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The International Geoethics Research Infrastructure

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Abstract

The development of geoethics has made remarkable progress in recent years, involving a growing number of scholars from various disciplines. This has led to the creation of spaces dedicated to sharing reflections, points of view, and study material. The network of relationships between scholars has significatively incremented both physical and virtual spaces for discussions strengthened conceptual coherence in geoethical thought, anchoring reflections in the historical evolution of the discipline and promoting further developments through open analysis.

At the heart of this network is the International Association for Promoting Geoethics (IAPG), founded in 2012. More recently, two new bodies have joined this network: the Commission on Geoethics of the International Union of Geological Sciences (IUGS), established in February 2023, which serves as the supporting branch of the IAPG to the IUGS and is the official body addressing geoethics and social geosciences for the Union; and the Chair on Geoethics of the International Council for Philosophy and Human Sciences (CIPSH), established in January 2024, whose aim is to broaden the international research network by promoting interdisciplinary initiatives that integrate geosciences, humanities, and social sciences through geoethics.

These three bodies together represent the International Geoethics Research Infrastructure (IGRI), built over years of activity in geoethics at the Istituto Nazionale di

Geofisica e Vulcanologia (INGV), Rome, Italy. It also includes the School on Geoethics and Natural Issues (the "Schola"), founded in 2019, and two editorial initiatives.
This paper provides an overview of the foundations of geoethics and outlines the progressive development of the international research infrastructure supporting it.

Keywords: Geoethics; Research infrastructure; Responsibility; Sustainability; Research integrity

1. Introduction: 25 years of geoethics at INGV in Rome

Geoethics is a discipline that reflects on the importance of Earth sciences, or geosciences[1], in the context of social and environmental responsibilities, not only for geoscientists but also for society as a whole. Its aim is to guide scientific practices and decisions related to managing natural risks, environmental protection, and sustainable development [Peppoloni and Di Capua, 2022]. In this context, INGV[2] has been a pioneer in the development and promotion of geoethical principles and values [Peppoloni and Di Capua, 2012]. This commitment arises from the diverse, multi-scope mission of the institute, which includes conducting high-quality scientific research using the most advanced knowledge, tools, and methods while adhering to the highest standards of research integrity; protecting the population from natural risks; and disseminating scientific knowledge to society.

In addition to these scopes, INGV has progressively developed and nurtured another internationally recognized vocation: exploring the ethical and social implications of its activities. Although not formally codified, this geoethical dimension has become a distinguishing feature of INGV, making it a global reference point for reflection on the ethics of geosciences and their impact on society and the environment.

In the early 2000s, INGV began to contemplate the meaning of ethical responsibility within its research, operations, and interactions with society. The increasing societal awareness of seismic and volcanic hazards and risks, and the growing impact of human activities on the environment, has highlighted the need for an approach

[1] In this article, the terms "Earth Sciences" and "Geosciences" are considered interchangeable and refer to studies and applications aimed at understanding the geological, physical, chemical, and biological processes, as well as their interactions, that characterize the Earth system.
[2] https://www.ingv.it/en/index.php (accessed 2 October 2024).

beyond merely generating knowledge to encompass the ethical obligation to use it responsibly and transparently. In this context, geoethics has become a fundamental tool for addressing the complexity of relationships between science, the environment, and society. It offers a value framework for geoscientists, helping them reflect on the ethical responsibilities that arise from their activities and the consequences of their scientific and technological choices.

The L'Aquila earthquake in 2009 [Cocco et al., 2015] marked a turning point, catalysing a wide range of reflections and initiatives regarding legal implications, communication methods, the responsibilities of geoscientists toward decision-makers and civil protection authorities, and their prospective responsibilities toward the general public [Dolce and Di Bucci, 2015]. That seismic event highlighted the challenges faced by those working within a public research institution, such as INGV, in their mission to monitor and alert about seismic and volcanic phenomena. The discussions following this tragic event underscored the importance of clear and transparent communication with society [Guzzetti, 2015; Cerase, 2021], emphasizing the crucial role of geoscientists in providing accurate and timely information to decision-makers, local authorities, and citizens.

