

# **Citizen-Science, Geoethics and the Human Niche**



Quarry "Piesberg"  
52:19:15 N, 8:1:33 O  
Osnabrück, Germany

**Dr. Martin Bohle**

Presentation @EGU2017  
EOS14 (Wed. 26th April)

Affiliation: Advisor, European Commission DG RTD

A magmatic intrusion locally transformed sediments of the carboniferous period and lifted them. Erosion made the metamorphosed sediments – shales, coal and quartzite – accessible at the surface. The coal was mined from 15th to 19th century, quartzite is extracted still today.

# Introduction

***"What do I like to argue here?"***

*- presenting a conceptual view -*

***Applied Geosciences***



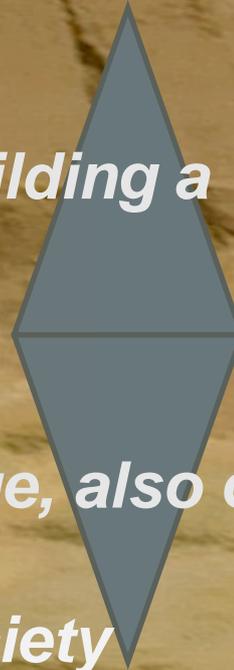
***Geoethics***

***for: building a 'Human Niche'***

***needs: Citizen Geo-Scientists***

***under: change, also of the bio-geosphere***

***Functioning of the Society***



# What is meant by '*Human Niche*'\*? – a primer

- ...the intersection of the biogeosphere and the sphere of human activities of social, economic, cultural and political nature;
- ...the production systems and consumption patterns that embeds geoscience know-how;
- ...a global biogeosphere that is disrupted little by citizens' activities and exposes them to tamed hazards, only;

p.m. Google Scholar (5/4/17) 'human niche': >1200 publications (2011 - 2016)

\* i) Ellis, Erle C. 2015. *Ecology in an Anthropogenic Biosphere*. *Ecological Monographs* 85 (3): 287–331. doi:10.1890/14-2274.1. ii) Fuentes, Agustin. 2016. *The Extended Evolutionary Synthesis, Ethnography, and the Human Niche: Toward an Integrated Anthropology*. *Current Anthropology* 57, S13 (June 2016): S13-S26 doi:10.1086/685684.

# What is meant by 'Geoethics' ? – a primer

- *...research and reflection on the values which underpin appropriate behaviours and practices, wherever human activities interact with the Earth system;*
- *...ethical, social and cultural implications of geoscience education, research and practice;*
- *...social role and responsibility of geoscientists in conducting their activities;*

**p.m. Google Scholar (5/4/17) 'geoethics': >500 publications (2011 - 2016)**

# Geoethics & Human Niche

- ❖ The interactions of human activities with the Earth system to build 'human niche'
  - ...often do not involve a *geoscientist, who is acting in a professional capacity,*
  - ...they are very tight-into citizens' daily lives, and
  - ...they reflect citizens' values and perceptions.
- ❖ The main application cases for geoethics go beyond geosciences into 'niche building', as said:
  - "...appropriate behaviours and practices, *wherever human activities interact with the Earth system...*".
  - **Examples:**

# Human Niche Building & ...geosciences

- *examples 'I'* -

***...civil engineering  
is about building a  
visible intersection  
of the geosphere  
and economic  
activities...***

- dredging a waterway
- building a shore defence
- operating a power plant

# Human Niche Building & ...geosciences – *examples 'II'* -

***...as technology evolves as more convoluted get the application of geosciences...***

- renewable energy from the wind, the tide and the sun
- tide, ice and sea wave forecasts for shipping
- satellites in a solar storm

# Human Niche Building & ...geosciences

– *example 'III' -*

***...urban dwellings are intersecting the local and global biogeosphere through massive fluxes of matter and energy...***

- receiving drinking water and ejecting waste water
- receiving electric power or fuels and ejecting heat
- receiving food and ejecting manufactured goods

# Geosciences, Human Niche & Geoethics

- ❖ Contemporary knowledge-based society/ies knot geoscience know-how firmly into the functioning of its/their 'human niche(s)', therefore sound geosciences are a vital common good, in particular in times of anthropogenic global change.
- ❖ Consequently, geoethics concerns the conduct of citizens (and of geoscientists) regarding both:
  - *their ordinary life-styles [including values and perceptions to which they refer], and (m)any of*
  - *their professional activities.*

## News on Geoethics or the 'Cape Town Statement\*' (September 2016)

- ✓ ...addresses the geo-professionals, who “*have specific knowledge and skills, which are required...*”;
- ✓ ...qualifies geosciences to “*have major impacts on the functioning and knowledge-base of modern societies*”;
- ❖ ...nonetheless it is silent about the participation of citizens at geoscience research, i.e. it does not reflect on '*citizen geoscientists*'.

