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Integration of Water Resources Management Strategies in Land Use Planning towards Environmental Conservation

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Abstract: Water resources management is a critical component of environmental conservation and sustainable development. This study examines the integration of water resources management strategies into land use planning and its impact on environmental conservation, with a focus on the case of Greece. This study employed a quantitative research methodology using a cross-sectional survey research design. The target population consisted of environmental experts in Greece, and a sample of 278 participants was selected based on the Krejcie and Morgan table for sample size determination. Data were collected through an online survey questionnaire, and the statistical analysis was conducted using SPSS version 23. The relationships between the study variables were examined through regression analysis. The findings support the hypotheses, demonstrating the importance of integrating water resources management strategies into land use planning to achieve both sustainable development and environmental conservation. This paper discusses various strategies and approaches that can be adopted to effectively manage water resources while considering the impacts of land use decisions on the environment. Better public awareness and better enforcement of water conservation rules result from this integration, which makes it possible for land use authorities and water management agencies to collaborate more effectively. This study acknowledges the need for strategic planning and cooperation between water management and land use authorities to address the growing challenges of water resources management and environmental protection. Emphasizing stakeholder participation, adaptive management, and continuous monitoring can lead to successful outcomes and a more resilient and sustainable future.

Keywords: sustainable development; water resources management; land use; nature conservation; mitigation of climate change; Greece

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1. Introduction

1.1. Water Resources Management and Land Use Planning

Water is a finite resource essential for various human activities and the health of ecosystems [1,2]. The ever-increasing demands for water due to population growth, urbanization, and industrialization have raised concerns about water scarcity and environmental degradation. Integrating water resources management (WRM) strategies into land use planning has emerged as a crucial approach to address these challenges [3–5]. Water resources are vital for ecosystem function and the well-being of human societies. However, growing demands of urbanization, agriculture, and industrialization pose significant challenges to the sustainable management of water resources [6,7]. Land use planning, on the other hand, plays a pivotal role in shaping the physical development of regions and can greatly

influence the quality and availability of water resources. Integrating water resources management strategies into land use planning processes can foster more holistic and effective approaches to environmental conservation [8].

The increasing demands for water resources from various sectors, such as agriculture, industry, and urban development, often lead to over-extraction and depletion of water sources [3,9–11]. Additionally, poor land use decisions, such as deforestation and urban sprawl, can exacerbate the degradation of water bodies, leading to reduced water quality and availability [1]. Climate change further intensifies these challenges, causing irregular precipitation patterns and exacerbating droughts and floods. The fragmented nature of water resources management and land use planning can hinder effective conservation efforts [12–15].

Mengistu et al. (2023) noted that when water agencies take into account land management strategies, they may better manage the land use origins of their water problems, such as stormwater concerns from impermeable surfaces or groundwater over pumping [7,16]. When water management organizations work with land use planners, they have access to additional compliance options [17–19]. Research, for instance, shows that imposed irrigation restrictions during droughts may significantly reduce total water use, but voluntary measures are not nearly as successful [20,21]. It is difficult for a water management group operating alone to enforce such restrictions. Working with a land use authority may help a water agency become much more effective since it can codify a policy, help with enforcement, and raise public awareness [22–24]. A water management agency may also consider land management strategies, such as landscape-scale conservation strategies and site-scale green stormwater infrastructure, to address difficulties with source water protection, flood control, and water quality [25–27].

The relationship between water resources management and land use planning is inherently interconnected [28]. Land use decisions directly influence the availability and quality of water resources, while water availability and quality significantly impact land use options [7,29]. The integration of water resources management strategies in land planning is to achieve a stable state both to meet human needs and conserve natural ecosystems. This paper emphasizes the importance of adopting an integrated approach to ensure the sustainable use and conservation of water resources.

1.2. Purpose of the Study

The study focused on assessing the integration of water resources management strategies in land use planning towards environmental conservation concerning a case study in Greece.

1.3. Objectives of the Study

1. To examine the effect of land use planning on environmental conservation.
2. To evaluate the relationship between water resources management strategies and level of environmental conservation.
3. To examine the benefits of integration of water resources management strategies in land use planning on environmental conservation.

1.4. Research Hypotheses

Hypothesis 1 (H1). *Aspects of land use planning have an effect on environmental conservation.*

Hypothesis 2 (H2). *There is a relationship between water resources management strategies and level of environmental conservation.*

Hypothesis 3 (H3). *Benefits of integration of water resources management strategies in land use planning have an impact on environmental conservation.*

1.5. Significance of the Study

The findings of this study hold considerable significance due to its potential to address crucial challenges related to sustainable development, environmental protection, and water resources management.

2. Literature Review

2.1. Water Resources Management

The conventional sectoral approach to managing water resources has made it difficult to properly address issues with supply and demand for diverse water users or the cumulative impact of various land use activities on water quality [30]. Over the past 30 years, the integrated water resources management (IWRM) method has been pushed as a superior and more successful alternative to the conventional sectoral and top-down strategy to halt the deterioration of water resources [1,8,31]. Despite thousands of articles on the subject of IWRM, the validity of evidence for effective IWRM techniques is still being debated. The definition of IWRM contains some of the responses to this query [32]. International water resources management (IWRM) is defined as "the integrated and coordinated management of both land and water resources as a way of balancing resource conservation with addressing social, ecological, and economic development demands" [6].

New issues are developing that can impact availability and demand, as well as the quality of the water, in addition to the present needs for water and the effects of pollution [8]. These include increased climatic variability, intensifying land use (in both urban and agricultural settings), new water uses like those connected to fracking, increased desalinization, water for making snow, atmospheric changes, and a resurgence of interest in hydropower generation as a substitute for electricity generation that emits greenhouse gases [20,33]. Only lately have we begun to address the issue of how to sustain water for environmental services, as most water management has traditionally been human-centric [34]. The way we utilize, and safeguard water resources will alter significantly as a result of these trade-offs. Meanwhile, we need to pay attention to the importance of the green water cycle and more specifically to the effect of rainwater falling on land and plants before the phenomenon of its evapotranspiration to the atmosphere [28,35]. The blue water cycle, or the fraction of rainfall that ends up in rivers, lakes, and groundwater, is the current focus of most human operations. Up to 65% of all precipitation went via the green water cycle, whereas only 33% went through the blue water cycle [2].

Pacheco-Vega (2020) noted that due to the fact that various jurisdictions have varied legislation, especially in international trans-boundary watersheds, applying integrated water resources management (IWRM) at large river basin sizes is particularly challenging [36,37]. In addition to making data integration challenging, this also raises ethical and moral issues [38,39]. Processes also switch to unique scales, which is more significant [40,41]. By contrast, lowland systems generally re-mobilize and carry accumulated sediments that have been deposited in the riverbed over time. For instance, soil erosion in head water systems immediately joins streams [42]. A headwater basin problem's downstream effects frequently take a while to become apparent, and the gap between the damage and the solution is frequently too wide to draw any conclusions [43]. The situation of hydroelectric dams that accumulate sediments above the dam is an excellent illustration of this [7]. The majority of the phosphorus that is accessible is absorbed by the sediments, depriving the downstream area of this crucial nutrient for maintaining aquatic biota [22,44,45].

Policy and management practices of this process require long-term commitment on the part of researchers so as to withdraw conclusions about the level of efficiency and success of such a process. The accounting and regulation of non-point sources (NPS) of pollution is particularly challenging [46]. The creation of a fair legal foundation for NPS is extremely difficult. Because it is believed that best management practices (BMP) are solving the issue, long-term financing commitments from government agencies are needed to enable the monitoring of the efficacy of management [1].

The integrated water resources planning (IWRP) process is shown graphically in Figure 1. It includes public input as a crucial step to make sure that different viewpoints are taken into account and addressed. It also considers future demands for water, current and future supply options, and economic approaches to meet water objectives. The IWRP process for a community should incorporate land use components, much like a community comprehensive master plan should do. This can happen at the demand forecasting stage, the water supply planning stage, or even the public process stage. When assessing water management plan choices, the IWRP's comprehensive and adaptable approach makes it possible to take into account a wide range of variables [31].

