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An Approach for Managing Landscapes for a Variety of Ecosystem Services in Prespa Lakes Watershed

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Abstract: The main goal of this research was to evaluate how well existing and emerging land management practices may be used to manage landscapes for various ecosystem services. By employing a mixed methods approach and conducting a case study in the Prespa Lakes watershed in southeast Europe, this goal was achieved. The necessary information was initially gathered using a semi-stratified survey. Following that, the primary ecosystem services and land management practices present in Prespa Lakes watershed were determined via a workshop and a Delphi survey. The identified ecosystem services were ranked using the multi-criteria analytical hierarchy process method. The most important ecosystem service topics included tourism and recreation, maintenance of healthy water bodies, wildlife habitats, healthy food production, natural and heritage values, and biodiversity. Finally, a set of primary priority land management practices for meeting production and ecosystem service goals in the current conditions of the Prespa Lakes watershed was produced utilizing a ranking framework. The very high priority land management practices include livestock breeding to meet both production and conservation objectives, organic farming, diversified crop rotation, crop and tree diversity, restored wetlands, and planning at landscape level. This study provides an important tool for assessing changes in ecosystem service provision under alternative land management practices.

Keywords: Prespa Lakes watershed; ecosystem services; land management practices; multi-criteria evaluation method; Delphi method; analytical hierarchy process

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1. Introduction

The demand for natural resources continues to rise in many parts of the world, owing primarily to climate change and population growth (MEA, 2005). Because of the ongoing depletion of natural resources, there is a greater appreciation for the value of ecosystem services (ES) and their contribution to human wellbeing. The world's ecosystems are not producing as many services as they used to [1–3].

The term "ecosystem services" has gained popularity in recent years as a way to describe the intricate processes and circumstances under which natural ecosystems support and sustain human life [4]. The ultimate goal of natural resources management is to maximize these direct and indirect benefits that humans derive from healthy ecosystems and their interactions with the natural world [1,2,5–8]. The ES concept has become widely known and accepted as a tool for supporting integrated decision-making in natural resource management [5,9,10], agricultural landscape management [5,11–21], land use policy design [22,23], biodiversity conservation [24,25], as well as land use planning [8,26].

After a phase where the conceptual aspects of ES were the main focus [10,27], scientific discussion of ES is now increasingly shifting towards the applicability of the ES concept in planning and management practice [28–30]. The process for examining ecosystem services is rapidly changing [5,31]. Better connecting science and practice will be required to improve the use of ES in planning and management [32]. To use ecosystem services effectively in management, it is necessary to understand the numerous interconnections between physical landscapes and how they are interpreted and used by people [33]. According to Frank et al. [34], the involvement of stakeholders is crucial for the success of ES-based assessments, management, and spatial planning. Given these complexities, this research was built on the idea that a wide range of stakeholders, such as policymakers, biophysical and social scientists, agribusiness and commodity groups, environmental and conservation groups, and landowners and managers, must be involved in decision-making.

As a foundation for better ecosystem and land management, there is a growing interest in assessing how complex landscapes generate multiple ecosystem services [13,18,35]. The assessment of ES at the landscape level may be useful as a starting point for integrated land use planning [36]. It is still not fully understood how to integrate or separate social and ecological aspects of services using site-specific data, how to determine which services should be included in assessments and which scale is appropriate for management [7], what effects different landscape settings have on service generation [7], and so on. This study focused on landscape services, which include a variety of social–ecological systems.

Due to its exceptional natural environment and distinctive cultural elements, the case study of the Prespa Lakes watershed is a region of great ecological and cultural value [37]. Over the past few decades, the main changes in land use in this area have been related to organic farming, best management practices, riparian buffers, perennial land cover, etc., all of which are known to support many ecosystem services [38].

This case study answered the research question: Since different stakeholders place different values on ecosystem services and land management practices, how much can they help different stakeholders agree on how to manage the landscape in the future?

Given the foregoing, a multi-method approach was used to address the problem of how to solve the complex issues of assessing ecosystem services to improve ecosystem management in landscapes in the Prespa Lakes watershed. The main goals of this study were to: (a) identify the typology of ecosystem services and land management practices, (b) rank selected ecosystem services, (c) assess the relationship between land management practices and ecosystem services, and (d) rank land management practices to achieve production and ecosystem service goals in the Prespa Lakes watershed.

2. Material and Methods

2.1. The Case Study

The Prespa Lakes watershed, the subject of this case study, is a cross-border region in south-eastern Europe that is shared by Albania, North Macedonia, and Greece (Figure 1). It has a total area of 1386 km^2 and a population of about 24,000 people. It is the only catchment basin in the area, and the three states that share it need to come up with a plan to protect it together.

