This Special Publication represents a new and important step in promoting geoethics within the scientific community. Its goal is to stimulate discussion among geoscientists on the ethical and social role they can play in conducting research and practice activities. The geoscientist has peculiar knowledge and skills that imply not only scientific and cultural but also social and ethical responsibilities towards society and the planet. His or her aim should be to pursue the common good by weighing benefits and costs of each choice, and identifying eco-friendly and socio-friendly solutions that guarantee the respect of the right balance between human life and the dynamics of the Earth. Geoscientists can support decision-makers in making choices regarding the use of geo-resources, the management of natural hazards, and global problems such as climate disruption, the conservation of geological heritage and geodiversity. A geoscientist is required to conduct his or her scientific activity with honesty, integrity and professionalism, in strict compliance with the scientific method, to collaborate with colleagues in a constructive way, thus ensuring transparency and reliability, and be willing to share results, with the aim of finding technical solutions that are acceptable, economically sustainable and compatible with the environment.

Geoethics is a point of intersection for geosciences, sociology, philosophy and economy. The International Association for Promoting Geoethics (IAPG) has defined geoethics as ‘the research and reflection on those values upon which to base appropriate behaviours and practices where human activities intersect the Geosphere’ (IAPG 2015a). Geoethics was born when geoscientists became aware that their activities can interact with and, in some cases, alter in irreversible ways the natural processes of the Geosphere, and when they realized that their choices can have negative consequences on the environment and jeopardize the possible survival of many species, including humankind. As geological research and practice have unquestionable ethical, social and cultural implications, geoethics can represent an opportunity for geoscientists to become more aware of their capability to influence the decisions regarding land, water and atmosphere.

The possibility of choosing between different practicable options, and being conscious of the effects of those choices, puts the geoscientist in the position of facing problems and ethical dilemmas. Having a clear framework of ethical values and principles as reference could help him or her in identifying better solutions to problems. For these reasons, the issues of geoethics can no longer be ignored by the scientific community, and should become central to the scientific and cultural training of geoscientists.

Undoubtedly, geoethics presents a new way of thinking about and practicing geosciences, a modern approach in managing resources and risks, and a concrete possibility of helping to guarantee the livability of our planet for future generations. In order to take into account the ethical implications of geological practice, several professional and scientific associations have developed codes of ethics and conduct (IAPG 2015b) that guide geoscientists when undertaking their activities, highlighting the importance of having a frame of reference of principles to be considered in their work. Similarly in the research field, scientists have adopted statements in which fundamental principles of research integrity are expressed that relate to personal responsibilities when conducting scientific activity, and to professional honesty when working with other colleagues in collaborative research, and towards society as a whole (Singapore Statement on Research Integrity 2010; Montreal Statement on Research Integrity 2013).

In the early 1990s, the word ‘geoethics’ began to be used to define the ethical and social implications of geosciences (Cronin 1992; Savolainen 1992). However, up until 2011, geoethics had been not accompanied by a satisfactory number of scientific publications, which are essential references in its development.

congress of the International Association of Engineering Geology and the Environment (IAEG) in 2014, have fostered debate and editorial initiatives on these themes, stimulating geoscientists to express their views and proposals on specific issues of ethics in geoscience (Lollino et al. 2014; Wyss & Peppoloni 2015). This volume aims to take this debate forward. The content is certainly not exhaustive, and the topics discussed do not cover all the possible geosciences issues. Nevertheless, it represents an invitation for dialogue, reflection and analysis of some of the main issues for which geosciences are called to give answers.

The papers are grouped into four sections: Ethics in Geosciences; Geoethics and Natural Risks; Geoethics and the Communication of Science; and Geoethics and Geodiversity. The first section focuses on ethical aspects related to various fields of geological activity. In particular, Dutta (2015) and Limaye (2015) draw attention to mineral and groundwater use, and the necessity of following a geothermal approach to avoid the degradation of the ecosystem and the depletion of natural resources. Allan (2015) highlights the role of geotourism in promoting geoethical principles in society, such as sustainability and geodiversity. Bohle (2015) stresses the importance of telling Earth sciences through storylines in order to bring the public to consider the importance of the geosciences in everyday life. Brox & Semeniuk (2015) describe an interesting case in NW Australia where not considering geoethical principles resulted in the destruction of geodiversity and geoheritage as a consequence of extensive industrial activities.

