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Residents' Views on Landscape and Ecosystem Services during a Wind Farm Proposal in an Island Protected Area

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Abstract: Industrial wind farms are being developed within many protected areas, such as in EU Natura 2000 sites; this includes proposals on small Mediterranean islands, such as Samothraki in Greece. Scarce wild land areas on islands may be particularly vulnerable to landscape-scale degradation; this may have serious negative societal impacts. Samothraki's resident perceptions were surveyed in the wake of such a proposal, in June 2018. Of 98 respondents, 48% reported they were against the wind farm plan, while 22% did not take sides. We compare for-and-against sub-group perceptions of the proposed wind farm with potential impacts on the landscape and explore residents' opinions on ecosystem services and environmental pressures and threats. Conflict over the wind farm was prevalent; residents most frequently reported that the proposal threatens aesthetic and landscape qualities. Aesthetic qualities were also the second highest ranked ecosystem services, after freshwater provision. However, other threats, such as livestock overgrazing, top residents' opinion of major environmental problems on the island. The questionnaire survey used provides a scoping assessment, which may assist in identifying "conflict hotspots" for wind farm development. A critical review of wind farm planning in protected areas is presented in light of insights gained from this survey and other relevant studies.

Keywords: public perception; wind turbines; landscape; ecosystem services; Natura 2000; Samothraki

1. Introduction

On many Mediterranean islands, wind energy developments are being planned and constructed on wild lands often within protected areas. Although renewable energy has been widely seen as a positive development in the European Union (EU) within the context of the climate crisis, some conservationists fear that many industrial wind farms are poorly placed and will produce long-term landscape-scale changes [1–3]. Modern wind farms are industrial-scale multi-turbine facilities developed by independent power companies to provide electricity to the wider grid [4]. Many such developments are supported by EU government subsidies and actively promoted by

member-state government agencies [5,6]. The transition to so-called "wind energy landscapes" [7], including the accompanying new roads, power lines and other support structures may have serious impacts on biodiversity, cultural heritage and local communities [8–10]. Residents' perceptions on the impacts of wind farms specifically in protected areas remains poorly studied, particularly in potential conflict hotspots for wind farm development such as the EU's Mediterranean protected areas [11–13].

Many wild and semi-wild areas on Mediterranean islands and uplands have been targeted for wind farm development, and hundreds of new wind farms are being set up within EU Natura 2000 protected areas where until now wild lands have been preserved [14,15]. This conflicting discourse has led to what some environmentalists call a "wicked problem" in the planning process; relating to perplexed or perhaps even impossible to solve planning and policy conflicts [11]. The notion of wild land can only really be a relative term along a continuum of increasing naturalness and inaccessibility (e.g., roadless conditions) however, high "wilderness quality" conditions have multiple values for biodiversity and various material and non-use cultural values [16–18]. Many wilderness values carry strong symbolic values for local societies or community groups [19,20]. While many wild land areas are in the Natura 2000 system, there is ample evidence that such wildernesses or wild land areas are being lost and degraded, mainly due to new road networks, particularly on and near the Mediterranean coasts [21–23].

Europe's Natura 2000 ecological network is the world's largest protected area scheme with a multitude of measurable benefits [24]; however, a landscape-protection gap seems to exist in protected area management [25,26]. The Habitats Directive does not clearly target the spatial scale of landscape or any notion of wild land preservation, although it should provide provisions for conserving the "integrity of the site" [18,27]. One of the difficulties in assessing impacts of possible new developments within Natura 2000 sites is the lack of appreciation of local stakeholders views [28,29] and other socio-economic aspects, including biophilic cultural values of these protected and/or wild land areas. Beyond biodiversity and wilderness, it is well known that wild land landscapes provide important non-material and intrinsic values to local communities and society at large [18,30,31]. The European Landscape Convention's [32] Article 5 emphasizes an obligation to ensure the participation of the public in the definition and implementation of landscape policies. The state of natural ecosystems, including the effect of landscapes on people's wellbeing should be taken into account when planning [33,34] and this is especially sensitive in EU-level protected areas.

Since planning difficulties at the landscape scale are on the rise in Europe and the Mediterranean [35], rigorous ways to inform land use decision-making are required. Assessing the value of the landscape in an ecosystem services approach is being investigated actively [30,36,37]. Ecosystem services (ES) applications are usually considered mission-orientated, often carried out to guide policy and decision-making [38,39]. ES help estimate the contributions of "ecosystems", in a broad sense, to human wellbeing [40]. These consist of provisioning, regulating and maintenance and cultural services [41], with cultural services being particularly challenging to quantify [42]. Several researchers consider the "human experience" gained through landscape as a type of cultural ecosystem service derived from landscapes [43,44].

In the context of such difficulties in protected areas, we focus on a Mediterranean island case study involving a wind farm proposal in a near-pristine island landscape in Greece. In most Mediterranean countries the values of landscapes are generally poorly articulated in policy [45,46] and often not well protected in practice [47,48]. Landscape conservation research in Greece has had very few initiatives until recently [49–52]. Although Greece has invested in building a representative network of Natura 2000 protected areas, wild land and aesthetic values or other intangible values are usually not taken into consideration when selecting sites for wind farms within or near this country's protected area network [14,46,53]. In this study we explore local residents' perceptions of landscape and ecosystem services in relation to a proposed wind farm on Samothraki Island in northern Greece. The research employed a face-to-face questionnaire survey realized during a period when a wind farm proposal was being planned within the core area of the island's Natura 2000 site.

