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Current Definition and Vision of Geoethics

Silvia Peppoloni[1,2] & Giuseppe Di Capua[1,2]

[1] Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy

[2] IAPG – International Association for Promoting Geoethics

Abstract

Geoethics was developed as a reflection on the meaning of geosciences and the roles and values of reference of the geoscientific community. More recently, the perimeter of geoethical analysis has expanded to include the global issues of modern societies, above all anthropogenic environmental changes, which are redefining the prospects and expectations of human life on the planet. The current definition of Geoethics describes both its philosophical dimension and aspects related to its practical application in the scientific and social fields. Its formulation has numerous implications and aims to provide reference points for a novel way of intending and relating to the planet. This chapter intends to present the fundamental characteristics, objectives and general vision of Geoethics, framing it in a synthetic way within some currents of contemporary thoughts.

Introduction

The primary purpose of this chapter is to highlight the evolution of geoethical thinking. It starts from definitions and a description of principles and values which connote its conceptual structure, finally supporting a vision of an "ecological humanism". That sketch from definition to vision may give context for other perspectives Geoethics has inspired, for example, as outlined in the following chapters.
By its definition, Geoethics considers human beings' operational behaviour, both as individuals and social groups, in relation to the Earth System, which is intended as a complex structure constituted by abiotic, biotic, technological, and socio-cultural elements. Geoethics aims to identify principles, values and categories of reference to propose a synthesis between different ideas and visions of the world.

The development of Geoethics was based on some essential considerations:

- Referring to socio-historical contexts, *Homo sapiens* by its intrinsic nature creates and modifies its ecological niche [1]: this observation led to introduce the concept of Anthropocene less than two decades ago [2]. It is nowadays scientifically ascertained that human actions have a profound impact [3,4,5] on social-ecological systems [6,7,8], which is a monumental niche construction process [9] that leads to negative planetary consequences, including pandemics [10].
- Considering geosciences, geoscientists' expertise is essential for the functioning of modern societies. It provides knowledge to identify effective strategies and solutions to address global problems affecting social-ecological systems and economic sustainability; exceeding ecological tipping points [11], determining a self-sustained deterioration of the human operative space [12] and provoking a systemic collapse of the planet habitability for human and other living species. An effective Earth system management must consider planetary boundaries [13] and those critical, interacting processes on the planet that contribute to the stability and resilience of the Earth system [14].
- Geoethics was an approach initially developed as professional ethics (deontology) inside geosciences [15,16,17] to frame inquiries on the responsible behaviour of geoscientists and the societal relevance of geosciences [18,19]. Over the years, the theoretical framework of Geoethics has progressively enriched to include extra-professional responsibilities towards society and the environment [20,21,22,23].

Currently, Geoethics is designed as an ethics of the human agent towards the Earth System and a framework in decision-making processes. Geoethics proposes a philosophical reflection and practices (individual and collective human agents) that are potentially extendable to other parts of society while respecting and implementing other people's contribution with diverse knowledge, experiences, and perspectives to face global problems [24,25]. However, this wide diversity needs to be dealt with a common ethical basis, by defining a reasonable alignment of values (economic, social, and moral) to minimise inevitable conflicting needs and expectations among stakeholders, to overcome differences among various social-ecological-cultural contexts, and to come to global ethics for an increasingly globalised world [25].
The philosophy of geosciences (for example, Geology [26]) provides distinguishing perspectives through the lens of geologic time and complex systems to analyse humanity-Earth system interactions. It highlights the original contributions that Geoethics, grounded on the wealth of geoscience knowledge [25], could give respect to environmental ethics [27,28] and engineering ethics [22,23,24].

<u>Defining Geoethics</u>

- *Geoethics consists of research and reflection on the values which underpin appropriate behaviours 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 Economics [20,21,29,30,31]*.

