ASERS

Journal of Environmental Management and Tourism

Quarterly
Volume XIV
Issue 5(69)
Fall 2023
ISSN 2068 – 7729
Journal DOI
https://doi.org/10.14505/jemt

ASERS Publishing

Fall 2023
Volume XIV
Issue 5(69)

ASERS Publishing
http://www.aserspublishing.eu
ISSN 2068 – 7729
Journal DOI: https://doi.org/10.14505/jemt

Table of Contents:

Fall 2023
Volume XIV
Issue 5(69)

ASERS Publishing
http://www.aserspublishing.eu
ISSN 2068 – 7729
Journal DOI: https://doi.org/10.14505/jemt

Call for Papers
Winter Issues 2023
Journal of Environmental Management and Tourism

Journal of Environmental Management and Tourism is an open access, peer-reviewed interdisciplinary research journal, aimed to publish articles and original research papers that contribute to the development of both experimental and theoretical nature in the field of Environmental Management and Tourism Sciences. The Journal publishes original research and seeks to cover a wide range of topics regarding environmental management and engineering, environmental management and health, environmental chemistry, environmental protection technologies (water, air, soil), pollution reduction at source and waste minimization, energy and environment, modelling, simulation and optimization for environmental protection; environmental biotechnology, environmental education and sustainable development, environmental strategies and policies.

Authors are encouraged to submit high quality, original works that discuss the latest developments in environmental management research and application with the certain scope to share experiences and research findings and to stimulate more ideas and useful insights regarding current best-practices and future directions in Environmental Management.

Also, this journal is committed to a broad range of topics regarding Tourism and Travel Management, leisure and recreation studies and the emerging field of event management. It contains both theoretical and applied research papers and encourages obtaining results through collaboration between researchers and those working in the tourism industry.

The journal takes an interdisciplinary approach and includes planning and policy aspects of international, national and regional tourism as well as specific management studies. Case studies are welcomed when the authors indicate the wider applications of their insights or techniques, emphasizing the global perspective of the problem they address.

This issue has a special importance for us, marking a new stage in the history of this journal. So, starting with Issue 5(69), Fall 2023 **Journal of Environmental Management and Tourism** will be published in Open Access system. Journal of Environmental Management and Tourism' articles are published under the Creative Commons Attribution 4.0 International License BB CY, which permits unrestricted use, distribution, and reproduction in any medium, provided the original authors and the source are credited.

Journal of Environmental Management and Tourism is indexed in SCOPUS, RePEc, CEEOL, ProQuest, EBSCO and Cabell Directory databases.
Details regarding the publication in this journal are here: https://journals.aserspublishing.eu/jemt/about

Deadline for submission:	21st October 2023
Expected publication date:	December 2023
Website:	https://journals.aserspublishing.eu/jemt
E-mail:	jemt@aserspublishing.eu

To prepare your paper for submission, please see full author guidelines in the following file:

JEMT_Full_Paper_Template.docx, then send it via email at jemt@aserspublishing.eu.

Volume XIV, Issue 5(69), Fall 2023

DOI: https://doi.org/10.14505/jemt.v14.5(69).24

Sustainable Development and Environmental Tourism. The Case of Lake Karla – Thessaly, Greece

Georgia TRAKALA
Department of Environment, Ionian University, Greece
v20trak@ionio.gr

Aristotelis MARTINIS
Department of Environment, Ionian University, Greece
ORCID: 0000-0002-3030-0667
amartinis@ionio.gr

Georgios KARRIS
Department of Environment, Ionian University, Greece
ORCID: 0000-0001-5264-8026; Researcher ID: H-7996-2019
gkarris@ionio.gr

Charicleia MINOTOU
Department of Environment, Ionian University, Greece
charmini@otenet.gr

Achilleas TSIROUKIS
Department of Environment, University of Thessaly, Greece
tsirouk@uth.gr

Article info: Received 20 May 2023; Received in revised form 5 June 2023; Accepted for publication 22 July 2023; Published 1 September 2023.

Abstract: Sustainable development is the common ground between the three components: environment, economy, and society, which are also known as sustainability pillars. In this work, an attempt was made to investigate whether Lake Karla - Mavrovouni, supporting agriculture, biodiversity and cultural activities and being part of the Natura 2000 protected area network, in combination with the diverse topics of environmental education, can contribute for the sustainable development of local societies, with the contribution of the collective bodies of local self-government. For the holistic management of the protected area of the "Karla" lake, the managers must consider on the one hand the protection of the natural and cultural heritage and on the other hand the sustainable development of the area through the promotion of the natural and cultural heritage and the promotion of environmental tourism. For this purpose, managers need to know socio-economic and demographic characteristics of visitors. Here, questionnaire responses were used to investigate the profile, environmental perception, knowledge, and behavior of visitors. In total, more than 300 questionnaires were sent, and finally 161 questionnaires were fully answered, which constitute the research sample. The analysis of the results showed that the natural and cultural environment contribute to the sustainable development of the wider area of Lake Karla-Mavrovouni, highlighting through them serious advantages and opportunities to exploit the area by the local bodies.

Keywords: sustainability; ecotourism; Lake Karla; pathways; ecosystem services; environmental education.

JEL Classification: Q01; Q56; R11.

Introduction

Lake Karla, until the drainage in 1962, was one of the important natural wetland ecosystems of Greece and the Mediterranean more broadly. The provision of ecosystem services by the natural environment encompasses a multitude of benefits such as water purification, air quality improvement, climate regulation and biodiversity

conservation. These services are vital for the well-being and resilience of local communities. However, beyond their utilitarian value, natural environments offer additional advantages through their capacity to serve as educational resources and recreational spaces. This unique attribute is particularly relevant within Protected Areas, which are designated regions that safeguard natural and cultural heritage (Szell and Hallett 2013; Trakala, Tsiroukis, Martinis 2023).

In addition to the ecosystem services that the natural environment provides to local communities, it presents a propitious setting for environmental education and recreation, specifically within Protected Areas (PAs). The pedagogical and leisurely worth of the natural environment exhibits a robust interconnection with the sustainable development of neighbouring communities, particularly in regions of Greece that have experienced environmental degradation and economic downturn, exemplified by the Lake Karla - Mavrovouni region.

Efforts to restore the Lake Karla and highlighting the wider area and the biodiversity of the region Mavrovouni, can involve initiatives such as the creation of nature centres, interpretation trails and educational programs that capitalize on the ecological significance of the area. These endeavours can attract visitors, including tourists, students, and researchers, who can contribute to the local economy while gaining valuable knowledge about the region's unique ecosystems. Moreover, collaboration between local communities, environmental organizations and governmental bodies can facilitate the implementation of sustainable tourism practices that prioritize conservation and respect for the natural environment (Moyle *et al.* 2017).

