

Words as stones for a geoethical glossary

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Abstract

This essay is the full paper version of authors' intervention during the webinar Geoethics without borders. Transdisciplinary visions for sustainability, held in October 13th 2022. The concept of geoethics, initially associated to environmental, social and economic issues inherent to exploration and exploitation of georesources, has turned over the last few years on an educational and political dimension, in order to be introduced outside the geoscience community and to improve the way humans interact responsibly with the Earth's system. Inspired by the call-for-commitment for a pedagogical and political project towards future sustainable societies made by Peppoloni and Di Capua, as well as by the Bohle's idea of relating geoethical thinking with the political philosophy, this paper aims to enlarge the geoethical glossary, connecting geoethics to some key terms of ecological philosophy and analyzing the contribution that the related theories can give, with a view to building an educational and political proposal in accordance with the principles of geoethics. The three terms we propose are Haraway's response-ability, Barad's intra-action and Ingold's correspondence. To move beyond the theoretical framework and orient toward educational practices, we suggest in conclusion to consider, alongside the three adjectives outlined by Peppoloni and Di Capua (inclusive, participatory and proactive), the so-called "3-Ts" of environmental education (transformative, transgressive

and transdisciplinary) and also a new triad of adjectives (ecological, aesthetic and ecumenical), rooted in the theories we have analyzed.

Keywords: Geoethics; Ecological philosophy; Posthumanism; Transdisciplinarity; Transformative education.



1. Introduction: geoethics without borders

And no matter how hard I tried to put words between myself and things,
I could not find words suitable for covering them;
because all my words were hard and barely chipped:
and saying them was like laying many stones.”
Italo Calvino, Prima che tu dica “Pronto?” [1985]

Geoethics, born to focus on the great responsibility of geoscientists towards the ecological crisis and to highlight the social, cultural and economic consequences of their choices [Peppoloni Di Capua, 2012], has been interpreted since the beginning as a good meeting point between humanistic and scientific disciplines [Lucchesi and Giardino, 2011]. The International Association for Promoting Geoethics¹ has been founded to provide a multidisciplinary platform for the development of geoethics not only from scientific side, but also philosophical, in order to introduce its values into society [Bobrowsky et al., 2017]. Over the last few years, it has been underlined the necessity of enlarging the disciplinary areas that should be investigated through the lens of geoethical thinking [Peppoloni and Di Capua, 2021]. In particular, some political philosophies about people’s social lives have been related to geoethics, like Kohlberg’s “hierarchy of societal coordination” [Marone and Peppoloni, 2017; Peppoloni and Di Capua, 2022b, pp.52-54], Bunge’s ‘balance of individual happiness and duty’ and Jonas’ “imperative of responsibility for agents of change”, in order to strengthen the socio-

¹ <https://www.geoethics.org>, accessed 19 May 2023.

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political anchorage [Bohle, 2021]. In a few words, this means that, far from proposing only a professional code for geoscientists, the real aspiration is to address civil society and bring about an ethical regeneration of human beings. If this multidisciplinary and transdisciplinary approach to geoethics is still at earlier stage, there are encouraging signs of integration and cooperation with scholars from outside the geoscience community [Di Capua et al., 2021].

The webinar Geoethics without borders. Transdisciplinary visions for sustainability², was held in occasion of the International Geoethics Day, October 13th 2022. Relators had different backgrounds, with experiences in geoscience, legal, educational and artistic fields. The event, exclusively online and in Italian, and addressed to geoscientists, professionals, teachers and students, had the aim to enhance an inter-disciplinary reflection on how principles and values of geoethics can be applied to build a sustainable future for humankind.

This paper is based on authors' webinar talks. It is focused on the proposal for expanding the geoethical glossary, by analyzing three terms that come from the broad and very diverse field of research of ecological philosophy. After giving a definition of ecological philosophy and a brief overview of its most popular and recent studies, the study focuses on the three terms illustrated in Table 1, that can be seen as capstones to build a solid relationship between the ethics of geosciences and the sustainability issues.

Term	Author	Scientific and cultural background	Reference and year
Response-ability	Haraway, D.	Feminist studies; ecofeminist; posthumanism	Stay with the trouble. Making kin in the Anthropocene [Haraway, 2016]
Intra-action	Barad, K.	Theoretical physics; feminist theory	Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning [Barad, 2007]
Correspondence	Ingold, T.	Social anthropology; contemporary art	Correspondences [Ingold, 2021]

Table 1. The three keywords analyzed in this work.

² This event was organized by the Department of Earth Sciences at the Turin University and the IAPG-Italy/Section of Geoethics and Geological Culture of the Italian Geological Society and sponsored by the Department of Philosophy and Education Sciences at the Turin University, University of Eastern Piedmont, National Institute of Geophysics and Volcanology, IAPG - International Association for Promoting Geoethics, National Association of Natural Science Teachers.

