

Review

The Status of Geoethical Thinking in the Educational System of Greece: An Overview

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Abstract: In recent years, the concern about geoethics in Greece has begun to grow. This review aims to present the current geoethical thinking in Greece's educational system through a thorough research of all educational levels' curricula and the actions developed on this topic in the Greek geoscientific community. In the Greek educational reality, geoeducation is not widespread, and geoethics is used in limited school curricula. The research highlighted a significant lack of initiatives to promote geoethical thinking and the values related to geological heritage and the need to protect it.

Keywords: geoenvironmental education; geoethics; awareness; Greece



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1. Introduction

In recent years, the geological research community has shifted towards interdisciplinary and socially relevant topics, one of which is the study and inventory of geological heritage. The study of geological heritage represents an emerging field of geosciences that involves, among other things, the investigation of the scientific, educational, aesthetic, and cultural values of the Earth's natural and cultural features, including geological and geomorphological features, fossils, minerals, landscapes, and other natural resources. The management of geological heritage is guided by ethical considerations, such as the respect for the rights of indigenous people, the protection of biodiversity, and the promotion of sustainable development [1].

Geoethics, on the other hand, is a relatively new and interdisciplinary field that addresses the ethical implications of the use and management of the Earth's resources and environment. It encompasses ethical considerations related to geosciences and the environment, such as the protection of geological heritage, the management of natural resources, and the mitigation of natural hazards [2]. Furthermore, it includes the ethical implications of the use of geotechnology, such as the use of geothermal energy and the handling of geological waste. It aims to ensure that the needs and well-being of present and future generations are considered when making decisions regarding the use and management of natural resources, including geoheritage [3].

Geoethics is often considered to be a subset of environmental ethics, as it deals specifically with the ethical issues related to the Earth sciences and their applications. However, it is also considered to be a distinct field of study, with its own unique focus and set of concerns. Environmental ethics is a branch of philosophy that considers the moral and ethical relationship between human beings and the natural environment. It examines questions such as how human activities impact the environment and what moral obligations we have to protect and preserve the natural world [4]. Geoethics, on the other hand, is an interdisciplinary field that focuses on the ethical and societal implications of the Earth sciences and their applications. It encompasses the study of ethical and social issues related to the use and management of natural resources, the impacts of human activities on the Earth's system, the conservation of biodiversity, and the mitigation of natural hazards.

Geoethics also deals with the ethical responsibilities of geoscientists and other Earth science professionals [5].

Two documents provide guidelines for ethical decision-making in the field of geo-sciences but are developed by different organizations and adopted at different conferences: The International Declaration on Geoethics is a document that was adopted by the International Union of Geological Sciences (IUGS) at the 35th International Geological Congress in Florence, Italy, in 2004. The International Declaration on Geoethics is a set of guidelines that provide ethical principles and values for geoscientists and other stakeholders involved in the management and use of the Earth's resources [6].

The Cape Town Statement on Geoethics, also known as the Cape Town Declaration, is a document that was adopted by the International Association for Promoting Geoethics (IAPG) at the 2nd International Conference on Geoethics in Cape Town, South Africa, in 2013. The statement lays out the principles and values of geoethics and provides guidance for the ethical practice of geosciences [7].

Geoethical thinking refers to the process of considering and applying ethical principles and values to the use, management, and conservation of the Earth's resources and environment [8]. The goal of geoethical thinking is to ensure that decisions regarding the use and management of the Earth's resources are guided by ethical considerations, considering the needs and well-being of present and future generations, as well as the impacts on non-human species and ecosystems. It also involves the consideration of cultural, social, and economic aspects. It is interdisciplinary, involving input from various fields, such as geology, environmental science, philosophy, and sociology, among others [9].

The protection and preservation of geoheritage is a key aspect of geoethics. This includes not only the preservation of geological and geomorphological features but also the protection of fossils and minerals, the conservation of landscapes and the management of other natural resources [10]. Education and awareness-raising are also important components of geoethics in relation to geoheritage. This includes not only educating the public about the scientific and cultural value of geoheritage but also raising awareness of the importance of its protection and preservation [11].