2. Materials and Methods

2.1. Study Area and Context

Samothraki Island is well known as being exceptionally rich in natural and cultural heritage, which is widely agreed as requiring conservation management and preservation [54–56]. Most of the island is covered by two Natura 2000 sites and it has been proposed as a UNESCO MAB Biosphere Reserve [57]. Samothraki's population is registered at 2840 people (based on the 2011 census), with approximately 1000 economically active residents; 20% are livestock herders and small-scale farmers, while the tertiary sector employs 60% and consists mainly of tourism-related services [58]. In the tourism literature Samothraki is known for its "wildness" and its outstanding mountainous relief: it has been said that "after Thira [Santorini], Samothraki has the most dramatic profile of all the Greek islands" [59]. However, tourism activities are concentrated during a very small time window in summer and have never dominated the island's culture [60]. The low-key tourism development is often attributed to several reasons, among them: isolated location near the northern Greek–Turkish frontier; poor year-round ferry connections; "poorly developed" beaches; and the lack of an airport [61,62]. In this way Samothraki may still maintain some aspects of what the late Oliver Rackham has called the "Greece of yesterday", that is, the Aegean world before the wholesale socio-economic and landscape changes of the last few decades [63].

Samothraki's infrastructural modernization begun in the 1960s with the first electricity network being fed by local diesel generators; in 2000 45 km-long underwater cables connected the island to the national grid on the mainland [64]. Between 1992 and 2009 four small wind turbines (55 KW, with towers at 24 meters height) were developed as a pilot project by the Public Power Corporation on a peninsula next to the town of Kamariotissa, but this government-sponsored project was abruptly discontinued. Although solar power on buildings (for hot water heating) is rather widespread and wood-burning stoves are also used, diesel is still important for winter household heating (G. Maskalidis, personal communication). In early 2015 Samothraki's residents began hearing about a new proposal for two wind farms on Mount Saos in the wilderness area of Amoni–Louloudi (Figure 1). The proposal was approved with a "production license" by the Greek Regulatory Authority for Energy [15] and refers to two industrial-scale wind farm units, one with three and the other with 36 wind turbines (potentially producing a total of 110 MW), in order to supply the mainland continental electricity grid through an underwater cable. The chosen area in the eastern range of Mount Saos (peaking at 1611 m a.s.l. (above sea level)) is located between 800 and 1300 m a.s.l. along rocky ridgelines near one of the wildest parts of the island with no immediate road access.

In mid-June 2018, we conducted a questionnaire survey during the fifth Samothraki Summer School (for details see [65]). In June 28th 2018, the Municipality of Samothraki voted to disapprove the plan for establishment of the particular wind farms. Controversy over the siting and future development of this project is ongoing.

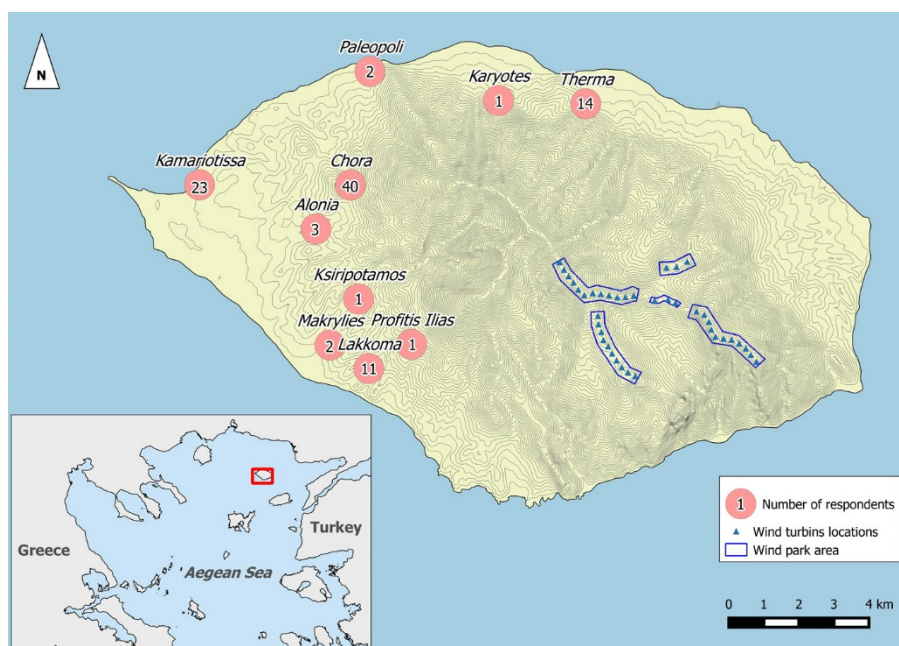


Figure 1. Location of the proposed wind farms on Mount Saos and settlements where questionnaire respondents were located. The number of respondents from each location is shown in circles.

2.2. Questionnaire Development and Application

The face-to-face questionnaire survey was conducted between the 3rd and 16th of June 2018 by three fluent Greek speakers. Local residents were surveyed in ten settlements on the island (see Figure 1). When we approached potential respondents we first introduced them to the scope of the questionnaires (realized as part of the Summer School) asking for consent to be part of the research. We assured them that the collected data are anonymous and it would not be possible to identify an exact person as a respondent.

