

Wolfgang Lucht

The future of the biosphere: where are we heading?

(summary by Bálint Czúcz)

Just imagine that a Little Green Organism (LGO) somewhere between *Deneb* and *Wega* is peeking the sky through a telescope-like object looking for places in the universe where life might exist (apart from his home, of course). If this LGO is patient enough, and manages to find our solar system among billions of other possible candidates, he (it) would probably cheer up and go to the local pub to have a refreshment after all that long and hard work. For as scientists – as Wolfgang Lucht – claim our living planet Earth could be easily spotted from thousands of uninhabited planets – only by the spectrum of the reflected light. This depends highly on the composition of the atmosphere, which, having been formed by long coevolution with the living world, carries the fingerprint of life. And this would surely give us away.

From here on Wolfgang Lucht has tackled many philosophical questions of the existence of life (*Does life occur easily on planets? Why do all organisms have to die? Are humans part or spoilers of the nature?*). Though we know no other inhabited planets (*Our biosphere is a statistical sample of size 1*) we may still learn much from our past. The first lesson is that a biosphere does not necessarily have to look like this one. In fact for most of its history the Earth's biosphere has been something completely simple in comparison to what we have now – with very little biodiversity and slow evolution. For events to speed up some *major transitions* had to happen: such as the appearance of chromosomes, cell nuclei and organelles, sexual populations and human societies. And with this last major transition we are at a point where the rules have completely changed. Genetics is not the only way of information transmission any more: the evolution of languages has made it possible to pile up huge amount of common knowledge. But does this also imply understanding about the world? *Can we understand the consequences of human actions? Could we be able to even steer this system?*

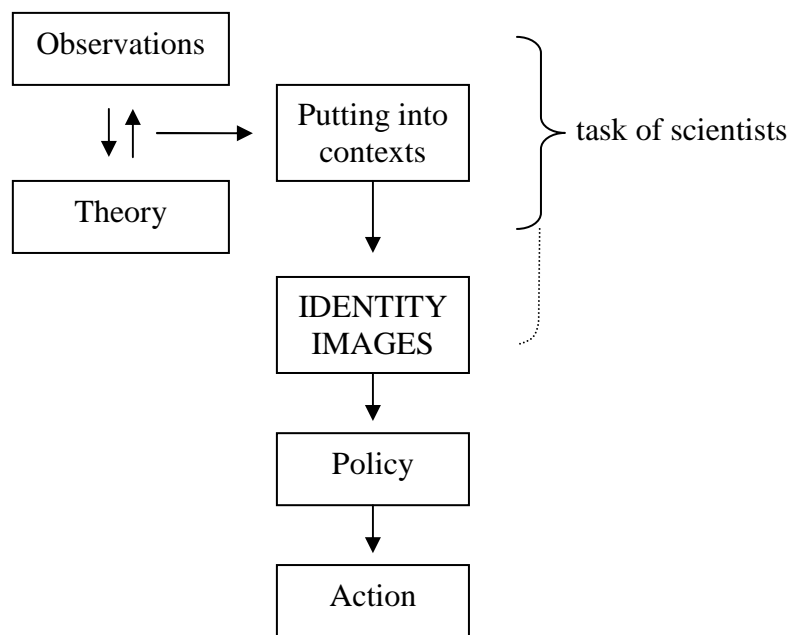
Our understanding can be improved in several ways, one of which is modelling (“*digital mimicry*”). This gives us the opportunity to play around a bit with our planet, trying to map the consequences of our actions on the future of the Earth. With such models (as e.g. the LPJ global vegetation model) it becomes possible to see how the system reacts to the human-induced changes in the environment. If the new equilibrium is close to what we are used to, and we can cope with the changes, we are lucky. But there might be changes that can drive our planet out of the limits of the “usual equilibriums”, to a completely new equilibrium, which may not support life any more (e.g. a “snowball Earth”). This is certainly a future no one dreams about. There are some other possible horror futures, that imply that new “major transitions” (e.g. artificial intelligence, GMO world...) would take place in our biosphere – as a part of our social-cultural “development”. Principally we have three choices:

- *adapt to Nature* (a “green” future?)
- *make Nature adapt to us* (the future of the Global Change – that might end up in a collapse)
- *detach from Nature* (the “cyborg” version)

Where we are heading is not clear yet. With the emersion of intelligent life there is new sphere of processes added to the Earth-experiment: the “*mental world*” including all the social economical and cultural drivers of our new environment. The former coevolution

between the *physical* and *biological* spheres of the Earth has to be replaced by a new type of adaptive evolution for all the three worlds. If this “new coevolution” is going to be successful, we have good chances to survive. *Despite all we do know (and that is: that a lot of change is coming), I don't think we know very well yet – as we still don't understand the Earth system including us humans all that well.*

(“And what can we, scientists do in this situation” – was there the question shortly after the presentation. Wolfgang only replied after long seconds of consideration. The answer was a little sketch on the blackboard (well, a similar one):



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