1.1. The Necessity of Geoethics and Geoethical Education

Geoethics is an important field that addresses the ethical considerations surrounding the use and management of the Earth's resources and environment. It encompasses research and reflection on the values that should guide appropriate behavior and practice at the intersections of human activities and the geosphere [6]. It provides a framework for making ethical decisions related to the use and management of the Earth's resources and environment, promotes sustainability in the use and management of natural resources, protects and preserves geological heritage, promotes transparency and accountability in the use and management of natural resources and the environment, and raises awareness of the responsibility of humans as a powerful geological force [12].

The field of geoethics has also turned to education in recent years, with a focus on reflecting on the way humans relate to the geosphere and how geologists work during their academic and professional activities. Geoethical education, which incorporates ethical considerations related to the Earth's resources and environment into education, is an important aspect of promoting geoethical thinking in society. This can include integrating ethical considerations into the curriculum of relevant educational programs, such as geology, environmental science, and earth science, and promoting geoethical education through outreach programs, educational resources, and community engagement initiatives [13]. Informal or formal "geoeducation" is a key area of interest as part of education for sustainable development and the promotion of geoheritage values, in order to achieve the implementation of geoconservation objectives and to ensure effective management of geoheritage [14].

1.2. Objectives of the Review

Greece is in the northeastern part of the Mediterranean basin (Figure 1), which is a tectonically active region characterized by complex geodynamic processes. The geodynamic setting of Greece is shaped by the interaction of several major tectonic plates, including the African, Eurasian, and Aegean plates, which have resulted in the formation of a diverse range of geological features, including islands, mountains, and volcanic activity [15–18]. This setting makes Greece a unique and interesting place to study geology and geodynamic processes and is home to a rich and diverse geoheritage, which includes a wide range of geological and geomorphological features, fossils, minerals, landscapes, and other natural resources [1].

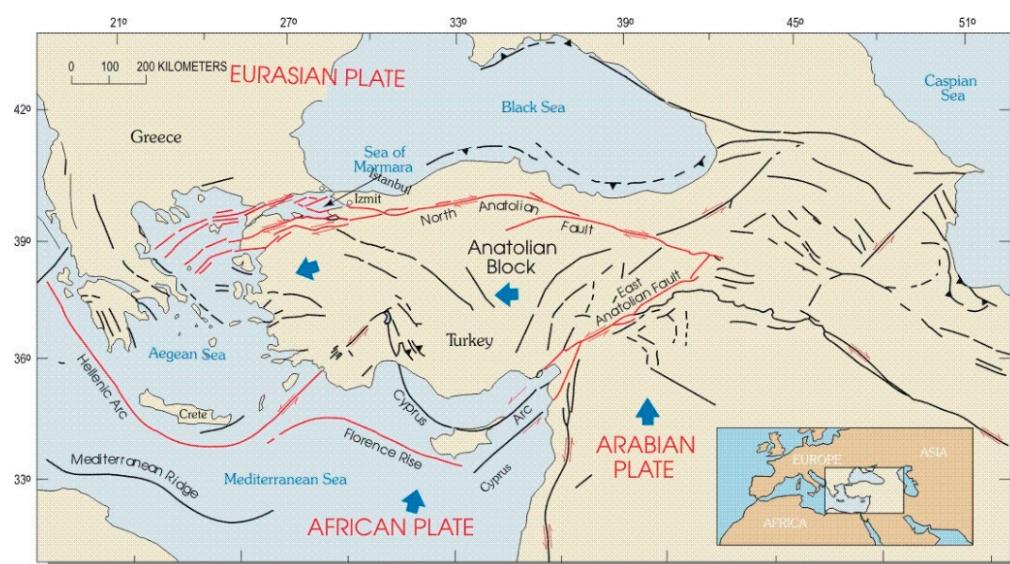


Figure 1. The tectonic map of Eastern Mediterranean Basin, including the North Anatolian fault, East Anatolian fault, and Hellenic and Florence trenches (by U.S. Geological Survey, National Earthquake Information Center—U.S. Geological Survey, National Earthquake Information Center, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=33751528> (accessed on 5 December 2022)).