The second section is a collection of articles dealing with ethical implications in natural risks. Cocco et al. (2015) tackle the delicate case of the ‘L’Aquila trial’, which caused a complex debate within the scientific community about the role of geoscientists in the defence against natural hazards, the behaviour that they should maintain with the media, decision-makers and the population, and the legal implications in risk communication. The authors give a detailed and accurate summary of this paradigmatic matter: a clear example on how the activity of geoscientists has a strong link with the life of human communities. Parkash (2015) defines an ethical framework based on 10 principles to be followed for improving activities in disaster management, while Acharjee (2015) highlights the need for appropriate engineering geology intervention and geoethical policies in sustainable developmental planning of an Indian city exposed to multiple geohazards. Crescimbene et al. (2015), De Pascale et al. (2015) and Kostyuchenko & Movchan (2015) address the issue of the risk perception from different points of view but with the same goal: helping society to improve its resilience to natural disasters. Finally, de Rubeis et al. (2015) describe the experience of using web tools in order to create a network of citizens scientists involved in monitoring the effects of earthquakes. This is an interesting case study aimed at improving the awareness of the population to the seismicity of their area by clarifying the meaning of the probability applied to seismicity and highlighting the importance of positive activities such as building reinforcements and earthquake simulation training.

The third section is dedicated to aspects of geo-science communication. Albarello (2015) addresses the issue of communicating uncertainty in terms of responsibility towards society by the geoscientists involved in probabilistic assessments of natural hazards. Solarino (2015) treats issues related to the communication of uncertainties and science limits to society. The author highlights the importance for geoscientists to be adequately prepared for public speaking and to use a language comprehensible to a non-technical audience. Marone et al. (2015) believe that improving the scientists’ ability in communicating is not sufficient to solve the problems of transferring information and data to the non-academic part of the society. There is a necessity for society to review the basic and secondary education systems in order to train the next generation to understand scientific concepts. Vecchia (2015) then addresses problems that arise when there is interaction between geoscientists and the population about the activities of the oil and gas industry, indicating that the alleged induced seismicity is basically a web-mediated relationship that is not based on scientific or well-documented data.

Finally, the fourth section of the book highlights one of the most important tasks for the geoscience community: serving society through educational activities. Silva et al. (2015) describe the Portuguese experience in promoting and implementing many initiatives (some of which are still ongoing) in education and the dissemination of geoscience information among the population. Ferrero & Magagna (2015) report on (1) the importance of widespread education activities and good-quality communication from geoscientists to increase people’s awareness and sensitivity in protecting the geological heritage, and (2) on how discussion groups constitute a relevant teaching/learning opportunity for teachers and students, allowing them to identify gaps, errors, prejudices and misconceptions in order to solve some conceptual difficulties of the geosciences. The last two papers are dedicated to activities for children. In the article by Rubbia et al. (2015), drawings made by children have been used to analyse how geoscience and researchers are perceived. The positive results obtained are deemed to most probably be a consequence of the direct
interaction between geoscientists and children during a visit to a research institute. This demonstrates how geoseducation should be considered a strategic activity that is needed in order to increase the trust of future generations in the usefulness of geosciences in giving practical answers to social needs. Piangiamore et al. (2015) describe the experience of 10 years of learning-by-playing, hands-on, emotion-driven, curiosity-driven approach activities, which have involved more than 20,000 students and teachers living in Italian areas prone to natural hazards, in order to develop a culture of risk prevention.

This Special Publication represents an important tool for geoscientists aimed at increasing the awareness of their social role and responsibilities. The major environmental challenges affecting human communities require not only a strictly scientific and technical preparation by the geoscientists, but also a reflection on their broader obligations towards society. It is important that geoscientists begin to consider geoethics as an indispensable framework on which to base their training and activity. Communication and dissemination of science should become core activities in building a knowledge society, which is able to better protect itself and the Earth ecosystems in order to guarantee to future generations a life in harmony with our planet.

References