Environmental Tourism has been broadly defined as the involvement in biophysical and socio-cultural environments (Zhong *et al.* 2011). Rural tourism stands apart from other forms of tourism due to its strong dependence on the natural and socio-cultural environments (Richards 1996). As a result, the conservation and preservation of the tourism environment, particularly in rural tourism destinations, assume utmost significance. Hiking is a popular form of ecotourism, providing travelers with a sense of satisfaction and awareness of the sustainability of the environment (Poudel and Nyaupane 2016). At the same time, the use of hiking pathways by local residents contributes to the development of walking routes, highlighting longer and better routes, through specific destinations in their area (Joseph and Zimring 2007). Walking routes are the link between tourism, culture and the environment per region, as the traveler crossing the path where he has chosen, is able to come into contact with the history, culture and local tradition of the region, gaining awareness and responsibility for the protection of the local ecosystem and its historical monuments (Evans and Jones 2011).

According to Manning (2001), the importance of connecting people with nature is very important, because nature offers experiences and knowledge to visitors. Moyle *et al.* (2017), link the ability of visitors to gain experiences in nature with the simultaneous sustainable development of local communities. In the work of Petrosilio showed that the higher the level of education, the greater the knowledge, awareness and environmental behavior of visitors and that the level of education is directly related to knowledge, information, awareness and environmental behaviour. Petrosilio also stated that environmental consciousness is an important variable that depends on education level and place of residence. In addition, the promotion of natural wealth and the protection of the environment, cultural heritage (archaeology, folklore, tradition) through the preservation and promotion of the most important cultural elements (monuments, architectural ensembles), the possibility of recreation, the utilization of monuments and places of natural beauty, as well as and certified walking pathways-routes give added value to the area.

Furthermore, according to Tsonis, community-based tourism has been defined as a form of tourism that grants communities a certain level of authority to make decisions and safeguard the environment, while concurrently fostering cross-cultural awareness (Tsonis 2009). The fundamental objective of community-based tourism is to promote the economic, social and cultural well-being of communities residing in sustainable tourism destinations (Brohman 1996). Achieving sustainable development in this context, necessitates the implementation of a balanced and harmonious approach that ensures the quality of development, both from cultural and environmental perspectives. Furthermore, this approach should prioritize the needs, interests and potentials of the community and its residents, as they play a crucial role in sustaining tourism development (Razzaq 2011). Concerning the area of Lake Karlas, the highlighting of the natural wealth and the protection of the environment, through a certified walking path - route with the neighboring ecosystems of Kissavos, Mavrovouni and Pelion, will give added value to the area. In addition, the utilization of the flora, birdlife and fish fauna (Catsadorakis 2019), will become a pole of attraction and multiple topics for environmental education, but also for alternative tourism, which has been widely recognized as a key tool for regional sustainable development (Trakala 2023). In fact, environmental education (EE) and education for sustainable development (ESD) is characterized as important tools to address knowledge, values and behavior and to achieve sustainable development.

Besides, there are many factors that shape environmentally friendly behavior, such as social, demographic, self-identifying, cognitive and exogenous factors. Characteristically, one of the parameters that influence people's attitudes towards the environment and therefore their behavior, is their level of knowledge towards important issues related to the ecosystem, such as protected areas (Petrosillo *et al.* 2007; Shamuganathan and Karpudewan 2015; Genc and Akilli 2016).

Accordingly, through the findings of scientific research, it has been shown that certain demographic factors shape environmental attitudes, among them the educational level (Gardner and Stern 2002; Teksoz *et al.* 2014; Newman and Fernandes 2016; Martinis 2020). Therefore, through environmental education, people are able to form a more friendly attitude towards protected areas, since their value is recognized. Thus, through environmental education, it is possible to realize the value of the cultural path (path) and to adopt a higher degree of friendly behavior for animate and inanimate materials, along it (Martinis *et al.* 2015, 2017). Also, the sound walk along the environmental and cultural route (pathway) provides the framework for active listening, analysis and understanding of the environment, focusing both on the physical characteristics of sounds and their meanings (Westerkamp 2011; Minotou 2012; Minotou *et al.* 2007).

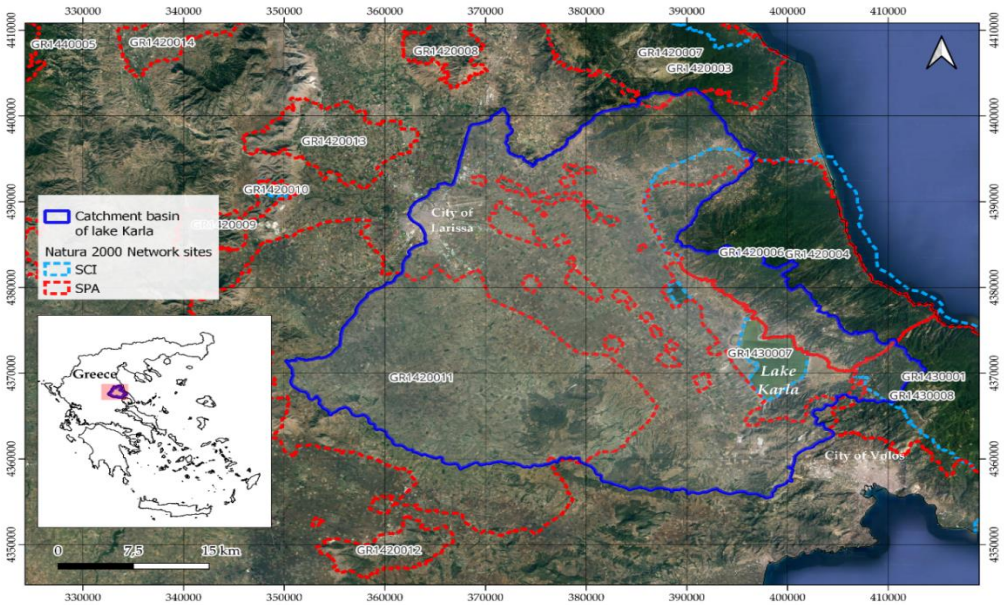
1. Aim of the Research

The desiccation of Lake Karla has resulted in a substantial degradation of the surrounding environment, with significant ramifications for the rural areas within the Thessalian plain. In response, efforts to partially restore the lake ecosystem have presented remarkable prospects for advancing sustainable development within the broader region. By focusing on the restoration of the environment, these initiatives provide an ideal framework for the establishment of environmental and cultural routes, effectively showcasing the area's inherent natural and cultural heritage. The primary objective of this study is to explore the perceptions and opinions of visitors regarding the conservation of biodiversity, cultural heritage, and landscape within the region. Through the acquisition of such insights, this research seeks to facilitate the transformation of the area into a sustainable destination, offering valuable opportunities for environmental education and awareness programs targeted at students and visitors alike. The ultimate goal is to foster the establishment of the region as a center for sustainable practices, preserving its natural and cultural assets while serving as a platform for environmental learning and engagement.

