

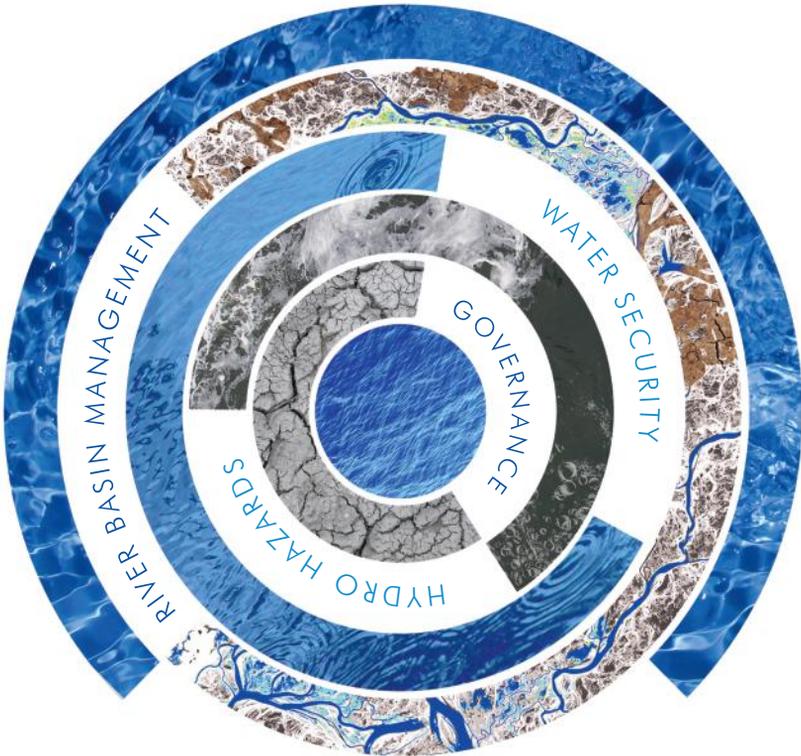


Federal Foreign Office

German House for Research
and Innovation - New Delhi



Germany
Land of Ideas



DWIH New Delhi

INDO-GERMAN SYMPOSIUM

WATERSCAPES

5 & 6 October 2017
India Habitat Centre, New Delhi

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MESSAGE



India and Germany are “made for each other”- that is how India’s Prime Minister Narendra Modi put it when he visited Berlin in May this year. Both countries are strong democracies, organized in federal systems. Both economies are thriving while bilateral trade is increasing. Both governments are dedicated to tackling global challenges, be it climate change, international terrorism or global pandemics. In short: both these countries are strategic partners.

Scientific collaboration has always been a high priority on our bilateral agenda. Currently, nearly 14,000 Indian students are enrolled at German universities, a number that has more than doubled over the past four years. Governments of both the countries are funding long-term partnerships between Indian and German universities. Moreover, India and Germany maintain joint large-scale research projects in various fields, from physics to computer sciences, from agriculture to biotechnology, or from civil security to sustainability research.

Some of these research areas are closely linked to the topic of this symposium: water and water management – an important area of cooperation also in our bilateral relations. Germany has gained substantial experience in water management, e.g. in cleaning up major waterways in densely populated areas. In April 2015, Chancellor Merkel and Prime Minister Modi agreed to cooperate closely in rejuvenating the holyriver Ganga and we are focusing today on the upstream state of Uttarakhand. With the help of German experts and companies we share our experience, knowledge and technology with India, and through KfW we finance investment projects.

I am glad that German House for Research and Innovation (DWIH) New Delhi is dedicating its annual event to the topic of water management. Moreover, I am confident that the “WaterScapes” symposium will be a successful event and I would like to thank the whole DWIH team for all their efforts in organizing this.

H.E. Dr Martin Ney

Ambassador of the Federal Republic of Germany to India

FOREWORD



India and Germany are natural partners. Despite the geographical distance between them, India and Germany are very close in terms of values, interests and goals. Above and beyond this, the two countries also consider science and innovation to be key areas for ensuring economic, social and sustainable development and have partnered for over 60 years in order to promote comprehensive and fruitful scientific cooperation. In this regard, a number of German funding organisations, research institutions and universities have established their offices in India to encourage and enable academic exchange, scientific collaboration and R&D projects. Hence, in order to facilitate all of this, internationalise science and research and encourage innovation, the Federal Foreign Office has set up the German House for Research and Innovation (DWIH) in New Delhi. Further, the DWIH also acts as an active link between government officials, policy makers and representatives of leading German institutions by creating a platform for exchange and cooperation by providing expert advice on partnership opportunities, and through seminars, conferences, B2B events, institutional networking etc.

