimension (Figure 5).

3.2.2. "Us Versus Them" Perspective

Participants associated with the "Us versus them" perspective emphasized that nutrient cycling is not benefiting them because their farms are located upstream. In their view, the WES cause nutrient leakage, not nutrient cycling, which is a disbenefit. Their emphasis on the water's role in transporting nutrients reflects an instrumental way of thinking, since they primarily focused on an issue that affects their utility. However, their value orientation is not clear when the plural value lens is applied (Figure 6). They expressed both relational and intrinsic arguments. An example of the relational value dimension is evident in the following quote:

> *"Well, all of them [the WES cards] are kind of interconnected. This [fishing] has to do with socialization, tradition, cultural heritage, everything. If there is no fish, you change the way you eat, the way you think, the way you spent your time during the summer evenings . . . " (P15)*

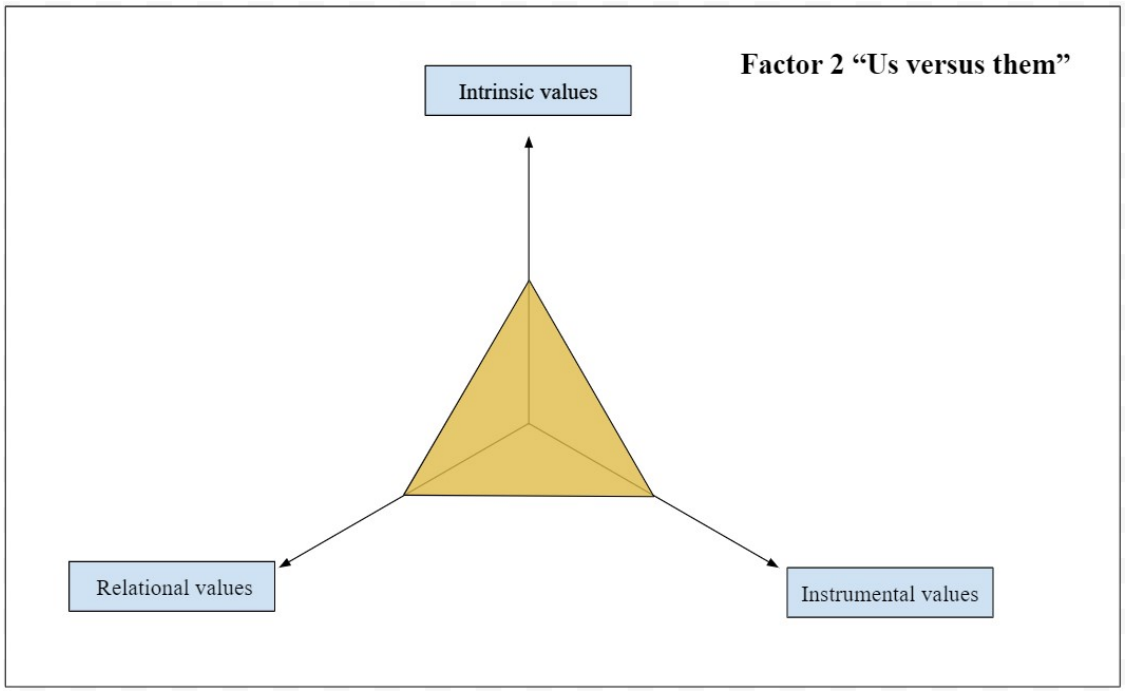

Figure 6. "Us versus them" conceptual space diagram.