2. Methodology and Study Area

The research part includes statistical analysis with questionnaires, that is, a quantitative analysis carried out with the main objective of examining certain research questions related to the perceptions of the participants regarding environmental education, as to whether it is possible to contribute to the sustainable development of an area of Lake Karla, in the central Greece (Figure 1).

Figure 1. Study area: the catchment basin of lake Karla, Thessaly, Greece. With a blue outline the catchment basin of lake Karla is depicted. Natura 2000 protected area network sites in the area, *i.e.*, Sites of Community Importance (SCI) and Special Protection Areas (SPA) are also presented.



Baseline map source: Google Earth, Trakala *et al.* 2023.

In total, more than 300 questionnaires were sent and finally 161 questionnaires were fully answered, which constitute the research sample. The participants of the research answered the questions included in the questionnaire, after the voluntary character of the participation and also their anonymity was known through a note. The participants expressed their opinions by completing the questionnaire, between September - November 2022, in electronic form (Google-forms), after it was preceded by a pilot sample with 25 questionnaires in paper form. The questionnaire included questions on a five-point scale (Likert), where the degree of agreement or disagreement on certain topics related to the research is examined. the research questions that the research participants were asked to answer are the following:

1.What is the prevailing situation in the wider area of Lake Karla - Mavrovounio?

2.Can environmental education contribute to the sustainable development of the region?

3.What are the educational tools of Environmental Education in the teaching practice?

Further questions investigated are the reason for visiting the area, as well as the degree of environmental interest of the participants. For the conduct of the statistical analysis of the data, the descriptive analysis and the interconnections analysis were used between the variables. For the conduct of the statistical analysis of the data, the descriptive analysis and the interconnections analysis were used between the variables. The data analysis was realized with the application of the statistical package SPSS 27.0. In addition, a SWOT analysis is carried out to highlight the strengths, weaknesses, opportunities, and threats of the region.

2.1 SWOT Analysis

Table 1. Swot Analysis

Strong points	Weak points
✓ Excellent location. ✓ Outdoor activities. ✓ An environment conducive to tranquility and peace of mind. ✓ Existence of historical sites covering long periods starting from prehistory. ✓ Existence of cultural monuments. ✓ Well-developed road network. ✓ The inclusion of the area in a protection regime (Natura 2000 Network). ✓ Existence of a statutory body for the management of the lake.	✓ Seasonal traffic model. ✓ Short-term visitors. ✓ Flooding of an underground aquifer. ✓ Existence of nitrates and consequences for eutrophication. ✓ Lack of road connections between the Parakarlian villages and Pelion / Ossa ✓ Abandonment of archaeological sites. ✓ Insufficient clearing of pathways from vegetation. ✓ Lack of observatories to monitor the birdlife. ✓ Low rate of repeat visitors.
Opportunities	**Threats**
✓ Positioning the area as a unique destination. ✓ Complete identity for the destination. ✓ Extending the traffic period. ✓ Quality management of public spaces and natural environment. ✓ Development of environmental education activities. ✓ Development of sustainable tourism. ✓ Reconstruction of Lake Karla. ✓ Motivation to utilize cultural elements. ✓ Holidays with a local character. ✓ Utilization of pathway for walking routes. ✓ Application development for the pathway. ✓ Completion of the plan of the area under study.	✓ Pandemic crisis with a blow to the economy. ✓ Reduction of citizens' disposable income. ✓ Slower growth in key target market economies. ✓ Postponements and delays in projects. ✓ Risk of loss of biodiversity, soil pollution and landscape degradation. ✓ Disturbance of ecological balance. ✓ The tendency of residents to migrate to large urban centres.

2.2 Map Suggested Routes, via Google Earth Pro Application

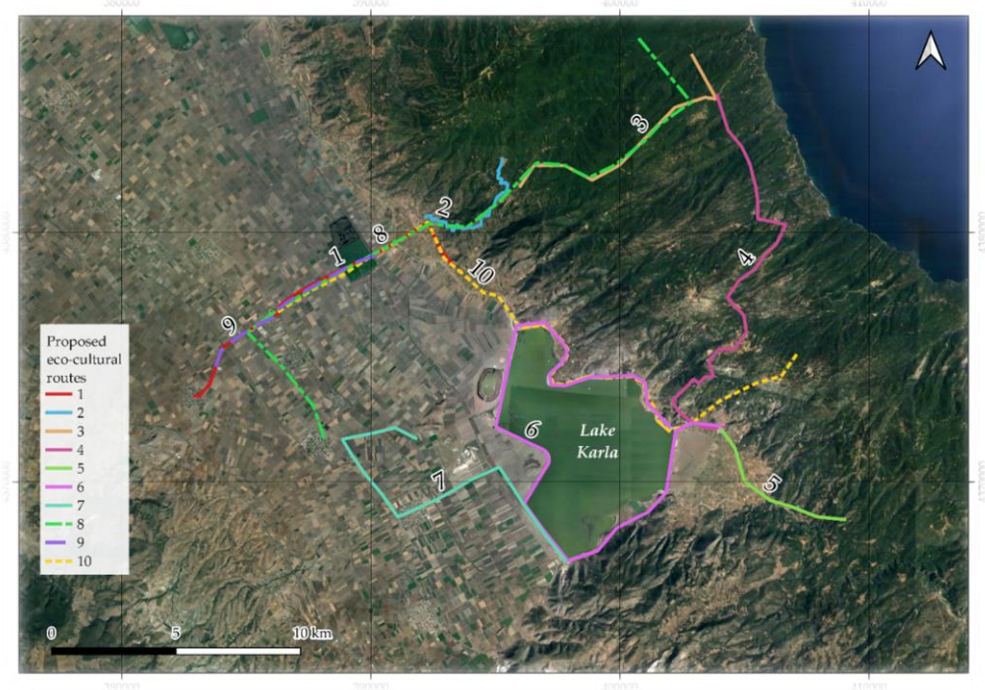
In the following thematic map, (Figure 2), we have mapped through the Google Earth Pro application, 10 suggested routes of ecological, historical and cultural interest, very useful for environmental education in the field.

Suggested Routes:

1. Farmer Monument Kileler – Achillio – Kalamaki - Paleoskala
2. Kalamaki – Elafos - Panagia Kampana
3. Elafos – Sklithro - Rakopotamos
4. Sklithro – Keramidi - Kanalia
5. Kanalia - Kerasia

6. Kanalia -Trail around lake Karla
7. Lake Karla - Stefanovikio - Panagia Armeniou - Panagia Petras Sotiriou
8. Armenio - Achillio-Kalamaki - Elafos-Sklithro - Dasos Polidendriou (former Royal estate)
9. Kileler greenhouses - Farmer Monument - VIOLAR-Achillio - Kalamaki reservoirs
10. Achillio – Kalamaki- Paleoskala - Lake Karla observatory - Ancient Oak Forest Park

Figure 2. Thematic map of the proposed enviromental and eco-cultural routes is presented



Baseline map source: Google Earth, Trakala *et al.* 2023).