We used an expert-based identification of main stakeholder groups to guide us in acquiring a balanced representation of main local actors [66]. We identified five generic local stakeholder groups: Agriculture, Tourism, Services, Local Authority and Others. Subsequently, we combined two approaches for collecting data—purposeful and ad hoc sampling of residents. The survey was designed to capture perceptions of the main groups of residents rather than striving for a representative sample of the population. At first, we targeted local stakeholder groups representing the public sector, services and positions of authority. These are typically involved in decision-making processes under a consultative role for various land use planning issues, therefore their opinions can be considered as having a potentially significant weight in affecting local decisions. We also tried to find members of local organizations and non-governmental organizations. Members of such organizations usually hold additional, relevant knowledge and experience and therefore their opinions may affect the processes of decision-making. We then approached residents randomly at various locations on the island, in cafes and other areas of villages and in the field during their work. We subsequently continued to combine the two approaches until we had what we assumed to be a fairly balanced sample of the main groups of local residents.

The survey had two components (Figure 2); both were applied to each respondent.

	COMPONENT 1	COMPONENT 2		
	ES assessment	Perception of threats / problems	Landscape preferences	Wind farm stance / perceived impacts
QUESTIONNAIRE DESIGN	Assessment of importance for 20 ES: provisioning, regulating, cultural (Guiding question: <i>How important are the following benefits which Samothraki island potentially provides?</i>)	Q1. <i>Do you believe that the Samothraki landscape is threatened? (Yes / No / I don't know) If yes, please explain why.</i> Q2. <i>Which are the most pressing problems of the landscape? a. Currently, b. In the future.</i>	Q3. <i>What do you like most in the landscapes of Samothraki?</i> Q4. <i>What is the most precious commodity in the landscape of Samothraki?</i> Q5. <i>What makes Samothraki unique?</i> Q6. <i>Are there special places which you visit for their unique cultural or spiritual values?</i>	Q7. <i>Have you heard about the proposed wind farms?</i> Q8. <i>What is your opinion about the proposed wind farms?</i> Q9. <i>How do you believe the wind turbines could influence the landscape?</i>
RATIONALE/ANALYSES	Investigate material / non-material benefits as perceived by residents • Ranked bar charts	Investigate residents' perception of threats and problems of the landscape • Qualitative content analysis	Investigate and corroborate preferences / interests of landscape and ES • Qualitative content analysis / mapping special places	Identify response to wind farm development and perception of potential impacts • Compare for / against subgroups with other categories

Figure 2. Conceptual framework of research objectives and how these are reflected in the components of the survey.

Component 1: Ecosystem services rapid assessment. Respondents were asked to rate the importance of 20 ecosystem services provided by the landscapes of Samothraki. The selection of specific ecosystem services was inspired by the Common International Classification of Ecosystem Services (CICES v4.3) classification (<https://cices.eu/>), and adjusted to local conditions where appropriate [67]. The face-to-face nature of the data collection allowed for clarifications where respondents did not understand the wording of an ecosystem service. A 5-point scale scoring on importance plus the "I don't know" option (zero value) were used. Adding the zero value enabled participants to have the option to declare a "lack of background information" instead of making a random guess. The list of the provided ecosystem services and their respective categories as well as the scale response categories are given in Figure 3.

Component 2: Questionnaire with a combination of closed and open questions on landscape values, environmental pressures or threats and the wind farm issue. Finally, information about the age, gender, place of residence and professional structure of the people surveyed was collected (Table 1). The entire questionnaire took about 20 to 30 minutes to complete. Pretesting of the questionnaire was conducted within the research team and within the summer school participants, as an informal test that helped identify poor question wording or ordering, errors in questionnaire layout or instructions.

The responses were translated into English by the authors and descriptive statistics was conducted for Component 1. For Component 2, a qualitative content analysis with a coding process was employed to uncover emerging response patterns and to facilitate the interpretation of text data [68]. Coding assists in giving "condensed meaning units" for further analyses and general interpretation [69]. Coding of all answers from the open-ended data collected was performed to allow for further analysis of preferences and values associated with various natural and cultural elements of the island's landscape (See Figure 5). A code in this process can be thought of as a label; a name that describes what this particular "condensed meaning unit" is about [69]. The ones we used were usually one or two words long and the choices of codes were discussed and cross-checked between two of the researchers analyzing the data for consistency.

A novel method of “two-dimensional enhanced” word cloud analysis of the qualitative coding categories was used to compare for-and-against sub-group perceptions of respondents (i.e., those against and those supporting the wind farm). Usually, word clouds provide an efficient interface to depict the most frequently used words in a data set [70–72]. In this study, we developed a new type of word cloud, which graphically describes two variables—frequency of occurrence of keywords/codes and distribution of relevant answers on a three-degree qualitative scale (positive–neutral–negative stance). The design of such an enhanced word cloud uses clearly arranged features of a group bar graph but still provides an easy-to-understand visual interface to convey results with graphical representations.

3. Results

3.1. General

Ninety-eight (98) questionnaires were completed. According to the place of residence, 65% of the respondents are from the two main towns of the island, the harbor town of Kamariotissa (N: 23) and the nearby capital town, Chora (N: 40); specific localities of data collection and numbers of participants are mapped in Figure 1. Socio-demographic characteristics of respondents (gender, age and general employment category) are shown in Table 1.

Table 1. General structure of the set of residents surveyed. Category refers to a general employment category.