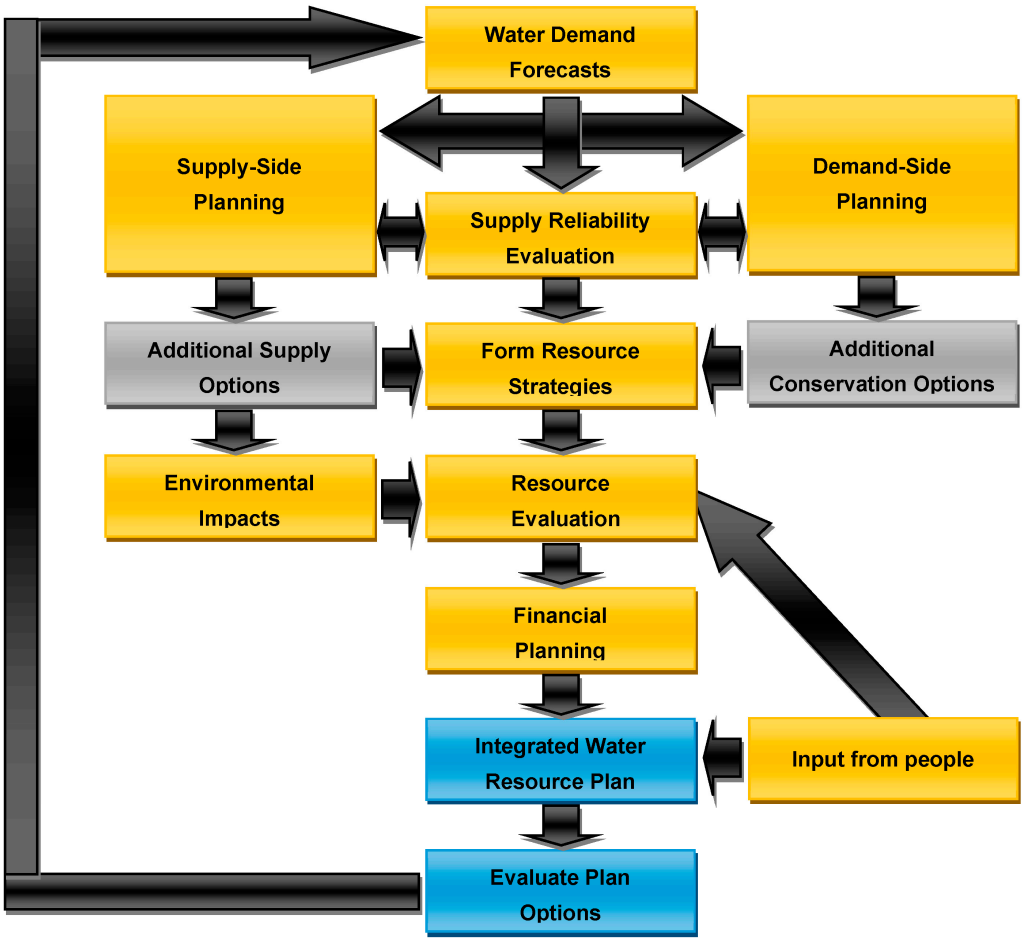

Figure 1. Integrated water resources planning/management.

Sang and Ode Sang (2015) noted that the provision of safe drinking water, wastewater services, and/or stormwater management are some of the most important services performed by water management organizations [47]. Making plans is essential to their success. Water management companies are often reluctant to impose rules on their clients since they are service organizations [48]. Water management organizations may provide water conservation initiatives; however, they are often optional or paid for rather than mandated. Making contact with land use planners may provide access to knowledge on public involvement and engagement, as well as policies to better water management [31]. A water agency might decide to voluntarily work with a land use authority to draft its plan even though a state does not have such a legislative mandate. In reality, any water management organization may benefit from and adopt the strategies adopted by governments with legislative obligations [8,10]. Additionally, they may devise unique strategies for integrating land use into their water management plans. The goal of proving the link points

in legislation is to prove that land use issues are already, as legally required, integrated into water management plans [19,29].

2.2. Land Use Planning

Although the land use planning system offers certain regulatory procedures for altering land use, these are currently not frequently employed [28,33]. Because the planning system is not designed for substantial natural resource decision making, there is a huge gap between theoretically possible sustainable land use regulation and actual implementation [49]. According to Kalfas et al. (2023), making minor adjustments to the planning process will not result in significant changes to land use [31]. The planning system, according to them, only ostensibly acknowledges the need for change, and the instruments for land use planning that are offered cannot provide the desired results [50–52]. To effectively ensure that inappropriate land use practices are avoided, changes must be made to the land use planning process. To make natural resources management decision making a priority, these changes necessitate reforms to the institutional, regulatory, and policy frameworks [2,53].

The formation of suitable zones and overlays, as well as the creation of strategic statements outlining the intended use throughout a local government area, are ways in which the land use planning system may limit changes to land use [43]. Outside of the Melbourne metropolitan region, there is a desire for small country lifestyle lots, and zones and overlays can help to regulate their growth [6]. For instance, the zoning regulations might regulate how rural residential subdivision lots are created, trying to reduce conflicts where these mostly residential lots meet agricultural property. A covenant imposing catchment objectives, such as plant cover, may be included in any new lots that are produced, depending on how many of these lots the local government decides to build [54,55].

The multidisciplinary method of sustainable land use development is a well-organized set of linked procedures that may be altered depending on the nature and scope of the research area [56]. The technique focuses on conflict-based decision-making processes and subsequent proposals for harmony in the supply of landscape features as natural capital and complex natural resources and the demands and impacts of human activities (Figure 2).

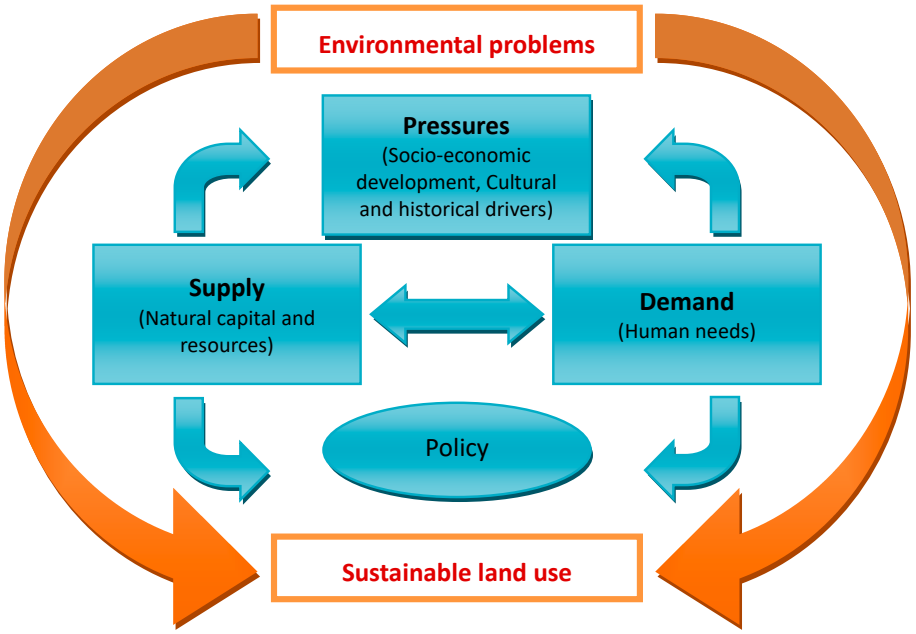

Figure 2. Integrated approach to sustainable land use management.

2.3. Integrated Land Use and Water Management Planning

Water resources management involves the sustainable use, allocation, and protection of water sources. Land use planning, on the other hand, involves the allocation and regulation of land for various purposes, such as residential, commercial, agricultural, and conservation areas. The integration of these two fields aims to ensure that land use decisions consider the impact on water availability, quality, and ecosystem health [57]. Owing to varying state mandates or owing to local discretion, water planning and land use authorities may function on distinct timetables. Therefore, local agencies perform best when they develop durable policies that guarantee continued cooperation. Setting up local processes that self-perpetuate and can endure shifting government should be one objective of integrated planning [13,42].

Communities practicing integrated planning, for instance, have to include coordinated growth reviews between planners and employees from water management organizations [48,58]. Without coordination, local communities that engage in integrated planning run the risk of being disrupted if staff turnover, changes in local government, or competing local agendas make integrated planning less urgent. State and federal water management programs may benefit from integrated planning between a water management agency and a land use authority [28]. The Urban Water Management Planning Act of California, the Aquifer Protection Program of Connecticut, and Western guaranteed water supply legislation have all been made more easily implementable because of coordinated planning [8,30,59].

