Geophysical Research Abstracts
Vol. 21, EGU2019-14864, 2019
EGU General Assembly 2019

Tracing information through an ecohydrological model framework: Land management assessment for climate change adaptation at the North Sea coast.

Conrad Jackisch (1), Thomas Graeff (2), Boris Schröder (1), Stefan Baumgärtner (3), and Anett Schibalski (1)

(1) TU Braunschweig, Geoecology, Landscape Ecology and Environmental Systems Analysis, Braunschweig, Germany (c.jackisch@tu-braunschweig.de), (2) Umweltbundesamt (Federal Environment Agency), Department IV 2.1, Dessau-Rosslau, Germany, (3) University of Freiburg, Chair of Environmental Economics and Resource Management, Freiburg, Germany

Uncertainty is an inherent property of monitoring, analysis and modelling of coupled human-environmental systems. The interdisciplinary RUINS project (Risk, Uncertainty and Insurance under Climate Change. Coastal Land Management on the German North Sea.) assesses land management options in coastal areas as adaptation to changing climate under uncertainty. Especially when it comes to future predictions of ecosystem services, to convey the information within the blur of stacked and interconnected uncertainties to the decision makers becomes challenging.

Projected changes in the weather regimes (drier hotter summers, wetter winters) and rising sea levels provide the dynamic drivers to an ecohydrological model framework with local settings defined by several land management options with respect to the establishment of water retention stores, cropping and cattle farming. Exposed to elevated drainage demands and decreased (passive) drainage capacity, water management and winter flood protection is the foremost requirement. In addition, likely summer droughts increase freshwater demands on agricultural sites. In return, lower inland groundwater levels and elevated sea levels might lead to increased salt water intrusion into low-lying areas above disturbed subsurface capping layers. Furthermore, low water levels in the drainage system and surrounding soils increase the risk of pyrite oxidation and the mobilisation of sulfuric acid.

The ecohydrological model framework consists of hydrological, soil hydrological, crop and ecological models. Based on simulations for representative elements, they will predict state dynamics, which will be valuated as ecosystem services. Obviously, there are many sources and kinds of uncertainty involved, which are analysed based on the flow of information through the model framework.

To contribute to the discussion of the session we present the setup of the ecohydrological model framework of the RUINS project. As an example, we show how the selection of hydrological process models influences the uncertainty of ecosystem service derivation and their valuation. By comparing results from the distributed GSFLOW model with simulations of an alternative approach following the Superflex concept for representative elemets, we evaluate the model insights based on an assessment of the information filtered by either approach.

With respect to the overall goals of the project and the session, we seek to discuss: How could different concepts of uncertainty in economic and environmental science disciplines be unified and what does this imply for either approach? How can we assure to convey the information and not the blur from the uncertainty assessment to the decision makers?