THE UNIVERSITY OF BIRMINGHAM

World Water Day 2020
Water and Climate Change

#UoBWorldWaterDay

Friday 20 March 2020
# WORLD WATER DAY 2020 PROGRAMME

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<td>09:00</td>
<td><strong>Prof. Stefan Krause &amp; David Hannah</strong> – WWD 2020 introduction</td>
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<td><strong>Prof. Harry Dixon &amp; Shahbaz Khan</strong> - Welcome remarks</td>
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<td><strong>Dr Sera Lewise Young</strong> The Household Water Insecurity Experiences Scale: A new way to quantify water access and use</td>
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<td><strong>Dr Luca Marazzi</strong> Conserving and Restoring Wetlands in the Climate Change Era: an Uphill Battle with Many Allies</td>
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<td><strong>Dr. Julian Klaus</strong> Hydrology through the lens - novel data types for enhancing models and system understanding</td>
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We have a great programme of talks and discussions with experts at the forefront of global water sciences research.

The theme of 2020 World Water Day is water and climate change – and how the two are linked.

Please be sure to share your thoughts and experiences throughout the day using the hashtag #UoBWorldWaterDay

We hope you have a great day”

Professor David Hannah, Professor Stefan Krause and Dr. Val Ouellet

UNESCO Chair in Water Science & Institute for Global Innovation
The UNESCO Chair on Water Science (established at the University of Birmingham in November 2016) aims to develop a transformative approach to tackle ‘wicked water problems’. These are multifaceted, interconnected problems that are very difficult to solve due to lack of data and changing human needs amongst other reasons.

To meet the Chair’s aim, and so enable sustainable development of finite water resources, we require new ways of addressing and rethinking the grand challenges related to water in a changing environment: (1) quantifying the nature and extent of change, (2) explaining the causes of space-time patterns of change and (3) reducing uncertainty of predictions under change. Only by meeting these challenges in an integrated and synergistic way will a transformative approach to water science be achieved to benefit societies at risk from water scarcity as well as providing water for the environment.

One of the ways in which the Chair’s aim will be met is by making better use of new, more cost-efficient sensing technologies, and by harnessing the knowledge of local people as ‘citizen scientists’ and stakeholders. The Chair brings together researchers from a range of disciplines, policy makers and the public to raise awareness of water scarcity and global water-related issues.
The Birmingham Water Council integrates interdisciplinary water related research and education across the five colleges of the University of Birmingham. It combines the efforts of almost 100 academic faculty and 200 Postdoctoral and Doctoral Researchers.

The complexity of today’s global water challenges requires interdisciplinary collaboration and transformative approaches across subject boundaries, integrating core-strengths of the physical and environmental sciences, engineering, medical research, arts and humanities, including economics, law and social sciences. Crossing traditional disciplinary boundaries, the Water Council aims to pioneer and facilitate the development of new research avenues by:

• Stimulating interdisciplinary research tackling global challenges and development goals
• Aligning cross-campus water research and enhancing synergies between colleges and with local, regional and (inter)national partners
• Facilitating industry – research partnerships, regionally, in the UK, and globally
• Shaping (inter)national research strategies in water related fields nationally and internationally
• Enhancing interdisciplinarity in cross-college delivery of water education

The Birmingham Water Council is closely aligned with the five work streams (Water Technologies, Water and Health, Water Resources under Change, Water Pollution and Water Justice and Socioeconomic Consequences) of the Institute of Global Innovation (IGI) inaugural theme on ‘Water Challenges in a Changing World’.

The delivery of water science solutions to global challenges is based on our extensive partnerships with (inter)national Science, Policy, Education, and Private Sector (water, chemical, manufacturing industry) partners as well as International Organisations (e.g. UNESCO, WHO) and NGO’s and hosts the UNESCO Chair in Water Sciences at the University of Birmingham.
Water quality and quantity affect the lives of millions of people every year. Water quality problems arise from a wide range of causes, from poor sanitation facilities to increased pollutants such as microplastics and metals. All of which have the potential to disrupt aquatic ecosystem functions and ultimately affect water quality. Water quantity is also a major problem across the globe with some areas being prompt to flooding related issues while other areas face water scarcity. Water scarcity affects more than 40% of the global population, and this number will rise due to the consequences of climate change and increasing demands for water in food production. Therefore, water scarcity is not only a direct threat to human health but also to food production. Flooding and other water-related disasters (storms, etc.) account for 70% of all deaths related to natural disasters.

