Vienna Catchment Science Symposium, Saturday 13th April, 2013

On the Theme of: Socio-hydrology – a new science of people and water

Socio-hydrology, a new science of people and water, is concerned with understanding the two-way coupling of dynamic human and water systems. The aim of this symposium was to understand the nature of possible traces of the time evolution and the interactions between the system components.

Time	Session	Location
8:30	Tea, coffee, pastries and greetings	3rd Floor Foyer
8:45	**Welcome and Introduction** Günter Blöschl, Vienna University of Technology, Austria	Kuppelsaal
9:00	**Assessing Freshwater Vulnerability and Evaluating Policies for Sustainability: A Coupled Human-Water Systems Approach** Steven M. Gorelick, Stanford University, United States	Kuppelsaal
10:00	Tea and coffee	3rd Floor Foyer
10:30	**Man as a hydro-geomorphological agent: modelling pathways and shifts in evolving catchment response** Rens van Beek, Utrecht University, Netherlands	Kuppelsaal
11:30	Short break	
11:35	**Floodplain Systems: Putting Humans into the Equations** Giuliano Di Baldassarre, UNESCO-IHE, Netherlands	Kuppelsaal
12:35	Lunch	3rd Floor Foyer
13:30	**Dynamic interaction of renewable resources, economic growth and population** Alexia Fürnkranz-Prskawetz, Vienna University of Technology, Austria	Kuppelsaal
14:30	**Socio-hydrologic patterns, feedbacks and trajectories in coupled human-water systems** Veena Srinivasan, Ashoka Trust for Research in Ecology and the Environment, India	Kuppelsaal
15:30	Tea and coffee	3rd Floor Foyer
16:00	**Small Group Discussion Sessions**	
	Group 1: *Water, ecology and human feedbacks* Brainstorming interactions and feedbacks between water, ecology and humans. Aim: to identify interactions, feedbacks and interplays. Moderator: Veena Srinivasan	Kuppelsaal
	Group 2: *Tackling socio-hydrology* Brainstorming how data collection and models need to be adapted and developed to address socio-hydrology. Aim: to create a strategy for putting the socio into hydrology. Moderator: Rens van Beek	Seminarraum 222 (3rd floor, follow signs)
	Group 3: *Settings of socio-hydrology* Brainstorming settings for comparative analysis of socio-hydrology. Aim: to develop a conceptual framework for research in socio-hydrology. Moderator: Giuliano Di Baldassarre	Seminarraum Kuppelsaal (4th floor)

17:30	**Plenum: Exchange of group findings**	Kuppelsaal
18:30	Evening drinks reception followed by Dinner	3rd Floor Foyer

Water, ecology and human feedbacks

Group 1

Types of feedback

- Social vs water: Small Ghana reservoirs
- Ecology vs social: Lake Balaton
- Local vs Global: Spanish agriculture feeding Europe
- Perception vs measurement: Drought sensitivity vs alarm levels
- Surface vs Atmosphere: meteorological change induced by urbanization

Why bi-directional feedback matters

- When do we definitely have two-way feedback:
  - Very long period eg. Tarim basin, development of society around river/oasis feeding back to hydrology
  - Lakes (rivers are more directional)
  - Atmosphere, microclimate

Putting these into models, models vs data

- Why build models? How to build models?
- Start simple, move towards complicated
- Try to understand your system and reflect it in the data
- The human aspect makes things complicated..

Tackling socio-hydrology

Group 2:

Socio-hydrology - new science of people and water

Tackling Socio-hydrology

"Understanding the two-way coupling between dynamic human and water systems"

Objective is to create a strategy for putting society into hydrology and evaluate feedbacks.

Main questions

How to address socio-hydrology:

- What are the requirements of socio-hydrological models?
- How should such models be developed / existing models adapted?
- What are the implications for data collection?

Aspects of socio-hydrological models

- Capable to evaluate the strength of feedbacks in the two-way coupling between dynamic human and water systems;
- Explicitly consider the human perspective of water (value, risk);
- Include human behaviour and its adaptation to information passed through formal and informal networks;
- Be robust and parsimonious.

How to include human behaviour

- Human activity to be replaced by human behaviour;
- Requires rule sets to describe human behaviour (agent-based models): perceived rational/cultural/instutional;
- Need for empirical data and rule sets for generalization (e.g., similarity);
- Novel ways of data collection (crowdsourcing, privacy);
- Embed socio-hydrology in ongoing data collection efforts;
- *Can we make models that are not context specific?*

Challenges to socio-hydrological models

- Framework for model development (what processes to include?)
- Framework for model evaluation (how to calibrate/validate such models; how to deal with uncertainty?)
- Definition of scope (application scale, dimensions of emergent patterns, compatibility of scales)
- Achieve the necessary resolution and depth to pick up possible anthropogenic signals.

Group3: Settings of socio-hydrology

Socio-hydrology (Sivapalan et al., 2012)

- Historical
- Comparative
- Process

Challenges

- *Can we (actually) model society? Potential counterintuitive outcomes (paradoxes)*
- Qualitative and quantitative (including data)
- Socio-hydrology benefits
- *Trans-disciplinary versus Inter-disciplinarity*
- *What is not? Stakeholder involvement vs advocacy*
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