It is a high-altitude basin with two interconnected lakes, Macro Prespa and Micro Prespa, located approximately 850 m above sea level [37]. Decades of effort to draw attention to the need for Prespa area protection culminated on World Wetlands Day, 2 February 2000, when the three prime ministers signed the Prespa Park Declaration [39]. Nine years later, the prime ministers of the three countries met in Prespa and agreed on the signing of a binding agreement for the protection and the sustainable development of Prespa Park that was followed with the Prespa Park Coordination Committee. Further on, on the tenth anniversary of Prespa Park, the three states and the European Union signed an international agreement which strengthens the institutional operation of the park, ushering in a new era for Prespa Park, which is the first transboundary protected area in the Balkans. This document lays the ground for an effective conservation of the Prespa ecosystem as a basis for the sustainable development of the area. It is the region's first transboundary protected area. The Ohrid–Prespa Transboundary Reserve, which connects Albania and North Macedonia, was included in UNESCO's World Network of Biosphere Reserves in 2014 [40]. Numerous ancient structures from the Neolithic and Bronze Age, including churches and hermit chapels, can be found in the region [38,41]. It is challenging to balance urban and environmental protection in this particularly vulnerable environment.

Prespa Park's territory includes settlements, roads, rocky and other unproductive areas, agricultural lands used for the cultivation of field crops, vineyards and orchards, pastures and meadows, forests, as well as the entire aquatic portion of the two Prespa Lakes [42].

Figure 1. Prespa Lakes watershed.

The residents work primarily in the primary sector of production. The most significant sector for employment is agriculture. The percentage of the labor force that is engaged in agriculture is roughly 75% [43]. Depending on the country, livestock and fishing also contribute to the area's production to varying degrees. The secondary sector is only moderately developed in the Resen area of North Macedonia, while the tertiary sector is largely confined to tourism, which is a significant economic activity in both North Macedonia and Greece. Unsustainable practices in key productive sectors throughout the Prespa Lakes watershed are threatening the ecosystem's health. Degraded forest, riverine, wetland, and shoreline habitats have resulted from poor land and water use planning and management.

According to recent evaluations and syntheses [44–47], the Prespa Lakes waters are relatively well-oxygenated (DO = 6–7 mg L^{-1}), alkaline in character (pH > 7), reasonably transparent (Secchi depth > 5 m), with moderate nutrient levels (total phosphorus = 15–25 μg L^{-1}; total nitrogen < 3 mg L^{-1}), and a moderate to high abundance of phytoplankton (chlorophyll-*a* > 3.8 μg L^{-1}). Phytoplankton is the most characteristic feature of the pelagic zone of the lake, while macrophytes are characteristic of the littoral zone.

While there are no significant point sources of pollution in the Albanian part of the Prespa Lakes watershed, they do exist on the North Macedonian and Greek sides. Agricultural activities increase the amount of diffuse source nutrients in Lake Prespa. In total, some 920 tons of nitrogen and 477 tons of phosphorus are applied each year in the North Macedonian watershed of the Prespa Lakes [48], while the pollution load on the Albanian side is approximately 230 kg COD d^{-1} [44]. A recent assessment of sediment quality in both Micro and Macro Prespa in Greece concluded that heavy metal concentrations were generally within the range of values that are found in non-polluted sites [49]. Chlorophyll-*a* concentrations were generally higher in the summer than in the spring, except for the 15 m-deep layer, where the reverse was true. Concentrations ranged between 2.32 and 5.43 μg L^{-1} [50,51]. The observed seasonal pattern of dissolved oxygen, nutrients, and chlorophyll-*a* concentrations is typical of mesotrophic lakes in the temperate zone. Further, recent water level decreases and continued human pressure are expected to result in increased eutrophication.

While there is a lack of approaches to ecosystem services and measures to be implemented in order to achieve conservation goals, the basic costs of actions are anticipated in the management plans of the three protected areas that comprise Prespa Park at the traboundary level. The assessment made via the Strategic Action Plan for the Conservation and Sustainable Use of Prespa Park valued a total of EUR 77,715,682 for implementing different conservation, development, and survey measures [52]. The actions included: elaboration of common concepts on nature protection and sustainable development of the Prespa Park area; joint research, monitoring, and documentation; joint conservation and restoration programs; joint water management, etc. Aside from this planning, there is still a long way to go before achieving the trilateral conservation and development goals.

The Prespa Lakes watershed is an excellent location for investigating the complexities of ecosystem services provided by landscapes [41]. The results of this paper can help decision-makers come up with policies and plans that will help the region grow and thrive in the long run.

2.2. Data Collection

The study was conducted over a two-year period (2017–2018), and a variety of methods were used to collect data and information. In terms of operations, the following activities were carried out: a field survey, more than 40 in-depth interviews with experts and authorities, a two-day workshop with participants, and a Delphi survey.

In the Prespa Lakes watershed, a field questionnaire survey based on samples taken in accordance with the strategy to meet statistical reliability and validity objectives was conducted in May–September 2017. The Dillman [53] method was used to administer the survey. Four hundred questionnaires were given out to residents of the Prespa Park watershed who were chosen at random. The questionnaires had to be returned by the respondents within 5 to 7 days. The initial package contained the questionnaire, a contact letter, and a return envelope that was already addressed and stamped. The questionnaires were mailed back after completion. There were 226 usable questionnaires, or 56.4% of the total.