The purposes of this study is to enlarge the geoethical glossary, connecting geoethics to some key terms of ecological philosophy and analyzing the contribution the related theories can give, with a view to building an educational and political proposal in accordance with the principles of geoethics. Although since the inception of this discipline there has been a great deal of awareness in defining key words and setting core values [Peppoloni and Di Capua, 2012; Peppoloni and Di Capua, 2015], our belief is that, if the goal is to manage the diversity of human socio-cultural contexts within a common ethical frame of reference that can ensure an alignment of principles [Peppoloni and Di Capua, 2022a], then crossing the borders of disciplines, creating a dialogue between words and concepts and letting them flow towards a general ethical regeneration such as that advocated by Morin [2020] is the only way to think and act in a sustainable way – as scientists, as educators, as human beings.

2. Ecological philosophy: a matter of perception and relation

The roots of a philosophical approach to ecological issues are grounded mainly in the revolutionary concept of deep ecology, created by Arne Naess (1912-2009). In his seminal paper, he distinguished between shallow and deep ecology movement: the central objective of the first one is the health and prosperity of people in developed countries; instead, the second one rejects the human being-in-environment image in favor of a relational, total-field image [Naess, 1973]. In other words, his belief is that humans must radically change their relationship to nature³ from one that values nature solely for its usefulness to human beings⁴ to one that recognizes that nature has an inherent⁵ value. Therefore, ahead of his time, the Norwegian philosopher had realized that the environmental crisis calls for human beings to overcome their limited anthropocentrism, in order to recognize the intrinsic value of life [Mickey et al., 2017]. Along with the concept of deep ecology, Naess himself began to use the term ecosophy, that has been reprised and developed by the French philosopher and psychoanalyst Félix Guattari (1930-1992). The term is composed of the root eco-, derived from the Greek oikos (“home”, “habitat”, “natural environment”) and the noun sophia, which in the same language means “knowledge”, “knowing”, “wisdom”: a literal translation could therefore be “wisdom of the environment”. In Guattari’s version,

³ <https://www.britannica.com/science/nature> (accessed 19 May 2023).

⁴ <https://www.britannica.com/topic/human-being> (accessed 19 May 2023).

⁵ <https://www.merriam-webster.com/dictionary/inherent> (accessed 19 May 2023).

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there are three levels (or registers) of ecosophy: the environment, the social relations and the human subjectivity [Guattari, 1989]. Conceptually linking all these dimensions, the author comes to the conclusion that we are in the world and the world is in us, starting with our immediate environment, our natural, social and cultural surroundings. Hence, we are both creators and created, since we create our environment, our ecological home and at the same time are constantly created by it [Knyazeva, 2021]. It may be interesting to note that these three levels of ecosophy are recalled in the four dimensions of the ethical reference system in which geoethics puts geoscientists: individual, professional, social and environmental [Peppoloni et al., 2019]: this can be considered like evidence that geoethics' framework share the same basic tenets of the ecological philosophy.

It is very easy to understand the possible connections of Naess' and Guattari's philosophical thoughts with other theories and concepts born during the second part of the 20th century, such as Gibson's affordance theory [1966], Routley's environmental ethics [1973] or the well-known Gaia's hypothesis developed by Lynn Margulis and James Lovelock [1979]. Figure 1 attempts to depict the intertwining and connections that can be established between those theories, also indicating which scientific and cultural backgrounds they come from. In the case of ecology, in fact, the philosophical approach is used by scholars who originally dealt with chemistry, microbiology, psychology: this should be remembered in case there is still any doubt in pushing the geoscientific community towards a transdisciplinary analysis of reality, in order to better understand the complexity of the Earth's system and provide humanity with solutions for an ecological and sustainable lifestyle.