In Greece, the advancement of geoethical thinking has been gaining increasing attention in recent years. However, geoethical thinking is still not fully integrated into the educational system and curricula, but there are some efforts to incorporate it in the universities' curricula and research programs [19]. The focus of this review will be to examine the extent to which geoethical considerations have been integrated into higher education curricula and research activities. The main research question that we will seek to answer is to what degree has geoethical thinking been incorporated into educational programs and what studies have been conducted in this field.

2. Methodology

We have employed a multifaceted approach to evaluate the state of geoethical thinking in the educational system of Greece. This approach includes:

- A review of the existing literature on the topic of geoethics in the educational system of Greece, including academic journals, reports, and other publications, to gain an understanding of what has been studied and written on the topic and to identify areas where further research is needed.
- An analysis of the curriculum of relevant educational programs in Greece to determine the extent to which geoethical considerations are incorporated into the curriculum, providing insight into the current state of the field, and identifying areas where further attention is needed.

- Examination of case studies of specific educational programs or initiatives that have incorporated geoethical considerations in Greece, which provides detailed information on how geoethical thinking has been applied in practice and highlights best practices and lessons learned.

To measure the level of geoethical research in Greece, we have used a variety of metrics, including:

- Tracking the number of research papers and publications on the topic in academic journals, conference proceedings, and books.
- Monitoring the amount of funding allocated to geoethical research in Greece.
- Counting the number of research centers and groups in Greece that focus on geoethical issues.
- Tracking the number of students who complete their Ph.D. or master's degrees in the field of geoethics.
- The number of workshops and conferences organized in Greece on the topic of geoethics.

It is important to note that the use of a combination of these methods is essential to obtain a comprehensive understanding of the status of geoethical thinking in the educational system of Greece.

3. Results

3.1. The Concept of Geoethics in the Greek Reality

When searching for the word “geoethics” in Greek on the internet, the results are scarce and refer mostly to general concepts, typically without any references. These results focus mainly on the first two decades of the 21st century, especially after 2012. Greece is a national section of the IAPG network, which, as is known, has a mission “to coordinate efforts in promoting Geoethics and enlarging the IAPG network in the country, by encouraging the participation of geoscientists in their activities on the basis of equal opportunities and favoring the exchange of information among its members through newsletters, publications or other suitable tools such as a website and social networks” [20]. Therefore, the Cape Town Statement on Geoethics is available in Greek. Furthermore, The National and Kapodistrian University of Athens-Applied Philosophy Research Laboratory (NKUA-APRL), which was established with a purpose to facilitate research in the area of applied philosophy and to conduct empirical and/or theoretical research in all areas of philosophy, signed with the International Association for Promoting Geoethics (IAPG), Memorandum of Understanding (MoU) (2019), with the aim of cooperation in developing empirical and/or theoretical research in the areas of geoethics and bioethics and to coordinate activities aimed at promoting the discussion on the ethical, social, and cultural implications of geosciences and biosciences [21,22]. However, the concept of geoethics has not yet gained widespread acceptance within the Greek educational system or among the scientific community in Greece [10].

3.2. Geoethics in the Greek Educational System

It is important to note that the inclusion of geoethics in curricula is a relatively new field, and there is limited information available about it, especially for specific countries such as Greece. However, in order to investigate the inclusion of geoethics in Greek curricula, we contacted the Earth and Environmental Science departments and the Geography departments of universities or colleges to inquire about the inclusion of geoethics in their curricula. We searched for academic journals that focus on geoethics and education, such as the *Journal of Environmental Education*, the *Journal of Geography in Higher Education*, and the *International Journal of Geoethics*, to find articles about the inclusion of geoethics in curricula. We searched for online resources, including websites of professional societies, such as the Greek Geological Society, that provide information and resources on geoethics in education. We searched for government reports on education and the environment, which may provide information on the inclusion of geoethics in curricula. Finally, we reached out

to experts in the field of geoethics and education, such as professors or researchers, who may be able to provide information on the inclusion of geoethics in curricula.

The conducted survey revealed that, unfortunately, there are no specific programs or courses on geoethics offered in Greek higher education institutions. However, Greek universities and research centers may have professors and researchers who specialize in environmental ethics and sustainable development, who may also be interested in geoethics. It is worth noting that, while it is not a common subject, there are some universities in Greece that have a Department of Environmental Studies, Environmental Engineering, and other related fields, where environmental ethics and sustainable development are being taught, and these departments could also be a good starting point for students who are interested in pursuing studies in geoethics.

