Geoethics and Environmental Humanities in the Anthropocene: Educating People about the Mountain and Risk Reduction

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Abstract: Geoethics deals with the intersection of geosciences, geography, economy, sociology and philosophy and often focuses on important environmental issues related to natural risk management and mitigation, the use of natural resources, climate changes, planet pollution, polyhedric role and responsibility of the geoscientists, human impact on the planet according to new geological epoch: the Anthropocene. On the other hand, Environmental Humanities, integrating perspectives from history, geography, literature, philosophy, arts, psychology, sociology and other fields — provides a means to study the roles of human perception and agency in the face of global climate change and environmental challenges of Anthropocene.

In this context, the paper explores new interdisciplinary approaches on the education about the mountain and the risk reduction through new technologies and neogeography.

Key words: environmental humanities, geoethics, geography, mountain education, risk reduction

1. Introduction

Geoethics deals with the ethical, social and cultural implications of research and of geological and geographical practice, representing a meeting point of Geosciences, Geography, Economy, History, Philosophy and Sociology. Through the identification of principles that should guide our actions with regard the geosphere, Geoethics may provide an opportunity for scientists to become more aware of their social responsibilities and a tool to guide society when dealing with issues relating to defense against natural hazards, sustainable use of resources and environmental protection. Geoethics can help construct correct social knowledge, reinforcing ties with the territory as a common heritage to be shared [1]. In particular, we ask ethics to furnish us with indications of how to address the problems inherent in the major changes that scientific research and technological innovation have produced in today’s society, particularly in the relationship between man and territory. This has led to the development of debates on so-called “environmental ethics”. Consequently, scientists in the third millennium claim the right to intervene in an area which was previously considered the exclusive competence of philosophers and the religious: the area of values. In this context, science plays a role of higher social responsibility than that commonly assigned to it. This new ethic considers good and bad not so much with regard to man, an anthropocentric view, but with respect of the territory, seen as an entity that has its intrinsic value regardless of the uses it is put to, an ecocentric vision. Indeed, the territory, as an expression of a given culture, a given history and a special relationship between man and nature, is documentary evidence that can be considered as a fully-fledged cultural heritage and its priority right
to exist and be protected and appraised derives from this [2]. Analysis of the issues dealt with by Geoethics leads to some considerations. First of all, in order to establish selection criteria for appropriate behaviour, it is first necessary to identify the values on which such behaviour is based. In addition, it would be appropriate to ask about the responsibility of those working in the Geosciences fields, focusing on the ethical issues of the operator, as an expert on the area and all its dangers, whether operating in research or in the public, institutional sector, carrying out professional activities or engaged in teaching and/or scientific divulgation [3].

According to the researchers Silvia Peppoloni and Giuseppe Di Capua [4], founders of the IAPG (International Association for Promoting Geoethics) (Fig. 1), Geoethics should promote reflection and consideration of the following themes (Fig. 2):

- the comparison with global geological problems, so as to identify in the complexity those elements that, although distinguishing, can unite in pursuit of common goals;
- the rational and sustainable use of our georesources;
- the proper and correct dissemination of the results of scientific studies and of responsible information on risks, which allows researchers to gain the confidence of the community, to ensure the quality of research products;
- the help towards efficient management of emergencies, to protect the community from geological hazards at critical moments;
- the improvement of the relationships between the scientific community, the mass media and public opinion, through constant and qualified participation in the spaces offered by the media;
- the respect of the law and the support of policy decisions;
- the organization of effective teaching tools to develop awareness, values and correct behavior;
- the identification of new elements, both in terms of content and activities, that can be directed towards new relations and cultural and ethical views;
- the transfer of the cultural values of the environment to those who inhabit it;
- the promotion of working groups within universities and professional associations, for the development of the topics listed above, also with a flexible and prudent perspective for the reconsideration of scientific certainties and for reflection on the mutability of knowledge and roles [4].