A group of experts, including survey researchers, ecologists, economists, environmentalists, and experts in statistical design, reviewed the questionnaire items to ensure their accuracy and determine their construct validity. A pilot field test was carried out to improve the questionnaire's thoroughness, content validity, and potential areas of ambiguity [54,55]. Thirty residents of the watershed were chosen to provide feedback on the questionnaire's clarity and usability. In the last version of the questionnaire, the changes suggested by the expert panel and the field test were added.

The questionnaire's internal consistency was evaluated using Cronbach's alpha; the closer the correlation is to 1.0, the more reliable it is [55]. The Cronbach's alpha for this study was 0.83. All of the questionnaires were checked to make sure they were appropriate for the research before being entered into the database. To protect respondent identity and maintain confidentiality, each questionnaire received was assigned a number, and each response on the questionnaire was assigned a numeric code. After all of the coding was completed, the data were entered into an Excel spreadsheet. The software SPSS 21.0 was used for data analysis.

The questionnaire items in this study were chosen through a number of iterative procedures based on (1) a literature review, (2) data availability, and (3) relationships between items of interest that have been identified. Their type was closed-ended. The questionnaire was constructed by grouping questions into three parts. Part 1 contained questions to gather information on the respondents' personal characteristics, such as age, gender, householder status, and education level, length of residency, household size, and annual household income, for determining their profile. Part 2 contained items with respect to how respondents perceived the supply, preferences, and diversity of ecosystem services across ecosystem types in the Prespa Park watershed; Part 3 included questions about how respondents perceived land management practices on their plot of land in terms of minimizing soil loss and nutrients, improving soil fertility and lake water quality, and increasing land productivity to achieve food security.

To save space, only a brief summary of the obtained results is provided in this study. Regarding the respondent profile, the average family size was 4.2. The gender split was 66.4% male and 33.6% female. The average age of the respondents was found to be 43 years old. In terms of education, 60.5% had a high school diploma, 29.3% had a university diploma, and 10.2% had a secondary school diploma. In addition, 96.5% of the respondents have been living in the Prespa Lakes watershed for more than 10 years. Nearly 59 % of the respondents reported a yearly income of less than EUR 3000. The survey's findings revealed that residents of the Prespa Park watershed had an optimistic perception and good understanding of the concept of ecosystem services and land management practices, as well as the underlying principles. A summary of the survey's results was presented in a two-day workshop, whose main purpose was to identify a preliminary list of ecosystem services and land management practices present in the Prespa Park watershed.

Then, 30 participants with in-depth knowledge of the issues under investigation, including economists, academicians, and representatives from agriculture agencies and protected area management authorities who work directly or indirectly on the study area, participated in a two-day participatory workshop. Participants were given background information on the study (including goals and objectives) upon arrival at the workshop, a summary of the survey's results, and an explanation of how the workshop and research relate to this process. Participants were briefed on the key ecosystem services, land management practices, and features of the Prespa Lakes watershed through a series of short presentations and panel discussions. During the first day of the two-day workshop, a preliminary list of key ecosystem services obtained from Prespa Lakes watershed landscapes was identified. At the same time, on the second day of the workshop, a preliminary list of land management practices was made.

2.3. Data Analysis Methods Applied

2.3.1. Delphi Method

The Delphi method is one of the most commonly used methods and involves a group of experts reaching an acceptable level of agreement on the attributes of interest [56–58]. The Delphi method is defined as a series of sequential questionnaires or "rounds" interspersed with controlled feedback [59] that seeks the most reliable consensus among the opinions of a "group of experts" [60]. The consensus is reached by administering and then applying data from questionnaires iteratively, with highly ranked items in one questionnaire used to formulate the next [61]. This iterative process begins with identifying areas of agreement and disagreement, followed by changes based on previous questionnaire responses. It is a flexible method to come to an agreement on big, complicated problems with a lot of uncertainty, like planning for the environment [60,62] and figuring out how much ecosystem services are worth [63].

Twenty experts were chosen for the current study to take part in the Delphi process and respond to the questionnaires via email. The experts came from state agencies, research groups, agricultural and environmental non-governmental organizations (NGOs), agencies that manage protected areas, and universities with experts in ecosystem services and conservative practices to manage land.

In this study, the Delphi survey was used to aggregate the diverse views of these experts and analyze the degree of consensus that may exist regarding ecosystem services and land management practices important for Prespa Park. Three rounds of the Delphi survey were discovered to be the optimal number for thoroughly probing the issues while maintaining participant interest [64,65]. Through successive rounds, participants first created a list of ecosystem services and the relevant landscape changes needed to achieve them. Then, they ranked these items in order of importance. Finally, they developed a list of land management practices.