3.2.3. "Tradition and History" Perspective

People associated with the "Tradition and history" perspective emphasized mostly relational values. They ranked the cultural WES as highly important and stressed the importance of tradition, as exemplified by the following quote:

> *"This one has everything. Tradition. The rest is important, but this one ["history and tradition"] includes everything." (P11)*

Instrumental values were also expressed, which is why this perspective was put in the middle of the instrumental value dimension (Figure 7). Two out of the three people who scored on this factor are involved in tourism, so this might explain why they ranked the tourism-related WES relatively highly. Participants associated with this factor expressed arguments that imply that something is of low value

if it does not serve human purposes (i.e., they opposed intrinsic value justifications), as exemplified by the following quotes:

> *"Oh, it is okay, we can live without water birds." and "If we do not eat fish, nothing will happen to us." (P2)*

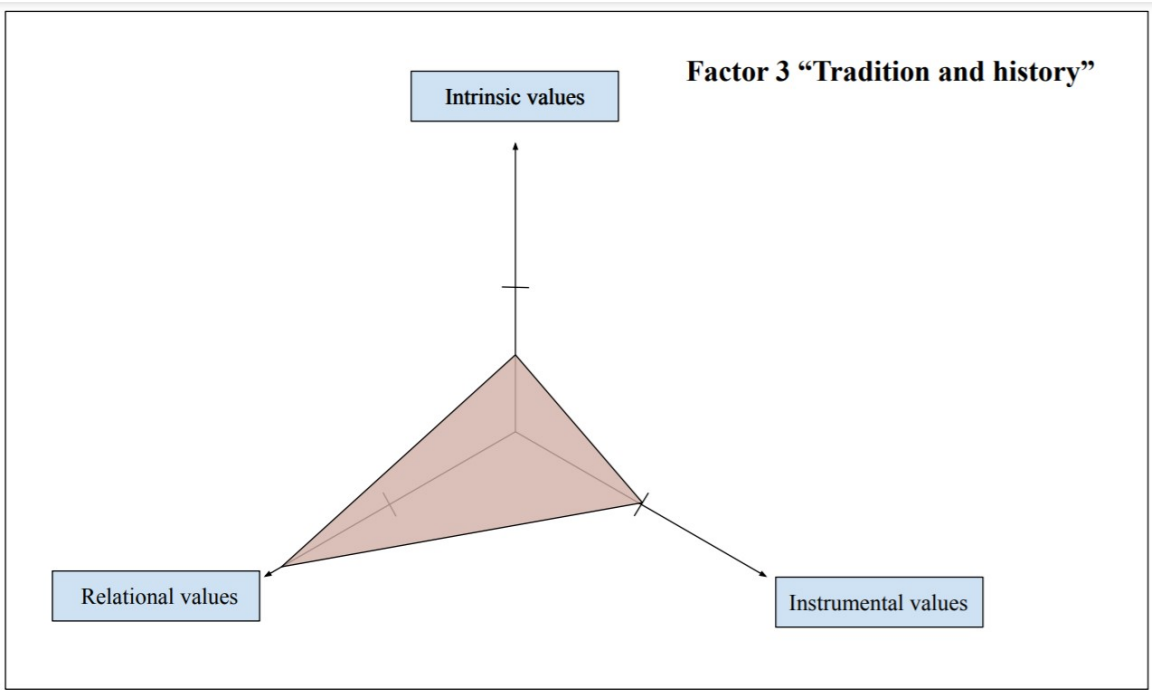

Figure 7. "Tradition and history" conceptual space diagram.

3.2.4. "Modern Environmentalists" Perspective

People associated with the "Modern environmentalist" perspective emphasized intrinsic arguments, and ranked highly the regulating and supporting WES (Figure 8). Instrumental arguments were also presented frequently by the participants, who aligned with this perspective. Their justification was that a well-functioning ecosystem is a prerequisite to support human activities, such as agriculture. Participant (P12) illustrates this point:

> *"If you ignore the economic dimension of these topics, you just speak to the ones that already care, which are few. If you show the economic dimension and consequences, you speak to everybody. The mistake that most environmentalists do is that they ignore this dimension and they speak about the birds, the Nature etc. This only speaks to you and to another 5 people. What about the rest? If you put emphasis on the economic dimension and provide the necessary education, then the farmers will understand that they will have to face the consequences of their mistakes in the future." (P12)*

Relational values were also mentioned, but the cultural WES cards were ranked relatively low compared to the other WES.