Stepping into its 6th year, a number of events were hosted by DWIH with Indian institutions in the year 2017, very much in keeping with its aim of forging and strengthening the ties between the two countries. While the year commenced with a successful first ever organized institutional networking forum in Hyderabad, a series of insightful science circle lectures made their way through the year. This was soon followed by the recently conducted Falling Walls Lab India 2017 in August where budding researchers and entrepreneurs along with their innovative ideas competed to represent India at the prestigious international Falling Walls Conference in Germany.

Moreover, furthering its aim, this year DWIH will present its flagship Indo-German Symposium ‘WaterScapes’ on the 5th and 6th of October at the India Habitat Centre. This event will offer a platform to scholars and practitioners to stress on the need for a new paradigm in water management which will closely link the natural and engineering sciences with the social sciences and humanities. In a knowledge transfer environment, the WaterScapes symposium will let participants from India and Germany present their work, initiatives and ideas, exchange their views and approaches, and jointly seek for commonalities and innovative solutions to secure sustainable and efficient water resources management. We are confident that this event will act as an effective stage for creating new networks and linkages to take the academic and scientific relations between the two countries to unprecedented heights.

Heike Mock

Director, DWIH New Delhi

Director, DAAD – German Academic Exchange Service

CONCEPT NOTE

DWIH INDO-GERMAN SYMPOSIUM: WATERSCAPES

As climate change, urbanization, industry advancement and associated pollution, and growing world population have continued to raise the demand for water resources; water scarcity has increasingly received attention as being a severe threat to human well-being and to the safety of the planet, in general. This therefore calls for a holistic, integrated, trans- and interdisciplinary approach to water resource management in urban, peri-urban and rural areas, which will closely link the natural and engineering sciences with the social sciences and humanities. In addition to this, there also arises a need for the development of innovative technologies, strategic processes and system solutions for a sustainable management of water resources.

In India and in Germany, in order to achieve the overarching goal of water security, scholars and practitioners stress on the need for a new paradigm in water management and governance that should include both top-down and bottom-up participatory approaches. This essentially refers to a greater need for engaging citizens in planning, designing, and monitoring water management by, for example, involving them in implementation processes of decentralised options for water management.

Hence, with an aim at promoting awareness and disseminating information on water sector trends, ground-breaking research and mobilising efforts of all parties at all levels involved in providing water problem solutions in Germany and in India, the DWIH flagship annual symposium 'WaterScapes' will be organised around four broad themes:

Water Security and Governance (e.g. trans-regional water sharing, water system governance and regulations, water diplomacy, multi-level stakeholder dialogues and negotiations)

Urbanisation and Water Resource Management (e.g., waste water treatment, reclamation and reuse, supply of safe and clean drinking water, water stress, sustainable use of ground and surface water, drainage systems, sanitation, etc.)

Hydro Hazards (e.g., floods, contamination of ground water, water pollution, climate change leading to irregular rainfall patterns, the degradation of aquatic ecosystems, stakeholder engagement, etc.)

Integrated River Basin Management (i.e., balance between economics and ecology, river basin organisations/authorities, ecological restoration and conservation of aquatic biodiversity, etc.)

In a knowledge transfer environment that will bridge science, policy and practice, eminent scholars, leading experts and practitioners from Germany and India will present their work, initiatives and ideas, exchange their views and approaches, and jointly seek for commonalities and innovative solutions to secure a sustainable and efficient water resources management.

DWIH INDO-GERMAN SYMPOSIUM

WATERSCAPES

KEYNOTE
ADDRESS

INTEGRATED WATERSHED MANAGEMENT:
TRADITIONAL KNOWLEDGE FOR FUTURE
CHALLENGES, GENERAL CONCEPTS AND SOME
INSIGHTS FROM SOUTH ASIA

5 OCTOBER
10.00 h - 11.00 h

SESSIONS

01	WATER SECURITY AND GOVERNANCE	5 OCTOBER 11.30 h - 13.00 h
02	URBANISATION AND SUSTAINABLE WATER RESOURCES MANAGEMENT	5 OCTOBER 14.00 h - 15.30 h
03	URBANISATION AND SUSTAINABLE WATER RESOURCES MANAGEMENT - INDUSTRY PERSPECTIVE	5 OCTOBER 16.00 h - 17.30 h
04	HYDRO HAZARDS - FLOODS	6 OCTOBER 09.30 h - 11.00 h
05	HYDRO HAZARDS - WATER CONTAMINATION	6 OCTOBER 11.30 h - 13.00 h
06	INTEGRATED RIVER BASIN MANAGEMENT	6 OCTOBER 14.00 h - 15.30 h
07	YOUNG MINDS ON WATER	6 OCTOBER 16.00 h - 17.30 h

