

# Contents

Preface by *Christophe Cudennec, Siegfried Demuth, Anil Mishra & Gordon Young* v

## 1 Keynote Papers

Hydrological sciences and water security: An overview <i>Gordon Young, Siegfried Demuth, Anil Mishra &amp; Christophe Cudennec</i>	1
Responding to the challenges of water security: the Eighth Phase of the International Hydrological Programme, 2014–2021 <i>B. Jimenez-Cisneros</i>	10
Panta Rhei, the new science decade of IAHS <i>Hubert H.G. Savenije</i>	20
Water Security – science and management challenges <i>Howard S. Wheater</i>	23
Anthropocene Futures and Water Security <i>Frans Berkhout</i>	31
Regional hydrological impacts of climate change: implications for water management in India <i>Arpita Mondal &amp; P.P. Mujumdar</i>	34
Hydrological extremes and security <i>Zbigniew W. Kundzewicz &amp; Piotr Matczak</i>	44
Integrated water resources management using engineering measures <i>Yan Huang</i>	54
New problems and opportunities of oil spill monitoring systems <i>Grigory M. Barenboim, Vladimir M. Borisov, Valentin N. Golosov &amp; Alexandr Yu. Saveca</i>	64
Water availability, water quality water governance: the future ahead <i>Jose Galizia Tundisi, Takako Matsumura-Tundisi, Virginia S. Ciminelli &amp; Francisco A. Barbosa</i>	75
Measuring what we manage – the importance of hydrological data to water resources management <i>Bruce Stewart</i>	80
What part of natural flow can be considered a ‘water resource’? <i>Vazken Andréassian, Jean Margat, Guillaume Thirel &amp; Pierre Hubert</i>	86
Water and Energy nexus: findings of the World Water Development Report 2014 <i>Michela Miletto</i>	93
Capacity building for hydrological change – using a blended learning approach <i>Heribert Nacken</i>	100
The role of groundwater in the management of water resources in the World <i>António Chambel</i>	107
Human pressure on rivers is increasing worldwide and threatens water security <i>Serena Ceola, Francesco Laio &amp; Alberto Montanari</i>	109

## 2 Extended Abstracts

### General

More room for water <i>M. Brilly</i>	113
Water Security of the Azerbaijan Republic: current situation and perspectives <i>Imanov Farda, Adishirin Alakbarov, Rustam Rajabov &amp; Anar Nuriyev</i>	115
Thailand's Water Security situation in the context of the world and ASEAN <i>Sucharit Koontanakulvong, Piamchan Doungmanee &amp; Piyatida Hoisungwan</i>	117
Water security in the Gulf Cooperation Council (GCC) countries: challenges and opportunities <i>M. Al-Rashed &amp; A. Akber</i>	119
Mexican National IHP Committee main activities <i>Victor Bourguett Ortiz</i>	121
The Arab Spring and Water Security <i>Muhammad Shatanawi</i>	123

### Climate Change

Detecting hydro-climatic change using spatiotemporal analysis of rainfall time series in the Cobres River basin, Portugal <i>Celso Augusto Guimarães Santos, Richarde Marques da Silva, Madalena Moreira, João Corte-Real &amp; Lígia Rabay Mangueira</i>	125
Rainfall trends over 40 years in the Cobres River basin, Portugal: variability and impacts <i>Richarde Marques da Silva, Celso A. G. Santos, Madalena Moreira, João Corte-Real &amp; Roberta de Carvalho Barbosa</i>	127
Assessing water security and adaptation measures in a changing environment <i>Wang Xiao-Jun, Zhang Jian-Yun, Shahid Shamsuddin, Bi Shou-Hai, He Rui-Min &amp; Zhang Xu</i>	129
Analysis of 30 years rainfall variability in Imo State of southeastern Nigeria <i>Fidelis Chinazor Okorie</i>	131
Evaluation of climate change impact on Blue Nile Basin Cascade Reservoir operation – case study of proposed reservoirs in the Main Blue Nile River Basin, Ethiopia <i>Demelash Wondimagegnehu &amp; Kassa Tadele</i>	133
Adapting to climate change: water distribution in BBA City, Algeria <i>Ayoub Zeroual, Mohamed Meddi &amp; Ali A. Assani</i>	134
Climate change impact on variability of rainfall intensity in the Upper Blue Nile Basin <i>Lakemariam Yohannes Worku</i>	135
Adaptation of irrigated agriculture to climate change: trans-disciplinary modelling of a watershed in South India <i>L. Ruiz, M. Sekhar, A. Thomas, S. Badiger, J.E. Bergez, S. Buis, S. Corgne, J. Riotte, H. Raynal, S. Bandhyopadhyaya &amp; C. Gascuel</i>	137

### Extreme Events

Forest influence on flash floods in small streams <i>Pavol Miklanek, Pavla Pekarova, Dana Halmova &amp; Ales Svoboda</i>	139
Intercomparison of three indices for addressing drought variability in North China Plain during 1962–2012 <i>Hongjian Lu, Xingguo Mo &amp; Suxia Liu</i>	141
Modelling extreme streamflows under non-stationary conditions in the Ouémé River basin, Benin, West Africa <i>Jean Hounkpe, Abel A. Afouda, Bernd Diekkrüger &amp; Fabien Hountondji</i>	143
Increase of flood water levels on the middle Danube <i>Pavla Pekarova, Pavol Miklanek &amp; Jan Pekar</i>	145