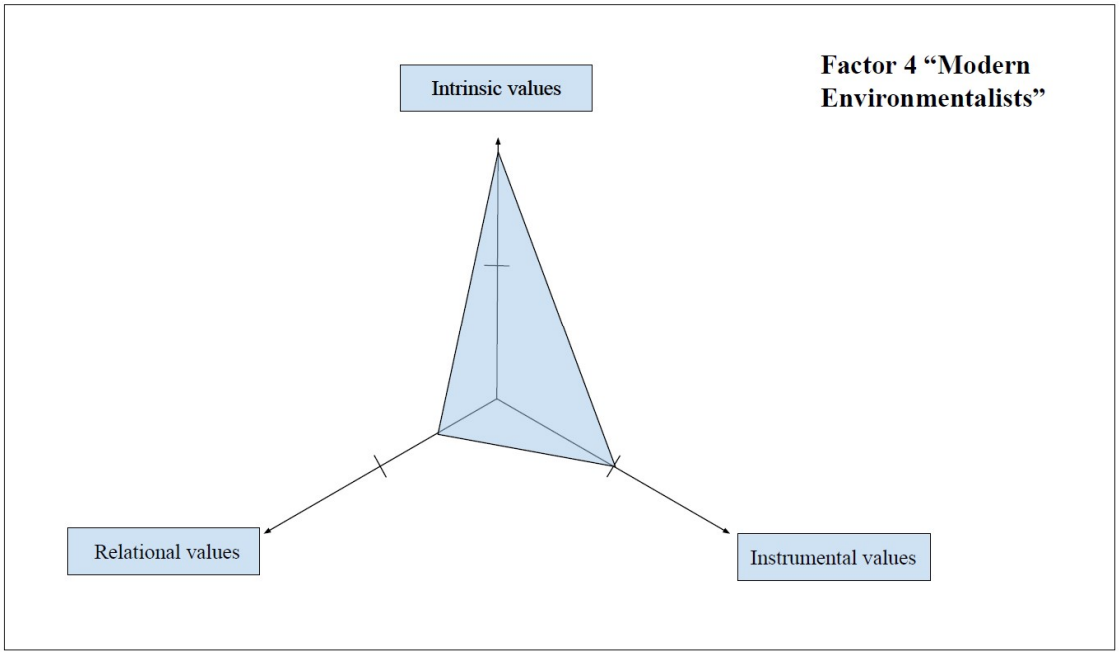

Figure 8. "Modern environmentalist" conceptual space diagram.

3.2.5. "Ecocentric" Perspective

Similar to the "Modern environmentalist" perspective, the participants who aligned with the "ecocentric" perspective emphasized the intrinsic values the most (Figure 9). However, the idea behind placing high importance on the regulating and supporting WES was that nature has value independently of humans, as illustrated by the following quote:

"The most important is that fish and birds can find a habitat in the cattail." (P5)