THURSDAY

5 OCT

09:30 – 10:00 h Registration

10:00 – 11:00 h Inauguration

- Welcome Address, Ms Heike Mock, Director, DWIH New Delhi
- Inaugural Address, Dr Jasper Wieck, Deputy Chief of Mission, German Embassy, New Delhi
- Key Note Address, Prof Dr Brigitta Schütt, Vice President, Freie Universität Berlin

11:00 – 11:30 h Tea/Coffee Break

11:30 – 13:00 h **Session 1: Water Security and Governance**

- Dr Matthias Hartwig, Max Planck Institute
- Ms Lydia Powell, Observer Research Foundation, New Delhi
- Dr Sharachchandra Lele, Ashoka Trust for Research in Ecology and the Environment (ATREE)
- **Chair:** Prof Dr Sudhir Chella Rajan, IIT Madras

13:00 – 14:00 h Lunch Break

14:00 – 15:30 h **Session 2: Urbanisation and Sustainable Water Resources Management**

- Prof Dr Jörg Drewes, Technical University of Munich (TUM)
- Prof Dr Dr Harrie-Jan Hendricks-Franssen, Forschungszentrum Jülich
- Prof Dr Michael Schneider, Freie Universität Berlin
- Prof Dr Mohan Kumar, IISc Bangalore
- **Chair:** Prof Dr Karl Schneider, University of Cologne

15:30 – 16:00 h Tea/Coffee Break

16:00 – 17:30 h **Session 3: Urbanisation and Sustainable Water Resources Management - Industry Perspective**

- Dr Marius Mohr, Fraunhofer IGB
- Mr Anshuman, Water Resources Division - The Energy and Resources Institute (TERI)
- Mr Adi Bhujle, Sovereign Tech Engineering Services Pvt. Ltd. & Indian Representative, German Water Partnership
- Mr Manish Gandhi, Ion Exchange India Ltd.
- **Chair:** Ms Anandi Iyer, Fraunhofer Office India

FRIDAY

6 OCT

09:00 – 09:30 h Registration

09:30 – 11:00 h **Session 4: Hydro Hazards - Floods**

- Dr Jorge Leandro, Technical University of Munich (TUM)
- Prof Dr Martin Voss, Freie Universität Berlin
- Prof Dr Jochen Schanze, Leibniz Institute of Ecological Urban and Regional Development Dresden
- Prof Dr Dhanya C T, IIT Delhi
- **Chair:** Prof Dr Nicola Fohrer, University of Kiel

11:00 – 11:30 h Tea/Coffee Break

11:30 – 13:00 h **Session 5: Hydro Hazards - Water Contamination**

- Prof Dr Karl Schneider, University of Cologne
- Prof Dr Thomas Braunbeck, Heidelberg University
- Prof Dr A.L. Ramanathan, Jawaharlal Nehru University
- Prof Dr Prosenjit Ghosh, IISc Bangalore
- **Chair:** Dr Jorge Leandro, Technische Universität München (TUM)

13:00 – 14:00 h Lunch Break

14:00 – 15:30 h **Session 6: Integrated River Basin Management**

- Prof Dr Nicola Fohrer, University of Kiel
- Dr Guido Schmidt, India-EU Water Partnership
- Prof Dr Bhallamudi Srinivasan Murty, IIT Madras
- Prof Dr Subashisa Dutta – IIT Guwahati
- **Chair:** Prof Dr Jayanta Bandyopadhyay, Observer Research Foundation, Kolkata

15:30 – 16:00 h Tea/Coffee Break

16:00 – 17:30 h **Session 7: Young Minds on Water**

- Ms Theresa Frommen, PhD Student, Freie Universität Berlin & Ms Dharmistha Chauhan, Mahila Housing SEWA Trust
- Ms Marcella Hansch, Pacific Garbage Screening (NGO)
- Dr Rahul Peethambaran, IISc Bangalore
- Ms Tarini Mehta, PhD, University of Cologne
- Ms Vinnarasi R, IIT Delhi
- Ms Neha Khandekar, The Energy and Resources Institute (TERI)
- Ms Ekashmi Rathore – Falling Walls Winner
- **Chair:** Prof Dr P K Joshi, Jawaharlal Nehru University

KEYNOTE ADDRESS

5 OCTOBER | 10.00 h - 11.00 h

by Prof Dr Brigitta Schütt

INTEGRATED WATERSHED MANAGEMENT: TRADITIONAL KNOWLEDGE FOR FUTURE CHALLENGES, GENERAL CONCEPTS AND SOME INSIGHTS FROM SOUTH ASIA

Prof Dr Brigitta Schütt

Vice President, Freie Universität Berlin and
Chair, Physical Geography, Department of Earth Sciences,
Freie Universität Berlin



Abstract:

Against the background of traditional knowledge of techniques and governance of water management, this presentation will focus on the principles of Integrated Watershed Management. Drawing from case studies across the dry lands of the old world, different forms of water harvesting, water storage and water distribution will also be introduced as the most important (ancient) technical measures through examples from Bronze Age to the Medieval Period.