Piemontese (2020) noted that communities must plan for integrated land use and water management in order to address the interconnected issues of climate change, population expansion, and diminishing water resources [2]. In order to make it easier to grasp both national trends and potential areas for growth, Mengistu et al. (2023) analyzed the possibilities for integrated planning with a special emphasis on comprehensive planning and water management planning [7]. The relationship between land use and water management may be strengthened by action at all levels, including local implementation, regional cooperation, and statewide legislation [60–62].

The cooperation of the involved stakeholders, which in this case include water management organizations and local planning agencies, is considered essential for the implementation of integrated land and water use planning. Councils and governing bodies from other localities may provide the leadership and assistance that is essential for success [2,46]. The public, developers, corporations, and nonprofit groups are important stakeholders that planners should include in their planning processes. In order to close the gap between drinking water, wastewater, and stormwater services, local water management organizations may also take on the additional task of holistically coordinating water management [1,20]. Similarly, it may be necessary for land use planners to collaborate with several local water management organizations. Long-term success requires developing structured procedures for integrating land use planning and water management [1,8,63].

In terms of improper management of water resources, wetlands are often turned into agricultural land by draining and the construction of embankments, which results in a significant loss of ecosystem goods and services that help to clean and regulate surface and subsurface waterways [17,64]. In addition to reducing biological diversity, conversion—often to irrigated agriculture and in deltas to significant crops like rice—hinders groundwater recharge, taints downstream and subsurface drinking water sources, and worsens the quality of coastal waterways. Even shoddily built irrigation canals and ditches lose water, resulting in waterlogged soils and decreased yield. Consumptive irrigation practices, as well as irrigation-related dams and barrages, waste valuable water, destroy coastal ecosystems downstream, pollute estuaries, and alter salt levels that harm coastal residents and their fisheries [36,37].

2.4. Environmental Conservation

The term "environment" refers to the whole of a living organism's surroundings, including natural forces and other living entities, which provide opportunities for development and growth as well as risks and harm [20,65]. A physical or social component might make up the environment. The constructed environment, natural environment, weather, water, land, atmosphere, etc. are all considered to be a part of the physical environment [62,66]. The environment is dynamic and flexible. In other words, the term "environment" may be used to refer to all interactions between humans and the land, water, and air. It encompasses every aspect of the natural and biological environment, as well as how they interact [8]. The environment and the organism are in constant communication. For instance, the earth's atmosphere, which contains the gases oxygen and carbon dioxide, is crucial to the ecosystem and to life as we know it. These gases exist as a result of living things acting upon them and are a prerequisite for life. Another example is the connection between dirt and vegetarians [67]. The relationship between humans and their surroundings is a particularly perplexing issue. The cultural environment must be taken into account in the case of man in addition to the biological and physical environment [30].

The practice of protecting the environment entails the wise management of our natural resources. This implies that we can utilize the resources, but only properly and intelligently [47,68]. Examples include recycling, conserving trees, cutting down on trash, and utilizing renewable resources instead of depleting our natural resources. Additionally, it mandated that all natural resources be owned collectively [8]. The management of all the earth's territory should ensure the long-term existence of humans as an ecosystem component. Since there is only one planet, we must take great care to avoid destroying the potential of the natural world. This tends to lead to the creation and adoption of a global communication strategy by many nations [1].

The idea of environmental management is one that is always evolving and changing. It mostly has to do with managing the environment that surrounds a company or activity. In general, it depicts the organizational layout, responsibility hierarchies, procedures, and prerequisites for putting environmental business policy into practice [20]. Setting goals and evaluating progress, managing information and communications, and assisting in decision making are the main responsibilities of effective environmental management. Internal and external audits of different projects and their execution are also included in environmental management [1].

In the European Community, environmental protection and sustainable development policies are a crucial part of the long- and medium-term strategy that is the foundation of the region's long-term growth [30,69]. Given this environmental program, it is possible to conclude that the European Union is advancing environmental goals outside of the borders of its member states. This fact alone makes the community's policies more effectively disseminated in order to achieve sustainable development [70]. The primary goals of EU policies include the preservation of the environment via the use of economic and legal tools, as well as the deployment of suitable countermeasures to pollution. Based on technical and scientific evidence and taking into account the actual environmental situations in the various E.U. areas, the European Community is developing and promoting its environmental policies [7]. The European Parliament has fiercely established itself as a co-legislator with expanded authority in the domain of environmental protection after the implementation of the Treaty of Lisbon, exercising democratic oversight over all European institutions. In terms of international cooperation and legislation that take on a worldwide or cross-border character, environmental protection against the major issue of global warming is presently a top priority [20].

There is no one strategy to address the challenge of environmental protection, but combining existing possibilities and increasing efficiency across all social and economic sectors of states would help to address the issue of resources and distribution [32,71,72]. Today, international legislation and cooperation are focused mostly on environmental protection, which has a global or cross-border scope. Global efforts for prevention are

required because of the environmental issues' permanence, purpose, and intertemporal character [20].

3. Methodology

3.1. Research Design

The study used a quantitative research methodology and a cross-sectional survey research design. The cross-sectional research strategy relies on a thorough investigation of a group or event in order to unearth the roots of numerous fundamental approaches related to the research topic or study subject. Because of the cross-sectional research design, it was simple to focus on integrating water resources management techniques in land use planning for environmental protection.

3.2. Target Population

The study focused on a variety of environmental specialists in Greece. This community provided the most appropriate sample for the study to learn how to integrate water resources management methods into land use planning for environmental protection.

3.3. Sample Size and Sampling Technique

Using the table from Krejcie and Morgan (1970), the optimal sample size from the population will be calculated. Krejcie and Morgan (1970) developed a table for calculating sample size for a certain population as presented in Table 1. Based on the target population of 1000 participants, a corresponding sample size of 278 participants as per Krejcie and Morgan (1970) was used for this study [73]. A purposive sampling technique was used to select the representative sample for the study.

Table 1. Table for determining sample size from a given or known population.

N	n	N	n	N	n
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2800	338
60	52	340	181	3000	341
65	56	360	186	3500	346
70	59	380	191	4000	351
75	63	400	196	4500	354
80	66	420	201	5000	357
85	70	440	205	6000	361
90	73	460	210	7000	364
95	76	480	214	8000	367
100	80	500	217	9000	368
110	86	550	226	10,000	370
120	92	600	234	15,000	375
130	97	650	242	20,000	377
140	103	700	248	30,000	379
150	108	750	254	40,000	380
160	113	800	260	50,000	381
170	118	850	265	75,000	382
180	123	900	269	1,000,000	384

Equation (1) shows the equation of Krejcie and Morgan.

$$n = \frac{\chi^2 NP(1-P)}{d^2(N-1) + \chi^2 P(1-P)} \quad (1)$$

where:

n = Sample size;
N = Population size (75,000);
X^2 = Chi-square for specified confidence level at 1 degree of freedom (3.841);
d = Desired Margin of Error (expressed as a portion = 0.05);
P = Population portion (0.05 in this table).

3.4. Data Collection

Data from the chosen environmental experts in Greece were gathered via an online survey form. Data collection started only when participants gave informed consent, and it was confirmed that they were willing to participate in the study. The information gathered will be useful in establishing relationships between the study variables and in addressing the research questions. The questionnaire had a variety of investigative questions about the incorporation of water resources management methods into land use planning for environmental conservation (see Appendix A).

3.5. Data Analysis

SPSS was used to code and analyze the quantitative data. The findings were tabulated, and frequencies and percentages were used to analyze them. The cumulative predictive ability of the multiple independent factors on the study's dependent variable was calculated using regression analysis [31,74]. A multiple regression model is required in this situation to determine various predicted values (Equation (2)).

$$Y = \beta_O + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \ldots\ldots 1 \quad (2)$$

where:

Y = Environmental conservation;
β_0 = constant (coefficient of intercept);
X_1 = Aspects of land use planning;
X_2 = Water resources management strategies;
X_3 = Benefits of integration;
ε = Represents the error term in the multiple regression model.

The hypotheses of the study were tested at the 5% (0.05) level of significance throughout the study.

3.6. Ethical Considerations

To confirm participants' desire to engage in the study, the researcher made sure informed consent was obtained. Additionally, privacy and confidentiality were maintained while handling the responses' data. Finally, respondents were given the option to reply to questions based on how well they understood the different opinion questions. This helped to increase the number of replies to certain inquiries.

4. Results

This section presents the different results obtained after analysis using SPSS.