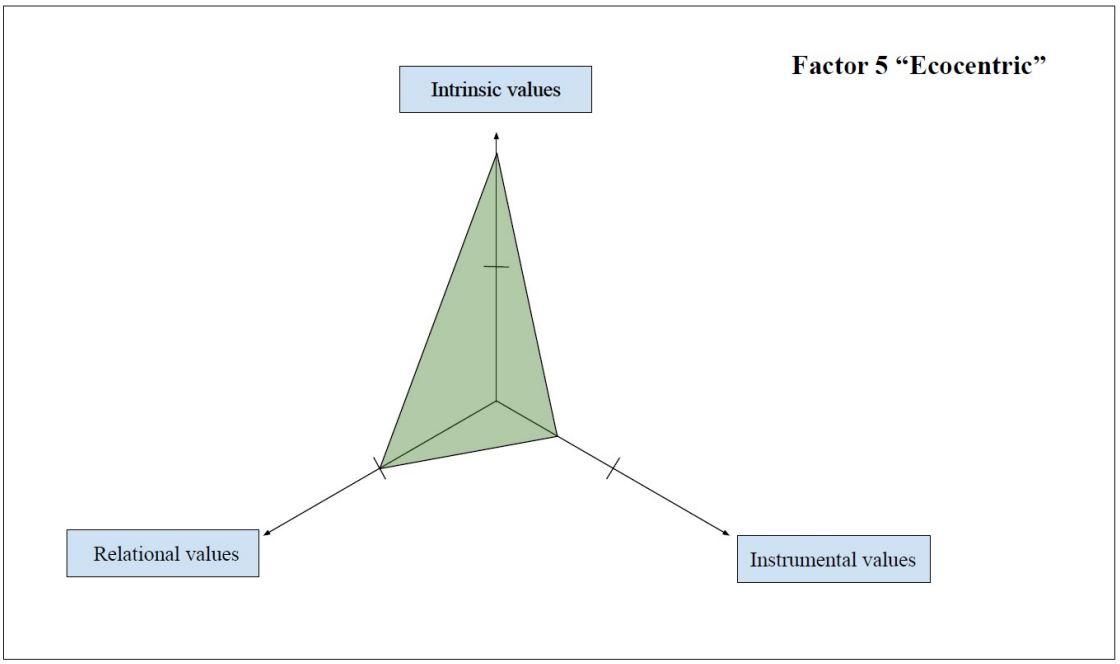

Figure 9. "Ecocentric" conceptual space diagram.

Another person who aligned with the "ecocentric" perspective mentioned an argument that illustrates why the instrumental values are not as important as the intrinsic ones.

"We use nature too much. We must let the natural processes to function." (P28)

4. Discussion

The results highlight five different perspectives on WES among the participants, and the CSDs illustrate the diverse value justifications underpinning these. For some WES, such as "irrigation" and "biodiversity", there was an overall agreement on their importance among the participants, while for other WES, such as "history and tradition of the region", there were often clear conflicting views between participants. Tradition was perceived both as strengthening the cultural identity of the studied socio-ecological system (SES), primarily emphasized by the "Tradition and history" perspective, and as hindering new ways of living in the "Basic needs come first" and "Modern environmentalists" perspectives. Here, people advocated for new technologies to increase the productivity of agriculture and to improve the services for tourism. This contested point highlights different understandings of the role of tradition. Other scholars have also noted this tension between tradition and modernization [57], which is reflected through the tension of instrumental and relational values, as illustrated by this quote in regard to tourism: "*Yes, it does benefit us. But on the other hand, the environment is getting shaped so that it serves the visitor.*" (P4). Thus, our results show a clear plurality in how people ranked WES and how they motivated their preferences.

Three out of the five perspectives were held more strongly (explained most of the variance) within the group of the interviewed stakeholders. These were the "Basic needs come first", "Modern environmentalists", and "Ecocentric" perspectives. The main difference between these perspectives is their divergent prioritization of provisioning against the regulating and supporting WES, and their justification for doing so. Specifically, "Basic needs come first", had a more anthropocentric and instrumental value justification approach, emphasizing the role of WES in contributing to human needs. "Modern environmentalists" and "Ecocentric" perspectives had a more systemic approach, motivating their ranking by explaining that a well-functioning ecosystem is the basis for everything that supports human well-being.

Notably, the five identified perspectives did not indicate any clear correlation with the original grouping of the stakeholders, which was based on the participants' occupation (Table 2). A possible explanation for this might be that many of the respondents were associated, directly or through kin relationships, with several stakeholder groupings. As Graham and Ernstson [58] note in their study on stakeholder perceptions, it is often the case that the multiple identities of the interviewees render comparisons between stakeholder groups simplistic. This is further illustrated by P7, who, when asked if he thinks that his opinion is representative of his stakeholder group, responded: "*[my opinion] has nothing to do with me being a farmer. It has to do with how somebody thinks, not with their occupation.*" As a result, it is unlikely that an approach that is only based on stakeholders' occupation would achieve a balance between different group aspirations and objectives. Instead, inclusive processes that encourage the expression of aspirations would contribute to more balanced outcomes and would thus be desirable, as discussed further below.