These statements outline the perimeter of the geoethical analyses, aims, and actions, underlining the need to first identify those values on which to shape a responsible and sustainable interaction with Nature. The main issues and topics of Geoethics are: sustainable use of natural resources; reduction and management of natural and anthropogenic risks; management of land, coastal areas, seas and open oceans; pollution and its impacts on human health; global environmental changes, including the climate change; protection of natural environments; research integrity and the development of codes of scientific and professional conduct; literacy and education in geosciences; geodiversity, geoheritage, geoparks and geotourism; forensic geology and medical geology. Hence, the 'geoethical thinking', its implications and applications, can be located within broader societal concerns about the responsible conduct of science and the science-society interface [19,31].
Ideas that underpin the conceptual foundations of Geoethics are traced back to the eighteenth and nineteenth centuries when anthropogenic impacts on Nature began to be broadly recognised and documented [32,33,34,35]. In the early 1990s, the word "geoethics" began to be used to define the ethical and social implications of geosciences [36,37], bearing in mind that several other scientists dealt with similar issues and perspectives without using that specific word [38,39]. The need to increase awareness of the ethical obligations of geoscientists' activity [40] was formalised in 2014 with the publication of the 'Geoethical Promise' [41], proposed to be extended to include applied Earth system sciences [42]. The Geoethical Promise is part of the 'Cape Town Statement on Geoethics' [29], a document translated into 35 languages [43] that provided a first comprehensive description of values that frames Geoethics.

<u>Geoethics for the Earth System: principles and values</u>

Geoethics is an emerging subject to inform human agents' actions and societal decisions [21,31], with well-established conceptual foundations and structure [25] and a developing framework for its practical application across the geoscience disciplines to ensure sustainability, safe and healthy conditions to human communities and protection of biotic and abiotic entities [30,31].
The four fundamental characteristics of Geoethics can be summed up as follows: a) human agent-centric, b) shaped as virtue-ethics, c) geoscience knowledge-based, d) with space-time context-dependent approaches.

The human agent is the *quantum* of societal behaviour, consciously adheres to a framework of individual and interpersonal reference values (honesty, integrity, accuracy, reliability, transparency, listening, sharing, and trust), and behaves according to the virtues of care, coherence, prudence, wisdom, dialogue, and good sense. These features make possible, along with other individuals' virtuous behaviours, to establish a human-Earth system relationship that is founded on the recognition of dignity of all the elements that make up the social-ecological systems. Hence the duty to guarantee to any entity the same value and existential space based on a recognised diversity.

Geoethics is a modern virtue-ethics, placing at the forefront individual, responsible action based on adopting societal and professional reference values, within a pragmatic, open and continuous revision process. According to personal abilities and possibilities, it calls upon each human being to operate within an ethical dimension, in which the duty to safeguard the rights of others takes precedence over the right to demand others' duties. The human agent's virtuous behaviours lean on universal rights and imply universal duties, as we recently proposed in the Charter for a Human Responsible Development [25]. This proposal starts from the consideration that the duty to guarantee to oneself and any other than oneself the same value and the same opportunities, arises from the awareness of having to act in accordance with one's own complex biological-emotional-rational nature, shaped by the knowledge of themselves and the world, and from the awareness of recognising oneself as a moral being. This approach opens the possibility that the rights of the human being are accompanied by the imperative duties of everyone, not as a jurisprudential dictation, but as evidence of their humanity [25], similar to Morin's vision [44], who invokes personal reform as a necessary step to achieve an ethical revitalisation of the individual.

The human agent shall act within an inclusive process to solve issues on a scientific basis, informed by human experience, supported by the multidisciplinary approaches of (geo)scientific knowledge and expertise on terrestrial dynamics, and respectful of traditional and indigenous knowledge [45].

Geoethics is context-dependent in space and time: this means that similar ethical issues and dilemmas that arise in different contexts and circumstances may require different choices. Geoethics is shaped and informed by the awareness of the technical, environmental, economic, cultural and political limits existing in different socio-ecological contexts and any decision inspired by Geoethics cannot ignore the physical-chemical-biological peculiarities of the territories affected by anthropic interventions [31]. Concepts such as prevention, diversity, sustainability, adaptation, protection of the territory (as an interlacement of natural, socio-cultural, economic elements), stewardship, conservation of the environmental and aesthetic quality of Nature, and geo-environmental education become reference values for the geoethical action [21,25,46]. Any approach in problem-solving must be based on equity to guarantee equal opportunities for social, economic and cultural development to the various human groups and to future generations aiming to build a more just society, in a natural environment that is not degraded, even aesthetically. Hence, the necessity to

protect geodiversity and geological heritage is considered a reference concept for Geoethics [21,24,29,31].

Geoethics considers the Kohlberg's hierarchy of moral adequacy, that identifies six developmental stages for the moral reasoning [47,48], as a reference scale for assessing the maturity of Human–Earth system interactions [49,50].