4.1. Demographic Characteristics

Table 2 shows that the most respondents (60.8%) were male, and the females were only 39.2%. Most participants (38.8%) had a bachelor's degree, 31.3% had master's degrees, and only 2.9% had PhDs. Most participants (48.2%) had an experience of above 10 years

in the environmental sector followed by 33.1% had an experience of 5–10 years, and only 18.7% had an experience of less than 5 years as an environmental expert.

Table 2. Showing demographic data of study respondents.

Characteristic	Frequency	Percentage (%)
Gender		
Male	169	60.8
Female	109	39.2
Education Qualification		
Certificate	17	6.1
Diploma	58	20.9
Bachelors	108	38.8
Masters	87	31.3
PhD	8	2.9
Experience in the environment sector		
Below 5 years	52	18.7
5–10 years	92	33.1
Above 10 years	134	48.2
Total	278	100

Source: Authors' own work (2023).

4.2. Descriptive Statistics

The study examined the different aspects of land use planning, and the results are presented in Figure 3.

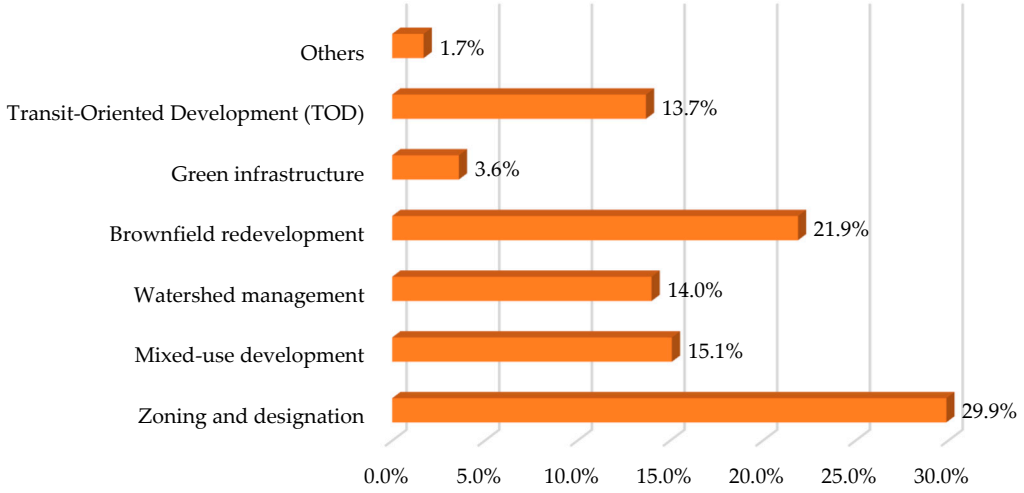

Figure 3. Aspects of land use planning. Source: Authors' own work (2023).

In regard to the aspects of land use planning in Figure 3, the majority of respondents (29.9%) identified "Zoning and designation" as the most significant aspect of land use planning. Zoning and designation involve categorizing land for specific purposes, such as residential, commercial, industrial, or agricultural, and are fundamental in urban and regional planning. "Brownfield redevelopment" was the second most mentioned aspect, with 21.9% of respondents recognizing its importance. Brownfield redevelopment refers to the revitalization and repurposing of previously developed and possibly contaminated land. "Mixed-use development" was noted by 15.1% of participants, indicating the significance of incorporating a mix of residential, commercial, and other land uses in urban planning to create vibrant and sustainable communities. "Transit-Oriented Development (TOD)" was mentioned by 13.7% of the respondents, suggesting that many consider the integration

of transportation and land use planning as crucial. Only 1.7% of participants mentioned "other aspects," including the systematic assessment of land and water potential. This implies that this aspect is relatively less emphasized in the context of land use planning according to the respondents.

The study also explored the different water resources management strategies, and the results are presented in Table 3.

Table 3. Water resources management strategies.

	Frequency	Percentage (%)
Watershed Management	48	17.3
Integrated Water Resources Management (IWRM)	83	29.9
Ecosystem-based approaches	59	21.2
Stakeholder engagement and public participation	17	6.1
Water-Smart Landscaping and Irrigation	32	11.5
Water Quality Monitoring	36	12.9
Others	3	1.1
Total	278	100

Source: Authors' own work (2023).

The results in Table 3 show that integrated water resources management (IWRM) was identified by the highest percentage of participants (29.9%) as the key strategy. IWRM is a comprehensive and holistic approach to managing water resources that considers the interconnectedness of water systems and involves multiple stakeholders in decision making. Ecosystem-based approaches" were recognized by 21.2% of the respondents, highlighting the importance of considering ecological systems and their services in water resources management. Watershed management strategies" were chosen by 17.3% of participants. Watershed management focuses on the protection and sustainable use of entire watershed areas to ensure a consistent supply of clean water. Water quality monitoring" was noted by 12.9% of respondents, indicating the significance of regularly assessing and ensuring the quality of available water resources. A small proportion (1.1%) of participants mentioned "other strategies" like utilizing riparian zones, emphasizing the importance of maintaining natural areas along rivers and water bodies to support biodiversity.

The study also examined the different benefits of integration of water resources management strategies in land use planning on environmental conservation and the results are in Table 4.

Table 4. Benefits of Integration of water resources management strategies in land use planning.

	Frequency	Percentage (%)
Sustainable water supply	43	15.5
Ecosystem protection	71	25.5
Flood and drought mitigation	96	34.5
Water quality improvement	62	22.3
Others	6	2.2
Total	278	100

Source: Authors' own work (2023).

The results in Table 4 show that most participants (34.5%) identified flood and drought mitigation. This result implies that many individuals are concerned about reducing the impact of extreme weather events on their communities. This was followed by ecosystem protection (25.5%) meaning that some participants considered the preservation of natural habitats and biodiversity as a crucial outcome of such integration. Furthermore, 22.3% of participants acknowledged that water quality improvement is a significant advantage. This indicates that a sizable portion of the respondents valued the enhancement of the overall quality of water resources. Also, 15.5% of the respondents identified sustainable water

supply as a significant benefit of integrating water resources management strategies in land use planning. This suggests that a portion of participants recognized the importance of ensuring a consistent and reliable water supply. Finally, the lowest portion (2.2%) mentioned other benefits of integration of water resources management strategies in land use planning.

The study also established the different aspects of environmental conservation, and the results are presented in Figure 4.

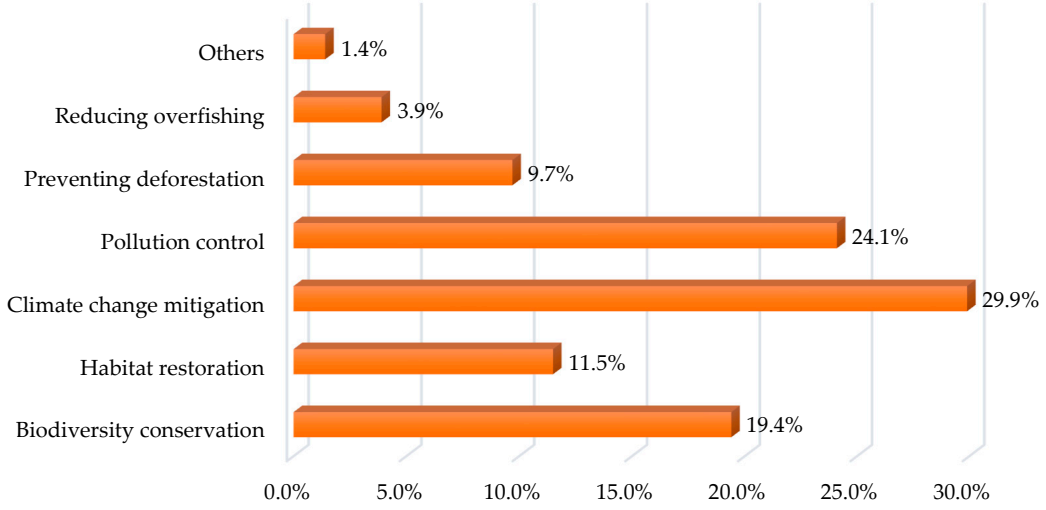

Figure 4. Aspects of environmental conservation. Source: Authors' own work (2023).