![Fig. 1 IAPG (International Association for Promoting Geoethics) logo, main goal and website. Source: Presentation “Foundations of Geoethics” by Silvia Peppoloni at the International Workshop “Teaching Geoethics Across the Geoscience Curriculum”, Chico Hot Springs, Pray, Montana (USA), The Science Education Resource Center at Carleton College (SERC), 10-13 June 2014.](image1)

![Fig. 2 The birth of Geoethics. Slide in the presentation “Foundations of Geoethics” by Silvia Peppoloni at the International Workshop “Teaching Geoethics across the Geoscience Curriculum”, Chico Hot Springs, Pray, Montana (USA), The Science Education Resource Center at Carleton College (SERC), 10-13 June 2014.](image2)
2. “Humanities for the Environment”: A New Approach

A group of researchers of the Trinity College Dublin and of other important universities from different continents presented a Manifesto for Research and Action as an invitation for others to join the “Humanities for the Environment”, open global consortium of humanities observatories [5].

“Environmental humanities” is a rapidly developing research field that involves tens of thousands of researchers globally and is currently organized into diverse disciplinary associations for the study of literature, art, history, and philosophy of the environment. It is, however, extremely difficult to get an overview of what is happening, let alone to promote a dialogue between the anarchic world of academia and the stakeholders of global change [6, 7]. The Humanities for the Environment initiative is an innovative effort to promote such a dialogue and to bridge disciplinary gaps in the pursuit of effective approaches to environmental challenges [5].

What they offer in this manifesto is a clear identification of exactly what the humanities may contribute to understanding of human imagination, perception and relationship with their surrounding environments — both social and natural. For a start humanities disciplines are wonderfully diverse, both in terms of methodologies and interests — a reflection of the ever-expanding experience of the human species itself. Curiosity spawns diversity in the humanities, as in all other academic pursuits, and curiosity is the very fuel of humanities research. On the other hand, in order to achieve economies of scale and impact, humanists need a concentration of effort and clarity of focus [5]. The scholars’ manifesto identifies five key questions in the global change agenda that call for clear humanities answers: What is happening? What prevents us from Pro-Environmental Action? What do we think of the new human condition? What can the Humanities do? How to get it done? Such questions require basic research, and the answers will be of direct relevance to stakeholders in the societal, cultural, economic, political, and academic worlds [5]. To understand global processes of the Anthropocene geological era, it may require synthesizing know-how of social sciences, humanities and natural sciences [8].

The concept of the Anthropocene is now commonly used by scholars to denote the slice of Earth’s history during which people have become a major geological force. Through mining activities alone, humans move more sediment than all the world’s rivers combined [9].

3. A New Geological Epoch: The Anthropocene

Homo sapiens has also warmed the planet, raised sea levels, eroded the ozone layer and acidified the oceans. Given the magnitude of these changes, many researchers propose that the Anthropocene represents a new division of geological time [9]. The concept has gained traction, especially in the past few years — and not just among geoscientists but it resonated with what was already by the 1990s emerging as a new field that would eventually be called the “environmental humanities”. Once divided humanities sub-disciplines such as history, philosophy, religious studies, and literature, and social science disciplines focused on humans-in-their-environments, such as anthropology, cultural geography, and political ecology, began flowing together [5].

On the other hand, discussing ethics in relation to geosciences (i.e., Geoethics) and considering the social implications of geological research and practice has by default become an indispensable requirement for geoscientists [4]. The debate on Geoethics is increasingly broad inside the scientific community and includes specific technical and methodological aspects, as well as theoretical considerations and reflections on the ethical value of geological activities [10]. According to the geographer Erle Ellis, the principal cause of the Anthropocene is social, rooted in the exceptional capacities of Earth’s first ultrasocial species: behaviourally modern humans [11].
A suitably learned community in Geoethics will enhance the needed global effort to sustain human existence and our environment on Earth [12].