Flood risk assessment for a heavily modified urban stream <i>Angeliki Mentzafou &amp; Elias Dimitriou</i>	147
Water scarcity and contamination in eastern Ukraine <i>Y. Vystavna &amp; D. Diadin</i>	149
Groundwater flooding risk in the cities of Ukraine: assessment and management <i>Oleksandr Chebanov &amp; Iryna Konoplia</i>	151
Identification hydrologique des événements secs extrêmes dans le bassin d'Ichkeul (Tunisie) <i>Majid Mathlouthi &amp; Fethi Lebdi</i>	153
<b>Groundwater</b>	
Enhancement of groundwater potential by aquifer artificial recharge techniques: an adaptation to climate change <i>B. El Mansouri &amp; L. El Mezouary</i>	155
Desalination for securing water productivity in an intensively used coastal aquifer (Campo de Dalías, Spain) <i>Aurélien Dumont, Elena López-Gunn, Esperanza Montero González &amp; M. Ramón Llamas</i>	157
History of groundwater development in the Indian Himalayas: past, present and future scenarios <i>Ritesh Arya</i>	159
Contribution of piezometric measurement to knowledge and management of low water levels: examples on the chalk aquifer in the Champagne Ardennes region <i>P. Stollsteiner, H. Bessiere, J. Nicolas, D. Allier &amp; O. Berthet</i>	161
Using geochemical investigations for determining the interaction between groundwater and saline water in arid areas: case of the Wadi Ouazzi basin (Morocco) <i>R. El Moukhyar, M. Bahir, N. Youbi, N. Chkir, H. Chamchati &amp; P. Caréra</i>	162
<b>Data and Measurement</b>	
Integrating high resolution remote sensing technology into an advanced water resources knowledge management system <i>R.A. Bradshaw, A. James, Y. Hee Kho, D. Kaskina, S. Mashtayeva, O. Alipbeki &amp; Z. Maksut</i>	164
A comparison of three geostatistical procedures for rainfall network optimization <i>Haifa Feki &amp; Mohamed Slimani</i>	166
Integrated SASSCAL research to assess and secure current and future water resources in Southern Africa <i>Jörg Helmschrot &amp; Norbert Jürgens</i>	168
SASSCAL WeatherNet to support regional weather monitoring and climate-related research in Southern Africa <i>Jörg Helmschrot, Gerhard Muche, Thomas Hillmann, Joseph Kanyanga, Mompati Butale, Domingos Nascimento, Salome Kruger, Ben Strohbach, Mary Seely, Carlos Ribeiro, Willem de Clercq, Piet Kenabatho, Katrin Josenhans &amp; Norbert Jürgens</i>	170
Prediction of mean monthly river discharges in Colombia through Empirical Mode Decomposition <i>Alejandra M. Carmona &amp; Germán Poveda</i>	172
River surface flow estimation using a camera: a case study on the Tiber River <i>F. Tauro, M. Porfiri, A. Petroselli, G. Olivieri, R. Rapiti, G. Cipollari &amp; S. Grimaldi</i>	173
A satellite-based terrestrial water storage indicator to assess the severity of a heatwave <i>Jose Agustin Breña-Naranjo &amp; Adrian Pedrozo-Acuña</i>	175
Estimation of discharge in rivers by different artificial neural network algorithms: case of the Algerian Coastal basin <i>Ayoub Zeroual, Mohamed Meddi &amp; Ali A. Assani</i>	177
Valuing knowledge on temporal dynamics from long-term monitored basins for neighbouring sites <i>A. de Lavenne, C. Cudennec, O. Fovet &amp; L. Ruiz</i>	179

## Management

- Integrated water management tools supporting future water security and food production in West Africa *Hèou Maléki Badjana, Jörg Helmschrot, Wolfgang-Albert Flügel, Kpèrkouma Wala, Abel Afouda & Koffi Akpagana* 181
- Science and security for changing water quantity and quality with rapid urbanisation and variability in climate and society *Anand Verdhen* 183
- Democracy and Water: hydrological spatial organization by recently democratized Regional Water Boards, a Dutch first? *Gerrit Rot* 185
- Efficient management of municipal water: water scarcity in Taiz City, Yemen – issues and options *Abdulla Noaman & Abdelwali Al-Sharjabe* 186
- Process oriented thinking as a key for integration of ecohydrology, biotechnology and engineering for sustainable water resources management and ecosystems *Maciej Zalewski* 187

## Miscellaneous

- Scaling of low flows in Czechia – an initial assessment *Ondrej Ledvinka* 188
- Functioning of the geo-ecosystem of a river basin *Elena Asabina* 190
- Influence of solar activity on global large rivers runoff trends *Bakhran Nurtaev* 192
- Suspended sediments – associated water quality elements *Seyed Hamidreza Sadeghi & Hiva Yaghmaei* 194
- Reservoir impacts on water security *Aleksandr A. Tskhai* 196
- Securing water for the environment: investing in the future Australian style *Fiona J. Dyer* 198
- Soil erosion assessment of a Himalayan river basin using TRMM data *Ashish Pandey, S.K. Mishra, Amar K Gautam & D. Kumar* 200
- Sand mining and morphometric dynamics along Ologe Lagoon *Delima Thaddeus & Shakirudeen Odunuga* 201