Category	No of respondents	Gender		Age group					
		Female	Male	18–25	26–35	36–45	46–55	56–65	66+
Tourism	20	8	12	0	5	4	6	4	1
Services	25	13	12	0	8	7	5	2	3
Agriculture	17	2	15	1	3	5	4	2	2
Local Authority	13	6	7	0	0	8	4	1	0
Other	23	5	18	0	3	2	5	9	4
Total	98	34	64	1	19	26	24	18	10
Percentage	100%	35%	65%	1%	19.4%	26.5%	24.5%	18.4%	10.2%

3.2. Ecosystem Services Ranking

The concept of ecosystem service categories was applied through a fit-for-purpose list of 20 pre-selected ecosystem service-related types to be evaluated by the respondents. Figure 3 provides results of a ranking based on five classes of assigned importance from the respondents (N: 98).

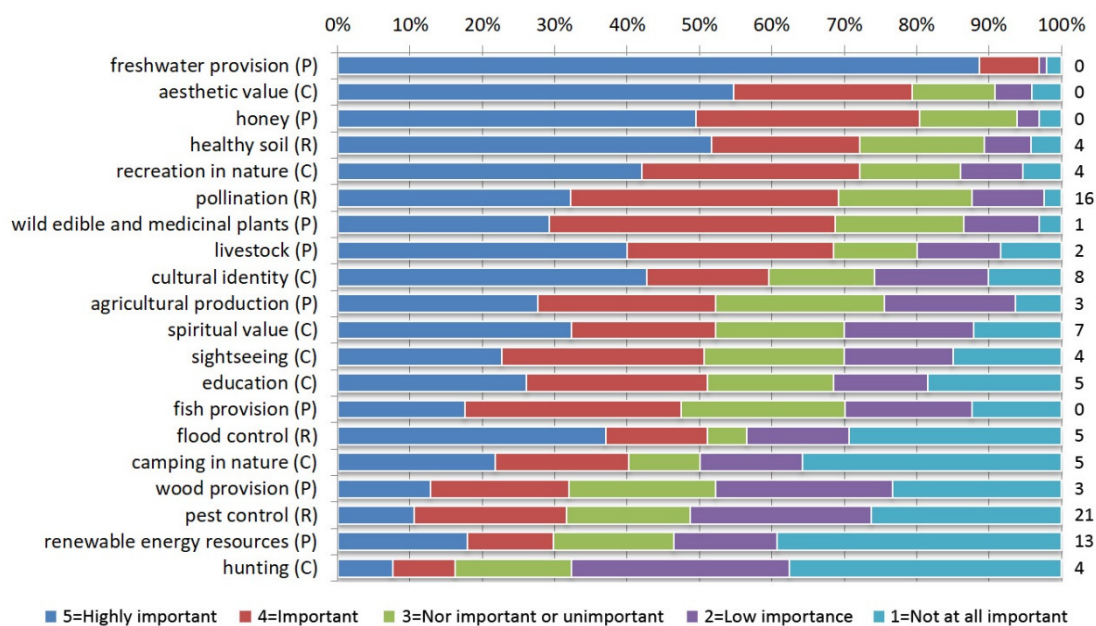


Figure 3. The importance of 20 selected ecosystem service items for residents (P = provisioning service, R = regulating and maintenance service, C = cultural service). The number of people who responded “I don’t know” is at the right side of the graph).

3.3. Preferences

The widely perceived “image” of Samothraki as a wild mountainous island with abundant freshwater was prominent in the responses of most residents (Figure 4). Natural elements such as the dominance of freshwater and a wild mountain environment (Figure 5) corroborate most ecosystem service-ranked assessment results (Figure 3). In terms of the word choice of the respondents, it is easy to see that “natural” elements dominate versus “cultural” elements when these are broadly categorized (Figure 5).

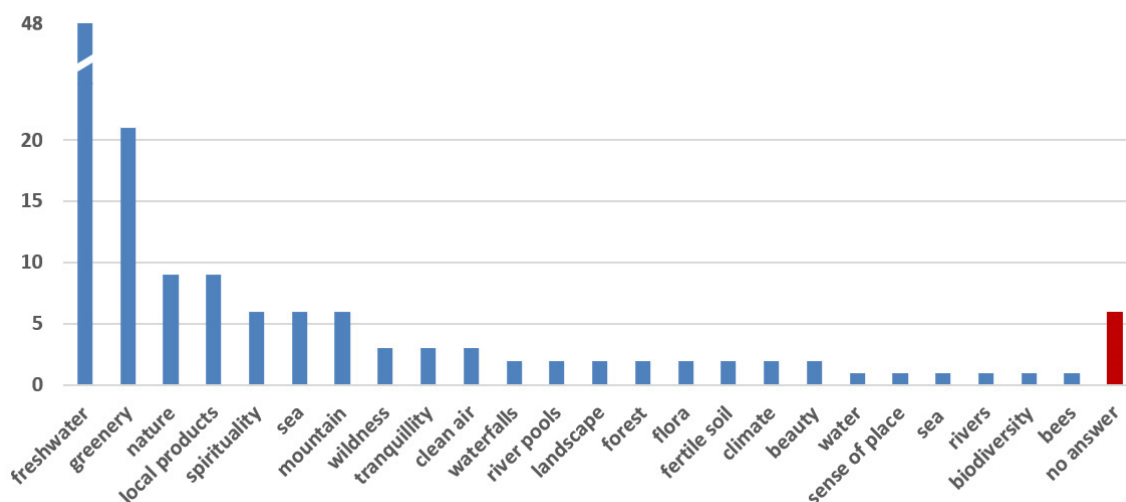


Figure 4. Responses to the open question “What is the most important benefit or offer of the landscape?” Responses are clustered into main categories through content analysis.