\* <http://www.geoethics.org/ctsg>

# What is meant by '*Citizen Science*'? - a primer

## It's about citizen's participation at research!

- **Frequently:** data gathering & analysis
- **Some times:** research question & experimental design
- **Regularly:** policy & impact

**p.m. A corpus of practical guidance & experiences exists; e.g.:**

Citizen Science at Universities: Trends, guidelines and recommendations, League of European Research Universities - Advice Paper No. 20 October 2016, LEUR Office, Leuven, Belgium, 22p.

**p.m. Used in some natural and social science disciplines; less in geosciences [ $< 5\%$ ]**

See: Kullenberg, Christopher; Kasperowski, Dick, 2016. What is Citizen Science – A Scientometric Meta-Analysis, 2016. PLOS one, DOI: 10.1371/journal.pone.0147152.

**p.m. Google Scholar (5/4/17) '*Citizen science*' \*: >16.600 publications (2011 – 2016)**

\* Searching in Google Scholar for “citizen geoscience” (5/4/17): i) Powell, John; Nash, Gemma; Bell, Patrick, 2013. GeoExposures: documenting temporary geological exposures in Great Britain through a citizen-science web site, Proceedings of the Geologists' Association, 124 (4), 638-647, DOI: 10.1016/j.pgeola.2012.04.004; ii) Wardlaw, Jessica 2015, 'Mars Rocks – introducing a citizen science project'. EGU-blog, <http://blogs.egu.eu/geolog/category/space-and-planetary-sciences/page/4/>.

# Science & Citizens – Citizen Science

- a lay excursion into history-

- The modern science endeavour emerged from the (European) Renaissance. Then a tiny urban elite undertook 'R & D'.
- Their insights trickled slowly into the daily dealings of citizens.
- Experiences, whether these insights were fit for citizens' lives were gathered in context of their *day-2-day-dealings*; more by (societal) practice than by testing & deployment.

*... since the Renaissance two centuries\* went with further social, economic and political developments; the scientists and technologists were (some) Bourgeois and Noble-man/woman who were supported by wealthy sponsor, public prizes, such as the 'longitude prize'; governments' invested into infrastructures (bridges, roads, and channels), mining technology, and means for power projection; and still the scientific findings and technological developments got used only slowly in daily doings of the citizens...*

\* Fressoz, Jean-Baptiste 2012. *L' Apocalypse Joyeuse - Une Histoire Du Risque Technologique*. Le Seuil.

# The Modern Citizen a Spectator?

- ❖ Mainly, the capitalistic production from caused to broaden the social basis of science and technology and its deployment, as well as it industrialises the production, testing and deployment of insights.
  - *~ 90% of all scientists that ever lived are living today,*
  - *in developed countries, the professional occupation of several percent of the population is researcher, scientist or engineer;*
- ❖ But nowadays\*, society and government often may take the role of a passive spectator, which frequently may feel to be kept as object of the knowledge-driven changes to the production systems, consumption patterns or ways of living.

\* David, P. A.; Foray, D. 2016. *An introduction to the economy of the knowledge society*. International Social Science Journal, 54: 9–23. doi:10.1111/1468-2451.00355

# The Citizen a *frustrated* Spectator?

- Assigning to citizens the role of a passive spectator means frustrating them, what is a substantial societal risk:
  - ❖ ...because of the speed and depth of different change processes (innovations) and their mutual interferences\*;
  - ❖ ...because of change processes that are disrupting the habitual societal dealings within the human niche;
  - ❖ ...because of the gap between ordinary (daily) and scientific – technical know-how.
- What's the issue: The citizen's view, how to render the change processes *'fit for daily lives & their human niche'*.

➤ **An example with limitations:**

\* Roco, Michali C.; Bainbridge, William S. 2013. The new world of discovery, invention, and innovation: convergence of knowledge, technology, and society. J. Nanopart Res. 15:1946, DOI: 10.1007/s11051-013-1946-1

# Global Change & Citizen Scientist

– an example of *illustrative* limitations (I) -

*"A global bio-economy must rebuild natural capital and improve the quality of life for a growing world population. It should balance managing common goods, such as air, water and soil, with the economic expectations of people. Three types of innovation will be needed ...Also needed will be citizen-science evaluations of new houses, local wood-recycling and construction efforts. Sustainable food systems will require advances in plant breeding, food products, and farming and cultivation techniques ....Inclusiveness and knowledge transfer are important."*

Beate El-Chichakli, Beate, Joachim von Braun, Christine Lang, Daniel Barben, Jim Philp (2016) Policy: Five cornerstones of a global bio-economy, Nature 353 (7611), Nature Publishing Group, Jul 12, 2016 p.222