The global water challenges are complex and require interdisciplinary collaboration and transformative approaches across subject boundaries, integrating core-strengths of the physical and environmental sciences, engineering, medical research, arts and humanities, including economics, law and social sciences.

Our central theme, Water challenges in a changing world, aims to foster ground-breaking research to improve the preparedness and resilience of socio-economic and environmental systems to globally increasing water challenges (such as drought, flood, water pollution), water-related public and environmental health; and the governance of water to increase security and reduce conflict.
UNESCO UniTwin on Ecohydrological Interfaces

Contact Stefan Krause s.krause@bham.ac.uk

We are launching a UNITWIN Network to UNESCO and in collaboration with different partners: IRSTEA Lyon, University of Western Australia, Indian Institute of Technology). This aims to create a world-leading hub for interdisciplinary ecohydrology research and education across a wide range of Ecohydrological Interfaces that crosses disciplinary boundaries. We will reinforce and extend our current networks of national and international partners (in particular partners from the Global South) which span Science, Policy, Education and Tools for Delivery in both developed and developing countries. The Network supports North-South and South-South cooperation, and develop ‘spokes’ radiating to a diverse set of stakeholders and end-user communities.

The specific objective is to improve the knowledge of the role of different types of water-related ecosystems (such as wetlands and estuaries) by applying and extending the concept of Ecohydrological Interfaces. These practical concepts strongly build on previous research on hotspots and ‘hot moment’ behaviour in ecohydrology. This network focus directly supports the development of knowledge to deepen our understanding of the current threats on aquatic ecosystems and to develop innovative approaches for sustainable development and ecosystem resilience. It addresses the connectivity between ecosystem types, which is also key to supporting more biological productivity and biodiversity conservation.

This all will be achieved by sharing knowledge on the use and integration of innovative ecohydrological methods and technologies (such as robust sensor network technologies with particular applicability in the context of low- and middle income countries). This will allow us to address the urgent challenge to halt and reverse the degradation of global water resources, ecohydrological services and system functioning, and to stop the further decline in biodiversity worldwide.
Professor Harry Dixon: Group Leader, Water Resources Systems at UK Centre for Ecohydrology & Hydrology

Harry leads the Water Resources Systems Group at the UK Centre for Ecology & Hydrology (UKCEH) and is an Honorary Professor in the School of Geography, Earth and Environmental Sciences at the University of Birmingham. His is a hydrologist with extensive experience of working in the UK and internationally on projects related to the collection and management of hydrological data and information. Harry has an active involvement in water-related intergovernmental hydrology programmes under the UN framework and bilateral international science collaborations - including as the Coordinator of the India-UK Water Centre; Chair of the World Meteorological Organization’s Global Hydrometry Support Facility Innovation Committee and; Secretary of the UK Committee for International Hydrology which coordinated input to the UNESCO Intergovernmental Hydrological Programme.

Professor Shahbaz Khan: UNESCO Director Regional Science Bureau for Asia and the Pacific

Professor Khan is Director Regional Science Bureau for Asia and the Pacific and UNESCO Representative for Brunei Darussalam, Indonesia, Malaysia, the Philippines, and Timor-Leste. He has multidisciplinary academic background and professional experience in engineering, environmental law, economics and international diplomacy. He is a Fellow, Chartered Engineer and Engineering Executive of Engineers Australia, Hon Fellow of Institution of Engineers, Malaysia, Fellow of the ASEAN Academy of Engineers, Hon Fellow of the Myanmar Engineering Society, Founding Fellow of the Academy of Engineering and Technology of the Developing World and Fellow of the Modelling and Simulation Society of Australia and New Zealand. Shahbaz is currently Adjunct Professor at the University of Canberra and Western Sydney University, Australia, Adjunct Professor at the Lincoln University, New Zealand, Visiting Professor at Wuhan University, Distinguished Professor at the National University of Science and Technology, Pakistan and Distinguished Professor at the Capital Normal University, China.
Biographies

Dr. Kieran Khamis: research fellow, University of Birmingham

Kieran Khamis is a Research Fellow in Water Sciences at the University of Birmingham. He has published widely in the fields of Aquatic Pollution, Environmental Sensing and Environmental Change Hydroecology. His current work focuses on the impacts of land cover change on water quality and the functioning of freshwater ecosystems. Kieran is also interested in knowledge transfer between academia and industry and is currently working with a leading UK instrumentation company to establish new monitoring techniques within the water industry.