2.3.2. Analytical Hierarchy Process (AHP)

Developed by Saaty in 1980 [66], the analytical hierarchy process (AHP) is a comprehensive decision-making tool that plays a significant role in the mathematical description of complex processes that arise in decision-making [67]. When there are only a few options available, each with a variety of attributes, Razandi et al. [68] claim that AHP is a powerful technique for analyzing and solving complex and unstructured decision-making problems that involve multiple criteria at multiple levels. It is frequently used in multiple criteria decision analysis in different fields [69] and for a range of purposes [67,70–72]. The article by Vaidya and Kumar [69] provides a review of the literature on the main applications of AHP and how they integrate with various techniques.

Saaty [66] proposed five steps that must be taken in order to make an organized decision. The problem is defined in the first step. In the second step, a hierarchical structure is formed, which is broken down into multiple sub-problems, including criteria and sub-criteria as well as decision alternatives, with the goal and the objective(s) of the study at the top of the hierarchy. The following step involves performing a set of pairwise comparison matrices for alternatives, criteria, and their subsets at each level of the hierarchy. According to this, each pair of criteria is compared and prioritized using a scale of 1 to 9 presented by Saaty [73], with 1 representing equal importance and 9 representing extreme importance between the two criteria. The relative weights of the components at each level are computed during the fourth step. The consistency ratio (CR) is calculated at the fifth step to check weighting accuracy. The degree of consistency or inconsistency is specified by CR [74]. According to Saaty [73,75], consistency can be satisfied if CR is less than 0.1; otherwise, the pair-wise comparison matrices must be repeated.

2.3.3. Framework for Ranking Land Management Practices

In order to better understand how the Prespa Lakes watershed social-ecological systems will adapt to changes in land management practices, this study aimed to bring together knowledge from many stakeholders who observe the system at multiple scales and from multiple perspectives. The ranking of land management practices is required to handle this. This was done using a ranking framework.

Identifying land management practices that may be evaluated is a crucial aspect of using this framework. They were determined in this study by completing repeated Delphi survey rounds. The Delphi survey analysis revealed quantitative evidence of opinion divergence between those who expect farm-scale, production-oriented services and those who expect other ecosystem services (environment-centered services). The latter group identified high-scale ecosystem services as being of particular importance, such as climate regulation, carbon sequestration, wildlife habitat, and soil erosion control.

As a result, land management practices that (a) simultaneously improve a variety of ecosystem services, particularly across scales, and (b) are favorably appreciated by a variety of stakeholders, perhaps providing points of agreement among divergent opinions, were taken into consideration. As such, the framework employed in this study ranks management practices based on both the following criteria: "multifunctionality", which refers to the practice's ability to simultaneously improve the delivery of multiple ecosystem services provided by land management practices, and "consensus," which refers to agreement on the merits of the practice among various production-oriented and environment-centered perspectives.

Combining these two criteria resulted in an overall priority ranking framework. Practices were ranked on a three-point scale within each category, as described by Balmford et al. [24] and Larsen [76]. A five-point overall priority score (Figure 2) is generated for all possible combinations of these two factors: (A1) very high priority, (A2 and B1) high priority, (A3, B2, and C1) moderate priority, (B3 and C2) low priority, and (C3) very low priority.

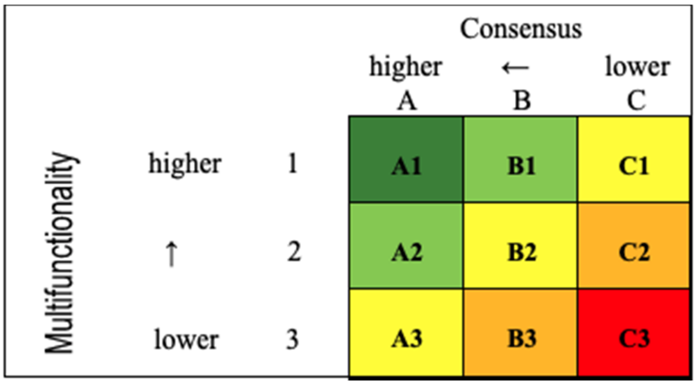

Figure 2. Land management practices ranking according to consensus (A to C) and multifunctionality (1 to 3) [24,76].

3. Results

3.1. Typology of Ecosystem Services and Land Management Practices for Prespa Park

This section aims to define the main Prespa Lakes watershed ecosystem services and land management practices. The following steps were taken in order to identify the ecosystem services that are currently offered in the Prespa Lakes watershed. First, on the first day of a two-day workshop, participants were asked to create a preliminary list of key ecosystem services that can be obtained from the Prespa Lakes watershed landscapes, as well as any changes that may be required to achieve them. The attendees engaged in heated debates during the meeting. A preliminary list of 23 ecosystem services was identified by the end of the first day of the workshop.

