



“Panta Rhei – Everything Flows”

Change in hydrology and society

The IAHS Scientific Decade 2013-2022

www.iahs.info/pantarhei

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Overview & Motivation

The new scientific decade 2013-2022 of IAHS, entitled “Panta Rhei – Everything Flows”, is dedicated to research activities on change in hydrology and society. The purpose of Panta Rhei is to reach an improved interpretation of the processes governing the water cycle by focusing on their changing dynamics in connection with rapidly changing human systems. The practical aim is to improve our capability to make predictions of water resources dynamics to support sustainable societal development in a changing environment. The concept implies a focus on hydrological systems as a changing interface between environment and society, whose dynamics are essential to determine water security, human safety and development, and to set priorities for environmental management. The Scientific Decade 2013-2022 will devise innovative theoretical blueprints for the representation of processes including change and will focus on advanced monitoring and data analysis techniques. Interdisciplinarity will be sought by bridging with socio-economic sciences and geosciences in general.

The rationale

The International Association of Hydrological Sciences (IAHS) was established in 1922 and has over 5400 individual members around the world. One of the missions of IAHS is to advance the science of hydrology for the benefit of society, with particular emphasis on countries that suffer from water problems. IAHS has a long and well-known track record in undertaking a range of activities that improve hydrological knowledge and practice globally (www.iahs.info; IAHS, 2012) to enable science to serve society.



IAHS promotes scientific decades focusing on emerging research issues related to hydrology and water. For identifying the subject of the scientific decade 2013-2022 a one-year long debate was engaged with the international community of researchers through physical meetings, conferences and a blog discussion (<http://distart119.ing.unibo.it/iahs>).



The interest in the above consultation process was impressive. The consultation was an unprecedented success in terms of involvement of people, discussions and exchange of ideas, which promoted a new spirit of global inclusivity. The consultation clearly highlighted that **the development of hydrological sciences is strictly related to the capability of the scientific community to profit from cooperative efforts through an effective synthesis, by stimulating, coordinating and valorising individual ideas.**

During the above consultation a common vision emerged to gain a better understanding of environmental changes to reach an improved interpretation of the processes governing the water cycle by focusing on their changing dynamics, in connection with rapidly changing human systems. The concept implies a focus on hydrology as a changing interface between environment and society through water, whose dynamics is essential for the impact of environmental change on society. In a changing environment and changing society it is now essential to consider hydrology as a moving mechanism which is itself adapting.

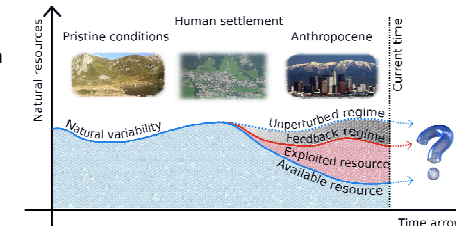
The identification of agreed science targets and questions will provide a significant opportunity to strengthen the role of hydrological sciences in society and to profit from the immense knowledge of the IAHS community for solving the current and future challenges related to water resources.

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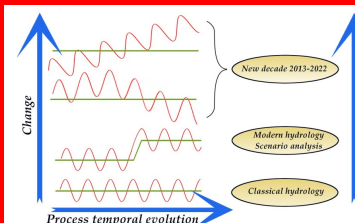
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Concepts

- The interaction between hydrology and society is changing. Humans are an important part of the system: there is the need to study the two-way coupling between humans and nature (socio-hydrology).
- Co-evolution of hydrological and connected systems (including society) needs to be recognised and modelled with a suitable approach, in order to predict their reaction to change.
- Hydrological processes determine the relationship between environment and humans. Hydrological change is vital to society as well as the environment itself.
- Change is resulting from the superimposition of natural variability and human induced effects. Their interaction is critical for deciphering the feedbacks on the environment and hydrological systems.
- Advances in hydrology are currently limited by the available measurement techniques. The community should therefore be proactive in devising innovative monitoring strategies.
- Future science must necessarily be based upon an interdisciplinary approach.



Targets and Science questions



- Target 1 – Understanding**
- Target 2 – Estimation and prediction**
- Target 3 – Science in practice**

The science questions of Panta Rhei are both rooted in the fundamental concepts of hydrology and focused on society and environmental management. They propose a compelling synthesis between basic and applied research. *Panta Rhei focuses on science for society.*

- Science question 1:** “What are the key gaps in our understanding of hydrologic change?”
- Science question 2:** “How do changes in hydrological systems interact with and feedback on natural and social systems driven by hydrological processes?”
- Science question 3:** “What are the boundaries of coupled hydrological and societal systems? What are the external drivers and internal system properties of change?”
- Science question 4:** “How can we use improved knowledge of coupled hydrological-social systems to improve model predictions, including estimation of predictive uncertainty and assessment of predictability?”
- Science question 5:** “How can we advance our monitoring and data analysis capabilities to predict and manage hydrologic change?”
- Science question 6:** “How can we support societies to adapt to changing conditions by considering the uncertainties and feedbacks between natural and human-induced hydrologic changes?”

Call for Research Themes and Working groups
www.iahs.info/pantarhei

The activity of Panta Rhei will be carried out by Working Groups (WG) who will address Research Themes (RT), that will be proposed by the Community and coordinated by the Panta Rhei leadership. The first deadline for proposing Working Group and Research Themes is **January 31st, 2014**. Other calls will be issued in 2014 and 2015. The call for WGs and RTs is published on www.iahs.info/pantarhei. The web site makes also available the Science Plan of Panta Rhei, the logos, the guidelines for acknowledging Panta Rhei in scientific contributions and delivers the instructions for including published papers in the list of the featured contributions to Panta Rhei.

References: Montanari et al. (2013). “Panta Rhei—Everything Flows”: Change in hydrology and society—The IAHS Scientific Decade 2013–2022, *Hydrol. Sci. J.*, 58:6, 1256-1275, available at <http://dx.doi.org/10.1080/02626667.2013.809088>