The routes shown on the map (Figure 2), numbered 1-10, refer to various thematic fields, very useful for environmental education, while at the same time, they highlight the areas as environmental and cultural routes - paths, contributing to the achievement of sustainable development in the region. Some of the environmental education actions that can be implemented in the context of the planned environmental and cultural route are: activities for improving the knowledge concerning the biodiversity of terrestrial and aquatic ecosystems, activities for cultural heritage, presentations about the effects of agrochemicals on agricultural ecosystems, the importance of environmental protection, etc. Also, the mapping of soundscapes along the environmental and cultural path (trail) provides the framework for active listening, analysis and understanding of the environment. Overall, the proposed individual educational actions, as well as other related ones, aim to cultivate environmental sensitivity, environmental ethics and ecological consciousness.

3. Results

3.1. Reliability Analysis

The **reliability analysis** for the set of factors investigated, in terms of the main part of the analysis, as well as overall proved to be high (a=0.887). In fact, the greatest reliability was found in terms of personal experiences during the stay in the area, for the response to the information that existed about the area before the visit (Cronbach's Alpha a=0.887) (Table 2).

Table 2. Reliability Analysis

Reliability Statistics	
Cronbach's Alpha	**N of Items**
,880	32

3.2. Visitors' Profile

A total of 161 individuals participated in the study, of whom 84 were females (constituting 52.2% of the sample) and 77 were males (constituting 47.8% of the total sample) (Table 3).

Table 3. Demographic data

Male or Female					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	77	47,8	47,8	47,8
	Female	**84**	**52,2**	52,2	100,0
	Total	161	100,0	100,0	

In terms of age, most of participants were between 21-30 years old, making up 52.8% of the total. In addition, a proportion of participants belonged to the age group <20 years, representing 37.9% of the total sample, furthermore, only 7.5% of the sample responded from the age group above 40 years (Table 4).

Table 4. Demographic Data – Age

Age of participants					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<20	61	37,9	37,9	37,9
	21-30	**85**	**52,8**	52,8	90,7
	31-40	3	1,9	1,9	92,5
	41-50	12	7,5	7,5	100,0
	Total	161	100,0	100,0	

Regarding the level of education, most of participants have a university degree, accounting for approximately 62.1% of the total sample. A percentage of 20.5% represent participants with a High School education, while 17.4% representing participants with a Middle School education (Table 5).

Table 5. Demographic Data – Level of education.

Level of education.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Middle School	33	20,5	20,5	20,5
	High school	28	17,4	17,4	37,9
	University	**100**	**62,1**	62,1	100,0
	Total	161	100,0	100,0	

In the present research, concerning the purpose of visiting in the area, participants offered diverse responses, with a notable predominance of answers associated with the natural environment, accounting approximately 19.3% of the total proportion (Table 6).

Table 6. Reason for visiting the area.

Reason for visiting the area					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Recreation	9	5,6	5,6	5,6
	Education	22	13,7	13,7	19,3
	Excursion	25	15,5	15,5	34,8
	Sport	4	2,5	2,5	37,3
	Walk	2	1,2	1,2	38,5
	Natural environment	**31**	**19,3**	19,3	57,8
	Bird Watching	5	3,1	3,1	60,9
	Hiking the Trails	11	6,8	6,8	67,7
	Ecotourism	8	5,0	5,0	72,7
	Excursion to the Lake	17	10,6	10,6	83,2
	Visit to the Management Body	4	2,5	2,5	85,7
	Investigation / Area Familiarity	18	11,2	11,2	96,9
	Sustainable Area Development	5	3,1	3,1	100,0
	Total	161	100,0	100,0	

Regarding the environmental quality, 70% of the participants perceive it as high or very high, 27% consider it moderate, and only 1.2% indicate that it is not of interest (Table 7).

Table 7. Degree of environmental interest

Degree of environmental interest					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	2	1,2	1,2	1,2
	Moderate	44	27,3	27,3	28,6
	High	**101**	**62,7**	62,7	91,3
	Very high	14	8,7	8,7	100,0
	Total	161	100,0	100,0	

3.3. Quantitative Analysis

No missing measurements were observed in both the demographics and the baseline part of the quantitative analysis. The demographics analyzed consisted of gender, age, education level, the reason for visiting the area and degree of environmental interest.

The reliability analysis for the set of factors that are investigated, in terms of the main part of the analysis, as well as overall proved to be high (a=0,887). In fact, the greatest reliability was found in terms of personal experiences during the stay in the area, for the response to the information that existed about the area before the visit (a=0,887).

3.4. Correlation of Variables

The **x^2 criterion** is used to investigate if some parameters are influenced by demographic characteristics. Therefore, considering a confidence level α=5%, it is examined if the questions under study are correlated or independent of gender, age or level of education, which is judged according to the corresponding tables and the value of the (two-sided) control with p. Based on the tables below, it is proven that the questions under consideration are independent of gender, because the p>0.05 condition applies. Thus, the answers of men or women are not the same, so they express different opinions. More specifically:

- ✓ p=0.721>0.05 (The Management Body contributes significantly to the protection, conservation and management of nature and the landscape in the wider area).
- ✓ p=0.61 >0.05 (Establishing environmental education at all levels contributes to achieving sustainable development and environmental awareness).
- ✓ p=0.375>0.05 (The region of Karla - Mavrovounio offers opportunities for environmental education through a local network of excellently organized pathways).
- ✓ p=0.721>0.05 (Students can approach the environmental dimension (of sustainable development) of walking pathways).
- ✓ p=0.972>0.05 (Walking pathways can be seen as an early level of development of ecological sensitivity).

On the other hand, the question concerning the reconstruction of Lake Karla in terms of providing opportunities for network development, certified at the European level of pathways in the wider area, depends on gender, because the condition p<0.05 applies (p=0.044<0.05). Therefore, the responses of the survey participants are identical, so women or men express the same opinions. At the same time, it was shown that the questions under consideration are independent of age, because the p>0.05 condition applies. That is, the answers of the participants are not identical, even if they belong to the same age range, so they express different opinions. More specifically:

- ✓ p=0.71>0.05 (The Management Body contributes significantly to the protection, conservation and management of nature and the landscape in the wider area).
- ✓ p=0.117>0.05 (The reconstruction of Lake Karla offers opportunities to develop a network of pathways certified at the European level in the wider area).
- ✓ p=0.986>0.05 (Establishing environmental education at all levels contributes to achieving sustainable development and environmental awareness).
- ✓ p=0.472>0.05 (The region of Karla - Mavrovounio offers opportunities for environmental education through a local network of excellently organized pathways).
- ✓ p=0.976>0.05 (Students can approach the environmental dimension (of sustainable development) of walking pathways).
- ✓ p=0.593>0.05 (Walking pathways can be seen as an early level of development of ecological sensitivity).