The value of traditional water management practices is in its documentation on the basis of some good practice examples. These will show how until date – now local – knowledge is applied. Moreover, in order to emphasize the sustainability of such approaches for these studies, in addition to the technical measures, the government structures and the management of the resource water will also be exemplified. Highlighting the governance structures in the present day, adapted practices will be contrasted with the ancient practices.



Dr Brigitta Schütt is the chair-holder for Physical Geography at the Freie Universität Berlin since 2002. Her current research focuses on the analysis of present and (pre-) historical human-environment interactions. This also aims at the reconstruction of palaeoenvironments which essentially refers to the reconstruction of the habitat of earlier cultures, the assessment of site conditions, and the assessment of the impact of settlement activities on landscape balance and geomorphologic processes. Moreover, in interdisciplinary research, she also wants to understand the resilience of past societies to natural extreme events and adaption strategies to decrease vulnerability. Apart from this, Dr Schütt also conducts applied research on soil erosion and watershed management and the regional focus of her work is in the dry belt of the Ancient World (Mediterranean, North and East Africa, Central and South Asia).

Due to extensive networking especially with Africa and Central and South Asia, she regularly works as a reviewer for the German Research Foundation (DFG), the German Academic Exchange Service (DAAD) and the Volkswagen Foundation. Besides this, Dr Schütt has been a member of the Leopoldina– National Academy of Sciences since 2012 and a member of the Commission for Geomorphology of the Bavarian Academy of Sciences. She is the Vice President of Freie Universität Berlin with the responsibility for research, sustainability issues in research, teaching and gender equality.

SESSION 1

5 OCTOBER | 11.30 h - 13.00 h

Chair: Prof Dr Sudhir Chella Rajan, IIT Madras

Speakers:

- Dr Matthias Hartwig, Max Planck Institute
- Ms Lydia Powell, Observer Research Foundation, New Delhi
- Dr Sharachandra Lele, Ashoka Trust for Research in Ecology and the Environment (ATREE)

The Settlement of Water Conflicts

Abstract:

Water has become a scarce resource and many states do not have enough water to meet their demands. Hence, one can say that water is not an equally distributed resource throughout the world, which further make conflicts unavoidable. The question of equal sharing of the water of a river or a lake between riparian states has been raised in many regions in the world and apart from Australia, there exists no other continent without water disputes. Moreover, ecological issues linked to the use of water make the situation even more complicated.

However, while there are many issues, there also exists a number of solutions to deal with them. Such as, while the National (– see f.e. the Deutsche Staatsgerichtshof in the Donauversinkung Case of 1927 -) and international Courts (– see f.e. the International Court of Justice in the Gabčíkovo - Nagymaros case between Slovakia and Hungary -) have decided cases before them since the beginning of last century, the international river regimes (– see f.e. The Mekong River regime, the Niger Convention or the Danube River Basin Convention -) have succeeded in harmonizing conflicting interests of riparian States. Additionally, on a global level, the UN Watercourse Convention has been adopted since 1997, although it has not yet entered into force due to lack of ratifications. Besides all this, rules generally applicable for water are also being continually developed.

WATER SECURITY AND GOVERNANCE

Dr Matthias Hartwig

Max Planck Institute for Comparative Law and International Law



Dr Matthias Hartwig studied law at the universities of Erlangen, Aix-en-Provence and Freiburg and later interned with the court of appeal (Heidelberg) and with the law firm Fulbright and Jaworski in Washington, DC. In the year 1997, he assisted at the Constitutional Court in Italy and went on to become an assistant at the Max Planck Institute for Comparative Public Law and International Law, from where he also pursued his Phd in international law. Subsequently in 1991, Dr Hartwig served as an assistant to the president of the German constitutional court until he joined as a senior researcher at the Max Planck Institute for Comparative Public Law and International Law in 1996.

Besides this, Dr Hartwig has been the lecturer at a number of universities including those of Heidelberg, Saarbrücken, Trento, Heidelberg Center Santiago de Chile and Al Farabi University in Kazakhstan. He has also been a consultant to the constitutional courts in Middle and Eastern Europe (Bulgaria, Latvia, Russia, Ukraine, Belarus) and has participated in the drafting process of the constitution in Libya and in Yemen, including questions on the distribution of resources.

Questioning the Goals of Water Regulation

Abstract:

The much emphasised need for water security through better water governance arises from the notion that water is a scarce resource. In the colonial period, deliverance from the scarcity of resources including the scarcity of water was achieved through sovereignty – that shifted scarcity to other people and other places in the developing world. Deliverance from scarcity of water in the post-colonial phase is attained through water governance often interpreted as water regulation. Under this interpretation, competitive behaviour in accessing water resources is regulated so as to maximise water use efficiency. The crucial difference here is that competitive behaviour is driven by prosperity rather than the motive of security or survival and like security, prosperity is a powerful driver of relative gains behaviour.

