

WATER IN RESEARCH AND PRACTICE

Guest editorial

PETER CHIFFLARD and DANIEL KARTHE

Water is the essential basis for human life as well as for terrestrial and aquatic environments. Any changes in global and local water cycles – no matter whether anthropogenic or naturally induced – have far-reaching consequences for humans and ecosystems. For this reason the sustainable management of water resources is of particular ecological and social importance. Therefore scientists and practitioners in both developing and industrialized countries have to create approaches beyond disciplinary and national boundaries to address and solve water-related challenges. The International Association of Hydrological Sciences (IAHS) underlines the urgency and importance of interdisciplinary research efforts in the context of the scientific decade “Panta Rhei – Everything flows: changes in hydrology and society” (MONTANARI et al. 2013)

Within the German Geographical Society (DGfG), the working group “Hydrology” was formed in 1979 as forum for discussion of geoscientific perspectives related to water. The working group, which holds an annual conference, consists of young and senior scientists and practitioners with a geographical background and an interest in water-related topics. The working group is in contact with both governmental and non-governmental organizations, and is open for cooperation with hydrological working groups with a focus outside the geography. The working group also publishes an annual series of conference proceedings (e.g., GRASHEY-JANSEN et al. 2014).

The aim of this special issue is to present a selection of topics currently addressed by members of the working group of hydrology. While not exhaustive, the papers provide an idea about recent hydrological research and the ranges of water related topics which are covered by the members of the working group.

The first contribution of this special issue focuses on floodplain restoration by re-establishing back water dynamics on the basis of a restoration project at the Upper Danube. The paper of PETER FISCHER and BERND CYFFKA underlines that hydrology is one of the key factors determining

the type and function of flood plains and thus alternating water levels are the motor of riparian ecosystems. The authors analyze how different measures help to restore natural hydrological dynamics to the floodplain, as they were found before river rectification and other hydromorphological changes. These measures, which include controlled ecological floodings, are carried out in a way to help to detect the interaction of the hydrological components (groundwater, surface water etc.) with the biotic environment.

The second contribution, a hydrological model study, deals with the impacts of groundwater flow on the simulation of lake water temperatures of the Ammersee (south-east Germany) by using a one-dimensional hydrodynamic model. The authors THOMAS BUECHE and MARK VETTER show that in comparison to simulation results which just include surface inflows, the additional inclusion of groundwater inflow into the simulation of lake water temperatures induced better correlation between modelled results and real conditions for almost all depths and seasons. These results underline the importance of all inflow components on the lake's thermal regime.

The third contribution deals with the improvement of the irrigation efficiency by considering soil hydrological properties. Based on the experience of several years studying the soil water dynamic influenced by irrigation, SVEN GRASHEY-JANSEN shows two main opportunities for optimizing irrigation. In the first simulation approach a multi-agent-based tool calculates soil specific and corresponding water tensions by using pedotransfer functions. This allows a quantification of the need for irrigation and the control of the irrigation system. The second simulation approach calculates a field-irrigation with simultaneous consideration of the horizontal variability of soil properties. With both approaches the author underlines that precision and soil specific irrigation are accompanied by a significant reduction of irrigation water and an improvement of irrigation efficiency.

The fourth contribution, by THOMAS ROGGENKAMP and JÜRGEN HERGET, deals with the reconstruction of peak discharges of historical floods. The authors focus on the main challenge of the reconstruction of historic floodplain conditions and modifications influencing the cross-section area and the hydraulic roughness. Their approach includes a procedure for reconstructing the hydraulic parameters of the river channel and flooded areas, coupled with an approach for the verification of estimated peak discharge reliability. The validation of the technique by comparison with recent gauged floods reveals results of adequate accuracy. From their long-term data analysis, the authors conclude that the reconstructed historic floods were partially larger than any gauged flood in the study area.

The four papers included in this special issue underline the diversity of water-related topics covered by the working group “Hydrology”. We hope that these contributions encourage young and senior scientists and practitioners to participate at the upcoming annual meetings. The authors of the preface, PETER CHIFFLARD and DANIEL KARTHE, would like to thank all authors for their contributions and the

editorial team of the journal *Erdkunde* for providing the opportunity to publish a collection of papers with a hydrological focus.

References

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Authors

Peter Chiffard
 Department of Geography
 Philipps-University of Marburg
 Deutschhausstr. 10
 35032 Marburg
 Germany
peter.chiffard@geo.uni-marburg.de

Daniel Karthe
 Department Aquatic Ecosystem
 Analysis and Management
 Helmholtz Centre for Environmental
 Research
 Brückstr. 3a
 39114 Magdeburg
 Germany
daniel.karthe@ufz.de