The most crucial ecosystem services offered by the Prespa Lakes watershed were then determined through the completion of successive Delphi survey rounds. A questionnaire with 23 ecosystem services identified by the workshop was created for the first round of the Delphi survey and sent via email to the Delphi experts for evaluation using a 5-point Likert scale (from 1 = not important to 5 = extremely important). The former list was narrowed down by eliminating less significant ecosystem services. This was accomplished using the Cronbach alpha (α) statistics. The closer the α coefficient is to 1.0, the greater is the internal consistency of the items (variables) in the scale. A value of 0.00 means there is no consistency in measurement, while a value of 1.0 indicates perfect consistency in measurement. The acceptable range is between 0.70 and 0.90 or higher, depending on the type of research [77]. In this study, a threshold value of 0.80 for Cronbach alpha coefficient was used. As a result, α is calculated for each ecosystem service included in the Delphi round 1 questionnaire. Ecosystem services with an α value lower than 0.8 were removed. For screening their survey items, both the second Delphi questionnaire about ecosystem services and the two Delphi questionnaires about land management practices used the same procedure. The second round's questionnaire was created using the 18 ecosystem services that were chosen during the first round. At the end of the second Delphi survey, 4 assessment items (22.2% of the total) were deleted, leaving 14 items. Figure 3 depicts the ten most important ecosystem services as determined by experts in round two of the Delphi survey.

Meanwhile, a preliminary list of 21 land management practices was identified at the end of the second day of the workshop. These practices were found to be active at or across three different spatial scales: (1) field periphery, (2) farm scale, and (3) landscape scale. There are nine practices that operate at multiple spatial scales and twelve practices that require planning at landscape-level. As with ecosystem services, the preliminary list of management practices was similarly reduced. Figure 4 depicts the ten most important land management practices as determined by experts in round two of the Delphi survey.

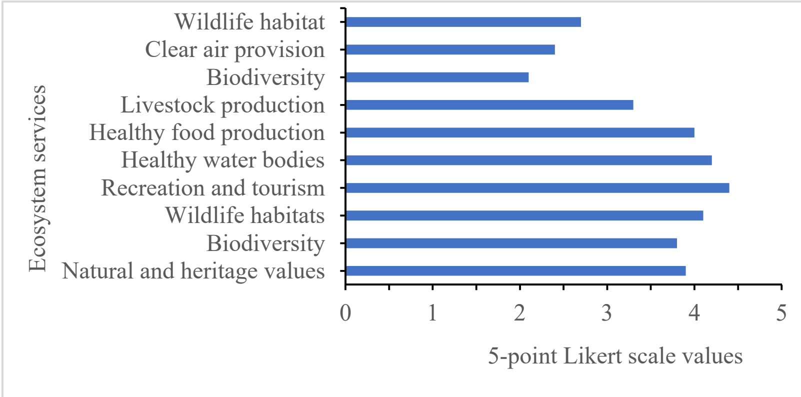

Figure 3. Ten most important ecosystem services.

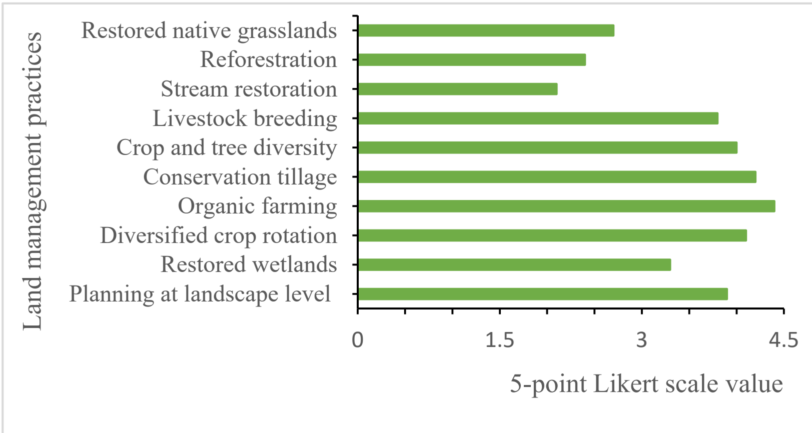

Figure 4. Ten most important land management practices.

3.2. Prespa Park's Effectiveness in Terms of Ecosystem Service Categories

In this section of the paper, the fourteen main ecosystem services that were chosen in the first round of Delphy were ranked using a participatory AHP method that took into account the opinions of stakeholders, academics, and ecosystem services experts.

Before using the participatory AHP method in this case study, the ecosystem services in the Prespa Lakes watershed were classified into five categories. These categories were not identical with the original ecosystem services in the Millennium Ecosystem Assessment [1]. The stakeholders reached an agreement to consider supporting services as contributions to "ecological integrity," cultural services as "aesthetic value," provisioning services as the provision of fresh water and air, defined in the case study as contributions to "human health and well-being," "bio-resource provision," including timber, food, and fibers, and regulating services as "climate change adaptation." Human health and well-being were identified as one ecosystem service group, although, according to Haines-Young and Potschin [10], it is the ultimate purpose of ecosystem services.

The process of developing and implementing this method was divided into two phases. Phase I's goal was to create the hierarchical structure (of two levels) required for AHP method analysis. Saaty [66] proposed that the number of elements in each level be less than seven in order to achieve consistency and make reasonable and effective pairwise comparisons. The number of elements in each level in this study was less than seven. The five ecosystem service categories mentioned above were included in the first level.