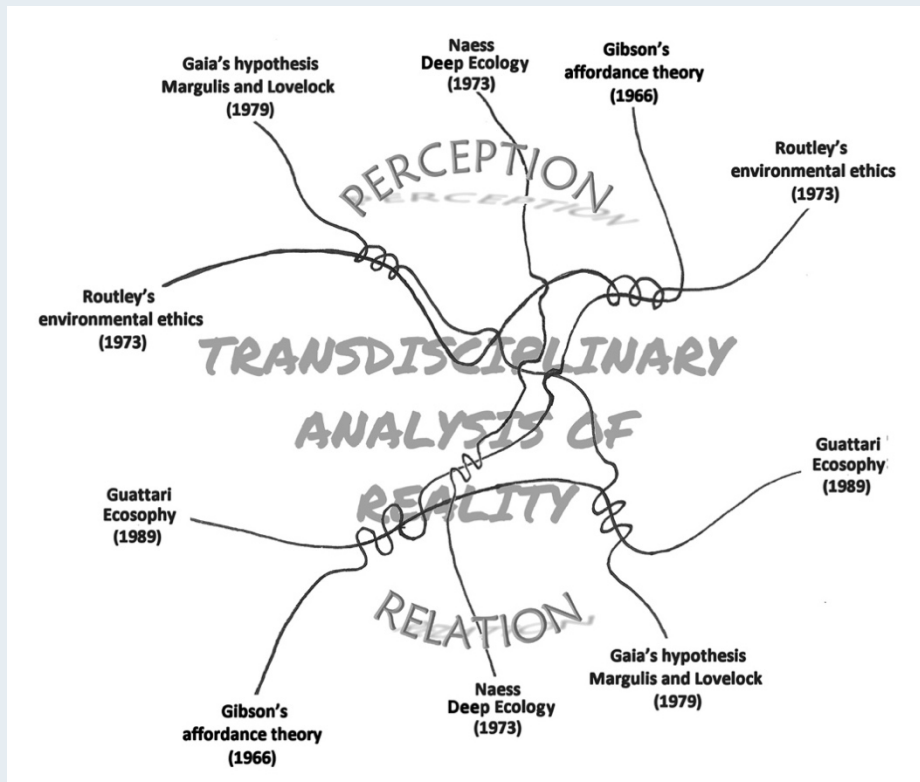


Figure 1. Possible meshwork involving the most important ecological theories (illustration by M.D.Tonon).

The two dimensions within which the above-mentioned theories move are perception and relation. Perception is related to the field of aesthetics, in accordance with its original Greek meaning (aesthesis = perception from the senses, feeling, hearing, seeing). Therefore, connecting this concept with ecology means to recognize that the current crisis is also an aesthetic crisis, because how the environment is perceived is now considered among the most important factors in determining how people relate to and “use” nature [Tonon et al., 2017]. More in general, the ecological crisis is a crisis of the human being [Peppoloni and Di Capua, 2021] that is reflected in all the relational forms of his/her experience (coming back to the four domains of geoethical value, from the individual to the environmental): relation is thus the basic element of all the contemporary posthuman theories that focus on non-human elements, biotic and abiotic, sometimes referring to the integration between human and technological elements [Haraway, 1991]; it is also the key element for the domain of ecological aesthetics, that investigate the sensorial relations affecting human corporeality and

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a wider range of surroundings [Gambaro, 2020]. Shifting from the critical distance proposed in the Kantian aesthetics, clearly separating the object of an investigation from the subject who is conducting it, to a critical intimacy [Miles, 2018] in which there are no objects, only subjects that interact and are defined by that interaction. The ecological aesthetics claims that every experience we make is an experience-with-something, rather than an experience-of-something [Perullo, 2021]. Philosophically speaking, what emerges from this conception is therefore a radical relationalism, that sees reality as the outcome of encounters and movements and is based on the principle of hybridization, i.e. the transition from a rational conception of being (cogito ergo sum) to a relational one: dialogo ergo sum [Marchesini, 2018].

Haraway's, Barad's and Ingold's works and studies are connected with this theoretical framework. As scholars, they underline once more how much ecological philosophy deals with different research fields: in this case we have a science philosopher that founded a cyborg theory; a theoretical physicist considered a benchmark in feminist studies; an anthropologist closely related to the world of contemporary art. In the next sections we will analyze three terms they used as keywords for their theories and we will connect them with the geoethical thought, declaring why they can be important to enlarge the debate upon it.

3. Donna Haraway's response-ability

The concept of responsibility sounds very familiar to geoethics. Since the first steps of the discipline, we find it recognized as an ethical principle that should be the foundation of any action of geoscientists, in the different field of their activities [Di Capua et al., 2017], but also an ethical principle for any citizen [Peppoloni and Di Capua, 2022]. This is clearly shown by the second statement of the Geoethical Promise [Matteucci et al., 2014], that is:

I know my responsibilities towards society, future generations and the Earth for a sustainable development.

Among four tenets proposed in geoethics [Peppoloni et al., 2019] responsibility has a predominant role: since it is shared with the ethical dimension of other disciplines, some considerations have been made about the possibility of using it as a bridge to link geosciences to other branches of human knowledge: based on this, e.g.,

geoethics has been related to Jonas' imperative of responsibility for agents of change [Peppoloni et al., 2019; Bohle, 2021].

To explore the idea of using the concept of responsibility as a link, it is worth considering the neologism coined by Donna Haraway (Figure 2), namely the compound word response-ability. This term appeared firstly in her Companion Species Manifesto [2003], where she analyzes the relationship between human and non-human. In this first formulation Response-ability has to do with a reciprocal relationship, recognizing inequality of power, yet enabling responsibility and some level of response, both directions [Makela, 2009]. The relationship between a dog and his owner could be a good example: the human is the strong element in the couple, but the dog still plays a role in building the relationship and can change it based on its ability to respond to the human's urges. In a more wildlife context, we can refer to the difficult cohabitation of human and wild animals, e.g. to the huge debate about the management of bears in anthropic areas raised after the first mortal attack by a bear in the eastern Alps, during spring 2023. Here again, the human beings have the biggest power in decisions, but these decisions are influenced by the response of the bears.

The concept has then been developed over the years through Haraway's works, linked to other neologisms, such as becoming-with-others [2007] and sympoiesis [2016], equally related to the central idea of relation. The most articulate definition of the term response-ability can be found in the volume *Staying with the Trouble: Making Kin in the Chthulucene* [2016], where the author speaks about:

the ability to generate responses to the problems of the present, vexed by the consequences [...] of an age of multi-species urgencies, including the human one [...] An age in which one refuses to know and cultivate one's response-ability, in which one refuses to be present in and to the advancing catastrophe.