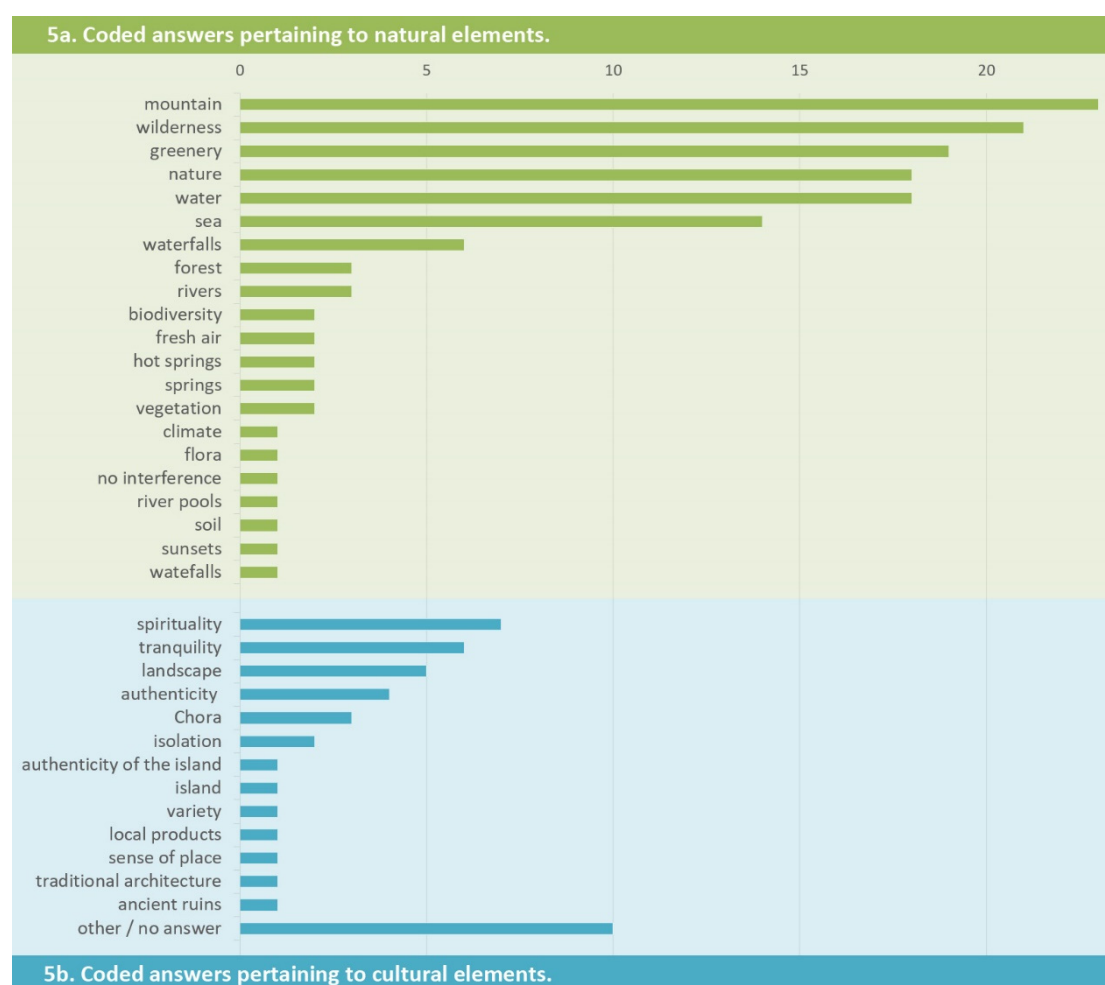


Figure 5. Answers given when asked "What do you like most about the Samothraki Landscape?" These are separated here into (5a) natural and (5b) cultural elements for comparison; natural elements predominate. Some cultural elements also include natural aspects and vice versa.

3.4. Anthropogenic Pressures and Threats and the Wind Farm Proposal

Cumulatively (for both present and future), the most frequently mentioned pressures and threats were: overgrazing, government neglect, erosion and water mismanagement. Wind farms followed at the seventh place in ranked order as a future threat (Figure 6). Out of the 20 most pressing current problems, most have a clear anthropogenic form and very few are related to natural forces (e.g., pest insects, erosion and drought).

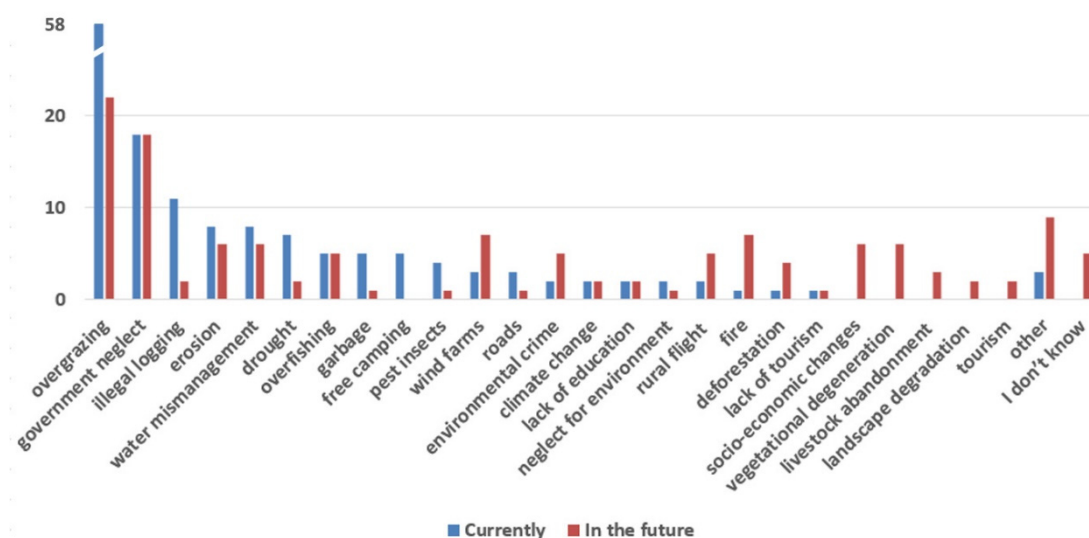


Figure 6. Answers to the question “Which are the most pressing problems (of the landscape) now and in the future?” Topics are arranged based on frequency of occurrence for present problems.

