



Panta Rhei – Everything Flows
Change in Hydrology and Society
IAHS Scientific Decade 2013-2022
www.iahs.info/pantarhei

Details of the Proposal

Title of the Working Group

Status and future of African river systems

Abstract of the proposed research activity

The majority of the African population relies directly on rivers for their livelihoods, thus the sustainable management of the water resources is crucial for securing food production and economic growth. However, insufficient data availability resulting from the lack and/or poor maintenance of often underequipped monitoring networks; competing water users as well as weak institutional structures often limit an efficient and sustainable management of water resources. Due to expected notable societal changes (e.g. population growth associated with higher demands for food production and water, increasing urbanization associated with localization of water demand, and by necessity, supply) as well as projected climate change; most African countries are facing growing challenges regarding the sustainable management of their often limited water resources, in particular in trans-regional river basins. Additionally, a trend is observed in the recent decades of decline in hydrological process-oriented research, which may lead to underestimation of effects arising in a changing and stressed hydrological and water resource systems, ultimately impacting ecosystems and societies.

With its research activities (e.g. basin studies, impact assessment studies, process studies), the working group will contribute to improve i) the data situation in various African river basins, ii) the knowledge and understanding of system-relevant drivers and processes in these basins and iii) assessments towards a sustainable management of these systems in the perspective of changes.

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

Depending on the given topic and expertise of each individual research project, the following **Panta Rhei research themes** will be addressed to a varying extent by our working group: i)

Transdisciplinarity, ii) Large scale water projects and society, iii) Physics of changes, iv) Water and energy fluxes in a changing environment, v) Hydro-meteorological extremes: Decision making in an uncertain environment, vi) Global Change in Hydrology and Society, vii) Reservoirs impact and viii) Water scarcity assessment.

All three **Panta Rhei Targets** will be addressed by the working group:

- 1.) **Understanding:** The activities of the working group members will contribute to a better understanding of natural and human-induced drivers and processes controlling African river systems.
- 2.) **Estimation and prediction:** A focus of most activities will be the assessment of impacts resulting from societal and climate change on actual and future water resources.
- 3.) **Science in practice:** Addressing the challenges water resources managers of many African rivers are facing in the perspective of natural and human-induced changes, the research of this working group contributes to real world problems and will offer relevant information for decision making in the studied river systems.

By its multi-faceted research activities, this working group will contribute to answer the following **science questions**:

1. What are the key gaps in our understanding of hydrologic change?
2. How do changes in hydrological systems interact with and feedback on natural and social systems driven by hydrological processes?
3. How can we advance our monitoring and data analysis capabilities to predict and manage hydrologic change?
4. How can we support societies to adapt to changing conditions by considering the uncertainties and feedbacks between natural and human-induced hydrologic changes?

Societal impact of the Working Group activity

The sustainable management of African river systems is of crucial importance for the development of African societies. Besides relevant new scientifically-based insights, providing information on the status and future of African river basins will directly support water management agencies as well as interest groups from the agricultural and environmental conservation sectors. By its outcomes, the working group activities is further expected to contribute to decision making in the respective basin and to increase the public awareness of the relevance of river systems for societal development and food security in African countries. Additionally, the working group aims on contributing to capacity development in African countries by involving young scientists in research studies, but also staff of collaborating stakeholders.

List of Participants

Please include at least 6 members from 3 different countries. Make an effort to ensure interdisciplinarity. Add rows at the Table if necessary.

Name of Participant	Affiliation (full address and email)	Role in Working Group	Main expertise
Joerg HELMSCHROT	¹ Biocentre Klein Flottbek, University of Hamburg, Ohnhorststrasse 18, 22609 Hamburg, Germany ² Southern African Science Service Centre for Climate change and Adaptive Land Management joerg.helmschrot@sasscal.org	Chair	Catchment hydrology, wetlands, land management and climate change analysis, impact assessment, process hydrology, Southern and western Africa
Raphael TSHIMANGA	¹ Department of Natural Resources Management, PO Box 117 KIN XI, University of Kinshasa, Kinshasa, DRC. ² CB-HYDRONET (Congo Basin Network for Research and Capacity Building in Water Resources) rapthm@yahoo.fr	Member	Hydrological modelling and water resources assessment, large rivers' hydrology, hydrological uncertainty analysis
Gil MAHE	HydroSciences Montpellier Laboratory Université de Montpellier - HydroSciences - CC57 163 rue Auguste Broussonet - 34090 MONTPELLIER gil.mahe@ird.fr	Member	Hydroclimatology, climate change, large rivers' hydrology, sediment transport, relationships between man, environment and water resources
Ansoumana BODIAN	Université Gaston Berger de Saint Louis, Laboratoire Leidi "Dynamique des territoires et développement", Senegal ansoumana.bodian@ugb.edu.sn	Member	Catchment hydrology, characterizing spatial and temporal variability of climate and hydrologic impacts, modelling the rainfall-runoff relationship and impact of climate change on water resource
Sven KRALISCH	Geographic Information Science, Friedrich Schiller University Jena, Loebdergraben 32, 07743 Jena, Germany Email: nsk@uni-jena.de	Member	Hydrological modelling & impact assessment, Open-Source scientific software development
Matthias MÜCK	German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), Muenchener Strasse 20, 82234 Wessling, Germany;	Member	Flood risk assessment, flood mapping and monitoring, remote sensing

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Pierre RIBSTEIN	Université P. & M. Curie (UPMC), 4 place Jussieu, 75252 Paris cedex 05	Member	Catchment hydrology, hydro-meteorological extremes
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Hodson MAKURIRA	Civil Engineering Department, Faculty of Engineering, University of Zimbabwe in 1998 hmakurira@yahoo.com	Member	Water & Environmental Resources Management, floods and droughts
Hèou Maléki BADJANA	¹ West African Science Service Center on Climate Change and Adapted Land Use, Graduate Research Program of "Climate Change and Water Resources", University of Abomey-Calavi, Benin ² University of Lome, Faculty of Sciences, Laboratory of Botany and Plant Ecology	Member	Catchment hydrology, integrated river basin assessment
Karima BENHATTAB	USTO-MB University of Sciences and Technology -Mohamed Boudiaf, 1505 Bir El Djir Oran Algeria benhattabhaseni@yahoo.fr	Member	regionalization of rainfall frequency analysis, inundation risk and forecast flash floods, climate change impacts
Markus MEINHARDT	Geographic Information Science, Friedrich Schiller University Jena, Loebdergraben 32, 07743 Jena, Germany Email: markus.meinhardt@uni-jena.de	Member	Catchment hydrology, wetlands, hydrological modelling, impact assessment, process hydrology
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Edwin MOSIMANYANA	Okavango Research Institute University of Botswana Private Bag 285, Maun, Botswana emosimanyana@ori.ub.bw	Member	Catchment hydrology, hydrological systems analysis
Henry M. SICHINGABULA	Department of Geography and Environmental Studies, University of Zambia, Great East Road Campus, P. O. Box 32379,	Member	Fluvial Geomorphology / Hydrology

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Frans PERSENDT	University of Namibia, Department of History, Geography and Environmental Studies fpersendt@unam.na	Member	Flood & Drought Risk Assessment; GIS & RS; Hydrologic and Hydraulic Modelling; climate; PUB