While explaining why they placed the items in a specific way on the score board, the participants showed a high plurality in the reasoning behind their choices. Our observations support Loring and Hinzam's view that: *"[. . .] how people prioritize among multiple desired outcomes is rooted less in the specifics of the values that they hold, and more in their philosophical approach to reasoning"* [59] (p. 275). For example, the participants talked about how things should be in a community, about how humans connect to nature, the role of the economy, and their fears and worries and aspirations on how the community will develop in the future. Consequently, when asked to elaborate on their way of ranking the WES statements, the participants illustrated that ES prioritizations are embedded in value systems and are reflective of the social-ecological context that influences their interaction with a given WES. An important aspect of social-ecological contexts are power structures, which mediate people´s interaction with WES and often indicate deeply rooted social constructs that shape the human–nature relationship [19]. For example, an examination of the relationship between stakeholders and ES might

expose social norms that cause varying abilities to access ES benefits [60] or to influence natural resource policymaking. Therefore, a balanced approach cannot be achieved without considering power dynamics [61,62]. Although we do not explicitly address power issues, we observe that, when people are asked to elaborate on the importance of WES, they express what underpins their views on WES, which can facilitate dialogue among stakeholders and thereby their involvement in management strategies.

WES have been influenced over the years by socio-ecological dynamics. A general trend in the region has been the increased tourism development, which has led to associated land use changes. The value of land, construction, road infrastructure, and shops to serve tourism have all increased [41]. These changes influence the demand and availability of, for example, "drinking water", "water for domestic uses", "tradition", and "aesthetic" WES. Our participants did not consider tourism-related WES as more important than the other WES, suggesting that this trend is not driven from within the community, but rather from the outside. Similarly, agriculture has shifted from diversified agriculture to olive monoculture [41], and has influenced the availability of WES such as "irrigation", "biodiversity", "tradition", and "aesthetic". These changes are not based on an inclusive decision by all effected stakeholders, but primarily driven by the aim to produce more olives more efficiently. Our research highlights a trend shared by some of the study´s participants (those associated with the "Modern environmentalist" perspective) in smart/integrated agriculture. Some farmers are experimenting with bio-friendly olive tree farming and other innovations (e.g., irrigation based on needs, building of small dams). This trend has the potential to affect several WES, such as "biodiversity" and "tradition". We believe that both agriculture and tourism would benefit from a more balanced use of WES, as these activities also are highly dependent on WES, both for their current activities and future development. From this perspective, research and education can help to make it increasingly clear that without WES such as "drinking water" and "aesthetic landscapes" the area would become less attractive for tourist and eco-tourism activities and with loss of biodiversity agriculture productivity is likely to decrease because of, e.g., less pollinators.

According to Jones et al. [5], SES literature has neglected the interaction between values and natural resource management. Translating value-mapping research into operational findings is still quite uncommon [23], and we argue that these approaches can support more inclusive and improved environmental management and governance in four ways.

First, our study shows that stakeholders assign multiple values to WES and suggests that policy-making would benefit from a broadened value base. Improved and applied knowledge on the full range of values people associate with WES can provide information to managers on how to design policies that align with people's values. This is important because policies that have stakeholders' support are more likely to lead to better outcomes [5,6].

Second, Jones et al. [5,43] argue that understanding stakeholders' differences in values can provide a more nuanced understanding of where tensions lie. We acknowledge that environmental conflicts may reflect hard choices or trade-offs between stakeholders [63] in the allocation of resources or between different types of values [64]. The approach presented in this paper is neither designed to, nor capable of adjudicating in such conflicts or allocating scarce resources. However, deliberation informed by a better understanding of the nature of trade-offs can identify higher-order values, and potentially lead to problem-solving [65]. This study identified some points of tension. For example, the contested point of the role of tradition indicates a trade-off between instrumental and relational values. Several respondents expressed that they perceive the public authorities as favoring touristic development instead of traditional ways of living. This overshadowed other value dimensions, such as the relational values (and consequently, those who think that relational values are important). IPBES [9] confirms that this situation is common in many interlinked SES. Our research located tensions and could help to facilitate processes where various needs and values are expressed, deliberated, and explored. Through these processes, synergistic instead of contradicting ideas might arise. For example, the tension between tradition and modernization could be reframed as agro-touristic development (an idea suggested

by our respondents) that strengthens both cultural identity (relational values) and provides income opportunities (instrumental values).