The group of ecosystem services chosen during the second round of the Delphi survey was included in the second level. The following were included in this set: healthy food and fiber production (a); livestock production (b); water filtration and purification (c); maintenance of healthy water bodies (d); provision of clean air (e); recreation and tourism (f); climate regulation (g); carbon sequestration (h); maintenance of soil fertility (i); soil erosion protection (j); biodiversity (k); wildlife habitat (l); natural and heritage value (m); aesthetic and/or spiritual benefits (n).

During phase II, an ANP questionnaire with 14 ecosystem services chosen during the second round of the Delphi survey was created and distributed via email to the Delphi experts for evaluation. Each expert provided a possible value for each assessed issue using Saaty's 1 to 9 scale, where a score of 1 indicates equal importance and a score of 9 indicates extreme importance of one issue versus another [66]. Then, different ecosystem services were compared to each other, pair by pair, and a comparison matrix was made.

Next, the Analytic Hierarchy Process was used to estimate the relative weights of the related ecosystem services. The consistency ratio (CR) and the normalized weights of the evaluated ecosystem services at each level and across the entire hierarchy were computed using this method. Table 1 summarizes the findings.

Table 1. Ranking of basic ecosystem services in the Prespa Lakes watershed.

1st Level		2nd Level		
Ecosystem Services Categories	**Normalized Weight**	**Selected Ecosystem Services**	**Normalized Weight**	**Ranking**
Bio-resource provision	0.194	Healthy food production	0.087	4
		Livestock production	0.064	8
		Water filtration and purification	0.069	7
Human health and well-being	0.333	Maintenance of healthy water bodies	0.104	2
		Provision of clean air	0.063	9
		Recreation and tourism	0.117	1
Climate change adaptation	0.067	Climate regulation (local)	0.028	14
		Carbon sequestration	0.040	13
Ecological integrity	0.272	Maintenance of soil fertility	0.059	10
		Soil erosion control	0.056	12
		Biodiversity	0.077	6
		Wildlife habitats	0.097	3
Aesthetic value	0.134	Natural and heritage values	0.081	5
		Aesthetic and/or spiritual benefits	0.058	11
Consistency ratio (CR) = 0.083 < 0.1				

The results indicated that the CR values were all below 0.1, and this meets an acceptable deviation scope as recommended by Saaty [66]. This result indicated that previous and subsequent judgments of experts at all levels were consistent. The overall consistency ratio of the hierarchical framework was 0.083. Since this value is below the threshold suggested by Saaty [66], the inter-level relationships within the hierarchical structure were appropriate, and the consistency of the entire hierarchy was satisfactory. Finally, based on the normalized weights, the ecosystem services performed in Prespa Lakes watershed were ranked.

Daniel [78] proposed in 1961 that most industries have three to six critical factors (issues) that determine their success or failure. The framework's results showed that the top-ranking ecosystem service (with the weighted value given in brackets) was "recreation and ecotourism" (0.117), and the other ecosystem services were ranked in the order of "maintenance of healthy water bodies" (0.104), "wildlife habitats" (0.097), "healthy food production" (0.087), "natural and heritage values" (0.081), and finally, "biodiversity" (0.077).

This study showed that using the Analytic Hierarchy Process and a Delphi survey in the context of the Prespa Lakes watershed was an effective way to rank the main ecosystem services that affect the performance of the Prespa Lakes watershed area in terms of ecosystem services.

3.3. Relationship between Ecosystem Services and Land Management Practices

In the third round of the Delphi survey, the experts were also asked to find links between important ecosystem services and how land is managed. The analysis produced some interesting results (Table 2).

Table 2. Relationship between land management practices and ecosystem services for Prespa Lakes watershed. Important links are denoted by a triple asterisk (***), moderate by two asterisks (**), and relatively less important links by a single asterisk (*).

Land Management Practices	**Ecosystem Services**													
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
Precision agriculture					*				*	**				
Livestock breeding	*	***		***	***	**	*			***	***	***		*
Perennial conservation practices	**	**	*		***	**	*		**	***	***	**		*
Conservation tillage			**						*	***				
Livestock numbers on the land	*	**			*	**	*	*	*	**	**	*		
Reforestation	**	**	**	**	**	**	**	**	*	*	**	**	**	**
Artificial wetlands			***	**	***	*	*	**	*	*		**	***	**
Restored native grasslands	***	***	***		**	***	***	***	***	***	***	**	***	**
Installation of tile drainage	**		**		**		*	*		**	**	**		
Contour grass buffer strips			*	**	**			*	*	*	**	**	*	**
Grass field borders	*	**	**		**	**	**	*	**	**	**	*	**	**
Diversified crop rotation	***	**	**	*	***	**	***	***	**	***	***	***		
Crop and tree diversity	***	**	**	**	**	***	***	**	**	***	**	***	**	*
Rotational grazing	***	***	**		*	*	*	**	**	**	**	*		
Restored wetlands	*	**	***	***	**	**	***	***	***	***	**	***	***	*
Planning at the landscape level	***	**	***	***	***	***	***	***	***	***	***	***	***	***

An interesting result was that the majority of management practices were identified by respondents as contributing to multiple ecosystem services. Restored native grasslands and restored wetlands, diversified crop rotation, livestock breeding to meet both production and conservation objectives, crop and tree diversity, and planning at the landscape level, were identified as being associated with the greatest number of ecosystem services. This set of practices was deemed critical to the future management of the Prespa Lakes watershed's ecosystem services. In contrast, two of the fourteen practices were linked to three ecosystem services.