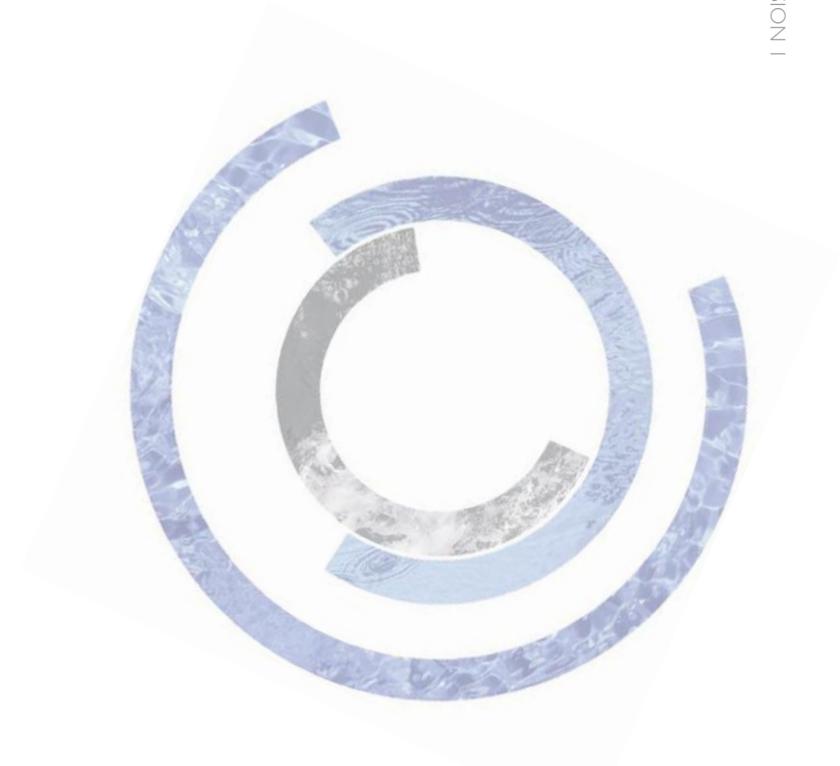
Hence, this paper will argue that as long as water governance is seen as the means to optimise a single production function such as water use efficiency, pertinent matters such as equity would be avoided. It will conclude that unless the goal of water governance is seen as the production of the public good of water, water governance would not only reinforce narratives of absolute scarcity of water but also ensure water prosperity for a few at the expense of water security for all.

Ms Lydia Powell

Head, Centre for Resources Management, Observer Research Foundation, New Delhi



Ms Lydia Powell works as a head and senior fellow at the Centre for Resources Management, Observer Research Foundation (ORF), New Delhi for the past 15 years, with energy and climate change being her major areas of research. She holds two MSc degrees in business strategy oil and gas and solid state physics, besides also holding an MBA degree in energy management from the Norwegian School of Management, Oslo, Norway. Before joining ORF, Ms Powell worked with Orkla India Ltd, Mumbai, India in the sectors of renewable energy, auto parts and hydro power and with Norsk Hydro ASA, New Delhi for aluminium, fertilizer and oil and gas sector. Tracing back her career, Ms Powell also worked as a Physics faculty for MEA, IIM and given part-time lectures at the School of Architecture and Planning on Climate Change before entering the corporate sector. Currently, Ms Lydia Powell is working on projects related to the scenarios for low carbon growth, sustainable development of the Sundarban and coal quality and coal use efficiency.



Dr Sharachchandra Lele

Senior Fellow and Convenor, Centre for Interdisciplinary Studies in Environment & Development, Ashoka Trust for Research in Ecology and the Environment (ATREE)



Dr Sharachchandra (Sharad) Lele received his B.Tech. degree in Electrical Engineering from IIT Bombay but then decided to shift his focus to environmental studies, thus pursuing his M.S. on the environmental impacts of large dams at the Indian Institute of Science, Bangalore. Following this, he then did his Ph.D. in Energy and Resources from the University of California, Berkeley (1993), focusing on forest use in the Western Ghats. Since then, he has worked at the Pacific Institute, Harvard University, and Centre for Interdisciplinary Studies in Environment & Development, and is now with the Centre for Environment & Development at ATREE, Bangalore, which is an applied research institute working on conservation and sustainable development.