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Figure 2. Donna Haraway and a reimagining of the cover of the Italian edition of her book from the animation *Endosymbiosis. Homage to Lynn Margulis (2012)* by Shoshanah Dubiner (illustration by M.D. Tonon).

In the latter formulation, the context of the ecological crisis (problems of the present, advancing catastrophe) is interpreted beyond any kind of anthropocentrism (an age of multispecies urgencies). Although this is debatable, because we would have to show that nonhuman entities are experiencing an epoch of urgencies and not a "natural" environmental pressure to which they will respond by adaptation or extinction, what clearly emerges is a systemic view in which humans, like other species, face the danger of extinction. In this regard, Haraway's thoughts should sound very familiar to geology in particular, which focuses on the interactions between parts, as also demonstrated by its systemic thinking, that is, the processes of action and feedback that govern the Earth system.

Speaking about response-ability, it is worth quoting a passage from translator Claudia Durastanti's (Figure 3) note to the Italian version of the volume, where she asks:

What would have been the effect of the neologism responsiveness (rispostabilità, in Italian) had it been chosen instead? Both denote the ability to generate responses in the face of the urgencies of the present, but in one case it accommodates the concept in something we already have, in another it relaunches it with a little break-in.

Response-ability must be built and modified continuously, based on observation and listening, i.e. relating to the non-human agents living with us on this planet. It is not a predetermined moral principle, it is a way of living, of staying-with the present, staying-with the problem, because that of life is a story of existing and progressing, which Haraway explains through another neologism, ongoingness. If we broaden this idea of listening to take care of the consequences of our actions to the nonliving elements of the planet, we might move toward a full recognition of the concept of geodiversity.



Figure 3. The Italian translator Claudia Durastanti of Haraway's book with some significant terms in the English/Italian translation (illustration by M.D.Tonon).

Rather than being applied in paradoxical contexts, e.g. questioning if a volcano may consider consequences of climate changes generated by its eruptions, the contribution of Haraway's response-ability to geoethical thought is to stress that the idea of making kin between companion species may include also the non-living elements, in order to move towards a full recognition of the concept of geodiversity as an equal value to biodiversity. The ability to generate responses to the problem of present that we have to develop passes through a new relationship to be established with the entire planet, including the geosphere, which we must be able to listen to in order to understand the consequences of our future actions. Interpreted under this

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ethical meaning, the geological system thinking appears to be the most suitable tool for this goal.

The relevance of these expressions created by Haraway brings back to one of the two dimensions of ecological philosophy emphasized earlier, that of relation: the same concept is basic on the neologism that will be analyzed in the following section.

4. Karen Barad's intra-action⁶

As mentioned above, the contemporary posthuman theories are based mainly on the concept of relation: everything comes from relations, because everything originates from interconnections, and so everything is ecological [Guida and Caretto/Spagna, 2019]. Among the most remarkable of these theories, Barad's agential realism is fundamental for many academic fields, from science studies to feminist technoscience. Barad's background as physicist, with studies in theoretical particle physics and quantum field theory, was the starting point of her view of the universe as a container of phenomena. But these phenomena do not precede their relations, they rather emerge through their relations: they represent "the ontological inseparability of intra-acting agencies" [Barad, 2007]. Intra-action is therefore a term that Barad uses to replace inter-action, which necessitates pre-established bodies that then participate in action with each other. On the contrary, intra-action defines agency not as an inherent property of an individual, but as a dynamism of forces in which all "things" (or phenomena) are constantly influencing and working inseparably [Barad, 2007]. With this concept, challenging for individualist metaphysics, Barad opens the way for a rethinking of identity itself and its performative modes of construction [Santambrogio, 2018]: the universe is no longer made up of pre-existing entities, but rather of phenomena occurring in their own intra-acting, interconnected, mutually emergent. In another formulation, intra-action is the ability of material entities to relate to each other in unanticipated ways, so as to create a new phenomenology:

The world out there has capacity to turn on and create things independently of the human (...) Reality remains mutable, unknown, complementary to what we can know [Barad, 2007].

⁶ This section uses the singular they to refer to Karen Barad, in order to respect the gender neutrality.