In regard to aspects of environmental conservation (Figure 4), the highest percentage of respondents (29.9%) recognized climate change mitigation as a major aspect of environmental conservation. This suggests that many participants believe that addressing climate change is crucial for environmental preservation. This was followed by 24.1% of respondents who identified pollution control as a significant aspect of environmental conservation. This highlights the importance of reducing pollution to protect the environment. A sizable portion of participants (19.4%) acknowledged the importance of conserving biodiversity. This result indicates that protecting the variety of species and ecosystems on Earth is a key concern for some respondents. Furthermore, 11.5% of participants considered habitat restoration as a significant aspect of environmental conservation. This suggests that rehabilitating natural habitats is an important goal for a portion of the respondents. A small percentage (1.4%) mentioned other aspects of environmental conservation, including afforestation and reducing deforestation, which were not explicitly listed in the survey.

4.3. Regression Analysis

The effect of integration of water resources management strategies in land use planning towards environmental conservation was established using regression analysis as presented in Tables 5–7.

Table 5. Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	0.642 [a]	0.627	0.601	0.1257

[a] Predictors (constant): social costs of fires, economic costs of fires, environmental costs of fires, aspects of land use planning, water resources management strategies, and benefits of integration.

Table 6. ANOVA analysis.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	76.204	3	28.031	73.261	0.014
Residual	71.051	380	0.413		
Total	147.255	382			

Dependent environmental conservation, predictors (constant): aspects of land use planning, water resources management strategies, benefits of integration.

Table 7. Regression coefficients.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.588	0.126		1.941	0.027
Aspects of land use planning	0.168	0.054	0.371	1.124	0.024
Water resources management strategies	0.424	0.072	0.062	0.817	0.001
Benefits of Integration	0.126	0.041	0.052	0.817	0.012

Dependent variable: environmental conservation.

Environmental conservation was the dependent variable. The dependent variable and independent variable are regressed, yielding an R^2 value of 0.627. This shows that the independent factors account for 62.7% of the variance in the dependent variable. Additionally, the regression findings show that none of the study's independent variables had any impact on 37.3% of the changes.

The F-statistic of 73.261 at prob. (Sig) = 0.014 conducted at 5% level of significance means that there is a significant linear relationship that exists between the independent variables (aspects of land use planning, water resources management strategies, and benefits of integration) and the dependent variable (environmental conservation) as a whole.

The results in the table above confirm environmental conservation was measured in terms of aspects of land use planning, water resources management strategies, and benefits of integration since $p < 0.05$.

Since the significance level of 0.024 is less than 0.05%, we confirm that aspects of land use planning such as zoning and designation, mixed-use development, and green infrastructure, have an effect on environmental conservation. Therefore, we accept hypothesis H1 that aspects of land use planning have an effect on environmental conservation.

Also, there is a relationship between water resources management strategies and environmental conservation since the significance level of 0.001 is less than 0.05%. This is an indication that water resources management strategies such as integrated water resources management (IWRM), ecosystem-based approaches, and water quality monitoring greatly influence environmental conservation. We therefore accept H2 that there is a relationship between water resources management strategies and level of environmental conservation.

Since the significance level of 0.01224 is less than 0.05%, we confirm that benefits of integration of water resources management strategies in land use planning have an effect on environmental conservation. Therefore, we accept Hypothesis H3 that benefits of integration of water resources management strategies in land use planning have an impact on environmental conservation. This suggests that when water management agencies collaborate with land use planners, they can better address water-related challenges and enhance environmental conservation efforts.

5. Discussion

This study examined the efficacy of integration of water resources management strategies in land use planning in regard to environmental conservation. The study showed that there is an association between water resources management strategies and level of environmental conservation. By ensuring that human activities are balanced with the

preservation and protection of natural resources and ecosystems, land use planning plays a critical role in environmental conservation [40,41].

The regression analysis reveals a significant positive relationship between aspects of land use planning and environmental conservation. This result supports the idea that land use decisions, including zoning and designation, mixed-use development, and green infrastructure, play a crucial role in shaping the environment. This finding aligns with Mengistu et al. (2023), who emphasize the importance of land use planning in protecting natural ecosystems and water resources [7]. Zoning regulations, for instance, can help control the growth of residential areas and mitigate conflicts between urban development and agricultural land. This is in line with the idea that responsible land use decisions can help maintain the quality and availability of water resources [12]. Some important elements of land use planning that support environmental protection were presented by the research [43,51]. Zoning in land use is the process of separating property into several zones or regions with designated allowable land uses [12]. Certain locations may be designated as conservation zones, protected areas, or green spaces by land use planners. By doing this, urban development is reduced, and natural areas, important ecosystems, and biodiversity hotspots are preserved [13,14]. Implementing urban development boundaries aids in limiting the growth of urban areas in environmentally vulnerable areas. These limits prevent development from going any farther, safeguarding forests, farmland, and other priceless natural resources [29,38,75,76].

Instead of transforming virgin land, land use planning might concentrate on redeveloping degraded or abandoned industrial areas (brownfields) [77,78]. The natural limits of watersheds may be taken into consideration when planning land use. Maintaining healthy aquatic ecosystems, preventing erosion, and protecting water quality are all benefits of regulating land uses appropriately within these borders. Conservation easements, which limit some property uses to conserve natural features, agricultural land, or animal habitats, may be established by land use planners working with landowners. These contracts guarantee long-term preservation while permitting a few specific land uses [19,47]. Urban areas that include green spaces, parks, and natural corridors benefit from increased biodiversity, recreational possibilities, and stormwater runoff management, which relieves pressure on existing infrastructure. Participating in land use planning procedures with the community encourages a feeling of ownership and accountability for environmental preservation [20,65]. Making better judgments may start with educating the public on the significance of sustainable land use practices [17,33,64].

The analysis also shows a significant positive relationship between water resources management strategies and environmental conservation. Water management strategies such as integrated water resources management (IWRM), ecosystem-based approaches, and water quality monitoring have a substantial impact on environmental conservation [22,79]. This result is consistent with the literature, which highlights the importance of sustainable water resources management for ecosystem health. IWRM, for example, is an approach that considers the entire water cycle, including the needs of human communities and natural ecosystems [20,54]. Such strategies help protect water bodies, maintain water quality, and support biodiversity, contributing to environmental conservation [2,20,32]. Artificial intelligence or a spiking neural network based architecture could help in this direction, as is done in the energy sector [80]. In order to maintain the sustainable use of water resources, it aims to balance opposing needs. IWRM can provide a framework for decision making in the context of land use planning that takes into consideration the water demands of various sectors, ecological requirements, and the general well-being of communities [22,54,79].

Planning based on watersheds is important in water management towards environment conservation. Watersheds act as the natural organizational units for controlling the usage of land and water. Utilizing watershed-based planning enables a comprehensive strategy to address human needs while conserving and restoring ecosystems [12]. Improved water infiltration, decreased stormwater runoff, and improved water quality may all be achieved by including green infrastructure, such as green areas, wetlands, and

permeable surfaces, in land use planning [61,81]. Another method of managing water resources is via land use zoning, in which areas are designated for conservation, sustainable agriculture, and urban growth in accordance with their capacity to hold water [6]. Additionally, encouraging water-saving habits, putting in effective irrigation systems, and promoting water reuse may all help to lower water demand and encourage sustainable land use techniques [1,34,61].

The findings indicate that the benefits of integrating water resources management strategies into land use planning also have a positive impact on environmental conservation. Yelling (2007) supports this idea by emphasizing the advantages of integrated planning. Collaboration between water management and land use planning authorities can lead to more effective policies, better enforcement of regulations, and increased public awareness [6]. This integrated approach is vital for addressing complex issues like water source protection, flood control, and water quality management [46,82]. For successful environmental protection and sustainable development, the management of water resources must be included in land use planning [83]. Communities may develop resilient, environmentally balanced, and socially thriving settings by taking water-related issues into account when making choices about where to utilize their property [7]. Although there are difficulties, the advantages of integration are obvious, resulting in better water quality, increased ecosystem health, and a more sustainable future. To address challenges and adopt integrated strategies for the welfare of current and future generations, policymakers, planners, and stakeholders must collaborate [13,70].

6. Conclusions

The study shows that the integration of water resources management strategies in land use planning is paramount for achieving environmental conservation and sustainable development. The study's goals were achieved, and the research hypotheses were tested, confirming the relationship between the degree of environmental conservation, water resources management, and land use planning. The research verified that several facets of land use planning, such as mixed-use development, green infrastructure, and zoning and designation, significantly influence environmental preservation. This emphasizes the necessity for urban and regional planners to prioritize the preservation of natural ecosystems in their practices and to take the ecological repercussions of their decisions into account. Sustainable land use practices can help lessen the detrimental effects of industrialization and urbanization on the availability and quality of water. The research also confirmed the premise that the degree of environmental conservation and water resources management techniques, like ecosystem-based approaches and integrated water resources management (IWRM), are significantly correlated.