Dr Sharad is an interdisciplinary environmental researcher, trying to bridge natural sciences, economics, and political science in understanding the concepts of and pathways to environmentally sustainable and socially just development. He has worked on sustainable forest management and forest governance, forest hydrology and farmer linkages, watershed development and its long-term impacts, and more recently on governance of water supply and water pollution. He is currently leading a major project on the impacts of climate change on water management in rapidly urbanizing basins in peninsular India, and is involved in other studies on water pollution regulation and sustainable water for the city of Bangalore. He has served on the MoEF-MoTA Forest Rights Act committee and the Karnataka High Court's Elephant Task Force. Besides this, he is currently serving on MoEF's Expert Appraisal Committee for Coal Mining and Thermal Power Plants, and the Government of Karnataka's Bellandur Lake Monitoring Committee.

CHAIR

Prof Dr Sudhir Chella Rajan

Professor, Department of Humanities and Social Sciences, IIT Madras



Dr. Sudhir Chella Rajan has an interdisciplinary doctorate in Environmental Science and Engineering. He has around 25 years of experience working with technical objects of social sciences in relation to conflicts regarding energy access and climate change policy, institutional and emergent processes and reforms. His primary focus across sectors has been on understanding and responding to a variety of challenges relating to institutions and governance for infrastructure and the environment. He is currently working on a project near Chennai to understand peri-urban dynamics and also to engage local farmers, village leaders, community groups and district state officials to record their own experiences in managing cascading water tanks and drainage channels in order to build institutional capacity in the area and safeguard sustainable strategies. He is a Professor of Humanities and Social Sciences at IIT Madras and is writing a manuscript on the 'long' or 'trans-temporal' history of corruption in India.

He is author of "The Enigma of Automobility: Democratic Politics and Pollution Control" and a co-author of "The Suicidal Planet: How to Avoid Global Climate Catastrophe." He has previously worked at the California Air Resources Board, the International Energy Initiative and Tellus Institute.



SESSION 2

5 OCTOBER | 14.00 h - 15.30 h

Chair: Prof Dr Karl Schneider, University of Cologne

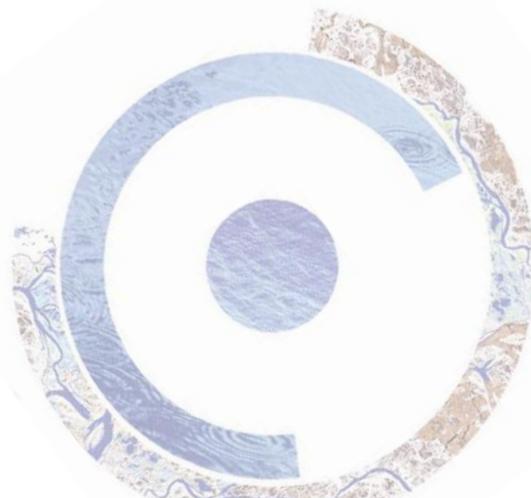
Speakers:

- Prof Dr Jörg Drewes, Technical University of Munich (TUM)
- Prof Dr Dr Harrie-Jan Hendricks-Franssen, Forschungszentrum Jülich
- Prof Dr Michael Schneider, Freie Universität Berlin
- Prof Dr Mohan Kumar, IISc Bangalore

Implementing the urban water-energy-food nexus: drivers and barriers

Abstract:

The growth-dependent economy infers that natural resources are without limit. However, radical new approaches linked to a paradigm shift are needed to reduce resource consumption to sustainable levels particularly in cities of the future. Integrated urban planning, using the Water-Energy-Food (WEF) Nexus approach, can help cities exploit potential synergies of climate change mitigation and adaptation approaches, thereby conserving resources such as water and energy. Urban water reclamation and reuse coupled with resource recovery is a key component of the WEF Nexus approach. In order to embrace such integrated urban planning concepts, drivers and barriers to implementation will be discussed.



URBANISATION AND SUSTAINABLE WATER RESOURCES MANAGEMENT

Prof Dr-Ing Jörg E. Drewes

Chair of Urban Water Systems Engineering,
Technical University of Munich



Dr Jörg Drewes is the Chair Professor of Urban Water Systems Engineering at the Technical University of Munich (TUM), Germany and serves as a speaker for TUM's interdisciplinary Water Cluster. Previously, serving as a Full Professor of Civil and Environmental Engineering at the Colorado School of Mines, USA (2001-2013) and Director of Research for the National Science Foundation Engineering Research Center on Reinventing the Nation's Urban Water Infrastructure (ReNUWIt), Professor Drewes' research and scholarly activities have been closely related to the common theme of energy efficient water treatment systems and water recycling.