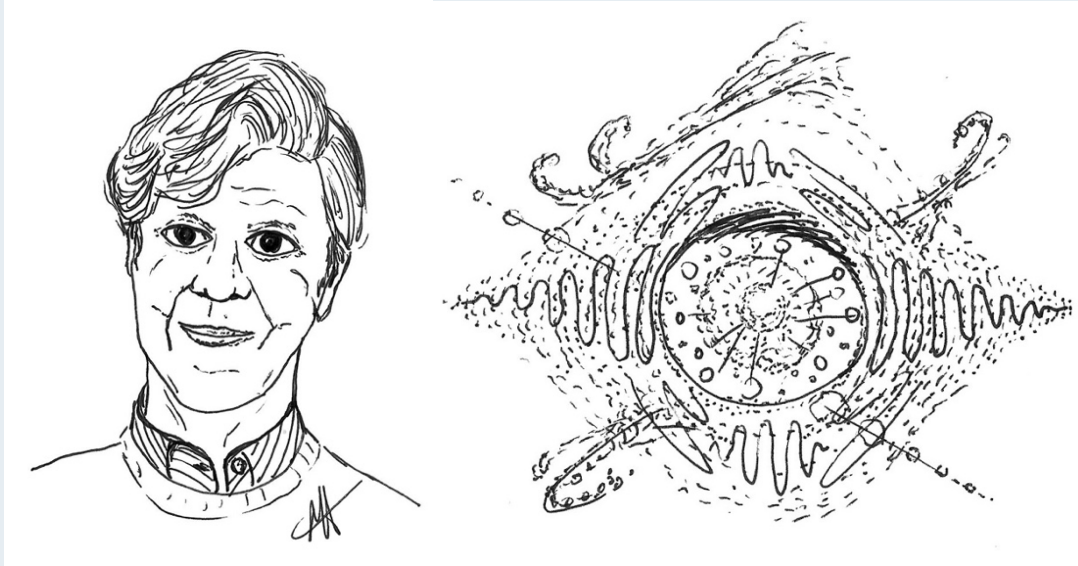


Figure 4. Karen Barad with a quantum physics concept drawing (illustration by M.D.Tonon).

These words easily recall some of Werner Heisenberg's (1901-1976) reflections about natural sciences, definable not only as a description of nature, but rather as a part of the mutual action between human beings and nature: an idea that fully restores the most authentic image of earth scientists [Peppoloni, 2008].

In order to make an example taken from the natural world, Barad explains the singular behavior of a unicellular amoeba, the *Dyctiostelium discoideum* (Figure 5). This organism lives in the layer of decomposing soil and leaves in the undergrowth, feeding mainly on bacteria. In the event that food begins to become scarce or otherwise environmental conditions become adverse, a multitude of amoebae aggregate. This gives rise to a multicellular form termed Pseudoplasmodium, resembling a snail, capable of moving to reach strongly illuminated areas; there a process of differentiation begins with the formation of a base, a stem and a fruiting body in which amoebae differentiate into spores. Finally, the spores are released and, in the presence of a favorable environment, single-celled amoeboid individuals emerge from the protective coating. The metaphorical value Barad attaches to the behavior of the *Dyctiostelium* is the renunciation of individuality, which allows survival within a critical stage. The transition from individuality to the group makes emergent properties appear that do not exist in the individual. The questions this observation

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raises for us are the following: who decides the ways in which individual amoebae aggregate and the Pseudoplasmodium moves? Where is the agency? Nobody decides for that. Evolutionism “has decided”. According to Barad’s intra-action, it seems clear that individual can only express itself through the community, i.e. the meshwork of relationships, that is the necessary act for future survival action. This approach can be defined ecumenical (from the Greek oikoumene, “the whole inhabited world”) because it deals with a cooperation of the individuals: in the conclusions we will put this adjective in our proposal of an enlargement of the geoethical glossary.

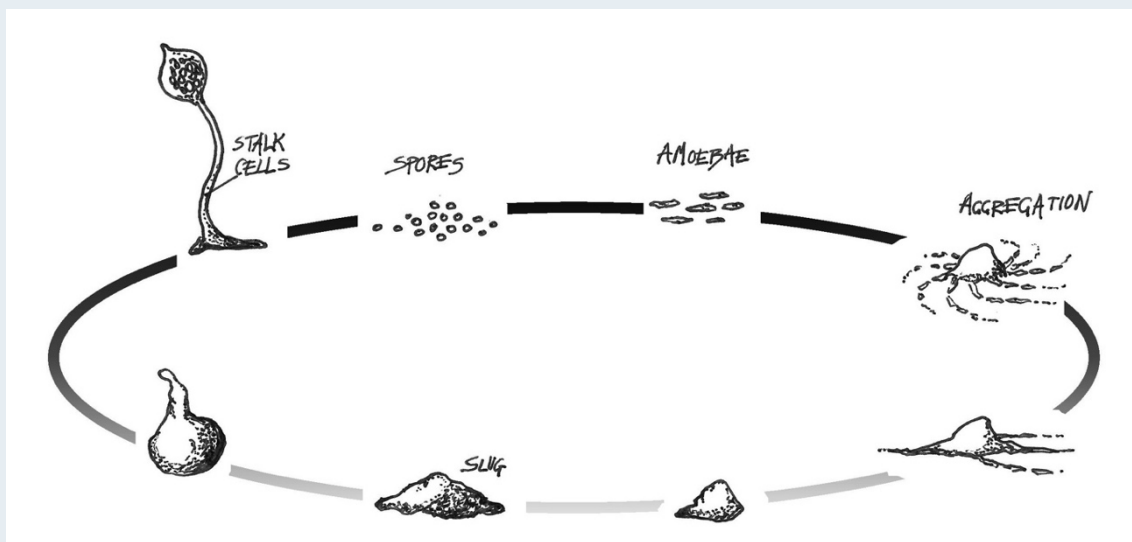


Figure 5. The extraordinary alternative life cycle of *Dictyostelium*, which under conditions of starvation, develops populations of cells that aggregate spontaneously and behave in a very similar way to a multicellular organism (illustration by M.D. Tonon).