These tactics are essential for guaranteeing the prudent use of water resources and the preservation of natural ecosystems. They offer a comprehensive method of managing water resources that takes into account the requirements of both environmental preservation and human society. The results of the study showed how including strategies for managing water resources in land use planning has a favorable effect on environmental protection. Better public awareness and better enforcement of water conservation rules result from this integration, which makes it possible for land use authorities and water management agencies to collaborate more effectively. Together, these organizations can create policies that safeguard source waters, manage flooding, and improve water quality, all of which improve the ecosystem as a whole. The demand for water resources is rising in a world where urbanization and population growth are both ongoing trends, posing a number of difficulties for sustainable water management.

Findings also emphasize the need for strategic planning and cooperation between water management and land use authorities to address the growing challenges of water resources management and environmental protection. Emphasizing stakeholder participation, adaptive management, and continuous monitoring can also lead to successful outcomes and a more resilient and sustainable future. This study can guide policymakers,

urban planners, researchers, and communities in making informed decisions that benefit both people and the planet by adopting an integrated approach that considers the interconnections between land and water, policymakers and planners can ensure the optimal use of water resources while safeguarding the environment for future generations. The integration of water resources management strategies in land use planning is crucial for achieving environmental conservation, sustainable development, and improved resilience to environmental challenges. By considering the interconnectedness of water systems and land use, societies can ensure long-term water availability, ecosystem health, and overall environmental well-being. The challenges are significant, but the benefits are equally promising, making this integration a critical endeavor for a better future. Emphasizing stakeholder participation, adaptive management, and continuous monitoring will lead to successful outcomes and a more resilient and sustainable future. This study can guide policymakers, urban planners, researchers, and communities in making informed decisions that benefit both people and the planet.

6.1. Recommendations

Despite the benefits of integrating water resources management strategies into land use planning, several challenges may arise. These challenges may include conflicting interests among stakeholders, limited financial resources, and inadequate data. To address these issues, collaboration among various sectors, governments, and international organizations is essential. Additionally, investing in research and data collection can help make informed decisions.

6.2. Areas for Future Research

The future requires more adaptive and resilient approaches as climate change impacts intensify. Incorporating climate change projections into integrated planning and utilizing advanced technologies like remote sensing and geographic information systems (GIS), artificial intelligence or a spiking neural network based architecture can enhance decision making.

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Appendix A

Questionnaire

Section A: Demographic Information:

Qtn 1: Gender

1. Male
2. Female

Qtn 2: Education Qualification
1. Certificate
2. Diploma
3. Bachelor's
4. Master's
5. PhD

Qtn 3: Experience in the Environment Sector
1. Below 5 years
2. 5–10 years
3. Above 10 years

Section B: Objective related questions

Qtn 1: What common aspect of land use planning do you know? Choose one below.
1. Zoning and designation
2. Brownfield redevelopment
3. Mixed-use development
4. Transit-oriented development (tod)
5. Watershed management
6. Green infrastructure
7. Others . . . . . Specify

Qtn 2: What water resources' management strategies do you know, choose one below:
1. Integrated Water Resources Management (IWRM)
2. Ecosystem-based approaches
3. Stakeholder engagement and public participation
4. Water-Smart Landscaping and Irrigation
5. Water Quality Monitoring
6. Others . . . . . Specify

Qtn 4: Are you conversant with the benefits of integration of water resources' management strategies in land use planning on environmental conservation.
1. Yes
2. No

Qtn 5: What common benefit of integration of water resources' management strategies in land use planning on environmental conservation do you know? Choose one
1. Sustainable water supply
2. Ecosystem protection
3. Flood and drought mitigation
4. Water quality improvement
5. Others . . . . . Specify

References

1. Bithas, K.; Kollimenakis, A.; Maroulis, G.; Stylianidou, Z. The Water Framework Directive in Greece. Estimating the Environmental and Resource Cost in the Water Districts of Western and Central Macedonia: Methods, Results and Proposals for Water Pricing. *Procedia Econ. Financ.* **2014**, *8*, 73–82. [CrossRef]
2. Piemontese, L. Sustainable Land and Water Management for a Greener Future Large-Scale Insights in Support of Agroecological Intensification. Ph.D. Thesis, Stockholm University, Stockholm, Sweden, 2020.
3. Duda, A.M. *Co-Managing Land and Water for Sustainable Development*; United Nations Convention to Combat Desertification (UNCCD): New York, NY, USA, 2017.
4. Duda, A.M. Integrated management of land and water resources based on a collective approach to fragmented international conventions. *Philos. Trans. R. Soc. Lond. Ser. B Biol. Sci.* **2003**, *358*, 2051–2062. [CrossRef] [PubMed]
5. Aylward, B.; Barbier, E.B. Valuing environmental functions in developing countries. *Biodivers. Conserv.* **1992**, *1*, 34–50. [CrossRef]
6. Yelling, J.A. Compensation and land use. In *Slums and Slum Clearance in Victorian London*; Routledge—Taylor & Francis Group: London, UK, 2007; pp. 75–90; ISBN 9780203717066.
7. Mengistu, A.G.; Woldesenbet, T.A.; Dile, Y.T.; Bayabil, H.K.; Tefera, G.W. Modeling impacts of projected land use and climate changes on the water balance in the Baro basin, Ethiopia. *Heliyon* **2023**, *9*, e13965. [CrossRef] [PubMed]
8. Sofios, S.; Arabatzis, G.; Baltas, E. Policy for management of water resources in Greece. *Environmentalist* **2008**, *28*, 185–194. [CrossRef]

