Geoethics for Operating in the Human Niche

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Abstract

Geosciences co-shape the human niche; hence, geoethical thinking is pertinent for geoscientists. Within the human niche, geo-endowments, like water, are shared resources that commons. As a societal context, the human niche is a planetary network of natural and cultural environments. Geoethical thinking explores cultural substrates that nurture the skills of human agents and the operational circumstances that they encounter in the human niche. Initially, geoscientists conceived geoethics for their professional circumstances. Subsequently, geoethics evolved into an epistemic, moral hybrid for citizens that are interacting with the Earth system. Furthering geoethics—that is, combining it with Kohlberg's 'hierarchy of moral adequacy' and Jonas's 'imperative of responsibility'—leads to formulating in a 'geoethical rationale', namely, to act *'actor centric, virtue-ethics focused, responsibility focused, knowledge based, all-actor inclusive, and universal rights based'*. Uniting geoethical thinking with thinking about moral adequacy and responsibility for future generations strengthens the applicability of geoethics. The geoethical rationale is formulated at a normative meta-level to apply in any societal or scientific context that is relevant for geosciences. Furthermore, the geoethical rationale supports any human agent (geoscientists or citizens) in navigating the human niche, for example, by framing how to handle a diversity of cultural, social and scientific circumstances.

1 Introduction

Geoethics is about how geo-professionals and citizens situate themselves as part of the Earth system (Bobrowsky et al. 2017; Bohle et al. 2019), that is, how to navigate the 'human niche'. The notion of human niche is a metaphor for the scientific concept of 'anthropogenic biome' (Ellis et al. 2016; Fuentes 2017). Essential parts of the human niche are shared resources like soil and water ('geo-endowments'), as well as the manners how societies do handle them (Leach et al. 2018).

This contribution takes a system dynamics perspective. The '*sense-making-action feedback loop*' of social–ecological systems relates the concepts of human niche and geoethics. Subsequently, a 'geoethical rationale' is sketched relating geoethics with Kohlberg's hierarchy of moral adequacy and Jonas' imperative of responsibility (Kohlberg 1981; Jonas 1984).

2 Geoethics: A Tool for Sense-Making

2.1 Complex-Adaptive Social–Ecological Systems

Anywhere at Earth, natural processes and human practices dovetail into local, regional and planetary social–ecological systems. Often these systems exhibit a dynamic that is marked by nonlinearity, threshold-dependent shifts of system stages and positive feedback loops. Subsequently, complex-adaptive system behaviour is emergent. The

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practices or governance arrangements of people (human agents), corporations and institutions co-shape the given social-ecological systems (Fuerth and Faber 2012; Biermann 2014; Chaffin et al. 2016; Kowarsch et al. 2016; Bohle 2017). The rational and affective justifications of design choices for production systems and consumption patterns, as well as people's reactions to system behaviour, are parts of these systems (Hämäläinen 2015; Galaz et al. 2011; Head and Xiang 2016a, b; Preiser and Woermann 2018; Merwe et al. 2018). These (soft) parts or 'people-features' are system features in the same merit as any (hard) engineered artefact or natural process. In a social–ecological system, these 'people-features' make loops of positive feedbacks that, subsequently, may cause amplification of system responses and emergent complex-adaptive dynamics.

The ensemble of dynamical features, such as nonlinearity, threshold dependence and positive feedback loops, render any social–ecological system more adaptive and more complex. Subsequently, the system behaviour may be counter intuitive to people's expectations. Such counter-intuitive system behaviour includes (adapted from Preiser and Woermann 2018; Preiser et al. 2018): (1) multiple, parallel cause-and-effect pathways that couple local and system-wide behavioural patterns, which are resulting from networked causes; (2) outputs and inputs may not relate proportionally so that minor changes in the controlling driver can cause rapid, system-wide behaviour or significant changes in the controlling driver may cause a slow and limited system-wide response; (3) structural parts are multi-functional, so that the same function may be performed by different structural parts or the same structure can perform different functions; (4) dynamic interactions that amplify minor inputs to drive cascades of significant effects that cause surprise and uncertainty, and any local intervention may modulate the system-wide organisation.