4. Geoethics and GIS

It is necessary, therefore, to take advantage of new technologies in order to obtain greater “geoethical control” of the most significant environmental emergencies: pollution and waste problems, the greenhouse effect and climate change, critical analysis of the use of natural resources, accurate information about dangers and risks to the territory, and the development of environmentally friendly technologies [13].

In this context, environmental sciences are often an area for the application for Geographic Information Systems. Atmospheric and oceanic phenomena, the morphology of the planet and its geological composition are studied using GIS (Geographic Information System); nature and the distribution of organic forms, the life and death of plants, animals and human beings, and the way in which man organizes, harms or improves the world in which he lives are all observed. Every dynamic within the environment and between the environment and humans may be represented in its full complexity on different scales. Opportunities for scientific reflection are being amplified by increasingly more sophisticated systems. Things are now operating in the global network, beyond the traditional concept of a geodatabase in a stand-alone configuration. If, until a few years ago, researchers, professionals and ordinary people interested in environmental issues depended on a limited range of mostly institutional or commercial resources, the advent of open source, webgis or, generally speaking, of readily available implementation and documentation has greatly extended access to data and technologies.

5. Geography and Mountain Education

Geography, as a “channel” between the social and physical-biological sciences, interacts between areas of knowledge which allow quantitative measurement and others which instead mainly rely on qualitative considerations. Due to their educational values and the methodological possibilities they open up, such possibilities for interaction would be most valuable in educational environment, as they would represent a significant step toward educational-methodological settings that permit the acquisition of skills and competencies of immediate spendability, for example the importance of “knowing how to translate quantitative elements into qualitative and vice-verse” [14]. In a context of alternation between quantity and quality, the concept of resource is open to a multiplicity of ideas. If we consider the mountains as a resource, ideas develop from that of the riches of the mountains as being measurable through quantitative indexes (but not always) and reach one of the mountains as a whole as a resource, valuable mainly through qualitative criteria (but not only). This game between quantity and quality leads to informed evaluation of environmental conditions and human actions. On an educational level, one can work with students through the use of environmental indicators (naturalistic and cultural). In addition, the signs of the past, etched into the mountains and often still influential in the present, constitute the fourth dimension of space, of which the teaching of Geography cannot do without. Memory can be reconstructed through the use of different sources (for example, pictorial or literary) or through photography, highlighting still further the possible connections with history, literature, art and image. However, the exploration of time also concerns the future, especially with regard the ethics of responsibility: it investigates the consequences of choices made in the present and how they can affect the future. Due to its many specificities (especially, but not exclusively, in terms of resources and risks), planning for a mountainous territory lends to an inexhaustible series of educational applications [15]. The anthropic presence in the mountain has progressively diminished
over the last century and this mountain depopulation has coincided with a loss of identity, cultural capital and the ability to rework the mountains culturally.

6. ICT and Mountain Education

ICT (Information and Communication Technology) development seems capable of diminishing the marginal position of the mountains, largely due to factors of physical distance and a lack of physical infrastructure. Information and communication technologies should therefore be thought of as a tool which can redesign territorial gaps, overcoming the traditional centre-periphery logic and strengthening the region’s practices of local development, such as those for mountainous areas which have had greater difficulty promoting their environmental resources during the era of industrialization. A simple survey of the websites within cyberspace and the use of ICT shows a significant foothold which educational agencies wishing to develop training projects for the mountains can refer to. In particular, the geographer Cristiano Giorda suggests four research paths through the ICT which may be particularly relevant today and can be used for educational purposes: the territorial system relative to local development: projects, actors and territorial values; territorial and environmental representations: identity, economy and use of the mountains through websites; self-representation of the mountains with regard the aim of sustainability: a comparison between visions and principles; ICT as a connective structure for relationships between mountains, men and territories [16].