It is also important to note that, as an interdisciplinary field, it is often taught through collaboration between different departments, such as geology, environmental science, ethics, and philosophy. Therefore, while it may not be a common subject in Greek higher education, there are opportunities for students interested in geoethics to explore the field through various disciplines and through international events. Moreover, it should be noted that, until now, in the Greek higher education community, there does not seem to be a particular reflection, equivalent to the international one, as to whether geoethics should be established in the field of environmental ethics or as something clearly different based on the foundations of the professional ethics of applied geosciences, although it seems that the most promising interface of geoethics with adjacent fields is likely the relation to the field of environmental ethics [23].

As far as the primary or secondary education in Greece is concerned, as in higher education, there are no specific curriculum or programs on geoethics offered. However, environmental education and sustainable development are often included in the primary and secondary education curriculum in Greece, and these subjects may include some aspects of geoethics. It is important to note that, while it is not a common subject, environmental education and sustainable development constitute a good starting point for students to be exposed to the ethics and societal implications of the Earth sciences and their applications.

However, it should be claimed that the education of students in geosciences is incomplete in the curricula of the geology–geography subject of the lower secondary education (Gymnasium) and the concept of the geoenvironment, as a witness of geological phenomena, is absent and rarely consists of a subject matter of the educational programs of environmental education. As a result, students are unable to perceive values of the geological heritage. In contrast to Greek geosciences curricula programs, in other countries, the didactics of geosciences studies aims to students' knowledge of the principles of geoethics [24].

The European Geosciences Union (EGU) has developed a geoethics initiative that aims to promote the integration of geoethics in geoscience education and research across Europe, which includes didactics of geosciences. Additionally, some universities in European countries, such as the UK, have started to offer courses or modules on geoethics, and some professional societies, such as the American Geological Institute, have also developed resources and guidelines for incorporating geoethics into education and training programs.

From the results of recent research concerning the new curriculum on environment and education for sustainable development, it is arguable whether the concepts will lead to the development of values in the field of geoethics since the basic concepts are mainly biodiversity, protection of nature and land, the environment in general, ethical behavior, and, secondarily, geological and geomorphological knowledge, geodiversity, and geoheritage [19].

3.3. Overview of the Current Geoethical Research in Greece

Geoethical research aims to understand and address the ethical dimensions of environmental and Earth science issues. Current geoethical research encompasses a wide range of topics, including sustainable development, climate change, environmental justice (meaning

the research on the distribution of environmental burdens and benefits among different communities and the ethical implications of these disparities), biodiversity conservation, resource management, and research on the ethical dimensions of the relationship between science and society, such as the responsibilities of scientists and policymakers and the communication of scientific information to the public.

Overall, geoethical research is an interdisciplinary field that uses philosophical, socio-legal, and other perspectives to understand and address ethical issues related to the Earth and the environment.

In terms of geoethical research in Greece, it is a relatively new field with limited information available. Our survey, however, revealed that the amount of geoethical research being conducted in Greece today is still small, but growing.

The scientific and research activity of the last few years at the level of postgraduate and doctoral theses reflects the current research being conducted in the field of geoethics in Greece and the interest in promoting geoethical thinking primarily in the Greek scientific community (Table 1). A common theme of these research contributions is the recognition of the importance of geoethics concerning the relationship of the earth sciences to society and the Earth.

Table 1. Master's and Doctoral Theses on Geoethics (unpublished).