2.2 Sense-Making in the Human Niche

When described from a systems perspective, the human niche is a network of tightly knotted process loops that exhibits non-separable societal and environmental dynamics (Colding and Barthel 2019; Crona et al. 2016; Schlüter et al. 2019; Donges et al. 2017). The human sense-making is an essential process within the system. To sketch it: people's (that is, individual, collective, corporate or institutional actors) perceptions lead to choices, for example, to deploy given technological schemes. Whatever the choice, it implies to undertake (tangible, physical) actions because of given (conceptual) aims. Subsequently, these actions alter the environment. Perceiving the altered environment leads the actor to undertake subsequent actions. The feedback loop 'sense-making ≫ action ≫ system behaviour ≫

sense-making' is a feature of any social–ecological systems. Within that feedback loop, the design features of the human sense-making processes itself are essential.

Complex-adaptive system dynamics challenge human capabilities to make sense of them; see, for example (Termeer et al. 2019). People use less their rational sense-making capabilities when they face challenging circumstances, such as counter-intuitive system behaviour of complex-adaptive social–ecological systems. Instead, and as an alternative, people use their affective sense-making capabilities (Salvatore et al. 2018). Additional complexity arises through the processes of how individual agents coordinate their sense-making and action. Furthermore, the resulting governance system is a network of knotted process loops with feedbacks. The question arises how, in these circumstances, geoethical thinking can co-shape the rational and affective human sense-making.

2.3 Geoethical Thinking, Geo-endowments and the Human Niche

Nowadays, global supply chains amalgamate a planetary human niche (Folke et al. 2016; Rosol et al. 2017). Geosciences knowledge combined with engineering sciences enables this process (Bohle et al. 2019b). Sustainability means to secure that current and future generations can benefit from the geo-endowments of the human niche, such as air, water, soils, fuels, minerals as well as biodiversity or ecosystem services. It is ethically imperative that the individual, collective, corporate or institutional 'niche-builder' uses common resources in a manner that considers the needs of future generations. That is the essence of Jonas' 'imperative of responsibility' applied to geosciences and their societal applications.

The Cape Town Statement on geoethics outlines an actor centric virtue ethic. It promotes to act responsibly, knowledge based, all-actor inclusive (Capua et al. 2017). Geoethics can be strengthened by applying findings of Kohlberg and Jonas (Kohlberg 1981; Jonas 1984), that is, acting geoethically on a universal rights basis,[1] and considering the needs of needs of future generations. Combining these approaches, a 'geoethical rationale' emerges that calls for agents in the human niche to be '*actor centric, virtue-ethics focused, responsibility focused, knowledge based, all-actor inclusive, and universal rights based*' (Table 1).

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[1]The highest level of moral adequacy, Kohlberg's 'upper post-conventional level', is described by a morality that is based on individual human rights and justice, by acts that are based on universal ethical principles, and by principled self-conscience and mutual respect.

Table 1 Table concise meaning of categories of the geoethical rationale

Category	Meaning of the category
Actor centric	To apply a normative framework that invests (empowerment) an individual/group to act to their best understanding in the face of given circumstances, opportunities and purposes
Virtue-ethics focused	A corpus of personal traits (honesty, integrity, transparency, reliability, or spirit of sharing, cooperation, reciprocity) of an individual/group that furthers operational (handling of things) and social (handling of people) capabilities of the individual/group
Responsibility focused	The outcome of a normative call (internal, external) upon an individual/group that frames decisions/acts in terms of accountability, as well for the intended effects as for unintended consequences and implications for future generations
Knowledge based	In the first and foremost instance, (geosciences/Earth system) knowledge acquired by scientific methods; experience-based ('indigenous/traditional) knowledge is a secondary instance; reproducibility of knowledge by third parties supports any claim of trustworthiness instead of allusion to faith or 'authorities'
All-actor inclusive	Achieve a practice of a 'shared social licence to operate' between various individuals/groups by mitigating differentials of power, voice etc. using participatory processes and capacity building
Universal rights based	Guide affective and rational sense-making of individuals/groups by universal human rights (life, liberty, justice) to strengthen secondary normative constructs such as utilitarian, sustainability or precautionary principles

3 Concluding Remarks

Combining geoethical thinking with thoughts about moral adequacy and responsibility for future generations strengthens its operational guidance. The six categories of the *geoethical rationale* allow relating geoethics to various ethical norms. For example, the categories 'actor centric, virtue-ethics focused' give relevance to any human actor; the categories 'responsibility focused, knowledge based' qualify the action; the categories 'all-actor inclusive, universal rights based' call for participatory governance and may refer to ethics of equity or justice. The geoethical rationale is formulated at a normative meta level to apply in any societal or scientific context that is relevant for geosciences. Furthermore, the geoethical rationale supports any human agent (geoscientists or citizens) in navigating the human niche, for example, by framing how to handle a diversity of cultural, social and scientific circumstances.

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