Strongly inspired by the works of Niels Bohr, one of the founders of quantum physics, the agential realism is at the same time an epistemology and an ontology (Barad uses the neologism ontoepistemology), but also an ethics: human beings should go beyond the idea of a humankind’s agency as an act confined to their species instead of a universal enactment. They should start to see themselves as active and real parts of the world-building that is their home [Svensson, 2021]. This is consistent with the dual meaning of the word ethics itself, one related to the social sphere and one to the individual sphere [Peppoloni and Di Capua, 2015], but at the same time broadens the social sphere to a sort of planetary sphere: that is why

agential realism and the concept of intra-action have something to do with the responsibility and the other principles of the geoethical thought. In terms of education for sustainability, indeed, an intra-active approach to education research and practice might enable less anthropocentric and more relationally attuned response-abilities, for both teachers and students [Verlie, 2020].

5. Tim Ingold's correspondence

*Nature is a temple in which living pillars
Sometimes give voice to confused words (...)
In a deep and tenebrous unity,
Vast as the dark of night and as the light of day,
Perfumes, sounds and colours correspond.
Charles Baudelaire, Correspondances [1857]
(English translation by W. Aggeler)*

It might surprise, speaking about ethics, to involve a poet whose reputation is as a blasphemer, rather than a sadist or an addict to any kind of depravation like Charles Baudelaire (1821-1867). However, the intention here is not to reason about his passionate ethical commitment [Kaplan, 2006] but to remember his use of the term correspondances, the title of one of his most famous lyrics. Considered a milestone of the symbolist poetry for its innovative use of some rhetorical figures such as analogy and synesthesia⁷, the poem was written without any ecological purpose: yet some lines (In a deep and tenebrous unity...perfumes, sounds and colours correspond) have an interesting resonance with the two dimensions of ecological philosophy that we are considering, perception and relation.

⁷ Analogy (from the Greek *analogía* = correspondence) is the rhetorical figure of meaning that consists of juxtaposing two images or situations, which are different and lack, apparently, a logical connection, because the connection between the two elements is not immediately obvious. Analogy is similar to metaphor, but compared to metaphor it is bolder and more complex in that it establishes similarity relationships by associating elements on the basis of free associations of thought or feeling, whereas metaphor is based on an obvious similarity relationship between images. Synesthesia, on the other hand, is the rhetorical figure of meaning that is based on the juxtaposition of two words that belong to different sensory spheres. The term comes from the Greek: *syn* = together, and *aisthánomai* = I perceive, meaning "simultaneous perception." In synesthesia, therefore, there is a mixture of different sensory realms in creating an image in which nouns and adjectives that belong to different sensory spheres are associated to each other for the purpose of making an image stand out and give it greater incisiveness.

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There's no evidence of Baudelaire in the references of Tim Ingold's books and studies. Nevertheless, the concept of correspondence can be considered the key to enter the thought of the British anthropologist [Perullo, 2021], so much so that it was chosen as the title of the volume published in 2021. But the reflection on this concept started earlier. In his previous essay Making [Ingold, 2013], where he connects anthropology with archeology, arts and architecture, Ingold speaks about a new methodology of inquiry.

Putting this method into practice does not mean describing the world or representing it, but opening our perception to what is happening around us so that we can respond to it in turn. This means establishing a relationship with the world, to which I will henceforth refer by the term correspondence [Ingold, 2013].