Regarding the specific wind farm proposal, 48% of respondents claimed a negative stance, while nearly a quarter chose not to answer or did not have an opinion about the wind farms (Figure 7). Respondents were divided into three sub-groups based on positive, negative or undecided/no answer response about the wind farms in order to quantitatively examine opinions on the proposed wind farms. Aesthetic damage and a negative influence on the landscape were the most commonly reported attributes (mostly by respondents who were against the wind farms) (Figure 7). Conversely there is a strong mention of “no harm” done to the aesthetic/scenic values or landscape by respondents that support the wind farms. The notion of landscape and aesthetic values in the sub-group of respondents points to a peak concern in the responses. Finally, the issue of damage done to the environment by roads is also consistently high in the ranking by respondents who were against the wind farms. Any mention of biodiversity, i.e., a general category comprising of any form of nature, wildlife species, ecosystems etc., is mid-way down the rankings and is mentioned by relatively few respondents (almost exclusively by those against the proposal).

Q2.What is your opinion on the proposed wind farm?



Q3. How do you think that the wind turbines could influence the landscape?

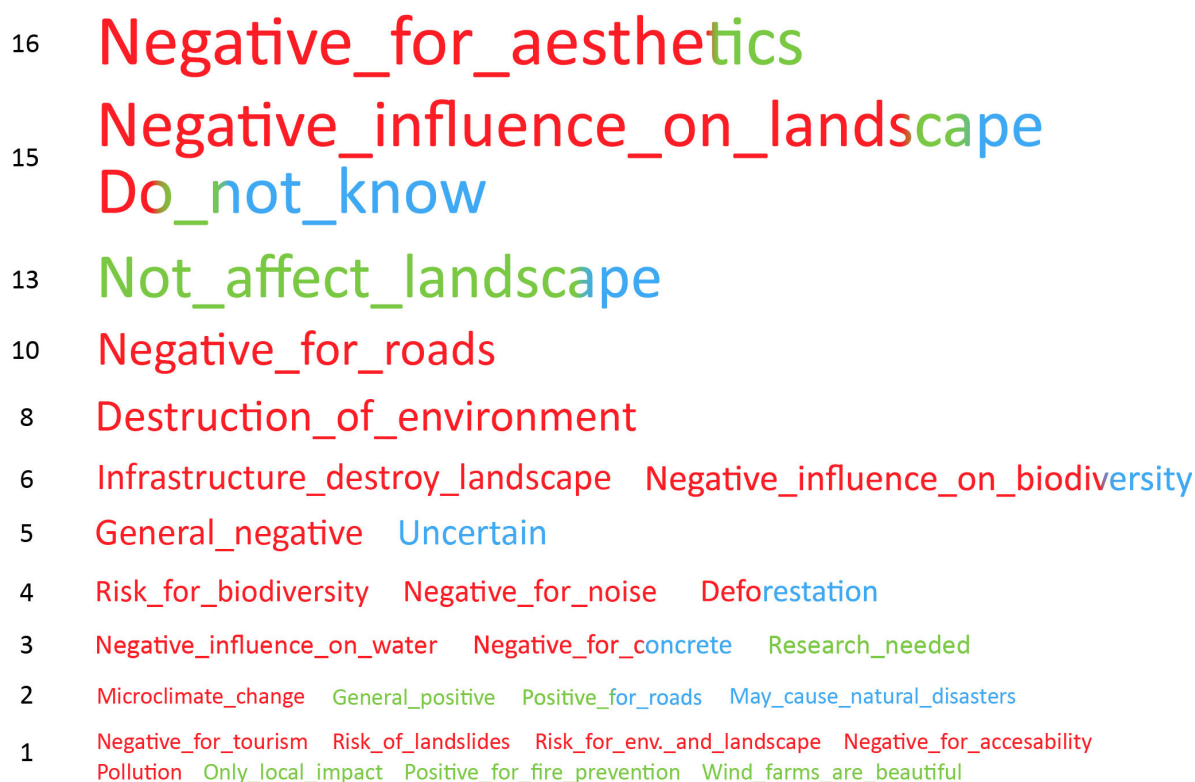


Figure 7. The pie chart shows answers to the question "What is your opinion about the proposed wind farm development?" (N: 98). The two-dimensional enhanced word cloud combines answers from Q2 and Q3 to distinguish three wind farm preference sub-groups in relation to the potential influence on the landscape. Q3 ("How do you think that the wind turbines could influence the landscape?") is expressed by the size of font (e.g., 12% of respondents said "Negative for aesthetics" = 60, 5 points; 1% of respondents said "Positive for roads" = 20 points). This also incorporates the frequency of occurrence of response codes from Q2 ("What is your opinion on the proposed wind farm?") expressed by the text color (e.g., the "Negative for aesthetics" code was recorded by 14 respondents with a negative stance and two respondents with a positive stance, which makes the text colored 87.5% red and 12.5% green). Numbers on the left show the frequency of codes.