Furthermore, a debate emerged regarding the legal and ethical responsibilities of scientists during emergencies or on the occurrence of natural hazards, prompting a profound reflection on how science can contribute to safeguarding the lives and safety of individuals and communities. These considerations stimulated further discussions about the necessity of fostering integrated approaches that not only consider the scientific rigor of the information released but also the social impact of scientific communication and the expectations of the affected community. Thus, geoethics has emerged as a field for analysis and development aimed at building a more conscious and responsible science capable of effectively addressing contemporary challenges related to natural risks.

Since 2009, the development and promotion of geoethics within INGV have undergone rapid acceleration, thanks to a series of scientific and cultural initiatives, both intra- and interdisciplinary, of national and international significance. Through its dedicated researchers, INGV has fostered a vision in which the geoscientist is not only a technician or researcher, but also a social actor [Peppoloni et al., 2019; Peppoloni, 2020] who must consider the repercussions of their professional choices, balancing scientific progress with responsibilities toward both the community and the environment. Today, INGV hosts the International Geoethics Research Infrastructure (IGRI), a complex and structured entity that coordinates research and outreach activities related to geoethics within geoscientific communities while also promoting dialogue with other academic communities and society.

2. An overview of the theoretical framework of geoethics[3]

Geoethics has unfolded as a field within the geosciences, aimed at addressing the ethical, cultural, social, economic, legal, and environmental issues related to geoscientific research and its practical applications. It seeks to provide a theoretical and practical framework to help geoscientists become more aware of their responsibilities toward the environment, society, and future generations [Peppoloni and Di Capua, 2012; Wyss and Peppoloni, 2015; Peppoloni and Di Capua, 2015; Peppoloni et al., 2017; Bohle, 2019; Di Capua et al., 2021; Peppoloni and Di Capua, 2022; Peppoloni and Di Capua, 2024]. The theoretical framework of geoethics is based on several key concepts: responsibility, sustainability, scientific integrity, risk management, and the importance of scientific communication. In addition to these concepts, it is crucial to emphasize the importance of recognizing the complex relationships in geoscientific research between its scientific aspects and the social and economic factors involved in the exchange of information and the consequences of such work. This emphasis is particularly relevant given a growing concern in modern society: the extreme specialization of expertise, which often comes at the expense of recognizing essential connections with other fields and activities. Through these concepts, geoethics aims to foster a more conscious science that is attentive to the implications of its discoveries and applications.

Gradually, geoethics has expanded its disciplinary horizons, positioning itself as an interdisciplinary field that bridges geosciences, human and philosophical sciences, and the humanities, to reflect more generally on the relationship between human activities and the Earth system [Bohle and Marone, 2021; Di Capua and Oosterbeek, 2023; Peppoloni and Di Capua, 2024]. This multidimensionality allows it to address global challenges more comprehensively, integrating a diverse range of perspectives and disciplines while promoting open and inclusive dialogue on complex issues such as anthropogenic global changes and planetary polycrisis [Peppoloni and Di Capua, 2022; 2024].

The theoretical framework of geoethics has evolved over time to address, on one hand, its geoscientific professional roots [Peppoloni et al., 2015; Mogk, 2017], and on the other hand, its broader societal implications as a global ethics [Peppoloni and Di Capua, 2021a]. From this perspective, geoethics is not only a professional code of ethics but also a proposal for global ethical standards.

Three foundational principles have been established as the basis of geoethics: dignity, freedom, and responsibility. From these principles, a set of values emerges,

[3] This section offers only the essential elements for understanding geoethics. For a more detailed exploration of its theoretical framework, as well as its practical application to issues concerning human impact on the Earth system, see Peppoloni and Di Capua [2022] and other works cited in the section.

which philosopher Umberto Galimberti describes as *social coefficients that an individual chooses to embrace for coexisting within a community*[4]. Human action should then be articulated within the geoethical domains of experience—namely, the self, relationships with others in one's reference groups, society, future generations, and the environment—aiming to pursue three aspirational principles: awareness, justice, and respect [Peppoloni and Di Capua, 2021b,c]. The development of geoethics is well exemplified by the evolution of its definition, as illustrated in Table 1.