7. Neogeographical Education about Risk Reduction in the Primary and Secondary School

The building of an “education about the mountains” project for primary and secondary school children through a series of learning units, from direct and indirect observation to territorial analysis, could bring out the range of perceptions that mountains can arouse in a child or pre-adolescent: from images of sadness and unhappiness to others of joy and elation. The mountains move you and palpitate, feel and make you feel, stimulate and awaken all the senses, thanks to their scenery, smells and tastes. The experience of a mountain path is instructive because the body can totally immerse itself, clearly grasping the multitude of possible sensory perceptions of light and shadow, heat and cold, and changes in the weather conditions. The sounds and the silences, the odours and fragrances are other examples of the many sensory perceptions which, although perhaps less obvious than their visual counterparts, are of great importance in the exploration of the environment. Perception is, of course, the first operational level and is essential in the exploration and understanding of space. This exploration and understanding is initially based on sensory perceptions and is then added to by perceptions of the environmental condition of the mountains, the weaknesses and risks, the links to history and to demographic, economic, social and cultural trends [15]. In this context, through the use of new technologies, children could become the true volunteers of geographic information [17], communicating their perceptions and their emotions directly on the web. Indeed, with the advent of Web 2.0, an experience based on mass collaboration, we have moved from “Wikinomics” to “Socialnomics”, where citizens are voluntary sensors. Over the past few decades, the main issue for GIS applications has been the availability of sound spatial information. Today, the wide diffusion of electronic devices that provide geo-referenced information has resulted in the production of a great amount of territorial information. This trend has led to a “GIS wikification”, where mass collaboration plays a key role in the context of territorial information (hardware, software, data and people). Neogeography [the term was used in France by the philosopher François Dagognet [18] and appeared in the English-speaking world for the first time in 1922 plays a fundamental role in providing new challenges to
scholars and territorial planners when addressing territorial issues and a new wealth of updated data, usually created by people who are interested in geographically related phenomena. Attention is devoted to the creation and display of geographic contents, in this case, by children who become the key players and producers of data and information, enriching any eventual maps of the mountains with their feelings and perceptions. This is a new educational experiment that firstly provides the opportunity for young children to become aware of the value of the natural, aesthetic and economic landscape of the mountains and, at the same time, enhance the mountains in all their aspects by using, in addition to icon-cartographic representations (including “mental maps”), the oldest and most effective media of communication in the world: the word [19], through the use of GPS (Global Positioning System) and positioning devices (mobile phones, PDAs and browsers). This mechanism is a sort of collective mental map and a valuable tool for spatial studies which use the techniques of participatory cartography; in addition, it can also be converted into an instrument of participatory democracy or, rather, of active citizenship, or even in participatory science. Indeed, this tool could also be useful with regard earthquakes perception and in order to know about the reactions of young people and adults when a seismic event occurs. The confirmation that so-called “participatory science” is an important low-cost complementary tool for research comes from a study conducted by the U.S. Geological Survey (USGS). On a global level, there are few sensors for earthquake detection in proportion to the territory and this means that communication signals can take about twenty minutes before they are processed by a research centre. According to the study, the new instruments have the ability to raise awareness in the population and obtain valuable information very quickly. In fact, the seismic monitoring station apps for smartphones, such as “Did you feel it?” in the U.S., the Italian “Hai sentito il terremoto?” or “Did you feel it?” of Seismic Monitoring & Research Unit at the Department of Geosciences of University of Malta (Fig. 3), allow citizens to give news of any earthquakes [13]. The introduction of these services is economical and provides an optimum solution to integrate with traditional networks. The reporting of an earthquake through a mobile phone or Internet also becomes a tool of psychological support for a child, who strives to identify some positive aspects as a consolation and, thus, enhances his resilience. This will serve to increase his ability to effectively manage stress, daily difficulties and, in this case, a possible traumatic event like an earthquake. Therefore, in the context of education regarding risk, improving communications, awareness of the complexity of a risk and the level of preparation would increase the resilience of the territory and allow for more effective management and planning [20].

Education at school, training, information, dissemination are key factors in the arousal of the interest of people for procedures which might appear uselessly complicated at first. Such procedures would be accepted and adopted only if the public benefit and the improvement of the quality of life, deriving from them, are clearly stated [21].