Dr. Sera Young: Associate Professor, Northwestern University (USA)

Dr. Sera Young (www.serayoung.org) is an Associate Professor of Anthropology and Global Health at Northwestern University. Her research is focused on a new way to measure water security. She has led the development of the Household Water InSecurity Experiences (HWISE) Scale, a cross-culturally valid tool to measure household water access and use (http://hwise.org). Awards include an Andrew Carnegie Fellowship (2019) and the Margaret Mead Award for her book about pica, Craving Earth.

Dr. Luca Marazzi: Research Manager, Earthwatch Europe (Oxford)

Luca Marazzi is an aquatic ecologist (Ph.D.) and environmental scientist (MSci). He is Research Manager on Plastic Pollution in the Freshwater Programme at Earthwatch Europe (Oxford). His research experience and interests include algal ecology and wetland ecology, wetland conservation and restoration, climate change, and global sustainability. He is now working on various citizen science projects to enable people to monitor plastic pollution in rivers and empower them to reduce their plastic footprint.
Doris Wendt: Ph.D. student at the University of Birmingham

Doris Wendt is a 4th year PhD student of the University of Birmingham, working on the influence of water management on hydrological droughts. Her research area is inspired by water conflicts around the world and previously projects were located in water-scarce areas in developing countries, i.e. Brazil, Palestinian Territories, Ethiopia. Currently, her focus is on groundwater management that proves itself to be influential during droughts. Her first PhD chapter summarises the asymmetric impact of groundwater use on groundwater droughts (submitted to HESS). The second PhD chapter focuses on Managed Aquifer Recharge as a drought mitigation strategy in the Southern California (AGU e-Lightning), and the last PhD chapter includes a conceptual model to simulate the impact of drought management plans in Europe. Doris’ PhD project is a collaboration of the University of Birmingham and British Geological Survey. In addition to the institutional support, Doris is also part of Panta Rhei network (Drought in the Anthropocene working group).

Dr. Jonathan McKay: hydrologist at the British Geological Survey

Jon is a hydrologist at the British Geological Survey whose research aims to facilitate better management of water resources. This is through developing and applying hydrological models to improve understanding of catchment water cycling processes and to forecast changes in water stores and fluxes due to environmental pressures from climate change and water resource exploitation.

He is particularly interested in cold, mountain environments, often referred to as the world’s “water towers”. The hydrology of these systems is fascinating due to the complex set of interactions between the climate, cryosphere (snow, ice and permafrost) and the hydrosphere that influence water cycling. They also represent some of the most vulnerable regions to climate change in the world. To date, Jon’s research has taken him to India, Africa, Iceland, and Philippines and, most recently, the Peruvian Andes where he’s working with the University of Birmingham to investigate the impact of glacier retreat on water resources.
Dr. Faye Jackson: Marine Scotland Science

Dr. Jackson works on a range of different projects in the Environment Group at Marine Scotland Science Freshwater Fisheries Laboratory (MSS-FFL). She undertook my PhD with MSS-FFL and the University of Birmingham, funded by a NERC Open CASE studentship. Her project focused on the development of novel monitoring and modelling methodologies to understand and predict the spatio-temporal variability in river temperature. As part of this the Scotland River Temperature Monitoring Network (SRTMN) was designed and developed. Using data from SRTMN a national river temperature model was developed, which can simultaneously predict daily maximum river temperature and climate sensitivity for rivers across Scotland, for any day of the year. Interactive maps of river temperature and sensitivity to climate change have been made available on MSS NMPI webpages.

Dr. Julina Klaus: Senior scientist, Luxembourg Institute of Science and Technology and Ecohydrology Research Group

Julian's research focuses on improved understanding on how water, solutes, and matter fluxes are controlled in natural and anthropogenic landscapes. For this, his lab combines experimental hydrology, isotope hydrology, and hydrological models to improved process understanding and system prediction. Such improved system understanding shall eventually lead to a science based sustainable management of water and natural resources under change.
Dr. Adam Ledger: reader in Theatre and Performance, University of Birmingham

Adam Ledger is a Reader in Theatre and Performance at the University of Birmingham and Co-artistic Director of The Bone Ensemble. He has published widely on theatre practices and created performances internationally.

Gulp! Making impactful theatre about water

Despite increased awareness of the global ecological crisis, theatre that responds to pressing global concerns remains underdeveloped. As part of its environmentally themed programme of work for families, The Bone Ensemble theatre company created Gulp!, which toured nationally in 2019-20. In this presentation, Adam will reflect on the challenges and strategies of creating empathetic and participatory dramaturgies that positively engage audiences in issues, and trace the collaboration with scientific advisors and stakeholders.