2.1 The roots of geoethics: scientific integrity and research ethics

Scientific integrity is a fundamental element of geoethics [Peppoloni et al., 2015; Gundersen, 2017]. Geoscientists must ensure that their work is conducted transparently, honestly, and rigorously, adhering to the fundamental principles of research ethics. This involves, for example, the reliability of information sources, proper data management, rigorous application of methods, the reproducibility of analyses and elaborations, which guarantees comprehensive sharing, independent verification, and opportunities for further development of research. It also includes the accurate publication of results and respect for the rights of other researchers and the local communities involved in research activities.

Ethical considerations in scientific practice take on even greater importance in the context of geoethics, as decisions based on geoscientific research can have direct implications for both human and non-human lives, and the environment. Beyond the overall unfairness and the far-from-orthodox practice, the manipulation or misuse of scientific data and the partial omission of relevant results, can have dire consequences, undermining effective management of natural risks or leading to the adoption of inappropriate environmental policies, further eroding public trust in science. Furthermore, the overly fast and far-reaching advancements in strategies and technologies associated with and derived from artificial intelligence raise novel ethical questions across the spectrum of geosciences [Rivas et al., 2023; Cleverley, 2024; Cleverley et al., 2024]. Thus, scientific integrity is a matter of professionalism and an ethical responsibility toward the scientific community, society, and the environment.

[4] https://www.orizzontescuola.it/galimberti-ci-vogliono-docenti-affascinanti-espellere-genitori-scuola-interessati-solo-promozione/ (in Italian, accessed 2 October 2024).

Year	Definition	Reference
2012	Geoethics is the investigation and reflection on the operational behavior of man towards the geosphere.	Peppoloni and Di Capua, 2012
2015	Geoethics consists of research and reflection on those values upon which to base appropriate behavior and practice where human activities intersect the geosphere. It deals with the ethical, social and cultural implications of geological research and practice, providing a point of intersection for geosciences, sociology, and philosophy.	Peppoloni and Di Capua, 2015
2017	Geoethics consists of research and reflection on the values, which underpin appropriate behaviors and practices, wherever human activities interact with the Earth system.Geoethics deals with the ethical, social and cultural implications of geosciences knowledge, education, research, practice and communication, and with the social role and responsibility of geoscientists in conducting their activities.	Di Capua et al., 2017
2019	Geoethics consists of research and reflection on the values, which underpin appropriate behaviors and practices, wherever human activities interact with the Earth system. Geoethics deals with the ethical, social and cultural implications of geoscience knowledge, research, practice, education and communication, and with the social role and responsibility of geoscientists in conducting their activities. Geoethics encourages geoscientists and wider society to become fully aware of the humankind's role as an active geological force on the planet and the ethical responsibility that this implies. Geoethics is considered a point of intersection for Geosciences, Sociology, Philosophy and Economy.	Di Capua and Peppoloni, 2019
2023	Geoethics is a field of theoretical and applied ethics focused on studies related to human-Earth system nexus. Geoethics is the research and reflection on principles and values which underpin appropriate behaviors and practices, wherever human activities interact with the Earth system. Geoethics deals with ways of creating a global ethics framework for guiding individual and social human behaviors, while considering human relational domains, plurality of human needs and visions, planetary boundaries, and geo-ecological tipping points. Geoethics deals with the ethical, social, and cultural implications of geoscience knowledge, education, research, practice, and communication and with the social role and responsibilities of geoscientists.	Peppoloni and Di Capua, 2023

Table 1. *Evolution of the definition of geoethics. The definition published in 2017 was incorporated into the Cape Town Statement on Geoethics [Di Capua et al., 2017] and is widely recognized at the international level, as can be seen at https://www.geoethics.org/ctsg (accessed 2 October 2024).*

2.2 Social and environmental responsibility of geoscientists

The roots of geoethics lie in the awareness that geosciences cannot be considered merely a technical aspect of research; they must also be evaluated in terms of their impact on society and the environment. Geoscientists do not operate in an ethical vacuum: their discoveries influence people's lives, the management of natural resources, the safety and well-being of communities, and the overall ecological integrity of the planet. From this perspective, professional, social, and environmental responsibility constitutes the foundation of geoethics [Peppoloni and Di Capua, 2022].
The responsibility of geoscientists extends across several levels. First, they must conduct accurate and transparent research, ensuring that scientific data are collected, analysed, and interpreted according to rigorous scientific and methodological standards. Second, geoscientists need to evaluate how their results might influence environmental, economic, and political decisions: this responsibility includes considering how scientific findings can shape public policy, impact natural resource management, and inform strategies for addressing environmental challenges; by recognizing the broader implications of their work, geoscientists can contribute to more informed decision-making processes that prioritize sustainable development and the well-being of society.

