19.-24.9.2017, Kuopio

GLOBAL FLOOD

How a scientist see the work

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Milla Martikainen: contributing to the planning of the installation, documenting and presenting the process
Pertti J. Martikainen: planning of the installation and creating the basic construction
Timo Oksanen: electronic control engineering
Puumalan Hirsiveistämo,Timo Martikainen: turning of the logs

Science and Art

Science has created the basis for the development of the modern society with the innovations used e.g. in technology and medicine. Unfortunately, this development has created also global scale environmental problems, increase in the atmospheric carbon dioxide concentration as an example.

Therefore, science and technology have a great responsibility in solving environmental problems. But science and technology can't do this alone because everything happens in a broader cultural and societal context: how the public perceives the situation and how we make everyday and political decisions. Values and emotions play an important part in the decision-making processes and there art can have a role. Propably every one has an experience of the personal/collective emotional state when, for example, an excellent movie ends and the audience starts to leave the cinema. As if, for a moment, one would have realized something deeper and more meaningful. I have attached below a figure of our recent publication. The figure presents a conceptual model how scientific knowledge is transmitted to societal and political decision-making. It has been completed here by indicating a potential place of art in the decision-making – process.

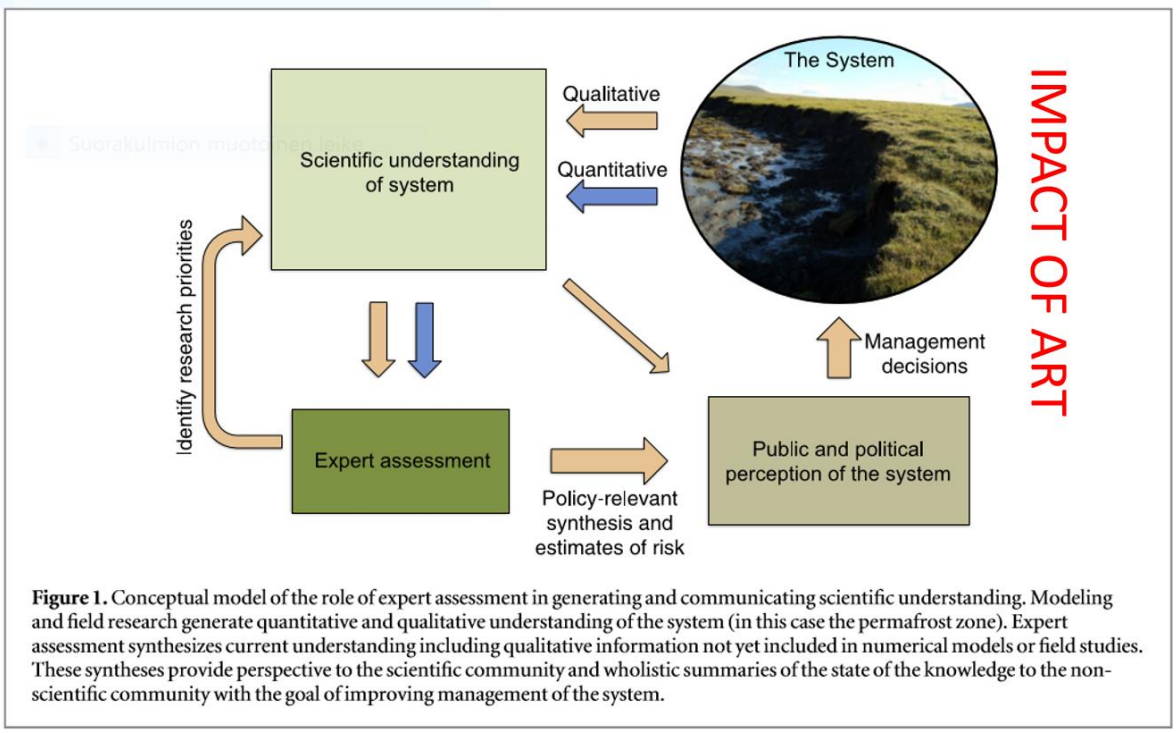

Figure 1. Conceptual model of the role of expert assessment in generating and communicating scientific understanding. Modeling and field research generate quantitative and qualitative understanding of the system (in this case the permafrost zone). Expert assessment synthesizes current understanding including qualitative information not yet included in numerical models or field studies. These syntheses provide perspective to the scientific community and wholistic summaries of the state of the knowledge to the non-scientific community with the goal of improving management of the system.

Modified from the publication of Abbott et al. (2016). Environmental Research Letters, doi:10.1088/1748-9326/11/3/034014

The Earth, water and life

When searching for the life in the universe, we are first looking water. All organisms require water. The Earth is a living planet resulting from the development of water depended physical-chemical environment supporting life. After development of life, the organisms of the Earth have changed the environmental conditions in the Earth by their living processes.

The atmosphere of the Earth would be very different without the ability of organisms to produce and consume gases. Oxygen in the atmosphere is produced by plants, algae and microbes able to photosynthesis.

The content of the important greenhouse gases, carbon dioxide, methane and nitrous oxide is largely regulated by the function of organisms of terrestrial ecosystems, oceans and freshwater ecosystem. The reason for the global warming is not only the use of fossil fuels but also land use (agriculture, cutting of tropical forests) affecting vegetation and function of soil microbes.

In the regulation of microbial processes water has even greater importance than temperature. An good example is the huge storage of organic matter (peat) accumulated in the tropical and northern peatlands of the world. The reason to the accumulation of peat is the lack of oxygen in water-saturated soil. Microbes are not able to decompose effectively plant derived organic matter in soil lack with low oxygen content. Drying of the peatland .e.g. for agriculture enhances oxygen availability in peat which favors activity of peat decomposing microbes. Peatland looses its ability to fix carbon dioxide from the atmosphere and the stored carbon reservoir is released as carbon dioxide to the atmosphere. A further negative atmospheric impact is that microbes in drained peat start to produce nitrous oxide, a strong greenhouse gas.

Climate change affects strongly the hydrological cycle of the Earth. Severe drought will be more common in many areas making wood production more difficult for the growing population. Drought causes also great wildfires. On the other hand there are more heavy rains and floods. The sea level is rising more than 3 mm in a year resulting from the thermal expansion of sea water and melting of glaciers. Many of the dense settlements of the world are located in the low coastal areas or islands. There the sea level rise will require expensive technical constructions to prevent damages. This is economically and technically not possible in all risk areas which leads to massive migration.

Global Flood

Global Flood installation is an abstraction about the function of the Earth before and after human induced climate change. There water describes following things: energy which the Earth gets from the Sun, greenhouse gases, thermal equilibrium of the Earth and its disturbance resulting from the greenhouse gases, fossil fuels and water/ocean. When the atmosphere/climate was in the “equilibrium” before the industrial revolution, the Earth was able to emit back to the space the solar energy so that the mean temperature of the Earth was constant. Now greenhouse gases in the atmosphere trap more and more solar energy leading to disturbance in the heat balance of the Earth, temperature increases causing rise in sea level.

Pine logs are used in the basic construction of the installation. Wood construction is a way to fix atmospheric carbon dioxide. Carbon dioxide taken by trees from the atmosphere can be stored in wooden constructions for hundreds of years in contrast to the short-lived paper products.

When constructing the Global Flood installation and considering the “waste materials” produced during the work, I got some side ideas associated to water (Local Flood video) and time (“spiral hourglass”). Time is essential in the climate change – the mitigation options have to be realized soon. There is a need for creative and openminded solutions.

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