The Bone Ensemble’s theatre production Gulp! has been turned into a unique children’s graphic novel with the support of Severn Trent Water. Beautifully illustrated by Emily Jones, it traces the story of Maya and how she learns more about water, and how to care for the world and its precious resources in an age of plastic and climate change.
Professor Stefan Krause: Chair of Ecohydrology & Biogeochemistry, Head of the Birmingham Water Council, Lead of IGI Water theme and UNESCO UNITWIN Network on Ecohydrological Interfaces

Stefan Krause is Professor of Ecohydrology and Biogeochemistry in the School of Geography, Earth and Environmental Sciences. His interdisciplinary research group on coupled groundwater and surface water systems investigates the impacts of global environmental change on hydrological fluxes, biogeochemical cycling and contaminant transport, and ecohydrological feedback functions in complex landscapes. His work particularly focuses on the analysis and quantification of multi-component reactive transport processes at aquifer-river interfaces and how these are influenced by changes in land-use and climate.

The research of his group combines novel modelling techniques with the development of innovative experimental technologies for investigating the interlinked cycling of nutrients and reactive transport of legacy (chlorinated solvents) and emerging contaminants such as engineered nanoparticles, microplastics and pharmaceuticals. He is applying novel distributed sensor network technology together with reactive “smart tracers” for investigating interconnected nitrogen and carbon cycling and microbial metabolic activity in reactive “hot-spots” and “hot-moments” at aquifer-river interfaces. His group provides expertise in developing adaptive modelling strategies for coupled simulation of groundwater and surface water flow at catchments scale which are applied for analysing the implications of environmental change on water transport and nutrient conditions in groundwater and surface waters.

In addition to reactive transport and transformation in coupled groundwater-surface water systems, Prof. Krause’s research interests extend to the ecohydrological implications of nutrient cycling and contaminant transport at aquifer-river interfaces as well as the development of management strategies and political instruments to promote the attenuation potential in these systems.
Professor David Hannah: Director of Research of the College of Life and Environmental Sciences and UNESCO Chair in Water Science

David M. Hannah is Professor of Hydrology in the School of Geography, Earth and Environmental Sciences and Director of Research of the College of Life and Environmental Sciences at the University of Birmingham. He is Chair-holder for the UNESCO Chair in Water Sciences.

He is recognised internationally for his pioneering work linking hydrology with climatology and ecology. He was honoured with the prestigious Tison Award (2014) from the International Association of Hydrological Sciences (IAHS). David’s research is interdisciplinary, focusing particularly on 3 complementary themes within hydroclimatology (interface between hydrology-climatology): (1) hydroclimatological processes within alpine, Arctic, mountain and glacierized river basins; (2) climate and river flow regimes; and (3) river energy budget and thermal dynamics. He has a crosscutting interest in ecohydrology/ hydroecology, specifically ecological response to hydro-climatological and physico-chemical habitat variability/ change.

David has made technological innovations in environmental sensing and helped shape the emerging citizen science agenda around water resources. His research has significant blue skies and applied implications for understanding and responding to impacts of climate change/ variability on hydrological systems and riverine ecology, and the management/ conservation of freshwaters.

David is very active in UNESCO’s International Hydrology Programme, formerly UK Representative for the International Association of Hydrological Sciences, and Vice-President of the IAHS-International Commission for Surface Water. Beyond academia, he provides advice to Government, various agencies, water industry and regulators.
Dr. Valerie Ouellet: research fellow University of Birmingham & IGI Water

Dr. Ouellet primary interest focuses on understanding how different environmental variables, such as water temperature and flow, affect the habitat and physiology of key fish species. Her research aims to generate knowledge about aquatic ecosystems at risk of thermal degradation and to inform on stream restoration strategies and aquatic resources management, especially in the context of human impacted systems and climate change.

She completed her BSc in Biological Sciences at the University of Montreal. She then undertook a MSc and PhD at INRS Eau Terre Environnement and worked in coordination with provincial and federal agencies. Her master project focused on the impact of water level management on biological indicators such as wetlands and muskrats for an international study on the St. Lawrence River.

For her PhD, she developed a 2D water temperature model and fish habitat model to study the role of elevated water temperatures in a massive fish kill in the St. Lawrence River. She also conducted experiment to understand on thermal stress can affect fish immune system. In 2015, Dr. Ouellet moved in Pennsylvania to work as a postdoctoral researcher at the Stroud Water Research Center working on thermal dynamics in rural and urban areas, fish thermal habitat and stream restoration. She is a research fellow at UoB since 2017.
Thank you for attending The University of Birmingham's World Water Day

See you again at World Water Day 2021

#UoBWorldWaterDay