Master and Doctoral Theses	Title	Affiliation	Scientific Domain (According to Affiliation)
Tsikripis, N.	Geoethics and Environmental Management	Department of Geology and Geoenvironment, UoA	environment management; natural disasters
Georgousis, E.	Man and Geoenvironment: An Interdisciplinary Approach to Environmental Ethics and Geoethics	Department of Geology and Geoenvironment, UoA	geoethics; environmental ethics; traditional indigenous environmental knowledge
Mosios, S.	Geoenvironmental education and its geoethical dimension at national, European and international level	Department of Geology and Geoenvironment, UoA	geoethics; geoeducation
Zafeiropoulos, G.	The importance of geo-environmental education in understanding geological heritage and geo-ethical awareness. The case of the Dodecanese barren islands	Department of Geology and Geoenvironment, UoA	geoethics; geoeducation; geocultural heritage
Koupatsiaris, A.	Geoethics as a factor of environment-friendly behaviour through a geo-environmental education programme for primary and secondary schools	Department of Geology and Geoenvironment, UoA	geoethics; geoeducation

The master's research paper, "Geoethics and Environment Management", highlights the contribution of geoethics in the management of natural hazards and disasters in the context of sustainable development and in communication among the scientific community, citizens, and the media. Aside from postgraduate theses, four doctoral theses are currently being written at the National and Kapodistrian University of Athens (UoA) Faculty of Geology and Geoenvironment, covering a wide range of geoethical research.

The contribution of the doctoral dissertation research titled "Man and geoenvironment: an interdisciplinary approach to environmental ethics and geoethics" lies in the connection of geoethics with the field of environmental ethics, the possibility of using traditional natural resources management practices, traditional indigenous and local populations environmental knowledge and their perceptions on environmental risks, as well as the integration of the traditional knowledge and value system in the field of geoethics. The research titled "Geoenvironmental education and its geoethical dimension at national, European and international level" outlines the current state of geoeducation and geoethics in Greece, Europe, and worldwide as well. It focuses on exploring the geoethical dimensions in the educational system, which as a miniature society, prepares future responsible citizens

for the environmental challenges, and presents the reasons and the need for the integration of geoenvironmental education not only in the curricula of the educational system but also in the actions and activities of non-formal education for the benefit of society. The Ph.D. thesis, "The importance of geoenvironmental education in the understanding of geological heritage and geoethical awareness. The case of the Dodecanese barren line islands", highlights the importance of geoenvironmental education in the understanding of geological heritage and geoethical awareness. Finally, the thesis, "Geoethics as a factor of environment-friendly behaviour through a geo-environmental education programme for primary and secondary schools", aims to show that geoethics in the context of geoeducation contributes to raising awareness and fostering values and responsibility and that geocultural heritage and geoethics can strengthen the links between people and their place and between their places of origin and their memories.

Various articles in peer-reviewed international journals address a range of topics surrounding the concept of ethics in geosciences (Table 2) and provide a much-needed basis for discussion to promote geoethical thinking in education. All the efforts are isolated but promising and should be enriched with the ultimate goal of integrating geoethics as a central part of all geoscience courses.

Table 2. Papers and conference presentations on Geoethics.

Paper Reference	Title	Affiliation	Scientific Domain (According to Affiliation)
Georgousis, E.; Savelides, S.; Mosios, S.; Holokolos, M.-V.; Drinia, H.	The Need for Geoethical Awareness: The Importance of Geoenvironmental Education in Geoheritage Understanding in the Case of Meteora Geomorphes, Greece.	Department of Geology and Geoenvironment, UoA	geoethics; values; geocultural heritage; geoeducation; quantitative analysis
Georgousis, E.; Savelidi, M.; Savelides, S.; Holokolos, M.-V.; Drinia, H.	Teaching Geoheritage Values: Implementation and Thematic Analysis Evaluation of a Synchronous Online Educational Approach.	Department of Geology and Geoenvironment, UoA	geocultural heritage; geoethical values, perception, awareness; qualitative thematic analysis
Zafeiropoulos, G.; Drinia, H.; Antonarakou, A.; Zouros, N.	From Geoheritage to Geoeducation, Geoethics and Geotourism: A Critical Evaluation of the Greek Region.	Department of Geology and Geoenvironment, UoA; Department of Geography, University of Aegean	geoheritage; geoconservation; geoeducation; geotourism; sustainable development
Georgousis, E.; Savelidi, M.; Savelides, S.; Mosios, S.; Holokolos, M.-V.; Drinia, H.	How Greek Students Perceive Concepts related to Geoenvironment: A Semiotics Content Analysis.	Department of Geology and Geoenvironment, UoA	geodiversity; geoheritage; geoethics; geotourism; geoeducation; semiotics content analysis
Savelides, S.; Georgousis, E.; Fasouraki, R.; Papadopoulou, G.; Drinia, H.	"Storm Tossed Sea Rocks in Pelion": An environmental synchronous online education program.	Department of Geology and Geoenvironment, UoA	environmental education; synchronous online education
Georgousis, E.; Savelidi, M.; Savelides, S.; Mosios, S.; Holokolos, M.-V.; Drinia, H.	The inclusion of Geoethical Values in the Design of Educational Policy for the Next Decade: The Case of the Greek Educational System	Department of Geology and Geoenvironment, UoA	geoethics; values; educational policy; Greek educational system
Georgousis, E.; Mosios, S.; Savelides, S.; Holokolos, M.-V.; Drinia, H.	The New Curriculum on Environment and Education for Sustainable Development and its Potential for Shaping Attitudes and Behaviors towards the Geoenvironment and Cultivating Geoethical values	Department of Geology and Geoenvironment, UoA	geoethics; geodiversity; geoheritage; geoeducation; environment; sustainable development
Mosios, S.; Georgousis, E.; Savelides, S.; Holokolos, M.-V.; Drinia, H.	Geodiversity and Geoheritage: The geoethical dimensions of a Geoeducation Program in the context of an experimental Lower Secondary Education school club	Department of Geology and Geoenvironment, UoA	geodiversity; geoheritage; geotourism; geoethics; geoeducation