In parallel, it was shown that the questions under consideration are independent of the level of education, because the p>0.05 condition applies. That is, the answers of the participants are not identical, even if they belong to the same level of education, so they express different opinions. More specifically:

- ✓ p=0.814>0.05 (The Management Body contributes significantly to the protection, conservation and management of nature and the landscape in the wider area).
- ✓ p=0.874>0.05 (The reconstruction of Lake Karla offers opportunities to develop a network of pathways certified at the European level in the wider area).
- ✓ p=0.672 >0.05 (Establishing environmental education at all levels contributes to achieving sustainable development and environmental awareness).
- ✓ p=0.82>0.05 (The region of Karla - Mavrovounio offers opportunities for environmental education through a local network of excellently organized pathways).
- ✓ p=0.59>0.05 (Students can approach the environmental dimension (of sustainable development) of walking pathways).
- ✓ p=0.384>0.05 (Walking pathways can be seen as an early level of development of ecological sensitivity).

3.5. Effect of Demographic / Individual Characteristics on Questionnaire Variable

ANOVA analysis is applied to check if there is a significant difference between the variables, at a significance level of 5%. The simple analysis of variance (ANOVA), regarding the first research question, proved that age, as

well as education, are the important factors for the variable "to preserve the valuable ecosystems of a protected area, limits and restrictions on their use are required" (F= 4.276, p = 0.006), (F= 3.8, p = 0.024), respectively. At the same time, regarding the second research question, age was an important factor in the variable "in order to achieve the sustainable development of the region, radical changes must be made in the framework of local governance" (F= 2.699, p = 0.048). In all the other variables of the first two research questions, as well as in all the variables of the third research question, no significant difference was found between the average values, because the p>0.05 condition applies. Therefore, age and education level are not characterized as important influencing factors.

3.6. T-Test Analysis

The T-test method is applied with the aim of establishing if there are statistically significant differences, with gender as the independent variable. The t-test, regarding the first research question, proved that gender is an important factor for the variables "the restoration of Lake Karla offers opportunities for the development of a local network of European-certified pathways in the wider area" (t= -0.469, df=159, p = 0.007), "the wider area of Lake Karla - Mavrovounio, has important ecological features and a rich cultural heritage" (t= -0.239, df=159, p = 0.002). Women have a higher degree of perception regarding the opportunities to develop a local network of European-certified pathways in the wider area, through the reconstruction of the lake (M.A.= 3.99, S.D. = 0.63), compared to men (M.A.= 3.94, S.D. = 0.8). Accordingly, women have a higher degree of perception about the ecological features and rich heritage of the wider area (M.A. = 3.99, S.D. = 0.611), compared to men (M.A. = 3.96, S.D. = 0.818). At the same time, regarding the second research question, it was shown that gender is an important factor for the variables "in order to achieve sustainable development, both the local government and the state must contribute substantially" (t= 0.947, df=159, p = 0.009), "in order to achieve sustainable development, radical changes must be made in the context of local governance" (t= -0.534, df=159, p = 0.01), "in order to achieve sustainable development, radical interventions must be made for the protection of the natural and man-made environment" (t= -0.429, df=159, p = 0.009).

Men have a higher level of perception regarding the achievement of sustainable development through local government and the state (M.A.= 4.23, S.D. = 0.759), compared to women (M.A.= 4.13, S.D. = 0.617). On the other hand, women possess a higher degree of understanding regarding the achievement of sustainable development, through radical changes in the local governance framework (M.A.= 3.88, S.D.= 0.648), compared to men (M.A. = 3.82, S.D. = 0.839), as well as through radical interventions to protect the natural and man-made environment (M.A.=3.85, S.D.=0.685), in relation to men (M.A.= 3.79, S.D.=0.879). In all the other variables of the two questions, as well as all the variables of the third research question, no significant difference was found between the mean values, because the p>0.05 condition applies. Therefore, gender is not characterized as an important influencing factor.

3.7. Summary Results of Statistical Analysis

The reliability of the research analysis was proved quite satisfactory, both overall and individually of all the factors under study, as the Cronbach's alpha coefficient approached unity. At the same time, regarding the correlations of the variables, all the questions under consideration are independent of the demographic characteristics, as the p>0.05 condition applies.

In the first research question, visitors answer that Lake Karla and the wider region of Mavrovouni constitute an attractive destination. Most respondents agree and fully agree, with a percentage of 80.1%. Regarding the importance of the ecological characteristics and the rich cultural heritage, the majority (>80%) responded that they agree or fully agree. Regarding the conservation and protection of ecosystems, visitors state that limits should be set on their use, with a percentage of 92%.

When asked if visitors believe that measures should be taken for the sustainable development of the area, many participants answered that they agree (55.3%) or strongly agree (32.3%). At the same time, it states that radical changes should be made in the framework of local governance, with particular emphasis on the seventeen (17) sustainability goals. 54% responded that they agree, while 17.4% responded that they fully agree. Environmental education plays a crucial role in achieving sustainability goals and shaping environmental consciousness. Most participants responded that they agree, with a percentage of 46.6%, while a high percentage of 44.1% fully agrees.

In the third research question, regarding whether the protected area of Lake Karla is a suitable space for environmental education and interpretation activities, most participants responded that they agree, with a percentage of 55.3%, while 25.5% stated that they fully agree. Additionally, regarding the ability of students to

approach the environmental dimension (sustainable development) of walking trails, the majority of participants responded that they agree, with a percentage of approximately 57.8%, and another large percentage of approximately 26.1% fully agrees. Conversely, a small percentage (2.5%) answered that they disagree. Similarly, regarding the design of environmental and cultural routes for promoting sustainable development through citizen education, many participants responded that they agree, with a percentage of approximately 54.7%, and concurrently, a percentage of 21.7% expressed full agreement. Conversely, a relatively small percentage (3.1%) answered that they disagree. Additionally, regarding the characterization of walking trails as an early stage of developing ecological sensitivity, the majority of participants responded that they agree, with a percentage of approximately 56.5%. Furthermore, a significant percentage of 23.6% fully agrees. Regarding the contribution of walking trails to conducting excursions through areas of significant aesthetic, environmental, and cultural value, most of participants responded that they agree (54.7%), with an additional 22.4% expressing full agreement.

3.8. Statistical Comparison

An exception was the question concerning the reconstruction of Lake Karla in terms of providing opportunities for the development of a network of pathways certified at the European level in the wider area, which depends on gender because the condition $p<0.05$ ($p=0.044<0.05$) applies. Through the ANOVA method, it was shown that age and level of education are not characterized as significant influencing factors in the variables of the three research questions, because the $p>0.05$ condition applies, and no significant difference was found between the mean values. An exception was the variable "limits and restrictions on their use are required to preserve the valuable ecosystems of a protected area", respectively, regarding the first research question, where important influencing factors are judged. Accordingly, about the second research question, age was an important factor in the variable "in order to achieve the sustainable development of the region, radical changes must be made in the operating framework of local governance". At the same time, with the application of the T-test method, it was shown that gender is an important factor for the variables "the restoration of Lake Karla offers opportunities for the development of a local network of pathways certified at the European level in the wider area" ($p=0,007$) and the question "the wider area of the lake Karla – Mavrovounio, has important ecological characteristics and a rich cultural heritage" ($p=0,002$), regarding the first research question.