2.3 Sustainability and geosciences

Another pillar of the theoretical framework of geoethics is the concept of sustainability [Capello et al., 2024; Stewart, 2024a]. Natural resources are limited, and their management must be based on a balance between current and future generations' needs while respecting locally and globally ecosystems and the dynamics of the Earth system. Geoethics recognizes that effective scientific and technological progress needs to be directed towards sustainable development, ensuring that the use of natural resources does not compromise the ability of future generations to meet their needs and does not harm the environment or its abiotic and biotic components.
In this context, geoethics promotes a holistic land and resource management approach, encouraging an integrated vision that considers environmental, economic, and social factors. Sustainability is not limited to environmental protection; it also encompasses social justice and equity in the distribution of resources. Geoscientific research can and should, therefore, contribute to building a more equitable and sustainable future by providing information and solutions upon which policies can be developed to protect the environment, improve quality

of life for people, ensure equitable access to resources, and preserve life. However, providing solutions to inform policy is not devoid of the personal political opinions of scientists. Here, potential conflicts may arise between the role of scientists as specialists and their role as citizens with individual political leanings. It is crucial to emphasize the ethical importance of scientists maintaining a neutral stance to avoid overstepping into political roles that do not fall within their professional domain. However, it is equally crucial to consider scientific knowledge as a political act for the common good, which can also manifest as political activism aimed at countering misinformation and falsehoods.

2.4 Risk management and community protection

One of the areas where geoethics has gained particular relevance is in managing natural and anthropogenic risks [Peppoloni, 2023; Woo, 2024]. Geoscientists play a fundamental role in studying events such as earthquakes, volcanic eruptions, landslides, and floods, and in mitigating the ensuing risks. These events can lead to severe loss of human life, material damage, and environmental destruction, with disruptive consequences for social, economic, cultural, and ecosystem networks. Therefore, the management of geoscientists' responsibility in risk analysis, proper management, and communication is one of the central themes of geoethics.
In this context, geoethics emphasizes the importance of making decisions based on solid and up-to-date scientific data, while also considering the social implications of such decisions. Risk communication must be clear, timely, without ambiguity or hidden information, and innovative [Stewart, 2024] so that authorities and the public can take appropriate and aware preventive measures. The 2009 earthquake that struck L'Aquila, central Italy, and whose aftermath resonated worldwide, is an emblematic example of geoscientists' difficulties and responsibilities in risk management [Cocco et al., 2015]. The main challenge is not only to study natural events with greater accuracy but also to effectively communicate the peculiar nature of risks (probabilistic, for example] to the population [Dallo et al., 2024] and to collaborate with policymakers in an ethical and responsible manner, clearly defining the roles and responsibilities of each actor involved in the risk scenario [Peppoloni et al., 2023].

2.5 Scientific communication: a bridge between science and society

Transparency and accuracy in disseminating scientific information are essential to

ensure that political decisions and societal actions are based on a correct understanding of the data. Geoethics encourages geoscientists to reflect on how they communicate their findings within the scientific community and the public and policymakers [Stewart and Hurth, 2021].
Risk communication is a particularly sensitive area [Stewart et al., 2017], where geoscientists should strike a balance between informing the public and avoiding causing panic or underestimating potential dangers. In an increasingly connected world, where information of variable quality and not always reliable, circulates virtually in real-time, the responsibility to provide accurate data and authoritative, comprehensible interpretations becomes even more critical. Geoethics emphasizes the importance of using clear and accessible language, that is proportionate to the understanding of the information recipient, and maintaining an open dialogue with society to build a trusting relationship between geoscience and citizens [Peppoloni, 2023].