9. Moltz, H.L.N.; Wallace, C.W.; Sharifi, E.; Bencala, K. Integrating Sustainable Water Resource Management and Land Use Decision-Making. *Water* **2020**, *12*, 2282. [CrossRef]
10. Ekstedt, K. Local Water Resource Assessment in Messinia, Greece. Master's Thesis, Stockholm University, Stockholm, Sweden, 2013.
11. Costanza, R.; d'Arge, R.; de Groot, R.; Farber, S.; Grasso, M.; Hannon, B.; Limburg, K.; Naeem, S.; O'Neill, R.V.; Paruelo, J.; et al. The value of the world's ecosystem services and natural capital. *Ecol. Econ.* **1998**, *25*, 3–15. [CrossRef]
12. Penning de Vries, F.W.T.; Acquay, H.; Molden, D.J.; Scherr, S.; Valentin, C.; Cofie, O. *Integrated Land and Water Management for Food and Environmental Security*; IWMI: Colombo, Sri Lanka, 2003.
13. Schismenos, S.; Emmanouloudis, D.; Stevens, G.J.; Katopodes, N.D.; Melesse, A.M. Soil governance in Greece: A snapshot. *Soil Secur.* **2022**, *6*, 100035. [CrossRef]
14. Karamesouti, M.; Detsis, V.; Kounalaki, A.; Vasiliou, P.; Salvati, L.; Kosmas, C. Land-use and land degradation processes affecting soil resources: Evidence from a traditional Mediterranean cropland (Greece). *CATENA* **2015**, *132*, 45–55. [CrossRef]
15. Fynn, O.F.; Dzikunoo, E.A.; Chegbeleh, L.P.; Yidana, S.M. Enhancing adaptation to climate change through groundwater-based irrigation. *Sustain. Water Resour. Manag.* **2023**, *9*, 36. [CrossRef]
16. Nkosi, M.; Mathivha, F.I.; Odiyo, J.O. Impact of Land Management on Water Resources, a South African Context. *Sustainability* **2021**, *13*, 701. [CrossRef]
17. Kourgialas, N.N. A critical review of water resources in Greece: The key role of agricultural adaptation to climate-water effects. *Sci. Total Environ.* **2021**, *775*, 145857. [CrossRef] [PubMed]
18. Qin, T.; Feng, J.; Li, C.; Zhang, X.; Yan, D.; Liu, S.; Wang, J.; Lv, X.; Abebe, S.A. Risk assessment and configuration of water and land resources system network in the Huang-Huai-Hai watershed. *Ecol. Indic.* **2023**, *154*, 110712. [CrossRef]
19. Tang, X.; Adesina, J.A. Integrated Watershed Management Framework and Groundwater Resources in Africa—A Review of West Africa Sub-Region. *Water* **2022**, *14*, 288. [CrossRef]
20. Zatsepina, E.; Sorokina, O.; Kosinsky, V.; Petrova, L.; Fomkin, I. Environmental Aspects of Land Management. In Proceedings of the IV International Scientific and Practical Conference "Anthropogenic Transformation of Geospace: Nature, Economy, Society" (ATG 2019), Volgograd, Russia, 1–4 October 2019; Atlantis Press: Volgograd, Russia, 2020; pp. 321–325.
21. Dias, F.T.; Mazon, G.; Cembranel, P.; Birch, R.; de Andrade Guerra, J.B.S.O. Land Use and Global Environmental Change: An Analytical Proposal Based on A Systematic Review. *Land* **2023**, *12*, 115. [CrossRef]
22. Kokkoris, I.P.; Drakou, E.G.; Maes, J.; Dimopoulos, P. Ecosystem services supply in protected mountains of Greece: Setting the baseline for conservation management. *Int. J. Biodivers. Sci. Ecosyst. Serv. Manag.* **2017**, *14*, 45–59. [CrossRef]
23. Kalfas, D.; Chatzitheodoridis, F.; Loizou, E.; Melfou, K. Willingness to Pay for Urban and Suburban Green. *Sustainability* **2022**, *14*, 2332. [CrossRef]
24. Tzanopoulos, J.; Kallimanis, A.S.; Bella, I.; Labrianidis, L.; Sgardelis, S.; Pantis, J.D. Agricultural decline and sustainable development on mountain areas in Greece: Sustainability assessment of future scenarios. *Land Use Policy* **2011**, *28*, 585–593. [CrossRef]
25. Li, C.; Peng, C.; Chiang, P.-C.; Cai, Y.; Wang, X.; Yang, Z. Mechanisms and applications of green infrastructure practices for stormwater control: A review. *J. Hydrol.* **2019**, *568*, 626–637. [CrossRef]
26. Pereira, B.; David, L.M.; Galvão, A. Green Infrastructures in Stormwater Control and Treatment Strategies. *Proceedings* **2020**, *48*, 7.
27. Barbosa, A.E.; Fernandes, J.N.; David, L.M. Key issues for sustainable urban stormwater management. *Water Res.* **2012**, *46*, 6787–6798. [CrossRef] [PubMed]
28. Zdruli, P.; Ziadat, F.; Nerilli, E.; D'Agostino, D.; Lahmer, F.; Bunning, S. Sustainable development of land resources. In *Zero Waste in the Mediterranean: Natural Resources, Food and Knowledge*; International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), Ed.; Presses de Sciences Po: Paris, France, 2016; pp. 91–113; ISBN 978-2-7246-1921-8.
29. Mulder, J.; Kimball, K.R.; Larson, D.T.; Douglas, L.J.; Rovig, L.R.; Labau, D.; Sizemore, K. *Integrating Water Resources and Land Use Planning*; Utah Water Research Laboratory: Logan, UT, USA, 1979.
30. UN—OECD. *Integrated Water Resources Management in Eastern Europe, the Caucasus and Central Asia*; UN—OECD: New York, NY, USA, 2014.
31. Kalfas, D.; Kalogiannidis, S.; Chatzitheodoridis, F.; Toska, E. Urbanization and Land Use Planning for Achieving the Sustainable Development Goals (SDGs): A Case Study of Greece. *Urban Sci.* **2023**, *7*, 43. [CrossRef]
32. Koulelis, P.; Solomou, A.; Fassouli, V. Sustainability Constraints in Greece. Focusing on Forest Management and Biodiversity. In Proceedings of the 9th International Conference on Information and Communication Technologies in Agriculture, Food and Environment (HAICTA 2020), Thessaloniki, Greece, 24–27 September 2020; pp. 592–603.
33. Izakovičová, Z.; Špulerová, J.; Petrovič, F. Integrated Approach to Sustainable Land Use Management. *Environments* **2018**, *5*, 37. [CrossRef]
34. Angelo, M.J. Integrating Water Management and Land Use Planning: Uncovering the Missing Link in the Protection of Florida's Water Resources. *Univ. Florida J. Law Public Policy* **2001**, *12*, 223–249.
35. Rugland, E. *Integrating Land Use and Water Management. Planning and Practice*, 1st ed.; Lincoln Institute of Land Policy: Cambridge, MA, USA, 2022; ISBN 978-1-55844-439-3.
36. Pacheco-Vega, R. Governing Urban Water Conflict through Watershed Councils—A Public Policy Analysis Approach and Critique. *Water* **2020**, *12*, 1849. [CrossRef]

37. Cotler, H.; Cuevas, M.L.; Landa, R.; Frausto, J.M. Environmental Governance in Urban Watersheds: The Role of Civil Society Organizations in Mexico. *Sustainability* **2022**, *14*, 988. [CrossRef]
38. Bitterman, P.; Koliba, C.; Singer, A. A network perspective on multi-scale water governance in the Lake Champlain Basin, Vermont. *Ecol. Soc.* **2023**, *28*, 44. [CrossRef]
39. Dimadama, Z.; Zikos, D. Social Networks as Trojan Horses to Challenge the Dominance of Existing Hierarchies: Knowledge and Learning in theWater Governance of Volos, Greece. *Water Resour. Manag.* **2010**, *24*, 3853–3870. [CrossRef]
40. Young, M.D.; Ros, G.H.; de Vries, W. A decision support framework assessing management impacts on crop yield, soil carbon changes and nitrogen losses to the environment. *Eur. J. Soil Sci.* **2021**, *72*, 1590–1606. [CrossRef]
41. Manos, B.D.; Papathanasiou, J.; Bournaris, T.; Voudouris, K. A DSS for sustainable development and environmental protection of agricultural regions. *Environ. Monit. Assess.* **2010**, *164*, 43–52. [CrossRef]
42. IAEA. *Integrated Assessment of Climate, Land, Energy and Water*; Non-Serial Publications; International Atomic Energy Agency (IAEA): Vienna, Austria, 2020; ISBN 978-92-0-113720-3.
43. Papadopoulou, C.-A.; Papadopoulou, M.P.; Laspidou, C. Implementing Water-Energy-Land-Food-Climate Nexus Approach to Achieve the Sustainable Development Goals in Greece: Indicators and Policy Recommendations. *Sustainability* **2022**, *14*, 4100. [CrossRef]
44. Ruckelshaus, M.; McKenzie, E.; Tallis, H.; Guerry, A.; Daily, G.; Kareiva, P.; Polasky, S.; Ricketts, T.; Bhagabati, N.; Wood, S.A.; et al. Notes from the field: Lessons learned from using ecosystem service approaches to inform real-world decisions. *Ecol. Econ.* **2015**, *115*, 11–21. [CrossRef]
45. Chan, K.M.A.; Balvanera, P.; Benessaiah, K.; Chapman, M.; Díaz, S.; Gómez-Baggethun, E.; Gould, R.; Hannahs, N.; Jax, K.; Klain, S.; et al. Why protect nature? Rethinking values and the environment. *Proc. Natl. Acad. Sci. USA* **2016**, *113*, 1462–1465. [CrossRef] [PubMed]
46. Dogaru, L. The Importance of Environmental Protection and Sustainable Development. *Procedia-Soc. Behav. Sci.* **2013**, *93*, 1344–1348. [CrossRef]
47. Sang, N.; Ode Sang, Å. *A Review on the State of the Art in Scenario Modelling for Environmental Management: Potential for Application in Achieving the Swedish Environmental Objectives*; Rapport; Swedish Environmental Protection Agency: Stockholm, Sweden, 2015.
48. Tzanakakis, V.A.; Angelakis, A.N.; Paranychianakis, N.V.; Dialynas, Y.G.; Tchobanoglous, G. Challenges and Opportunities for Sustainable Management of Water Resources in the Island of Crete, Greece. *Water* **2020**, *12*, 1538, Correction in *Water* **2022**, *14*, 1024. [CrossRef]
49. Rodríguez, M.I.; Grindlay, A.L.; Cuevas, M.M.; Zamorano, M. Integrating land use planning and water resource management: Threshold scenarios—A tool to reach sustainability. *WIT Trans. Ecol. Environ.* **2015**, *192*, 231–242. [CrossRef]
50. Singh, S.; Biswas, R. Analysis of Land Use Change Effects/Impacts on Surface Water Resources in Delhi. *Urban Sci.* **2022**, *6*, 92. [CrossRef]
51. Kyriakopoulos, G.L. Land Use Planning and Green Environment Services: The Contribution of Trail Paths to Sustainable Development. *Land* **2023**, *12*, 1041. [CrossRef]
52. Ackerschott, A.; Kohlhase, E.; Vollmer, A.; Hörisch, J.; von Wehrden, H. Steering of land use in the context of sustainable development: A systematic review of economic instruments. *Land Use Policy* **2023**, *129*, 106620. [CrossRef]
53. Martino, S.; Kenter, J.O. Economic valuation of wildlife conservation. *Eur. J. Wildl. Res.* **2023**, *69*, 32. [CrossRef]
54. Gugerell, K.; Endl, A.; Gottenhuber, S.L.; Ammerer, G.; Berger, G.; Tost, M. Regional implementation of a novel policy approach: The role of minerals safeguarding in land-use planning policy in Austria. *Extr. Ind. Soc.* **2020**, *7*, 87–96. [CrossRef]
55. Kalogiannidis, S.; Kalfas, D.; Chatzitheodoridis, F.; Papaevangelou, O. Role of Crop-Protection Technologies in Sustainable Agricultural Productivity and Management. *Land* **2022**, *11*, 1680. [CrossRef]
56. Nolon Blanchard, J.C. *Integrating Water Efficiency into Land Use Planning in the Interior West: A Guidebook for Local Planners*; Elliott, D.L., Nolon, J.R., Eds.; Land Use Law Center for Western Resource Advocates: New York, NY, USA, 2018.
57. Duan, Y.; Tang, J.; Li, Z.; Yang, Y.; Dai, C.; Qu, Y.; Lv, H. Optimal Planning and Management of Land Use in River Source Region: A Case Study of Songhua River Basin, China. *Int. J. Environ. Res. Public Health* **2022**, *19*, 6610. [CrossRef] [PubMed]
58. Sgroi, M.; Vagliasindi, F.G.A.; Roccaro, P. Feasibility, sustainability and circular economy concepts in water reuse. *Curr. Opin. Environ. Sci. Health* **2018**, *2*, 20–25. [CrossRef]
59. Kalogiannidis, S.; Papadopoulou, C.-I.; Loizou, E.; Chatzitheodoridis, F. Risk, Vulnerability, and Resilience in Agriculture and Their Impact on Sustainable Rural Economy Development: A Case Study of Greece. *Agriculture* **2023**, *13*, 1222. [CrossRef]
60. Ma, P.; Lyu, S.; Diao, Z.; Zheng, Z.; He, J.; Su, D.; Zhang, J. How Does the Water Conservation Function of Hulunbuir Forest – Steppe Ecotone Respond to Climate Change and Land Use Change? *Forests* **2022**, *13*, 2039.
61. Thoidou, E.; Foutakis, D. Spatial Planning in view of new challenges: Land take and some evidence from Greece. In Proceedings of the Planning for Transition, AESOP 2019 Annual Congress, Venice, Italy, 9–13 July 2019.
62. Thoidou, E. Spatial Planning and Climate Adaptation: Challenges of Land Protection in a Peri-Urban Area of the Mediterranean City of Thessaloniki. *Sustainability* **2021**, *13*, 4456. [CrossRef]
63. Kalogiannidis, S.; Chatzitheodoridis, F.; Kalfas, D.; Patitsa, C.; Papagrigoriou, A. Socio-Psychological, Economic and Environmental Effects of Forest Fires. *Fire* **2023**, *6*, 280. [CrossRef]