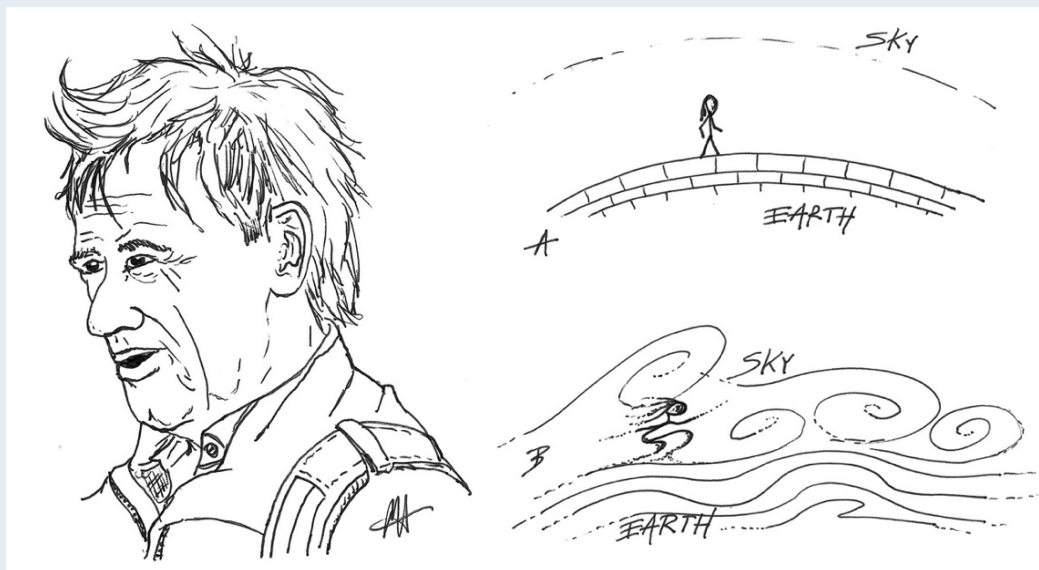


Figure 6. Tim Ingold and the two models of the world: the one we conventionally represent (above) and the real one in which everything is in inter-action in a continuous flow of energy and matter (below) (illustration by M.D. Tonon).

Once again, perception and relation are both present in this statement. To better explain what kind of relationship with the world can be considered as a correspondence, Ingold distinguishes it from inter-action, because inter-action is between-ness, correspondence is in-between-ness [Ingold, 2015]. This distinction, so subtle from a linguistic point of view, is best explained in this passage [Ingold, 2020]:

If our world is in crisis today, it is because we have forgotten how to correspond to it, engaging instead, in campaigns of interaction. Pro-interaction factions confront each other, with identities and goals already predisposed, dealing in ways that are useful to their separate interests, without doing anything to transform them. Their difference is given at the beginning and remains afterwards. Interaction is therefore a relationship between, while correspondence proceeds in agreement (goes along). The problem is that we have become so wrapped up in our interactions with others that we have ceased to notice how much, both we and they, proceed together in the current of time. As I have tried to show, correspondence is about the paths along which lives, in their perpetual unfolding and becoming, unite and at the same time differ from one another. This transition from interaction to correspondence involves a fundamental reorientation: from being-between (between-ness) to the being-in-between (in-between-ness) of entities and things.

It is worthy to underline how much Ingold's words are in harmony with the Barad's theory of agential realism. Here and there, the idea of inter-action represents a non-ecological way to perceive the world, made by individual identities with separate interests: nothing to do with the correspondence (in Barad [2007], intra-action), where things are united and at the same time different, in a perpetual becoming. But there's another interesting resonance in Ingold [2020]:

Since the things of this world, as they grow and move, respond to each other, they are also responsible. In this one world of ours, responsibility does not affect only some. It is a burden that everyone must bear.

These statements sound very similar to some Haraway's passages, and we suggest to read the idea of responsibility as a burden that everyone must bear not like a moral feature, rather like a skill, a capacity to respond (response-ability). Once again, this would help to avoid some misreading: Ingold is not saying that rocks, fossils or volcanoes should follow an ethical code of behavior; he's stating that they, as parts of the Earth system, have the ability to interact with other elements, including human beings.

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The contribution of the term correspondence to geoethics could hence be articulated in these two points: 1) not enclosing research nor educational practice in distinctions such as subject/object, thought/matter, rational/irrational, instead walking the path of the in-between-ness of things and entities; 2) working on perception of the world as a basic premise for ecological education. This focus on perception brings us back to the idea of an aesthetic crisis underlying the environmental crisis. In the conclusions we will discuss the possible consequences of this awareness, including the pedagogical strategies that can be used to educate people in a (geo)ethical and sustainable way.

6. Conclusions: the stones, the arch, the bridge

*Marco Polo describes a bridge, stone by stone.
But what is the stone that supports the bridge? - Kublai Kan asks.
- The bridge is not supported by this or that stone, - Marco replies, -
but by the line of the arch they form. Kublai Kan remained silent, reflecting.
Then he added: - Why are you telling me about the stones?
It is only of the arch that I care.
Polo replied: - Without stones there is no arch.
Italo Calvino, Le città invisibili [1972]*

Born to widen the cultural horizon of geoscience knowledge and contributes to orient scientists and society in the choices for responsible behaviors towards the planet [Peppoloni and Di Capua, 2020], geoethics can no longer be considered a discipline that deals mostly with abstract concepts, rather a transdisciplinary field open to discussion on issues relevant to sustainability and the accomplishment of the 2030 Agenda sustainable development goals [Vasconcelos et al., 2020]. The connection with the ecological philosophy or ecosophy, starting from the original definitions of Naess and Guattari to the more contemporary theories discussed in the previous sections, is in our opinion an issue that cannot be postponed: the proposal of using the term geosophy to refer to geoethics sensu lato, i.e. to the broader considerations regarding human–Earth system interactions [Bohle et al., 2019], finds us in agreement.

The pedagogical and political project of geoethics, urgently needed, has been defined by three adjectives: inclusive, participatory and proactive [Peppoloni and Di Capua, 2021]. If we stand on the pedagogical side, these terms can be compared with the

so-called 3 T of environmental education that, in accordance with many studies, has to be transdisciplinary, transgressive and transformative [Hirsch-Hadorn et al., 2008; Lotz Sisika et al., 2015]. Based on what we have analyzed in this article, we suggest yet another triad of adjectives: a geoethical educational proposal can only be ecological (of relation), aesthetic (of perception), and ecumenical (of community), understanding the term community in the broadest possible sense, which includes the human and the non-human, the living and the non-living. Our suggestion is to reflect upon the multiple possible intersections between these nine adjectives listed in Table 2, as illustrated with an example in Figure 7, in order to consider them for an enlargement of the geoethical glossary. The same terms, and the same principles, are applicable to a political proposal, understood both as a training opportunity for policymakers and as inspiring action for those who want to participate in public life.