2.6 Geoethics: a new vision for geosciences

As a theoretical framework, geoethics provides geoscientists with an ethical reference that goes beyond the mere technical application of their skills, inviting them to reflect on the ethical and social implications of their discoveries and actions. It promotes a more responsible, sustainable science that is aware of its impact on society and the environment. Geoethics recognizes that geoscientists are not just technicians studying the planet, but social actors [Peppoloni et al., 2019; Peppoloni, 2020] whose choices can influence the future of humanity and ecosystems, as has already occurred in the past.
Through social responsibility, scientific integrity, risk management, and effective communication, geoethics contributes to building a new vision of geosciences [Peppoloni and Di Capua, 2024], where scientific progress is not a concluding goal in itself, but a means to promote collective well-being, social justice, and environmental protection. This vision implies a paradigm shift in the training of geoscientists, who thus need to be educated not only in technical skills but also in professional ethics, along with an understanding of their work's socio-political and economic implications.
Moreover, geoethics encourages the active participation of geoscientists in decision-making processes regarding the management of natural resources, the mitigation of geological risks, and climate change, while maintaining the specificity of their role as providers of data, models, theories, and proposed solutions. In this context, geoscientists are called to become advocates for sustainable resource

management and to contribute to the formulation of policies that protect the environment and communities. This requires interdisciplinary collaboration and constructive dialogue with other disciplines, including economics, sociology, and philosophy, to ensure that technical decisions are also socially and ethically justified. In this sense, geoethics does not only helps define the responsibilities of geoscientists toward the environment and present and future generations, but also contributes to shaping a vision of geosciences as an integrated science, where knowledge of the Earth is closely connected to the social, cultural, and ethical dynamics that guide our collective human development.

3. An integrated network for geoethics

The main geoethical issues transcend national boundaries. Problems such as climate change, the management of water and mineral resources, and the prevention of disasters require global and collaborative solutions. Every decision made at the local level has broader implications for the environment and global society. For example, irresponsible mineral extraction in one country can lead to environmental degradation and economic instability at the regional level, increasing pressure on migration and conflicts.

For this reason, the International Geoethics Research Infrastructure (IGRI) is necessary to analyse these issues and establish shared guidelines and best practices, thus guiding geoethical action worldwide. IGRI aims to harmonize initiatives and documents, facilitating the adoption of geoethical standards at a global level. Additionally, it is important for creating a space for sharing knowledge and experiences through dialogue platforms and interconnected research networks. In this context, organizations such as the International Association for Promoting Geoethics (IAPG) and international networks of scholars, such as the Commission on Geoethics of the International Union of Geological Sciences (IUGS) and the Chair on Geoethics of the International Council for Philosophy and Human Sciences (CIPSH) are developing with these objectives in mind. With the aim to coordinate efforts among different nations and communities of scholars, these three structures interconnect to form IGRI, hosted by INGV, in Rome, Italy. Additional initiatives in the educational field, such as the School on Geoethics and Natural Issues (The "Schola"), as well as in publishing — like the *Journal of Geoethics and Social Geosciences* and the *SpringerBriefs in Geoethics* series — enhance the commitment of IGRI to address the complexity of the issues and communities involved. These efforts, encompassing both professional and social dimensions, are fundamental for coordinating the development and promotion of geoethics at all levels.

IGRI aims to integrate knowledge and networks of scholars to foster a multidisciplinary enrichment of geoethical thought, representing a scientific, cultural, and social space capable of connecting the various dimensions of the geosciences with philosophical, social, political, and economic sciences through a participatory dimension of the scientific-cultural enterprise. Another essential element of IGRI is training and awareness-raising, achieved through educational and editorial initiatives. This includes educating future geoscientists and promoting a geoethical culture globally, among both citizens and institutions. Through educational programs and awareness campaigns, it is possible to promote responsible behaviours and a greater awareness of the ethical challenges related to managing the Earth system. Figure 2 illustrates the structure of IGRI.