It was also explored to what extent production- and environment-centered perspectives supported land management practices. The findings showed that there was overlap between two perspectives (production-centered and environment-centered perspectives) for ecosystem services for six practices, including artificial wetlands, livestock numbers on the land, diversified crop rotation, perennial conservation practices, rotational grazing, and planning at a landscape level. Perennial conservation practices and restored native grassland were viewed positively from an environmental standpoint but negatively from a production standpoint. Precision agriculture, conservation tillage, and installation of tile drainage were all the polar opposite. Concerning the latter two practices, a number of case study participants who represented an environmental viewpoint acknowledged their value, but saw them as a minimum standard of environmental stewardship rather than specifically enhancing ecosystem services.

3.4. Ranking Land Management Practices to Meet Production and Ecosystem Services Goals

This part of the study lists the land management practices that should be ranked in order to meet production and ecosystem service goals in the Prespa Lakes watershed as it is now. The ranking framework is explained in Section 2.3.3.

Prior to implementing the ranking framework, the criteria were parameterized. The production-oriented and environment-centered perspectives on ecosystem services were taken into consideration while parameterizing the consensus criterion to take into account any potential agreement within and between these two groups.

To parameterize the multifunctionality criterion, the total number and strength of connections between land management practices and ecosystem services were taken into consideration. Furthermore, the highest rank of multifunctionality was defined as the capacity to satisfy both productivity and environmental objectives because compromises between both are inevitable. Based on how these two criteria are used in the ranking framework, Table 3 shows how the land management practices rank in terms of their overall importance.

Table 3. Ranking of land management practices in Prespa Lakes watershed. Five color-coded categories define priorities: (A1, dark green) very high priority, (A2 and B1, light green) high priority, (A3, B2, and C1, yellow) moderate priority, (B3 and C2, orange) low priority, and (C3, red) very low priority.

<table>
<tr><th rowspan="2">Land Management Practices</th><th colspan="2">Priority</th></tr>
<tr><th>Consensus</th><th>Multifunctionality</th></tr>
<tr><td>Precision agriculture—practical use of modern equipment</td><td colspan="2">C3</td></tr>
<tr><td>Increase livestock numbers “on the land”</td><td colspan="2">A3</td></tr>
<tr><td>Reforestation</td><td colspan="2">A2</td></tr>
<tr><td>Tree lopping for winter fodder</td><td colspan="2">C2</td></tr>
<tr><td>Stream restoration</td><td colspan="2">A2</td></tr>
<tr><td>Conservation tillage farming</td><td colspan="2">B1</td></tr>
<tr><td>Perennial conservation practices</td><td colspan="2">C1</td></tr>
<tr><td>Restored native grasslands</td><td colspan="2">A2</td></tr>
<tr><td>Artificial treatment wetlands</td><td colspan="2">B1</td></tr>
<tr><td>Wood production for heat</td><td colspan="2">B2</td></tr>
<tr><td>Livestock breeding to meet both production and conservation objectives</td><td colspan="2">A1</td></tr>
<tr><td>Organic farming</td><td colspan="2">A1</td></tr>
<tr><td>Installation of tile drainage</td><td colspan="2">C3</td></tr>
<tr><td>Contour grass buffer strips</td><td colspan="2">C2</td></tr>
<tr><td>Grass field borders</td><td colspan="2">C3</td></tr>
<tr><td>Livestock access to lakes and streams</td><td colspan="2">B2</td></tr>
<tr><td>Diversified crop rotation</td><td colspan="2">A1</td></tr>
<tr><td>Crop and tree diversity</td><td colspan="2">A1</td></tr>
<tr><td>Rotational grazing</td><td colspan="2">B3</td></tr>
<tr><td>Restored wetlands</td><td colspan="2">A1</td></tr>
<tr><td>Planning at the landscape level</td><td colspan="2">A1</td></tr>
</table>

The findings (Table 3) revealed that 6 of the 21 land management practices evaluated were deemed extremely important for the Prespa Lakes watershed (Table 3, dark green). Livestock breeding to meet both production and conservation objectives, organic farming, diversified crop rotation, crop and tree diversity, restored wetlands, and planning at a landscape level are among these practices. In contrast, six practices were identified as having a low or very low priority (Table 3, orange and red). Five practices were identified as high priorities (Table 3, light green) and four as moderate priorities (Table 3, yellow). It was discovered that nearly half of the 21 practices evaluated were thought to operate across spatial scales. Furthermore, many practices were linked to a variety of ecosystem services. Planning at the landscape level was deemed necessary for 11 of the 21 practices.

