

## Citizen-science, Geoethics and Human Niche

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The anthropogenic biogeosphere or 'human niche' is the intersection of the biogeosphere and the sphere of human activities of social, economic, cultural and political nature. The application case for geoethics, namely "appropriate behaviours and practices, wherever human activities interact with the Earth system" [1], is about niche building. Geoethics is about the conduct of people and geoscientists, respectively their ordinary lifestyles and professional activities. Geoscience professionals notice the diverse economic, social and cultural living conditions of people, and the application cases of geosciences mirror the diversity of the global social sphere. Subsequently it is argued: A) when considering the ethical dimensions of global niche building then geosciences should feature 'citizen geoscience'; and B) when considering the functioning of a knowledge-based society under conditions of anthropogenic global change then 'citizen geoscience' facilitates applying that knowledge base.

(A) Regarding 'niche building': The design of production systems and consumption patterns embeds geoscience know-how and relates it to the everyday life. Any citizen's activities purposefully interconnect to the biogeosphere for well-being, care-taking, and reproduction, although habitually without involving a geoscientist in professional capacity. In that implicit manner the everyday behaviours and practices of people influence Earth system dynamic. This renders their inherent geoscience know-how a public good as it makes their ignorance a public risk.

A comfortable human niche for billions of people requires a global biogeosphere that is disrupted little by citizens' activities and exposes them to hazards that can be tamed. Quite the reverse, anthropogenic global change will disturb living conditions for many citizens. Much geoscience know-how will have to be deployed to tame disturbances in a socially sustainable manner. Sustainability in turn needs involvement of citizens in researching know-how and deploying it, i.e. needs 'citizen geo-scientists' to maintain the human niche.

(B) Regarding knowledge-based societies: The rapidly increasing human knowledge base accelerates the scientific-technical revolution. Its industrial-societal implementation confronts societies with numerous change processes. Their speed and scope is a risk as well as the mutual interferences of different change processes that often only get obvious within everyday societal doings. This vigour of change requires robust two-way linkages between research and technological development on one side and societal activities on the other side. Research and development undertaken in cooperation with citizen scientists would improve such linkages, e.g. through increased transparency of research and development or strengthening the sense of belonging of people for their environments.

Citizen scientists are a resource, because they are complementary partner to the professional researcher. On one side citizen scientists provide experiences that are rooted in everyday practices and on the other side they facilitate uptake of new practices. Both features are needed in societies that face anthropogenic global change. Summarizing, geoethics affiliates geosciences and 'citizen science' in a particular relationship, i.e. 'citizen geo-science', which is beneficial for knowledge-based societies that are functioning under conditions of anthropogenic global change.

[1] <http://www.geoethics.org/> (accessed: 8th November 2016)

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