3.1 The International Association for Promoting Geoethics (IAPG)

IAPG[5] is a global, non-profit, scientific organization dedicated to addressing the ethical, social, and cultural implications of geoscience knowledge, research, practice, education, and communication, founded in 2012. It promotes ethical standards and best practices in geosciences, encouraging responsible and sustainable use of Earth's resources while fostering awareness about the impacts of geoscientific activities on society and the environment. In particular, IAPG:

- seeks to raise awareness about the ethical responsibilities of geoscientists and encourage ethical behavior in geoscientific activities. This includes promoting sustainable practices, protecting vulnerable ecosystems, and ensuring that geoscientific work benefits society as a whole;
- provides a framework to guide geoscientists in making decisions that consider not just scientific accuracy but also the social, environmental, and cultural consequences of their work. This framework helps geoscientists navigate complex challenges such as natural resource management, risk mitigation, and climate change;
- fosters dialogue among geoscientists, policymakers, and the public to build a common understanding of geoethical issues;
- encourages the integration of geoethics into academic curricula and professional standards;
- is committed to international collaboration and networking, partnering with other scientific organizations, universities, and research institutions worldwide to promote the importance of geoethics in geosciences and related fields;
- promotes the idea that geoscientific research should be conducted with

[5] https://www.geoethics.org (accessed 2 October 2024).

responsibility toward humanity. It emphasizes the importance of considering the long-term environmental and social impacts of geoscientific work.

To achieve its objectives, IAPG organizes and participates in international conferences, workshops, and forums where scientists and professionals discuss the ethical dimensions of their work. Moreover, it publishes articles, reports, and guidelines related to geoethics and engages in educational initiatives aimed at integrating geoethics into the training of geoscientists. This includes developing resources for teaching geoethics at universities and professional institutions.