Accordingly, with regard to the second research question, it was shown that gender is an important factor for the variables "in order to achieve sustainable development both the local government and the state must contribute substantially", "in order to achieve sustainable development it must radical changes should be made in the framework of local governance", "in order to achieve sustainable development, radical interventions must be made to protect the natural and man-made environment". In all the other variables of the two questions, as well as all the variables of the third research question, no significant difference was found between the mean values, because the $p>0.05$ condition applies, therefore gender is not characterized as an important influencing factor. In addition, the research has some limitations, such as the sample of participants, which is considered satisfactory, but not very large. Accordingly, another limitation that exists in the study is that the questions concerning the second research question are more compared to the rest, so there is no uniformity in the number of questions, among the research questions. Therefore, a future study may include a larger sample of participants to be more reliable. In addition, future research may include inquiries about pathways from different regions of the country or even abroad, to observe the differences or similarities between the research questions under consideration.

4. Discussion

From the analysis of this study, it appears that the restoration of Lake Karla can support various types of ecosystem services and benefits, providing opportunities for sustainable development in the wider area, while restoring the degraded rural environment in the Region of Thessaly. In addition to the restoration of a wetland ecosystem, which will simultaneously restore biodiversity and abiotic parameters, it will also contribute to sustainable development, giving possibilities for alternative forms, which will be linked to the highlighting of the natural and cultural wealth of the area. At the same time, the perspective of a stable business opportunity including agriculture and tourism/services related to the lake environment. The restoration of the lake may also contribute to the return from the cities to their place, a large part of the population that has left the rural areas.

The restoration of the lake not only has ecological benefits but also provides opportunities for sustainable tourism. It is an ecosystem with rich biodiversity, attracting many different species of birdlife (Zalidis *et al.* 1999). At the same time, the terrestrial forest and agro-forest ecosystems offer shelter and food to many species, creating a healthy ecosystem, ecologically balanced. International recognition of the importance of Lake Karla is

evident through its designation as a Natura 2000 site (GR1430007). The wealth of biodiversity of species and habitats are a major attraction for tourists (Dodouras, Lyratzaki and Papayannis 2014).

Lake Karla and its surrounding areas offer not only ecological benefits but also great cultural services. The environment is perfect for recreational activities and raising environmental awareness. The existing infrastructure includes info-kiosks, observation posts for bird watching, a tourist information center, and a natural history and folklore museum. Visitors can engage in various activities, such as tree planting along the lake's perimeter and embankments, visiting environmental education sites, as well as enjoying horse riding, cycling, and hiking routes. These activities can be further complemented in the future with water sports facilities and accommodation services. Greek studies conducted in the touristic area of Rethymno, Crete, investigated visitors' perceptions of a significant nesting ground for sea turtles. The study indicated a positive attitude towards the implementation of two policy instruments: an entrance fee to the beach and a tax on local accommodation costs, which could secure funding for environmental management improvements in the area (Jones *et al*. 2011; Panagopoulos and Dimitriou 2020). have shown support for the development of such activities in Lake Karla. Another study concerning the Prefecture of Pella in Northern Greece surveyed visitors of thermal springs and found that the development of an educational center and ecotourism leisure activities, including hiking and water sports at Lake Vegoritida, were highly appealing to almost half of the respondents (Apostolidis 2017). These policy instruments could also be applicable to Lake Karla's case. Understanding the opinions and preferences of visitors is one of the fundamental requirements when setting up an appropriate tourism management plan in a few protected areas (Banaš and Zahradník 2012). In a study on the management of a protected area, she investigated the views and perceptions of visitors to a sensitive area of Crete on the nesting of the *Caretta-Caretta* sea turtle. The study showed a positive attitude among visitors about protecting and securing funding for such environmentally sensitive areas, with the acceptance of a beach entry ticket to enhance environmental stewardship (Jones *et al.* 2011). The above studies show the positive response of visitors to the effective protection of the environment and the taking of measures for the sustainable development of the areas. From this research where it was carried out, some current questions were studied, which must be considered by the competent management bodies of the area under study, with the aim of improving the provision of quality services and infrastructure to visitors.

Conclusions

The design of new sustainable infrastructures and activities will improve the satisfaction of visitors and will simultaneously contribute to the protection of the Park and to the sustainable development of the wider region (thematic routes, guided tours, cave visits, camping, summer and winter schools etc.

The analysis of the questionnaires showed that the newly reconstructed Karla Lake can support several types of benefits (some quantifiable in monetary terms and some not), offering multiple recreational and environmental education opportunities to visitors, while ensuring sustainable development and ecosystem services to society and in the country (Lukas *et al.* 2008).

The very positive situation above will be the precondition ensuring the maintenance of the agricultural population in the region. The perspective of a stable business opportunity including agriculture and tourism/services related to the lake environment can even motivate a population return to the countryside from the cities that have suffered more during the last years from the economic crisis and austerity.

The ecological advantages, which include rich biodiversity in and around Karla, have the potential to create opportunities for sustainable tourism. The lake is an ideal habitat for many species of migratory birds. It offers safe shelter, rich food and suitable breeding ground. The international importance of Lake Karlas is further documented by its designation as a Natura 2000 site (GR1430007), which is mainly attributed to the abundance of birdlife present in the area (Dodouras *et al.* 2014). People will obtain several kinds of benefits through ecosystem services from the restored Lake Karla.

Karla Lake and the surrounding lakeside and mountain areas, apart from the rich biodiversity, have additional important values, while offering the possibility of a variety of cultural services, making the area an attractive destination for leisure activities and environmental awareness. Today there is already a basic infrastructure which includes information kiosks, birdwatching sites, a tourist information center, a natural history museum and other infrastructure for easy and safe visitor access [Management authority]. All of the above should be enriched, including new actions (horse riding, cycling, hiking, guided tours, environmental information, environmental interpretation and awareness) using new technologies and audio-visual media, with the possibility of equal access and information for all without exception, including of course of people with problems (movement, vision, hearing, etc.).

In general, the results of this research show that the utilization of the natural and cultural heritage of the Karla area, *i.e.* biodiversity, history and cultural and cultural values can contribute to the emergence of the area as an attractive destination, for the benefit of visitors, of local society and the sustainable development of the area (Panagopoylos and Dimitriaou 2020). A necessary condition must be the preparation of a special study for the carrying capacity of the area, to avoid phenomena of degradation of the environment and the destination. alongside information and awareness programs for visitors (švajda *et al.* 2018; Trakala, Tsiroukis, Martinis 2023).

Acknowledgments

We would like to thank the students and citizens who willingly answered the questionnaires for the completion of this research.