School is a crucial environment where to start spreading the principle of damage prevention connected to the seismic event. All the scientific disciplines, involved in the description and explanation of the event and in the organization of the human response to it, can concur to shape all-encompassing educational projects directed to kids. The exposition of young people to such topics should aim at raising their knowledge about earthquakes and awareness of the risk and then at making preparedness a part of common life. Educational programs should be designed in compliance with the kids’ age and cover both the scientific part (plate tectonics, what is a seismic area, what is an earthquake and how it affects the surface world) and the prevention part (safety procedures in different environments). Becoming familiar with the
Geoethics and Environmental Humanities in the Anthropocene: Educating People about the Mountain and Risk Reduction

Education should be matched with an information and dissemination policy in the community about the culture of resilience.

8. The interdisciplinary concept of resilience

How we respond to difficulties? How much stress is caused by a particularly difficult event? The ability that allows the individual to react in the face of defeats, to grow in adversity, to persevere in their goals, to face hard work for the realization of himself is connected to the concept of resilience [22]. This term derives from materials science and indicates the property of some materials to maintain their structure or to regain its original shape after being subjected to crushing or deformation [23]. Being resilient, therefore, is more than resisting: it means learning to live [24]. The term resilience refers to those skills and abilities of a subject able to reduce the tension that comes from the encounter with stressful events and the individual’s ability to know how to properly face it [25]. People with a high level of resilience can deal effectively with the opposition, to give new impetus to their existence and even to reach important destinations [26]. The exposure to adversity seems to strength it rather than weak it. According to Short and Casula “resilience is the determined volition to remove obstacles and overcome the temporary difficulties to move forward with optimism aware [...]”. Resilient is who has the courage to undertake a tortuous way and knows how to finish what started [...]. Resilience is an antidote to any attempt of resignation and surrender to fate, the tragedy or the fatality of the superiority of the events on the person. It is the ability to accept the wounds in the struggle for self-realization, which requires wisdom and discernment, not to be confused with blind impulse, irresponsibility and foolishness” [25]. The construct of resilience contains internally the coping understood as the ability to deal with stressful events, overcome them and regroup to reshape their lives [27]. During life, each individual has to contend with everyday events that can create important intimate sufferings. In order to deal with these circumstances everyone comes to develop one or more strategies: tricks don’t avoid suffering, but limit the effects both in quantity and in quality [28].

The recent literature has also adopted the ecological concept of ‘resilience’ as a means of understanding the ways in which societies deal with disasters [29, 30]. While critical, the focus on community resilience and vulnerability has arguably coexisted with a neglect of the role and nature of scientific advice in disaster management.

The UN International Strategy for Disaster Reduction defines resilience as the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions [31].

Fig. 3 Screenshot of the questionnaire Did you feel it? of Seismic Monitoring & Research Group at the Department of Geosciences of University of Malta. Source: http://seismic.research.um.edu.mt/questionnaire.php.
Resilience in this definition is thus closely tied to adequate governance and resources, and to the preparedness of local people [30, 32].

The resilience of a society to a hazard depends on the pre-disaster infrastructure and on adaptive capacity [33, 34], and on the nature of the hazard and its impacts. The ability of critical systems to adapt to the changing circumstances can have a significant impact on the recovery process [34, 35]. This includes the ease with which expert advice can be located and integrated into disaster risk management [36].

9. Etymology of the word “risk”

The term “risk” comes from the late Latin *risicum* and is traced, by etymologists, to “resercare”, the meaning of which is *tagliare* (cut), similar metaphor contained in the verb “decidere” (from the Latin *de-cidere*, properly cut off). The risk — unlike the danger — is always connected to the device of a human decision.