Dr. Drewes has published more than 300 journal papers, book contributions, and conference proceedings (h-index of 37). He has served on multiple science advisory panels and chaired blue ribbon panels on topics related to public health, engineering, and reliability of water reuse projects in the U.S., Australia and the EU. He was awarded the 2007 AWWA Rocky Mountain Section Outstanding Research Award, the Quentin Mees Research Award in 1999, the Willy-Hager Dissertation Award in 1997, and the 2003 Dr. Nevis Cook Excellent in Teaching Award. In 2008 and 2013, he was appointed to the U.S. National Academies/National Research Council Committees on Water Reuse as an Approach for Meeting Future Water Supply Needs (2008-2012) and Onsite Reuse of Graywater and Stormwater (2013-2015), respectively. He also serves on the Research Advisory Council of the Water Environment and Reuse Foundation (Alexandria, VA) and on the State of California's expert panel on direct potable reuse. Besides this, professor Drewes currently serves as the chair of the International Water Association (IWA)- a water reuse specialist group and is the editor of the Journal of Water Reuse and Desalination.

Improved water resources management by combining integrated terrestrial system modelling, near-real time data and data assimilation.

Abstract:

The optimal management of our water resources is becoming increasingly important given the pressures of climate change and increasing human population. Keeping this in mind, integrated terrestrial system models from groundwater to the upper atmosphere, including soil, vegetation and streams can provide predictions of groundwater levels, soil moisture, discharge, evapotranspiration and weather conditions, amongst others. Model predictions can be adjusted by increasing the amount of data which are available in near real-time, both from in situ and remote sensing platforms. The merging of integrated terrestrial model predictions and on-line data can be done via data assimilation techniques. As a result, data adjusted predictions of the complete water cycle (from subsurface to atmosphere) for the next weeks can be made, which can be used for water resources management.

This approach is illustrated for a series of real-world cases. The first case is the real-time control of irrigation scheduling for citrus trees near Valencia (Spain) for the years 2015 and 2016. Model predictions and on-line soil moisture measurements were used for the optimal assignment of irrigation water for the next days. Also, stem water potential campaigns and the recording of citrus production showed the water saving potential of the approach. The second case is soil moisture prediction over a German region which combined integrated terrestrial system modelling and measured neutron count intensity by cosmic ray probes. Finally, an outlook has been developed and shall be shared for water resources planning on larger spatial and temporal scale like the future development of irrigation for the Indian subcontinent.

Prof Dr Harrie-Jan Hendricks-Franssen

Professor, "Scientific computation in terrestrial systems"
at Technical University of Aachen and Forschungszentrum
Jülich GmbH



Prof Harrie-Jan Hendricks-Franssen has MSc degrees in soil science, and atmospheric and climate sciences and a PhD degree in hydrogeology. While being employed by the agrosphere institute (IBG-3) at Forschungszentrum Jülich GmbH, he holds a W2-professorship on "Scientific Computation in Terrestrial Systems" at RWTH Aachen University. His research focuses on integrated modelling and the assimilation of measurements to improve predictions with integrated terrestrial system models. He also works on a better understanding of soil moisture and evapotranspiration measurements.

Apart from this, he is co-coordinator of FOR2131 ("Data assimilation for Improved Characterization of Fluxes across Compartmental Interfaces") and PI of a data assimilation project (C6) in the Transregional Collaborative Research Center TR32 "Patterns in Soil-Vegetation-Atmosphere Systems – Monitoring, Modelling and Data Assimilation". 79 ISI-publications have been co-authored by Dr Franssen and he is the editor of Hydrology and Earth System Sciences and the associate editor of Advances in Water Resources.



Groundwater as drinking water resource in urban and peri-urban areas in India – experiences from case studies

Abstract:

According to the Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR), Indian water resource planning is currently facing major challenges primarily due to growing population, increasing urbanization, inadequate exploitation, protection and treatment of water resources and climate change impacts. Also, increasing water demand, change in rainfall patterns and change of land use have led to declining groundwater tables and changing of surface water and groundwater flow patterns. Furthermore, the water quality is endangered by geogenic and anthropogenic substances.

The Hydrogeology Group of Freie Universität Berlin has been conducting water research in India for more than 12 years, in close cooperation with universities, industry partners and non-governmental organizations and our presentation shall focus on the work done as a part of this cooperation.

From 2006 to 2014, water research has been carried out on the function and relevance of artificial groundwater recharge and bank filtration for drinking water production in the urban areas of Delhi and Chennai, as well as on the problem of salt water intrusion in coastal aquifers. The research work was carried out within the scope of the collaborative research projects TECHNEAU (www.techneau.org) and SAPH PANI (www.saphpani.eu).

Besides this, participatory water management strategies based on hydrogeological research are currently being developed in two peri-urban slum areas in Jaipur, Rajasthan. This research work is integrated in the interdisciplinary project "Women's Action towards Climate Resilience for Urban Poor in South Asia", coordinated by the NGO "Mahila Housing SEWA Trust" and financed by the "Global Resilience Partnership".