References	Adjectives	Meanings
Peppoloni and Di Capua, 2021	inclusive	Consider issues of diversity in an effort to engage all students in learning
	participatory	Involves people taking part in it
	proactive	Is intended to cause changes, rather than just reacting to change
Hirsch-Hadorn et al., 2008; Lotz Sisika et al., 2015	transdisciplinary	Crosses the boundaries of disciplines
	transgressive	Generates critical thinking, challenge systems and rules
	transformative	Leads to a shift in thoughts, emotions and actions
Gerbaudo and Tonon (this work)	ecological	Focuses on relations between the human sphere, living matter and the physical world
	aesthetic	Is based on perception: the way we perceive the world influences the way we interact with it
	ecumenical	Sees learning as a collective process, not just individual one

Table 2. The nine adjectives proposed for a geoethical educational project.

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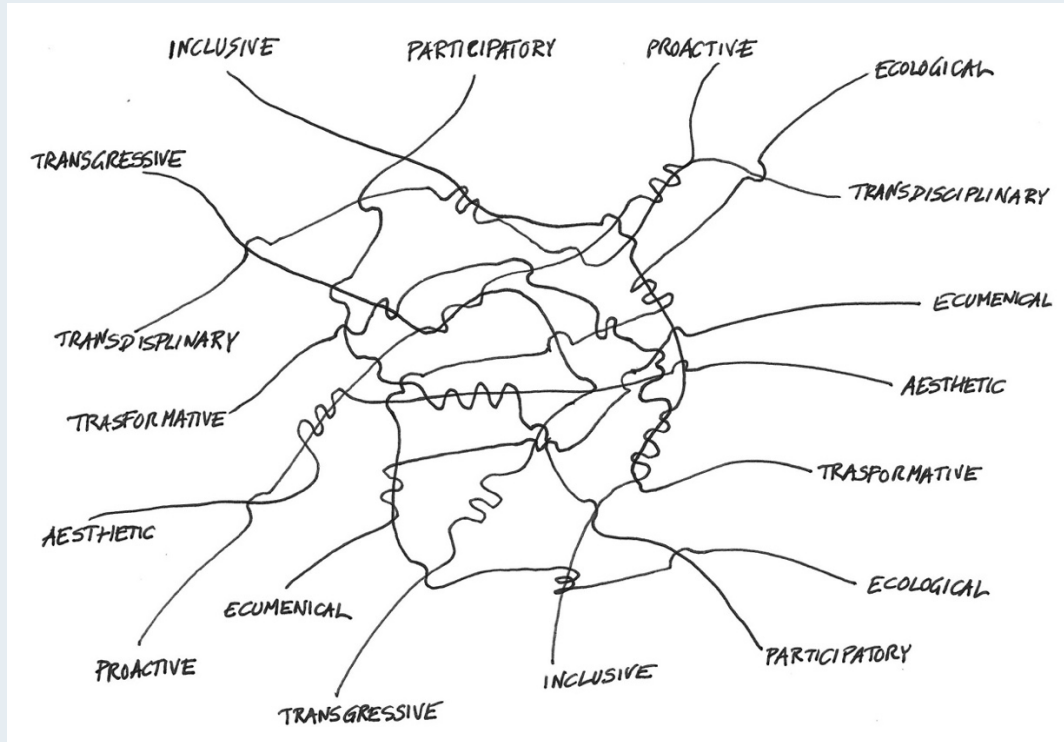


Figure 7. Another meshwork, the possible relations between the three triads of adjectives (illustration by M.D. Tonon).

One might ask what is the point of reasoning about words? In a scene from his famous 1990's movie, *Palombella Rossa*, the Italian director and actor Nanni Moretti said:

Who speaks wrongly, thinks wrongly and lives wrongly. It is necessary to find the right words. Words are important!"

This is a good starting point, every time we want to discuss about ethics and language: if we want to build a new kind of ethics, and that is geoethics, we need its foundation to be solid: It seems not casual that one the first and most important paper on geoethics is "The Meaning of Geoethics" [Peppoloni and Di Capua, 2015], in which authors deal with geoethics starting from the etymological analysis of the prefix *geo-* and the word *ethics*.

If we want to draw an arc across the divisions between disciplines and to arrive at a new kind of science and education, we need its capstones to hold. If we want to support a bridge between the present and the future, we need its cornerstones to sustain the

weight of the challenges ahead. As the imaginary Marco Polo in Italo Calvino, *Le città invisibili*, [1972] says, “without stones there’s no arch”. Without the right words there’s no possible ethics, no innovative education, no sustainable future.

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