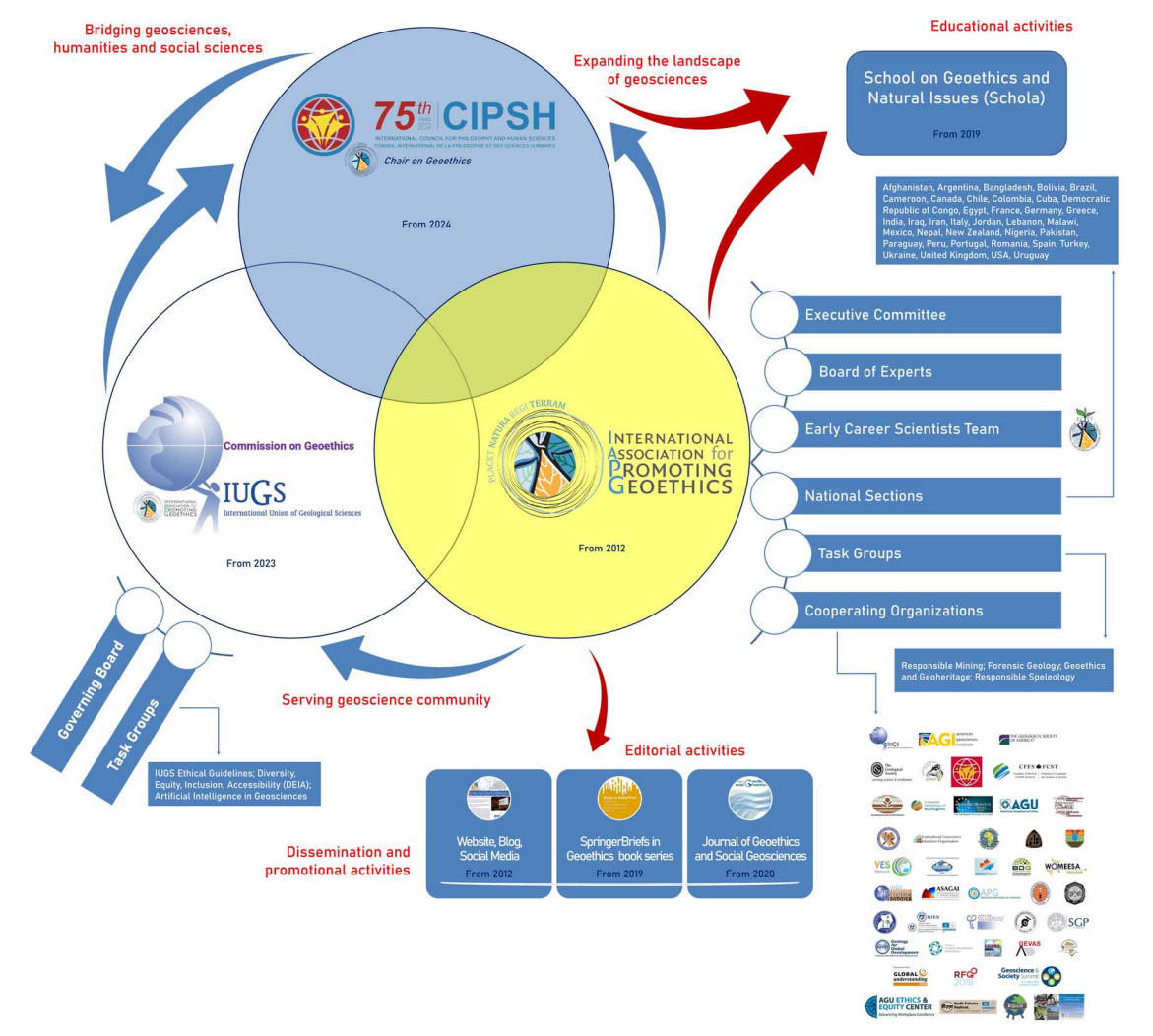

Figure 1. *Structure of the International Geoethics Research Infrastructure.*

3.2 The Commission on Geoethics of the International Union of Geological Sciences (IUGS-CG)

This is a dedicated body within the IUGS focused on addressing ethical issues related to geosciences, established in 2023[6] by the IUGS Executive Committee and ratified by the IUGS General Assembly in 2024 at the 37th International Geological Congress. The Commission is the supporting branch of the IAPG to the IUGS and the IUGS body that officially deals with geoethics and social geosciences for the Union. Established to promote awareness and implementation of geoethical principles, the Commission aims to ensure that geoscientific research and practices consider their ethical, societal, and environmental implications, even by drafting and updating ethical guidelines for the IUGS. Particular emphasis is placed on activities that support the IUGS Presidency, Executive Committee, and affiliated bodies in addressing unprofessional conduct, misconduct, harassment, retaliation, racism, sexism, and conflicts of interest. Additionally, efforts are made to promote the participation of women and underrepresented groups in activities, events, and initiatives organized or supported by the IUGS, with the aim of reducing the gender gap and enhancing equity and diversity. More details about the organization and goals of the Commission can be found in the Figure 1 and on dedicated web pages (see footnote 6).

3.3 The Chair on Geoethics of the International Council for Philosophy and Human Sciences (CIPSH-CG)

The Chair on Geoethics of the CIPSH was established at the beginning of 2024[7]. Its focus is creating a research network that fosters discussions about a global ethics rooted in geoethics, informed by diverse cultural perspectives. Geoethics needs interdisciplinary approaches to develop its potential as an ethics capable of fostering planetary ecological humanism. In this perspective, geoethics is the meeting point between geosciences, humanities, and social sciences. The cooperation between scholars with different disciplinary backgroundsis the challenge for dealing with the anthropogenic global changes of social-ecological systems and creating pathways for responsible human progress.

The long-term objective of the Chair is to strengthen the existing international community of scholars with different disciplinary backgrounds engaged in geoethics. It aims to involve additional individuals, institutions, and organizations

[6] https://www.geoethics.org/iugs-cg (accessed 2 October 2024).
[7] https://www.geoethics.org/cipsh-cg (accessed 2 October 2024).

in this global network to deepen discussions about geoethics and enhance its theoretical framework and practical applications across a wide range of disciplines, favouring interdisciplinary collaboration. This Chair emphasizes the importance of humanistic perspectives in addressing the ethical challenges of human interactions with the Earth system. The Chair facilitates collaboration between geoscientists, philosophers, ethicists, social scientists, and humanities scholars. This interdisciplinary approach is essential for understanding the broader ethical implications of geoscience in the context of human values and responsibilities. The Chair advocates for a geoethical approach that balances scientific progress with social justice, sustainability, and respect for the planet. More details about the organization and goals of the Chair can be found on dedicated web pages (see footnote 7).

3.4 The School on Geoethics and Natural Issues (The "Schola")

The *Schola*[8], founded in 2019, aims to provide excellent education in geoethics, promoting the development of a scientific and critical approach to understanding the Earth and its constituent systems. It fosters increased awareness and responsibility toward the planet and education in the values and actions underpinning respect for ecosystems. It serves as a platform for teaching and learning geoethics, with the goal of providing foundational knowledge and evaluation skills necessary to comprehend the complex relationship between human actions on ecosystems and the decisions geoscientists make that impact society. This includes raising awareness among professionals, students, decision-makers, media operators, and the public about the importance of responsible and ecologically sustainable development. The *Schola* has organized onsite courses and workshops, and provides online videos on various themes of interest related to geoethics through the YouTube channel[9] of IAPG.