Third, value-mapping is a step towards a broader democratization process. Reed [6] argues that participatory decision-making is representative of a greater diversity of values, because these processes allow stakeholders to directly express their diverse values rather than being indirectly represented by experts. In parallel to this study, several stakeholders participate in ongoing group discussions in the form of multi-actor labs through the COASTAL program, examining synergies and trade-offs between land–sea interactions. This study stresses the importance of such participatory initiatives, the involvement of marginalized actors, and that these processes reflect and engage with value pluralism [6].

Last, the study stresses that data from single-method approaches are not sufficient to inform management, because the people whose values are not captured by these methods are neglected [10]. Valuations should integrate data from plural methods and approaches (on methodological integration potential see [16]) to generate comprehensive, context-specific data. Thus far, the few assessments of ecosystem services in our study area have been dominated by biophysical studies [41,66–68] and a monetary assessment employing a "willingness to pay" scheme [69]. This paper is, to our knowledge, the first socio-cultural assessment of WES in the region. According to Jacobs et al. [10], who examine the relation between methodological approaches and the type of elicited data, biophysical and monetary assessments are ill-suited to elicit relational values. Since the choice of methodology frames which data is relevant [10,23], we suggest that local policies could be improved by employing several methodological approaches that can be integrated to produce holistic ES assessments, taking into account biophysical, monetary, and socio-cultural sources of information.

The study's approach captured a snapshot of how participants perceive WES at the present, individual, and local scale. It is possible that the participants would rank the WES differently if they repeated the ranking exercise in the future. IPBES [9] recognizes the dynamic nature of values and suggests that future research could further examine to what extend value expressions change after time or experiences. Another limitation of the study is related to the individual focus. Group deliberation is an experience that might alter an individual's values. Kenter et al. [21,26] argue that values are neither formed individually nor defined in isolation—instead, values are shaped through deliberations. As mentioned earlier, participation in the COASTAL series of multi-actor labs might affect the values held by stakeholders.

5. Conclusions

We have shown that stakeholders from the coastal-rural communities surrounding the Gialova wetland have multiple perceptions of wetland-based ecosystem services (WES). Twenty-five WES were identified in the area studied. We used Q methodology to elicit five perspectives on how participants ascribe the relative importance of these WES. These were named "Basic needs first", "Us versus them", "Tradition and history", "Modern environmentalists", and "Ecocentric". By examining the reasonings behind participants' rankings through the theoretical lens of "plural values", we show how perspectives reflect divergent understandings of relational and instrumental values. We stress the need to better understand not only what people value but also what shapes peoples' values and how this could improve natural resource management. While such mixed-methodological approaches can capture different understandings of ES and values, improving environmental governance also requires spaces where these values can be expressed and deliberated.

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Appendix A

Table A1. Wetland ecosystem interlinkages of the studied area and brief descriptions of their main uses, management statuses, and associated pressures.