4. Discussion

4.1. Limitations of the Study

Given the research design developed for the project the study focused on a small sample aiming for wide representativeness among the key employment categories present on the island and the different localities in which they were based, assuming that livelihoods and dependencies on land are key factors affecting perceptions and attitudes towards ecosystem services and landscape. We therefore would not attempt to generalize the results to the whole island population; a larger sample size (approx. 250–330) would be statistically representative of the resident population. Thus, as our questionnaire survey was designed to reveal mainly qualitative data (see Figure 2, Component 2),

we aimed at capturing a rather in-depth understanding of the perceptions of each respondent. We also acknowledge the limitations of our identification of stakeholder groups, which are probably not fully inclusive [73]. Nevertheless, our stakeholder groups reflect main professional categories of employment represented on the island as reported by official statistical resources [74] and evidenced in complementary recent research on Samothraki [64].

Despite these limitations, the survey approach did take into account the literacy level of the potential respondents and elderly participants (i.e., respondents with low literacy levels would have greater difficulty completing a self-completion or postal questionnaire). The design of the face-to-face survey was successful in addressing challenges that a self-completion questionnaire would have struggled to face [75]. The method chosen could best reply to the challenge of limited resources and time for data collection. The research design of the survey ensured a high variety of evidence gathered and exploration (covering aspects of ES and perceptions of landscape as well as attitudes towards industrial wind farms) to enable triangulation between wider perceptions and theme-specific attitudes (opinions on the wind farm proposal and its impacts).

4.2. Ecosystem Services Rapid Assessment

The first part of the questionnaire comprised an ES survey based on socio-cultural valuation [67,76], aiming to provide indications of perceptions about the ecosystem's material and non-material services and benefits to society. Most of the respondents had not heard of the ES before and there were queries about the concept during the survey. Some of the ES evaluated as important were later corroborated in the open questions that followed (e.g., the high value attributed to aesthetics and freshwater resources). It is also interesting to note which ES were "least favored" and which ones garnered high uncertainty (i.e., not ranked or commented on). For example, the "least favored" ES were recorded as: "wood provision", "pest control", "renewable energy resources" and "hunting" (in progressively lower order of ranking). In the open questions that followed, evidence emerged as to why each of these ES may have received very low scores; potential reasons include: a dwindling or poorly managed fire wood supply; a recent caterpillar defoliation outbreak; the wind farm conflict; and game species population declines, respectively.

We consider this first stage of the questionnaire a rapid ES assessment, structured to provide an initial orientation. ES has been used as a kind of "Esperanto" for valuing nature's services and engaging participatory processes [77], but ES typologies may have "semantic limitations" [78]. Sometimes, there may be ambiguity in the meaning of ES categories [79,80] and caution in using these screening-level assessments is required.

4.3. Aesthetic Values and Landscape "Wildness" are Important

The qualitative part of the survey, utilizing the open questions, revealed how residents often showed appreciation for various geographic attributes of the island and its ecosystems. We were able to detect frequent intentions to protect aesthetic and natural values; this confirms earlier socio-ecological surveys of the island's population's perspective on nature [57]. Aesthetics and landscape were the top-ranked theme words when relating to wind farm impacts in our survey. This is in line with research showing that aesthetics plays a dominant role in shaping local attitudes toward wind farm development in broadly similar circumstances [81–84].

We were able to recognize regularities in residents' accounts that suggest a biophilic tendency towards natural landscapes (or so-called wild and natural places on the island). For example, in their response to listing important "areas of spiritual value", the majority of the specific locations mentioned were natural areas (i.e., not human-built, archeological sites or settled areas). "Least frequented" natural and remote areas were shown to be appreciated as idyllic (e.g., wilderness mountain ridges, waterfalls, the Fonias river pools and springs, Mount Saos and wild and rather remote beaches, such as Vatos, Kipi, and Pachia Ammos). Again, natural areas predominate, even in answers to the question: "What do you like most about the Samothraki landscape". Some of these areas and locations on the island also coincide with much-photographed scenes of outstanding natural beauty. In this way the qualitative data may help to identify and highlight key landscape

features of high value to residents [85,86]. Most of these landscapes or sites are also known to be of value to tourism and are repeatedly promoted in the tourism literature or as noted destinations for outdoor recreation on Samothraki [59,60].

On Samothraki, it is possible that many of the respondents have undergone a shift from traditional rural views towards a so-called urban appreciation of the landscape (e.g., [87]). This may be related to the fact that most respondents were recruited in the two major island towns; this is where most residents reside. Additionally, we suggest that many respondents have been influenced by the views and behavior of the small but important tourism industry [58,60]. It is interesting that similar positive representations of nature have been expressed in villages in protected areas with high ecotourism development, such as Dadia National Park in northeastern Greece [88]. In Dadia, locals seemed to adhere "to motivations and aesthetics resembling those of the visitors" [89]. In our opinion, a similar stance may be present among many residents in Samothraki as well. Although tourism is still low-key, it strongly influences Samothraki's current economic and social system [58]. In this context, more research into the influence of tourism on residents' perceptions of nature, landscape and the island's protected area would be of interest [90,91].