4. Discussion

According to Hein et al. [79], the concept of ecosystem services can serve as a platform for reaching a consensus, which is necessary for coming up with feasible solutions and developing the shared vision required for future planning [5]. Despite the growing importance of landscape management for a variety of ecosystem services in policy and research [80,81], actual implementation of ecosystem service management has been limited by a general lack of coordinated on-the-ground procedures. As a result, it is important to consider whether the ES concept serves its goal as a platform. If not, what may be done to make success more likely?

The first thing this case study does is teach readers about the difficulties involved in using ecosystem services as the basis for land-use choices. Second, divergent meanings of terms and concepts, as well as misunderstandings about the relationships between land management and specific ecosystem services, were discovered to be possible communication hurdles. Third, the research findings reveal that stakeholders with production-oriented expectations and stakeholders with ecosystem service expectations are fundamentally at odds with one another. Because there is a well-established cultural idea that there is a conflict between agriculture and the environment, this outcome is not unexpected. Fourth, the data back up the idea that local and state leaders may need to talk more with each other to switch from an agriculture model that focuses on production to one that focuses on ecosystem services.

The findings of this study, on the other hand, are sufficient to support a phenomenon in which employing management practices that improve two or more ecosystem services at the same time reduces the overall cost of the changes. In conclusion, in the Prespa Lakes watershed, the concept of ecosystem services is changing and becoming a more visible part of land management for agriculture and the environment.

With careful analysis and by directly addressing the following key issues for ecosystem services, they can be used as a useful decision-making tool for land management in the Prespa Lakes watershed. All parties involved must be clearly identified. Other issues are as follows: a comprehensive set of relevant ecosystem services must be developed and explicitly described in order to identify and optimize trade-offs; an avenue through which people can directly impact the delivery of ecosystem services is required for successful ecosystem service management; discussions about land management must be location-based; and stakeholders' expectations and values must be understood for the range of them as these impact their attitudes and behaviors. These issues were shaped in response to questions frequently posed by participants in the case study.

Additionally, this study sought to investigate the most efficient ways to apply current farm-scale land management practices to achieve ecosystem service goals at various scales. On the basis of the land management practices' multifunctionality and group consensus regarding their usefulness, a methodology for ranking land management practices was presented. This methodology must take into account knowledge from stakeholders who see these systems from a variety of scales and viewpoints and can be used to guide land management practices in various regions and across spatial scales.

The methodology is hypothetical and flexible rather than rigid. The most recent information, resources that are accessible, system limitations, sociocultural norms, and the behaviors and attitudes of the parties involved [82–84] will all affect how land management practices are carried out in the real world. Furthermore, priorities, like ecosystem services, may shift over time and space.

Such a ranking procedure may encourage debate and the adoption of a wider range of multiscalar management options that cross property borders [85]. The development of place-based toolkits is a key element of such an approach. Even though a list by itself might not lead to widespread ecosystem service management, it may be valuable for driving research activities, formulating policies, and allocating resources, as well as encouraging conversation and discourse.

5. Conclusions

The objective of this study was to investigate how existing and emerging landscape and conservation land management practices can be used to achieve ecosystem service goals. With the Prespa Lakes watershed case study, an approach is provided for assessing various ES to assist in planning land use at the landscape level.

The central component of this study was developing a set of plausible land management practices for the future management of the Prespa Lakes watershed and assessing how ecosystem services change under these different land management practices.

The concept of ecosystem services has been found to be helpful and is progressing toward becoming a tangible component of environmental and agricultural land management. Ecosystem services can be used as a beneficial decision-making tool for land management if they are carefully considered. While the findings show a significant gap between production-centered and ecosystem service-centered viewpoints, benefits connected to "recreation and tourism," "maintenance of healthy water bodies," "wildlife habitat," "healthy food production," "natural and heritage values," and "biodiversity" were considered to be the most essential for the Prespa Lakes watershed. It was found that there are opportunities for enhancing ecosystem services at multiple scales and across levels of management organizations.

The case study data were also applied to a ranking framework to generate a list of priority land management practices for the Prespa Lakes watershed. The most important land management practices for the Prespa Lakes watershed were "livestock breeding that met both production and conservation goals," "organic farming," "crop rotation," "crop and tree diversity," "restored wetlands," and "planning at the landscape level."

The established landscape-level assessment approach in this study allows for the assessment of multiple ES and provides regional planners and land managers with a streamlined and rapid tool for evaluating the impact of land management practices on ES. This work also offers a means to effectively use the concept of ecosystem services and serves as a useful framework for land management decision making. Meanwhile, prioritizing land management practices can assist in guiding research initiatives, policy development, and practice implementation. Finally, the approach provides information on how the Prespa Lakes watershed might employ ecosystem services as a basis for long-term, multifunctional landscape management. It is applicable and easily adaptable to similar areas.

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