Credit Authorship Contribution Statement

Georgia Trakala: Conceptualization, Investigation, Methodology, Project administration, Software, Formal analysis, Writing - original draft, Supervision, Data curation, Validation, Writing – review and editing, Visualization, Funding acquisition.
Aristotelis Martinis: Conceptualization, Methodology, Project administration, Data curation, Validation, Writing – review and editing, Visualization, Funding acquisition.
Georgios Karris: Validation, Writing – review and editing, Visualization, Funding acquisition.
Charicleia Minotou: Validation, Writing – review and editing, Visualization, Funding acquisition.
Achilleas Tsiroukis: Data curation, Validation, Writing – review and editing, Visualization, Funding acquisition.
All authors have read and agreed to the published version of the manuscript.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] Apostolidis, G. 2017. Investigating the impact of visitors' perceptions and attitudes towards Sustainable Tourism Management in Greece: The case of Pella prefecture. In Proceedings of the 8th International Conference on Information and Communication Technologies in Agriculture, Food and Environment (HAICTA 2017), Chania, Greece, 21–24 September 2017.

[2] Banaš, M., and Zahradník. D. 2012. Monitoring of the visitors' opinions in protected mountain areas in the Czech Republic (KRNAP, NP and PLA Šumava, PLA Jeseníky, PLA Beskydy). Public Recreation and Landscape Protection – With Man Hand in Hand, Conference Proceeding, Mendel University in Brno, 7–16.

[3] Brohman, J. 1996. New directions in tourism for third world development. *Annals of Tourism Research* 23(1): 48-70. http://dx.doi.org/10.1016/0160-7383(95)00043-7

[4] Catsadorakis, G. 2019. Establishment and Growth of a New Dalmatian Pelican *Pelecanus crispus* Colony in Central Greece. *Acta Ornithologica* 54(1): 125-132.

[5] Dodouras, S., I., Lyratzaki and T., Papayannis 2014. Lake Karla Walking Guide; Mediterranean Institute for Nature and Anthropos (med-INA): Athens, Greece, 2014; 228p. https://med-ina.org/wp-content/uploads/2019/11/ENG-Karla-web-extra-low.pdf

[6] Evans, J. and P., Jones 2011. The walking interview: Methodology, mobility and place. *Applied Geography* 31 (2): 849-858.

[7] Gardner, G. and P. C., Stern 2002. *Environmental problems and human behavior*, 2nd edition, Boston: Allyn and Bacon.

[8] Genc, M. and M., Akilli 2016. Modelling the relationships between sub-dimensions of environmental literacy. *Applied Environmental Education and Communication* 15(1): 58-74. DOI:https://doi.org/10.1080/1533015X.2016.1141724

[9] Jones, N., K., Panagiotidou, I., Spilanis, K., Evangelinos and P., Dimitrakopoulos 2011. Visitors' perceptions on the management of an important nesting site for Loggerhead Sea turtle (Caretta caretta L.): The case of Rethymno coastal area in Greece. *Ocean Coast. Manag.* 54: 577–584. DOI:https://doi.org/10.1016/j.ocecoaman.2011.05.001

[10] Joseph, A. and C., Zimring 2007. Where active older adults walk: Understanding the factors related to path choice for walking among active retirement community residents. *Environment and Behavior* 39 (1): 75-105.

[11] Loukas, A., L., Vasiliades and J., Tzabiras 2008. Climate change effects on drought severity. *Adv. Geosci.* 17: 23–29. DOI: https://doi.org/10.5194/nhess-4-719-2004

[12] Manning, R. 2001. Programs that work. Visitor experience and resource protection: A framework for managing the carrying capacity of national parks. *Journal of Park and Recreation Administration* 19(1): 93–108. DOI: http://doi.org/10.1093/gmo/9781561592630.article.17662

[13] Martinis, A. 2020. Assessing the Environmental Policy of a Natural Protected Area Using Visitor Opinions. Case Study of Parnassos National Park, Greece. *Journal of Environmental Management and Tourism* 3(43): 501-512. DOI:10.14505/jemt.v11.3(43).01

[14] Martinis, A., K., Kabassi, C., Dimitriadou and G., Karris 2017. Pupils' environmental awareness of natural protected areas: The case of Zakynthos Island. *Applied Environmental Education and Communication*. DOI:https://doi.org/10.1080/1533015X.2017. 1366883

[15] Martinis, A., S., Mazi, and Ch., Minotou 2015. Sustainable Development and Environmental Education in Natura 2000 areas. A Vision of the Mountain of Pantokratoras for Corfu and the Local Community. 6th International Conference on Information, Intelligence, Systems and Applications (IISA) 2015: 1-6 https://www.researchgate.net/publication/304413203

[16] Minotou, Ch. 2012. "Protected Areas and People with Disabilities – Special Environmental Education", Ph.D. dissertation, University of Ioannina, Greece, 2012. (in Greek)

[17] Minotou, Ch., I., Pantis, S., Paraskevopoulos, and A., Mniestris 2007. "Acoustic ecology and education on the protection and conservation of ecosystems as tools of environmental education and familiarization with ecosystems and soundscapes for the disabled", 5th Greek Conference idactics of the Natural Sciences and New Technologies in Education, Ioannina, Greece, 2007.

[18] Moyle, B.D., *et al.* 2017. Assessing preferences of potential visitors for nature-based experiences in protected areas. *Tourism Management* 62: 29–41. DOI: https//:doi.org/10.1016/j.tourman.2017.03.010

[19] Newman, T. P. and R., Fernandes 2016. A re-assessment of factors associated with environmental concern and behavior using the 2010 General Social Survey. *Environmental Education Research* 22(2): 153-175. DOI: https://doi.org/10.1080/13504622.2014.999227

[20] Panagopoulos, Y., and E., Dimitriou 2020. A Large-Scale Nature-Based Solution in Agriculture for Sustainable Water Management: The Lake Karla Case. *Sustainability* 2020, 12: 6761; DOI:https//:doi.org/10.1061/(ASCE)WR.1943-5452.0000428

[21] Petrosillo, I., G. Zurlini, M.E. Corlianò, N. Zaccarelli, and M. Dadamo 2007. Tourist perception of recreational environment and management in a marine protected area. *Landscape and Urban Planning* 79: 29–37. DOI:https://doi.org/10.1016/j.landurbplan.2006.02.017

[22] Poudel, S. and G. P., Nyaupane 2016. Exploring the Roles of Tour Guides in Trekking Tourism. Tourism I and Research Association: *Advancing Tourism Research Globally*, 47.

[23] Razzaq, A. S. A., M. Y., Hadi, M. Z., Mustaa, A., Hamzah, Z., Khalifah and N.H., Mohamad 2011. Local unity participation in homestay program development in Malaysia. *Journal of Modern Accounting and Auditing* 7(12): 1418-1429.

[24] Richards, G. 1996. *Cultural Tourism in Europe*. Wallingford, CAB International.