# Global Change & Citizen Scientist

– an example of *illustrative* limitations (II) -

- ✓ Bio-economy is an emerging driver of major change
- The link between bio-economy and geosciences is noteworthy, although it remains unspoken:
  - ❖ **But:** *"Common goods, such as air, water and soil"* are essential *geo-features of the 'human niche'*.
  - ❖ **But:** A global bio-economy designed to *"rebuild natural capital and improve the quality of life"* means **to engineer at a planetary scale.**
  - ❖ **Finally,** Citizen Scientist are seen as end-of-line product tester, **only.**

# What to learn?

- ❖ To recognise:
  - the need of intermediary agents\*, who are interfacing (geo)sciences and society/ies, and
  - the hidden nature of 'geosciences' insights: *to be a common, public good*;
- ❖ To exploit Citizen Science as a resource:
  - to reach out to practitioners (of various trades), their experiences and their daily societal practices; and
  - to provide an early test-bed to practice geoscience insights within (other / different) communities;

\* Bonney, Rick; Philips, Tina B.; Ballard, Heidi L.; Enck, Jody W. 2016. *Can Citizen science enhance public understanding of science?* Public Understanding of Science 25(1):2-16, DOI: 10.1177/09633662515607406.

# What to do next?

## ❖ **Deploy\*** *Citizen Geo-Scientists*

- ✓ *But, go beyond to look for the "data-buddy"*
- ✓ *to seek a complementary partner to do research*
- ✓ *to research 'how to operate a sustainable human niche?'*

## ❖ **Citizen Geo-Scientist's contributions to:**

- ✓ *...evidently, data gathering and data analysis*
- ✓ *...evaluation of research findings in day-to-day contexts*
- ✓ *...design and selection of the research questions*
- ✓ *...design of the methodologies and conduct of experiments*
- ✓ *...publication, dissemination and outreach*

\* Vayena, Effy; Tasioulas, John 2015. "We the Scientist": a Human Right to Citizen Science. *Philos. Technol* 28: 479-485. doi:10.1007/s13347-015-0204-0

# Citizen Geoscience - applied Geoethics !

## To recall:

**'Geoethics'** is as much about ordinary citizens as it is about geoscientists; it is about their lifestyles and professional conducts, in (m)any profession(s).

## To recall:

In knowledge - based societies, which have to function under the conditions of anthropogenic global change, **'geoscience'** know-how is a common, public good.

*An active role of 'Citizen Geo-Scientists' in research to exploit how the quality of lives of citizens and earth sciences relate to each other.*

# Thank you !

Early draft: <http://iapgeoethics.blogspot.be/2016/08/whats-up-citizen-scientist-by-bohle.html>  
Abstract, DOI: 10.13140/RG.2.1.1889.0489

## Citizen Science at EG02017:

Session IE2.1/NH9.19/ESSI3.12 Media: Citizen science and observatories for environmental monitoring, planning, and disaster resilience building; EGU2017-18275: Timing and duration of autumn leaf development in Sweden, a 4-year citizen science study; EGU2017-17841: Challenges of citizen science contributions to modelling hydrodynamics of floods; EGU2017-13449: Developing citizen science projects: Cut twigs for 'chilling' pupils; EGU2017-8662: Citizen Science for Traffic Planning: A Practical Example; EGU2017-17740: The PACA Project: Creating Synergy Between Observing Campaigns, Outreach and Citizen Science; EGU2017-8102: New possibilities in hydrological monitoring offered by experiences of Citizen Science: CITHYD, a web application for hydrometric measurements in rivers; EGU2017-3723: Creating a testing field where delta technology and water innovations are tested and demonstrated with the help of citizen science methods; EGU2017-7778: Reducing tick bite risk in Finland – combining citizen science and GIS for predictive modelling of tick occurrence; EGU2017-5220: Immersive participation: Smartphone-Apps and Virtual Reality - tools for knowledge transfer, citizen science and interactive collaboration; EGU2017-3310: Climate research, citizen science and art in Bangladesh; EGU2017-15595: Eco-drifters for a dispersion experiment at the mouth of the River Arno: the citizen-science contribution; EGU2017-3593: Can remote sensing help citizen-science based phenological studies?

## Acknowledgement:

*I'm grateful that my employer granted the opportunity to pursue extra - curricula activities along with my professional duties. For the lawyers, the opinions expressed in this essay engage only me, the author and not my employer.*

## Background picture

*(mine, [imageo.egu.eu](http://imageo.egu.eu))*

*Story: To lay foundations, a building pit was carved into sandy clay. Rain alimented a water puddle upstream of the pit. The puddle bursts. The water cuts a canyon into the slope of the pit, and disposes a sediment fan at its flat bottom.*