4.4. Perceived Anthropogenic Pressures and Threats

The residents' insistence on livestock overgrazing being a primary negative pressure was unexpected. Government neglect and erosion are also ranked second and third in frequency of the items mentioned by respondents. In our opinion, the reasoning for these responses may involve a combination of recent events and a recently developed awareness about livestock grazing as a frequently discussed socio-ecological issue. Two catastrophic flood events in the summer of 2017 [92], less than a year before our survey, were attributed by several respondents to "erosion" caused and/or aggravated by overgrazing. Additionally, the issue of overgrazing has occupied visiting researchers and environmentalists working on Samothraki for over a decade [57,58,93,94] and these efforts have promoted local discourse aiming at conservation and restoration initiatives on this subject in recent years [64]. It has been shown in other protected areas in Greece that the provision of information to local inhabitants significantly influences perceptions on conservation issues [95].

Concerning other anthropogenic problems, several noticeable environmental degradation issues were infrequently mentioned (e.g., waste management, suburban sprawl, holiday home building, architectural changes, road-building, wildlife poaching and wetland degradation). There is plenty of documentation that these are all serious anthropogenic pressures on Samothraki [54,96,97], as they are in many inhabited Greek islands [98,99]. Mention of the flora and fauna was also unusually scarce in questionnaire responses, despite the island's status as a Natura 2000 area and a biodiversity endemism hotspot. This response pattern on Samothraki seems to contrast to rather higher concerns for fauna and flora shown by resident responses and conservation initiatives in protected areas of mainland northeastern Greece [89,100,101]. These indications from the questionnaire fueled our assumption that a rather low level of specific biodiversity knowledge and local conservation area awareness may be present in members of the resident community of Samothraki. More "mature" protected areas on the adjacent mainland, such as Dadia National Park, developed different local discourses and notable success in conservation management [102]. More research on this aspect would be useful in integrating the Samothraki residents' involvement in education, awareness and protected area management.

4.5. Wind Farm "Conflict Hotspots" in Protected Areas

Our research on Samothraki points to a brewing wind farm conflict (in mid 2018). This problem is more complex than initially apparent. It is now generally agreed that most wind farm conflicts are not adequately explained by the "Not In My Back Yard" (NIMBY) concept [103,104]. On Samothraki there is no evidence that the proposed wind farms will directly "disturb" most local residents through significant changes seen or heard from their households, since developments would be located in the mountains of the eastern part of the island, rather far from inhabited areas. Therefore, instead of an often-stereotyped NIMBY situation we suggest that we were witnessing a complex

social response to a perceived threat to the island's status quo. The wind farms may disturb local residents' perceptions of the island's unique identity and its various inherent qualities and non-material values (e.g., the idyllic "wild land" identity of Mount Saos was repeatedly expressed). However, by contrast, many residents also expressed that they were poorly informed about aspects relating to the wind farm's impacts and the status of the Natura 2000 "protected area" as well.

With respect to wind farm planning, relatively few studies of this kind have investigated residents' perceptions in protected areas in Greece [46,50,105–107]. Studies relating to wind farm impacts often take a 'reductionist' approach with a focus solely on specific impacts; i.e., visual [83], economic evaluations [6,108] or spatial planning design [109]. Studies rarely explore the public's attitudes and preferences; however, this may also reflect a wider lack of participatory management in Natura 2000 protected areas both in Greece [110] and in other European countries [28,29]. Areas under multiple conservation designations (Natura 2000 etc.) are obviously candidates for land use planning "difficulties"; this is also related to the fact that important ecosystem services are usually concentrated there [39]. However, such difficulties should be treated with greater care where prominent development-driven "conflict hotspots" may exist. Using scoping assessment questionnaire methods to help identify such hotspots would be a valuable prerequisite in wind farm planning. The method applied here may assist in identifying conflict hotspots for wind farm development; it may also be useful in engaging participation with the resident communities of protected areas.

Industrial wind farms, along with other renewable energy developments, can seriously degrade protected areas [111]; our case study shows that efforts to avoid severe negative social impacts and conflict should also be widely initiated. There have been persistent proposals for increasing protected area conservation effectiveness [24], landscape-scale stewardship and long-term visioning [112,113]. In a changing rural–urban dynamic in Europe and the Mediterranean, protected areas call for an improved understanding of diversified social demands [35,86,87]. This is also in line with a protected area paradigm shift promoting holistic natural–cultural heritage conservation approaches [25,114]. Part of the problem, in the context of Natura 2000 protected areas, relates to how the aesthetic and other cultural benefits have been widely under-represented as conservation concerns [29,115]. Therefore, public authorities would be wise to invest more in assessing the perspectives and sentiments of local communities when planning for wind power development [13,116,117]. Especially in protected areas, public perceptions and the local contexts are key to effective conservation planning and sustainability.

5. Conclusions

Our case study provides a window of understanding into the complex issue of wind power development in Natura 2000 protected areas. Insights achieved in this study on Samothraki include the following: a) scoping surveys may utilize ecosystem services to help assess perceptions about benefits provided by the nature and landscape; b) residents' perceptions of landscapes, pressures and threats were varied; influenced by many context-dependent and local factors (e.g., tourism may be important in our case-study) and therefore greater depth of inquiry was required; c) freshwater provision was by far the most important ecosystem service as well as a perceived benefit of the landscape; d) aesthetics and landscape quality were critical attributes perceived as potentially threatened by the wind farm development. Assessments such as these are especially important in protected areas where high investments by government and society are being made to promote potentially conflicting targets of renewable energy development and landscape conservation (in this case: protected area management and initiatives for UNESCO Biosphere reserve designation).

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