[25] Schmitz, M.F., I., De Aranzabal, and F.D., Pineda 2007. Spatial analysis of visitor preferences in the outdoor recreational niche of Mediterranean cultural landscapes. *Environmental Conservation* 34: 300–312. DOI:https://doi:org/10.1017/S037689290700424

[26] Shamuganathan, S. and M., Karpudewan 2015. Modeling Environmental Literacy of Malaysian Pre-ersity Students. *International Journal of Environmental and Science Education* 10(5): 757-771. DOI:https://doi:org/10.12973/ijese.2015.264a

[27] Švajda, J., Masny, M., Korony, S., Mezei, A., Machar, I., Taczanowska, K. 2018. Visitor profiling using characteristics of socio-demographic and spatial behavior as tools to support the management of protected mountain areas. *Geografie*, 123, 4, 461–478.

[28] Szell, Andrea and Lucius F. Hallett. 2013. Attitudes and Perceptions of Local Residents and Tourists toward the Protected Area of Retezat National Park, Romania. *International journal of humanities and social science*, 3: 18-34.

[29] Teksoz, T. G., J. W., Boone, O. Y., Tuzun and C., Oztekin 2014. An evaluation of the environmental literacy of preservice teachers in Turkey through Rasch analysis. *Environmental Education Research* 20(2): 202-227. DOI: https://doi:org/10.1515/jtes-2015-000

[30] Trakala, G. 2023. The promotion of the natural/cultural heritage and the environmental education and information of citizens, challenge for the protection and sustainable development. The case of Karla's Lake – Mavrovouni mountain. Master Thesis. Ionian University, School of Enviroment, Enviroment Department.

[31] Trakala, G., A., Tsiroukis, and A. Martinis 2023. Eco Cultural Development of a Restored Lake Environment: The Case Study of Lake Karla (Thessaly, Greece). *Land* 2023, 12: 1227. DOI:https://doi.org/10.3390/land12061227

[32] Tsonis, L.J. 2008. *Ecotourism Development: Government, Industry and Community Linkages.* Proceedings from the Asia Pacific Tourism Association (APTA) 2008 Conference, 9-12 July 2008, Bangkok, Thailand.

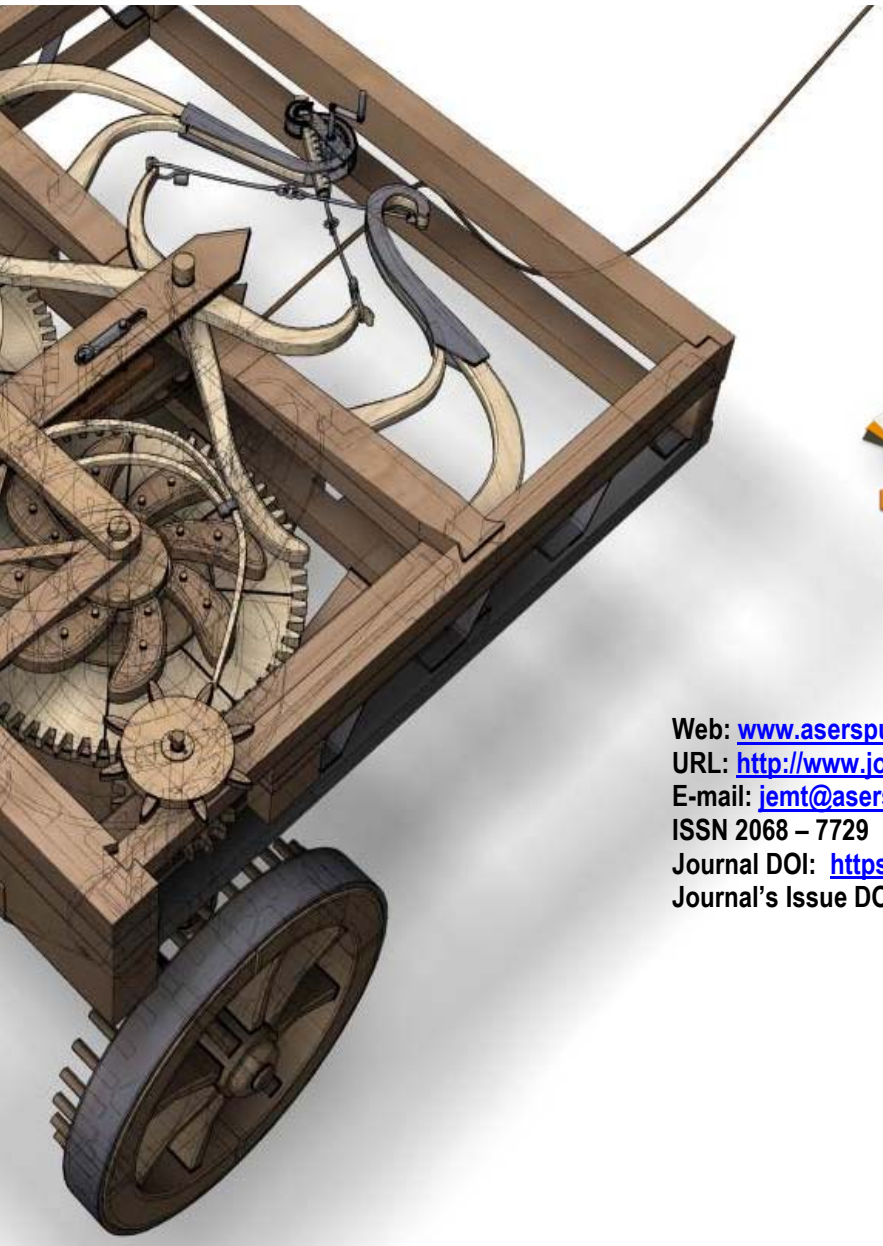
[33] Westerkamp, H. 2011. Exploring Balance and Focus in Acoustic Ecology. Soundscape. *The Journal of Acoustic Ecology*, 11(I): 6-13.

[34] Zalidis, G.C., S., Katsavouni, G., Bilas and S., Chatzigiannakis, 1999. Suggested Interventions to Restore Sustainably the Karla Wetland; Greek Biotope/Wetland Centre: Thessaloniki, Greece, 1999. (In Greek)

[35] Zhong, L., J., Deng, Z., Song, and P., Ding 2011. Research on environmental impacts of tourism in China: Progress and prospect. *Journal of Environmental Management* 92: 2972-2983. DOI:http://doi.org/10.1016/j.jenvman.2011.07.011

[36] Management Authority of Lake Karla. Available online: http://www.fdkarlas.gr/Default.aspx

ASERS



ASERS Publishing

Web: www.aserspublishing.eu
URL: http://www.journals.aserspublishing.eu/jemt
E-mail: jemt@aserspublishing.eu
ISSN 2068 – 7729
Journal DOI: https://doi.org/10.14505/jemt
Journal's Issue DOI: https://doi.org/10.14505/jemt.v14.5(69).00