3.4. Overview of the Initiatives to Promote Geoethics in Greece

In recent years, there have been several international conferences and workshops on geoethics held around the world, with a focus on topics such as the ethical considerations related to natural resource management, the protection of geological heritage, and the

integration of geoethics into education. As such, we mention, indicatively International Geoethics Day, an event that is celebrated worldwide every year, GOAL workshops, and IAPG's participation in the annual General Assembly of EGU. These events have brought together experts from various fields, including geology, sociology, philosophy, law, and education, to discuss and share their perspectives on the field of geoethics. In Greece, the 16th International Congress of the Geological Society of Greece in 2022 marked the first instance of such an event where a sub-session regarding geoethics (Sub-session 1: Geoheritage, geoconservation, geoeducation, geoethics of the special session: Geological heritage for education and sustainable development) was included. Unfortunately, the number of presentations on geoethics was quite limited.

In the frame of the events organized by IAPG–Greece, a lecture titled Modern Geoethical Issues was presented by Dr. Gerassimos Papadopoulos (IAPG–Greece coordinator) on 6 March 2019, at the Department of Geology and Geoenvironment of the University of Athens. Additionally, on 8 November 2022, IAPG–Greece and SafeGreece organized an online event on the topic "Public communication of seismic hazard issues and geoethical dilemmas". It is likely that there will be similar conferences and workshops on geoethics in Greece in the future.

As far as research funding is concerned, at the moment there are no funding opportunities and eventually no research centers and groups that focus on geoethical issues, except for the research conducted through environmental education programs.

4. Discussion

The necessity of geoethics is to ensure ethical decision-making, sustainability, protection of geological heritage, transparency, accountability, and social responsibility in the use and management of natural resources and the environment.

Geoethical education is important for fostering a culture of ownership and environmental responsibility in society and for ensuring that future generations of geoscientists and decision-makers are equipped with the knowledge and skills needed to make informed and ethical decisions related to the Earth's resources and environment.

Effective teaching tools aimed at developing geoethics awareness are needed, enabling young people to become conscious and active citizens [24]. That is why the planning and implementation of geoenvironmental education programs for lower secondary education school (Gymnasium) students with the aim of empowering them in geocultural values is essential for the Greek school reality [25–27]. In contrast to the prevailing situation in schools and curricula [26,27], there are positive examples of planning and implementation of educational activities organized for elementary and high school students, mainly in the context of "Educational Programs of School Activities" and "Skills workshops" [28]. Such activities contribute to the awareness and empowerment of students to the values of geoethics [25,29,30] and consequently to the development of appropriate behavior regarding the interaction of human activities with the Earth system [10,25,28,29,31].

