



Panta Rhei – Everything Flows Change in Hydrology and Society IAHS Scientific Decade 2013-2022

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Details of the Proposal

Title of the Working Group

Resilience-based management of natural resources: the fundamental role of water and soil in functional ecosystems.

Abstract of the proposed research activity

In anthropogenically exploited systems the use of natural resources, such as water and soil, are embedded in complex social-ecological systems (SESs). To ensure the sustainability of the SESs, a resilience based management which considers both social and ecological elements, is fundamental. In the past a lack of adequate management has often resulted in overexploitation of water and soil resources and subsequently disrupted the relationships within the respective SES. Consequently, unforeseen degradation of ecosystems results in a decline in the livelihoods of local communities and the benefits that people can obtain from ecosystems, as well as increased economic costs. In addition, poor institutional structures and processes related to resource utilization, weak policies and environmental factors like droughts, floods, fires or other unpredictable events have ruptured the resilience of SES in many areas worldwide.

Nowadays geosciences have brought forward new sophisticated observations and modeling tools, with the aim to improve predictions of ecological developments. At the same time, the added value of linking ecological factors to the surrounding social structures and processes has received growing acceptance. A social-ecological system framework, as proposed by Nobel Prize winner E. Ostrom in 2007, brings in a holistic understanding of how these systems are inevitably interlinked and how their sustainability can be better maintained. We claim that the biggest challenge for geoscience in the coming decades will be to establish a link between these disciplines in order to generate adequate strategies to restore and preserve ecosystems, their functions and resilience, parallel to their utilization.

Panta Rhei Research Themes, Targets and Science Questions addressed by the Working Group

Target 3 - Science in Practice:

- How can results from hydrological and soil investigations / modeling be used in social ecological system analysis?
- What are the key anthropogenic processes responsible for disrupting processes and functions in water and soil?
- How can a SES framework be used to promote resilience-based management?
- How can a SES framework be used to motivate local communities, other stakeholders and related governance systems to sustainably utilize water and soil resources?

Societal impact of the Working Group activity

Water is vital for every living being. Anthropogenic impacts on the natural water cycle eminently impact also on soil, vegetation, ecosystems and finally also on society and the economy. Interferences into the natural water cycle (e.g. reservoirs, irrigation systems, drainages and soil exploitations) have drastic consequences for downstream ecosystems and subsequently also for the society depending on their functionality. By broadening the discussion on water and soil management to a holistic view on social and ecological impacts, we intend to find ways forward for resilience-based management of water and soil resources. While soil research and hydrological investigations can only provide answers to the direct effect of anthropogenic activities, the aim of this WP is to embed results from geoscientists in social-ecological system analysis. Our overall goal is to generate guidelines for resilience-based management that preserves functions and structure of ecosystems parallel to their sustainable utilization to the benefit of the local population.

List of Participants

Please contact David Finger if you would like to contribute to this WG.

Name of Participant	Affiliation (full address and email)	Role in Working Group (Chair or Member)	Main expertise
Dr. David Finger Water Resources Expert	Icelandic Met Office, Bústaðavegi 9, 150 Reykjavík, Iceland finger@vedur.is	Chair	Water resources Water availability and quality Aquatic ecosystems Hydropower Modeling

Prof. Dr. Christophe Cudennec	Agrocampus Ouest Secretary General, IAHS-AISH International Association of Hydrological Sciences cudennec@agrocampus-ouest.fr	Member	hydrogeomorphology, water-soil-agriculture, desertification
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Dr. Benz Kotzen	The School of Architecture, Design & Construction University of Greenwich Mansion Site Avery Hill Campus Bexley Road Eltham London SE9 2PQ B.Kotzen@greenwich.ac.uk	Member	Sustainable landscape design Environmental noise Arid and desert landscapes Water and restoration
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Þórunn Pétursdóttir	Manager of the Centre for Ecological Restoration and Natural Resource Management Soil Conservation Service of Iceland Gunnarsholti 851 Hella Iceland thorunn.petursdottir@land.is	Member	Ecosystem degradation Ecosystem restoration Social-ecological system Resilience-based management Policy evaluation