Niklas Luhmann [37] defines risk as a decision that binds the time, although we cannot know the future enough, even that which is produced by our own decisions. The risk is therefore a symbolic performance in which the temporal and the random dimensions appear intertwined, as is the case of the promise [38]. Indeed, it is clear that, beyond the intentions of who makes promises, the promises cannot be kept, as well as, beyond the precision of the calculations, it happens that risks are underestimated, such as nuclear accidents (Chernobyl accident on 26 April 1986 or Fukushima Daiichi on March 2011).

In Italian vernacular of 1300 the term “*risciare*” meant “osare” (to dare). This means that we, in the horizon of what Ulrich Beck (1986) has called the “risk society” (*Risikogesellschaft*), never choose between risk and absolute safety, but, even when we think to do it, among the risks we run us and those who run other. The main victims of these risky — or rather, catastrophic — events, are often peoples who are not yet born and whose voice, therefore, cannot yet be heard, just as it did for millions of children of the ex Soviet Union after the explosion of the Chernobyl nuclear power plant.

Then, the “squared” risk, the heightened risk that, beyond any reasonable calculation denies himself and the rationalization processes that produce it, takes root in a society that doesn’t want to become aware of the structural contradiction between the program of an unlimited growth, the growth theorized by the global capitalist system — which is the basis of the exponentially increasing request of energy amounts — and the limited resources of a finite planet, consider themselves in relation to the finitude of the living human and non-human that live in it [38].

Nevertheless, believe in a total risk elimination is an illusion. A risk-free society is a goal impossible. It is necessary, rather, to learn to live with the risk giving rise to the “subculture of the disaster”, as says Bruna De Marchi [39], or that set of technologies, standards, knowledge, procedures and behavioural patterns that, developed following previous experiences, create a system able to face the disaster as an already known and manageable event.

10. Conclusions

The agreement by world leaders at the Paris Climate Change Conference in Paris (COP 21 30 November 11 December 2015) gives rise to hope that action will be taken towards a sustainable future. Geoethics and Environmental Humanities form an important component in developing new approaches on variations in renewable energy use, the willingness and ability of different societies to adopt renewable energy sources, and the political, institutional, cultural, and cognitive factors that shape the implementation and use of different sources of energy. Indeed the challenge in the promotion of a sustainable future will be that of interaction between humanities, engineering and natural sciences, including a knowledge of new GIS technology and new geographies, which will allow
Geothics and Environmental Humanities in the Anthropocene: Educating People about the Mountain and Risk Reduction

exploration of the geoethical problems of the Anthropocene.

In such a synthesis, the natural sciences contribute to understanding the abiotic and biotic processes, which determine earth-systems dynamics. The social sciences and humanities contribute to understanding both, how people interact given their mental, subjective concepts (worldviews, culture, values, preferences, etc.), and how they collectively pursue their economic activities with the purpose to maintain their well-being, mutual care-taking, reproduction, and interaction [8]. Human beings use language, narrative, imagination and cognitive models to understand, cope, and take action. Humanities disciplines are repositories of insight into human perception, motivation, creativity, and agency at a variety of levels — individual, institutional and social [5].

People’s engineering endeavors provide the feedback between the noosphere of people’s worldviews and preferences and the geosphere. Engineering works couple humankind’s economic activities to the geosphere. The manner how these engineering works are conceived, designed, build and maintained depends on people’s worldviews, culture, values, and preferences [8].

In fact, the role of a geoscientist goes far beyond the US Bureau of Labor Statistics’ official definition of one who studies “the physical aspects of the earth… to learn about its past, present, and future” [40]. Geoscientists have a social responsibility in their work. While many geoscientists still work in the oil and gas industry, others are finding jobs in less traditional fields, such as consulting. This is an indication that what it means to be a geoscientist is flexible and changes over time [40]. Geoscientists should be at the service of the common good also dealing with social and cultural dimension of geosciences. Environmental humanities scholars and scientists need to work together to understand cultural differences, to overcome stock prejudices, to understand the importance of affect and multiple perspectives — and to instigate actions as well [5]. The interdisciplinary approach is essential to meet the demands of contemporary society.

References