64. Kourgialas, N.N.; Psarras, G.; Morianou, G.; Pisinaras, V.; Koubouris, G.; Digalaki, N.; Malliaraki, S.; Aggelaki, K.; Motakis, G.; Arampatzis, G. Good Agricultural Practices Related to Water and Soil as a Means of Adaptation of Mediterranean Olive Growing to Extreme Climate-Water Conditions. *Sustainability* **2022**, *14*, 13673. [CrossRef]
65. Elhag, M.; Boteva, S. Quantitative Analysis of Different Environmental Factor Impacts on Land Cover in Nisos Elafonisos, Crete, Greece. *Int. J. Environ. Res. Public Health* **2020**, *17*, 6437. [CrossRef]
66. Kyvelou, S.S.; Gourgiotis, A. Landscape as Connecting Link of Nature and Culture: Spatial Planning Policy Implications in Greece. *Urban Sci.* **2019**, *3*, 81. [CrossRef]
67. Randolph, J. *Environmental Land Use Planning and Management*, 2nd ed.; Island Press: Washington, DC, USA, 2011; ISBN 9781597267304.
68. Sobhani, P.; Esmaeilzadeh, H.; Sadeghi, S.M.M.; Wolf, I.D.; Deljouei, A. Prioritizing Water Resources for Conservation in a Land of Water Crisis: The Case of Protected Areas of Iran. *Water* **2022**, *14*, 4121. [CrossRef]
69. Kalogiannidis, S.; Loizou, E.; Kalfas, D.; Chatzitheodoridis, F. Local and Regional Management Approaches for the Redesign of Local Development: A Case Study of Greece. *Adm. Sci.* **2022**, *12*, 69. [CrossRef]
70. Papanastasis, V.P.; Arianoutsou, M.; Papanastasis, K. Environmental conservation in classical Greece. *J. Biol. Res.* **2010**, *14*, 123–135.
71. Atay, I. Water Resources Management in Greece: Perceptions about Water Problems in the Nafplion Area. Master's Thesis, Stockholm University, Stockholm, Sweden, 2012.
72. Koulelis, P.P.; Proutsos, N.; Solomou, A.D.; Avramidou, E.V.; Malliarou, E.; Athanasiou, M.; Xanthopoulos, G.; Petrakis, P.V. Effects of Climate Change on Greek Forests: A Review. *Atmosphere* **2023**, *14*, 1155. [CrossRef]
73. Krejcie, R.V.; Morgan, D.W. Determining Sample Size for Research Activities. *Educ. Psychol. Meas.* **1970**, *30*, 607–610. [CrossRef]
74. Kalogiannidis, S.; Kalfas, D.; Chatzitheodoridis, F.; Lekkas, E. Role of Governance in Developing Disaster Resiliency and Its Impact on Economic Sustainability. *J. Risk Financ. Manag.* **2023**, *16*, 151. [CrossRef]
75. Mitchell, D.P. Land administration trends and their implications for Australian natural resource management. *J. Spat. Sci.* **2009**, *54*, 35–47. [CrossRef]
76. Mitchell, D.; Grenfell, R.; Bell, K. Assessing the Suitability of Land Administration to Support Natural Resource Management at the Parcel Level. In Proceedings of the International Federation of Surveyors (FIG) Working Week, Paris, France, 13–17 April 2003; International Federation of Surveyors (FIG), Ed.; International Federation of Surveyors (FIG): Athens, Greece, 2003; pp. 1–15.
77. Elimam, H. *Environmental Conservation and Sustainable Development*; LAP Lambert Academic Publishing: London, UK, 2014; ISBN 978-3659609282.
78. McDonach, K.; Yaneske, P.P. Environmental management systems and sustainable development. *Environmentalist* **2002**, *22*, 217–226. [CrossRef]
79. Vlek, P.L.G.; Khamzina, A.; Azadi, H.; Bhaduri, A.; Bharati, L.; Braimoh, A.; Martius, C.; Sunderland, T.; Taheri, F. Trade-Offs in Multi-Purpose Land Use under Land Degradation. *Sustainability* **2017**, *9*, 2196. [CrossRef]
80. Brusca, S.; Capizzi, G.; Lo Sciuto, G.; Susi, G. A new design methodology to predict wind farm energy production by means of a spiking neural network–based system. *Int. J. Numer. Model. Electron. Netw. Devices Fields* **2019**, *32*, e2267. [CrossRef]
81. Chatzitheodoridis, F.; Michailidis, A.; Theodosiou, G.; Loizou, E. Local cooperation: A dynamic force for endogenous rural development. In *Balkan and Eastern European Countries in the Midst of the Global Economic Crisis*; Contributions to Economics; Physica: Heidelberg, Germany, 2013; pp. 121–132. [CrossRef]
82. Papadopoulou, C.I.; Loizou, E.; Melfou, K.; Chatzitheodoridis, F. The knowledge based agricultural bioeconomy: A bibliometric network analysis. *Energies* **2021**, *14*, 6823. [CrossRef]
83. Mishra, P.K. Environmental Conservation and Management. In *Environmental Geography*; IGNOU—Indira Gandhi National Open University: New Delhi, India, 2021; pp. 185–195.