Water Category	Biophysical Element	Names and Description	Connection with Other Wetland Ecosystems	Main Uses and Management	Pressures
Transitional	Lagoon	Gialova lagoon is part of a coastal wetland (Gialova wetland), which due to human interventions has gradually become a hyper-saline lagoon [41,66]. It is part of a wider Natura 2000 area (GR2550008; GR2550004) and is also designated as an Important Bird Area, and an archaeological site [41]. The lagoon covers an area of about 250 hectares, with an average depth at 0.6 m [70] and maximum at 1 m [67]. The lagoon has a high fisheries value [67] and the wetland has the potential to become an eco-touristic attraction.	The lagoon is currently connected to the sea via an open channel. Tyflomitis springs is the main freshwater provider of the wetland, however it provides limited, volumes of freshwater, compared to the past [41].	The lagoon is mainly used by fishers. Fish management is assigned to the higher bidder by the Sub-region of Messenia (administration) for a period of 5 years. The lagoon is part of a wider Natura 2000 area, and since January 2019, the environmental management of the area is under the Management Body of Protected Areas of South Peloponnese and Kythira Island. The local archaeological ephorate is also engaged in the management of the area.	Drainage efforts and other anthropogenic interventions since the 1960s have altered the wetlands' functions, resulting to increased salinity and loss of biodiversity [41,66,71]. Salinity is expected to increase under future warmer and drier climatic conditions [66]. Possibly residuals from agriculture (nutrients and pesticides). Lack of conservation actions, unstable management scheme [41,71]. At present, the ecological status of the lagoon is characterized poor to low. In addition to increasing salinity, the ecosystem is strongly affected by anthropogenic activities, especially by nutrient enrichment [57].
Surface	Rivers	Gianouzagas, Selas, Xerias and Xerolagados are small rivers (drainage basins < 100 km^2/each). Xerias and Xerolagados flow heavily depends on the season [72].	These rivers collect water from the surrounding catchments. Xerolagados used to provide the Gialova lagoon with freshwater, but it was diverted in the 1960s. All rivers flow directly out into the sea.	A small percentage of Selas' and Gianouzagas' winter flow is used to fill up two artificial reservoirs. It is the responsibility of the Decentralized Administration of Peloponnese (DAP) to manage the rivers under the EU Water Framework Directive (WFD).	During the olive harvesting period, some olive mills discharge wastewater from their activities into Xerolagados and Selas rives. Xerolagados is referred by the locals as "the black river" [41], and possibly contain residuals from agriculture (nutrients and pesticides).
Groundwater	Aquifers	Tyflomitis conglomerates groundwater aquifer, is located at the east side of the Gialova wetland. Locals refer to the Tyflomitis springs as the "lungs of the wetland" [41]. Chandrinou springs is another aquifer in the studied region, located close to Chandrinos village.	The aquifers basic recharge is through precipitation inputs. Part of the water from Tyflomitis spring flows into the lagoon.	Water from the aquifers is used for water supply (public wells) and irrigation (private wells). It is the responsibility of DAP to manage the groundwater under the WFD, but there is ambiguity on whether the water extraction is regulated.	There is potential of sea intrusion and increased salinity when there is water overconsumption.

Table A1. *Cont.*

Water Category	Biophysical Element	Names and Description	Connection with Other Wetland Ecosystems	Main Uses and Management	Pressures
Surface	Reservoir	Two reservoirs of approximately 700,000 m^3 total capacity built by Costa Navarino (CN) [38].	The reservoirs recharge from the rainwater and approx. 1% from Selas and Gianouzagas winter flow [38].	The water from the reservoirs is used to irrigate the golf courses and the hotel's green infrastructure. Built and managed by the CN hotel.	Not known pressures.
Seawater	Coastal zone	Voidokoilia, Romanos and Navarino bay beaches and the coastal zone of the Navarino bay. These beaches are the nesting ground for endangered *Caretta carreta* loggerhead sea turtle [73] and the Voidokoilia sand dunes are the habitat of *Chamaeleon africanus*.	The Navarino bay is connected to the lagoon via an open channel. Additionally, all rivers flow into the sea.	Coastal waters are mainly used for fishing (local fishers) and recreational activities (swimming, diving, snorkeling, kayaking, etc.). Activities at sea are regulated by the local coast guard. Conservation activities at Romanos beach are based on the common efforts of CN, Archelon NGO, and the municipality, a collaborative initiative aiming to monitor and protect the nesting grounds of *Caretta caretta* and thus minimize the impact of touristic activities on the loggerhead sea turtle [74].	Threats include uncontrolled touristic/recreational developments and associated seasonal overcrowd, garbage pollution, as well as sand dune habitat erosion and degradation by cars and humans.

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