According to the literature review and our opinion, the following activities, that were implemented recently, could be used as a guideline. The program "Geoethics in Indoor Learning Environments: The Storm Tossed Sea Rocks in Pelion" is an environmental synchronous online education program in which the scenario attempts to empower students with knowledge, attitudes, and values that promote geodiversity and geocultural heritage [25]. Students should develop an ethical code and sense of responsibility for the environment protection and preservation [32] of the coasts and especially the storm-tossed sea rocks. Through assignments, presentations, and public debates, they develop and spread geoethics attitudes and values of sustainability [25].

Additionally, a geoeducation program was undertaken by 2 teachers and 45 students at an experimental lower secondary education school who expressed the desire to participate as members of the respective Creativity and Innovation Group. It was designed with the aim of broadening students' ethical concerns concerning the recognition of geodiversity's intrinsic value, which essentially means that people do not have the right to reduce geodi-

versity and that students are expected to realize their personal values' framework, which may signal their transition to a higher stage of ethical thinking [26,33]. In the context of "Skills workshops", teachers may choose the workshop titled "Geological heritage" and give students of secondary education the opportunity to learn about geocultural heritage, become familiar with virtual tour routes, and enhance observation and critical skills.

Greece boasts a unique position on the European geological map with numerous significant geotopes, including paleontological remains, rare geomorphological formations, and thousands of caves. This is why Greece has been a member of the UNESCO European Network of Geoparks since 2015, with seven designated geoparks (Lesvos Petrified Forest, Psiloreitis Geopark in Crete, Chelmos–Vouraikos Geopark, Vikos–Aoos Geopark, Sitia Geopark in Crete, Grevena–Kozani Geopark, and Kefalonia–Ithaka Geopark) among the 94 geoparks in 28 European countries [1]. This rich geological heritage highlights the importance of considering Geoethics in outdoor learning environments in Greece.

The positive examples of designing and implementing environmental education programs and educational activities in geologically protected areas organized for primary and lower secondary education students can contribute to the need to educate students in geosciences [34–36]. The geoethics elements can be incorporated into almost any geoscience fieldtrip [37]. Educational fieldtrips can enhance students' interest and awareness in various geoethics topics. They can be prepared accordingly to the geoethics dilemmas existing in the schools' area and aligned with a specific curriculum. It also links the instinct to learn with the need to teach and to learn the conceptual contents without the need to memorize them without understanding. By integrating the development of knowledge and competencies and by increasing the motivation to learn, field trips can be a powerful educational strategy to teach geoethics in higher education. More relevantly, the domain of fieldtrips has the potential to achieve GOAL project aims and an awareness geoethics learning [37]. A large body of research carried out over the last three decades shows the positive learning outcomes that field studies have had in education and within the positive and environmental cognitive fields [38–41]. To help and motivate teachers to plan and implement such activities successfully, it would be useful to organize training courses and prepare educational materials.

Geoethical education is not implemented in geoscience curricula; however, it is important to disperse knowledge and provide guidelines for its application in higher education [42] because such education will help aspiring future geoscientists and young people to become more sensitive to their natural environment, geohazards, energy, and conservation of natural resources, etc. [43]. Furthermore, students will recognize their personal, communal, and professional responsibilities to society and the planet, and for all these reasons, it is obviously unethical not to provide the necessary geoethical knowledge in schools and universities [44]. It should be noted that many university geoscience departments lack in incorporating considerations of ethics or geoethics into their strategies for student development, curriculum, or research efforts [45].

In conclusion, as abovementioned, geoethics should be the primary focus of all geoscience courses, provided that it is combined with the development of critical thinking skills and effective educational practices.

5. Conclusions

The aim of this review has been based on the system in force to demonstrate the current situation regarding the promotion and utilization of geoethics and its values in the Greek educational reality. The review outcomes showed that there is a significant lack in the implementation of geoethics in school and university curricula. That calls for geoethical awareness and the easiest way to achieve this goal is through the inclusion of geoeducation at all levels of education and through the promotion of geoethical values among Greek society since there are many challenges that still need to be addressed in Greece. These include a lack of enforcement of environmental laws and regulations, insufficient funding for environmental protection, and a lack of public awareness and participation in environ-

mental decision-making. In conclusion, the advancement of geoethical thinking in Greece is crucial for addressing these challenges and ensuring sustainable development for present and future generations.

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