The concept of responsibility (the commitment to answer for our actions and their consequences) is the central pivot in Geoethics: the human agent sits at the centre of an ethical reference system in which a) individual, b) interpersonal/professional, c) social and d) environmental values coexist, underpinning responsibilities within these four levels (named "Geoethical domains") [20,21,30,31]. Responsibility is the geoethical criterion for human action [20,31,51] to ensure recognition and protection of the intrinsic value of any living and non-living element with which the human being interacts on the planet. Making responsible choices requires applying ethical principles while considering the impact of one's choices on future generations [52].

In the final instance, geoethics is ethics of responsibility towards the Earth system, leading the human agent to inform his/her action on the awareness of being a moral subject, on justice (intra- and intergenerational) when considering consequences of actions, and on respect for geo-biodiversity and social-ecological systems. This awareness makes the human agent capable of giving meaning to existence, primacy to dignity, and responsibility to action in all circumstances.

In the geoethical vision, the human agent moves within those four existential and interactive domains of Geoethics and acts consciously, according to an analytical and prudent approach based on the principle of responsibility. A genuine geoethical decision can only come from a responsible choice, whose fundamental prerequisite is the freedom to choose among different options, acting by one's own conscious and reasoned choice, rather than under compulsion. Only widely shared ethical values can guide human beings towards common decisions that are as acceptable as possible, both socially and ecologically, that allow approaching the complexity of natural and human reality and handling it with caution, while respecting geodiversity and biodiversity. Transferring this attitude to society means contributing to the promotion of responsible economic, technological and social development, and pushing towards political decisions and legal systems that consider the consequences of human actions affecting the natural system and related issues on different time scales. Any intervention on the environment imposed without considering the conditions and characteristics of the local contexts, risks provoking opposing reactions, even violent ones, by the communities involved [31]. Geoethics fosters inclusive and participatory processes with the population and an accurate assessment of the social and environmental costs of such an implementation. Only a cooperative dialogue will reconcile all parties' reference values and interests and offer sustainable benefits to those involved, maximising social and environmental advantages [53,54,55,56,57,58]. Human communities should be oriented by suggestions coming from science and humanities to find political, legal, social and economic forms for a practical application of new operational paradigms, capable of improving environmental, generational, and distributional justice [59,60,61].

Geoethics as an ecological humanism

The anthropocentric vision places the human being at the centre of reality, as creator and agent of his/her sensible and rational experience, committed to guaranteeing him/herself survival and material and spiritual well-being. This view has historically assigned humans a central and dominant position on Nature, arriving in an extreme view to consider the value of the latter only in relation to its usefulness for the human species. In Geoethics, the anthropocentric vision about human experience is not denied but made responsible. At the same time, Geoethics recognises the value of the biocentric vision, as it is capable of grasping the value of life itself, which is considered fundamental to recognise the value of Nature in us humans. From this concept, it follows that respect for Nature inevitably involves respect for ourselves. Finally, Geoethics embraces the key concept of the ecocentric vision, based on the ability to grasp the meaning of the whole and of the link between the parts.
Therefore, Geoethics captures the profound meaning of anthropocentric, biocentric and ecocentric positions and synthesises them in a vision that can be defined as "ecological humanism" [25], which finds correspondence in the concept of "regenerated humanism" or "planetary humanism" proposed by Morin [44] and which rejects the quasi-divinisation of a human being dominating Nature. On the other hand, Geoethics considers the fact that it is not possible for the human being to leave the anthropological point of view, for the simple fact that, as human beings, our thinking about Nature is irremediably "human" [62]. Biocentric and ecocentric views are not exempt from an anthropological perspective, for they are related to the human experience. Having therefore cleared the difference between anthropocentrism and anthropocentric vision, the vision of Geoethics is centred on a human agent conscious of the partiality and relativity of their rational, sensitive and emotional experience, albeit within the richness of the manifestations of universal being. The Anthropos is assigned the unconditional responsibility of being part of a whole and an equal among all. This perspective assigns to the human being a centrality in the Earth System in terms of responsibility and not of dominance and power. This responsibility is implemented through responsible human actions, and the creation of conditions for the development of an ecological humanism, which is not limited to a perspective of survival of the living species, but which, through a scientifically founded geosophy [63], opens the possibilities of Anthropos to a future of authentic and conscious unity with Nature.

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