3.5 The Journal of Geoethics and Social Geosciences (JGSG)

JGSG[10] is a diamond open-access journal of INGV, supported by IAPG. Founded at the end of 2020, it published articles since 2022. It is dedicated to exploring geosciences' ethical, social, and cultural dimensions across a wide range of topics, with a strong interdisciplinary focus. As a diamond open-access journal, it offers

[8] https://www.geoethics.org/geoethics-school (accessed 2 October 2024).
[9] https://www.youtube.com/@iapgeoethics/videos (accessed 2 October 2024).
[10] https://www.journalofgeoethics.eu/ (accessed 2 October 2024).

free access to readers and does not charge publication fees for authors, ensuring that scholars from low-income countries, those with limited institutional support, and researchers with restricted access to open-access funding can publish their work without barriers. This model fosters inclusive and equitable access to geoethical discourse, allowing the free exchange of ideas, insights, and reflections on critical topics related to geoethics and geosciences. *JGSG* emphasizes social geoscience, which examines how geoscientific knowledge influences and interacts with society. This includes exploring the impact of geoscience on public policy, economic development, environmental justice, and public health. By offering a platform that amplifies voices from diverse backgrounds and regions, the journal helps ensure that geoethical perspectives reach a broad audience, promoting a more responsible and socially engaged approach to geoscientific research and its applications.

3.6 The SpringerBriefs in Geoethics series

Founded in 2019, this series envisions a collection of short publications on geoethics and related topics of interest from a geoethical perspective[11]. The goal is to present concise summaries of cutting-edge theoretical insights, research findings, practical applications, and case studies across various subjects, offering a clear and focused overview of key developments in the field. While grounded in the geosciences, the series adopts an interdisciplinary approach, integrating perspectives from ethics, philosophy, sociology, and environmental science. This broadens the publications' relevance to geoscientists and scholars from other fields interested in the ethical and societal dimensions of professional issues, as well as the interaction between humans and the Earth system. In addition to theoretical perspectives, the *SpringerBriefs in Geoethics* series include also real-world case studies and practical applications, demonstrating how geoethical principles and values are applied in various contexts.

4. Conclusions: IGRI as a means to bridge cultures

IGRI represents a new international reality, built on the decade-long experience of IAPG. On one hand, it aims to expand analytical opportunities in geoethics, promoting a critical and reflective approach to environmental, social, and cultural

[11] https://www.springer.com/series/16482 or https://www.geoethics.org/springerbriefsgeoethics (accessed 2 October 2024).

issues. On the other hand, the infrastructure seeks to build bridges that foster dialogue and collaboration between geoscientists and scholars from various disciplines, creating a space for discussion and idea exchange. Through interdisciplinary and multidisciplinary research, editorial initiatives, and educational activities, IGRI aims to stimulate discussion on key themes related to sustainability, the ethics of natural resource management, and social responsibilities in geosciences. Additionally, it encourages the creation of professional and academic networks, contributing to greater integration of knowledge and expertise. In this context, promoting geoethical thought emerges as the central objective of IGRI, serving as a tool for dialogue and engagement with traditional and indigenous cultures. This approach aims to explore and value frameworks of ethical principles and values that guide human experiences interacting with the physical environment. The synergy among different disciplines and cultures thus represents the foundational value of IGRI in addressing our time's complex challenges, adopting a scientific humanism perspective. Indeed, it is crucial to recognize that the natural sciences and the humanities are not isolated disciplines; rather, they influence one another, are interconnected, and complement each other, forming a complex tapestry of knowledge that enables us to tackle contemporary challenges. This interrelationship enriches our understanding of the connection between humans and the Earth system and offers multidimensional perspectives for analysing the intertwined ecological, cultural, and social dynamics. For example, an issue like seismic risk can be studied through geology, seismology, and seismic engineering and by examining how human communities perceive and respond to risk. Only through an integrated approach can we develop sustainable solutions and promote informed dialogue that considers environmental needs and human values, thereby contributing to a more harmonious and sustainable future.

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