Prof Dr Michael Schneider

Head, Hydrology Group, Institute of Geological Sciences,
Department of Earth Sciences, Freie Universität Berlin



Prof Dr Michael Schneider has a diploma degree in Geology and a doctoral degree in Hydrology from the Technical University of Berlin. He has been a consultant for groundwater exploration, exploitation and management, environmental and engineering geology from the year 1986 until 2005. Following this, Prof Schneider worked at the Ludwig-Maximilians-Universität Munich as a professor of Hydrology and Environment in 2005-2006. Later he joined as a professor in Freie Universität Berlin in 2006 until he became the Head of the Hydrology Group at the Institute of Geological Sciences. Dr Michael Schneider's focus of research is urban water resources, managed aquifer recharge (MAR) and bank filtration, deep aquifer systems and evaluation of hydrothermal resources.



Integrated urban water management

Abstract:

This presentation will focus on the challenges the cities are facing in terms of drinking water supply along with other challenges imbedded in them. With a very rapid rate of urbanisation and clear indications of climate change leading to extremes of floods and droughts, it has become a herculean task for supply utilities to ensure adequate water quantity which is of acceptable quality to all its consumers. With inbuilt competition among agriculture, domestic usage and industry, it is a challenging task to keep minimum supply-demand gap in all spheres. Paradigm shift in the way we handle water management, harvesting and developing other sources of water, will bring down the pressure on traditional water resources. There is also a need to look at the water cycle, particularly in areas which are feeding into the cities. Also, real time control and operation of water systems becomes an essential component of urban design at a time when there is a lot of development towards building smart cities. In this presentation, all these aspects will be discussed along with possible solutions to arrive at better management of urban water systems.

Prof Dr Mohan Kumar

Professor, Department of Civil Engineering,
Indian Institute of Science – Bangalore



Prof M S Mohan Kumar works in the broad area of flow and contaminant transport in both natural and man-made systems. His research areas are: groundwater, Vadose zone hydrology, multiphase flow systems, urban water networks, irrigation systems and small experimental watersheds. He has been involved in several national and international projects in both research and consultancy mode. Prof Kumar has guided many PhD and Master students and published a number of papers in international and national journals.

A fellow of the Indian Water Works Association, he has been the recipient of several prestigious fellowships such as the Alexander von Humboldt fellowship and the INSA-JSPS fellowship. Moreover, Prof Kumar was also recently awarded the Amulya and Vimala Reddy award by the Indian Institute of Science for sustainable development and the IBM faculty award.

Prof Mohan Kumar is currently the professor of Water Resources & Environmental Engineering, Department of Civil Engineering, and Associate Faculty CISTUP, Robert Bosch Centre for Cyber Physical Systems, ICWaR, Indian Institute of Science, Bangalore. He is also the Chairman of Indo-French Cell for Water Sciences at IISc and the Former Hon. Secretary, Karnataka State Council for Science and Technology.



SESSION 3

5 OCTOBER | 16.00 h - 17.30 h

Chair: Ms Anandi Iyer, Fraunhofer Office India

Speakers:

- Dr Marius Mohr, Fraunhofer IGB
- Mr Anshuman, Water Resources Division - The Energy and Resources Institute (TERI)
- Mr Adi Bhujle, Sovereign Tech Engineering Services Pvt. Ltd. & Indian Representative, German Water Partnership
- Mr Manish Gandhi, Ion Exchange India Ltd.

Fraunhofer Water Systems Alliance – solutions for industrial water management

Abstract:

Fraunhofer is Europe's largest application-oriented research organization and in the Fraunhofer Water Systems Alliance (SysWasser), different Fraunhofer Institutes pool their expertise for research and development of effective water infrastructure systems and technology. The alliance's objective is to take sustainable solutions pertaining to water catchment, infrastructure, and wastewater treatment and adapt them for use in practical applications on a national and international level, taking into consideration the relevant social, economic and environmental implications. Over the years, Fraunhofer Institutes have developed several processes and technologies for the treatment of water and wastewater - the examples of which will be shown in the presentation.

Beyond this, Fraunhofer Water Systems Alliance also offers their expertise and lab scale equipment for solving practical problems, e.g. at industrial production sites. Examples of this approach are illustrated through the projects carried out in Germany. For instance, in one such example, a hazardous substance from a petro-chemical process had to be eliminated at the site of a large producer. Different tests were carried out to eliminate this substance through a combination of biological and ozone treatment, taking into account the impacts on the existing wastewater treatment process. In another example, the infrastructure of a large development site of an automotive company had to be checked in order to identify approaches for sustainable future development, considering the areas of water supply, stormwater management, wastewater collection and treatment, waste management, supply with heat and cold, and the attractiveness of the site.

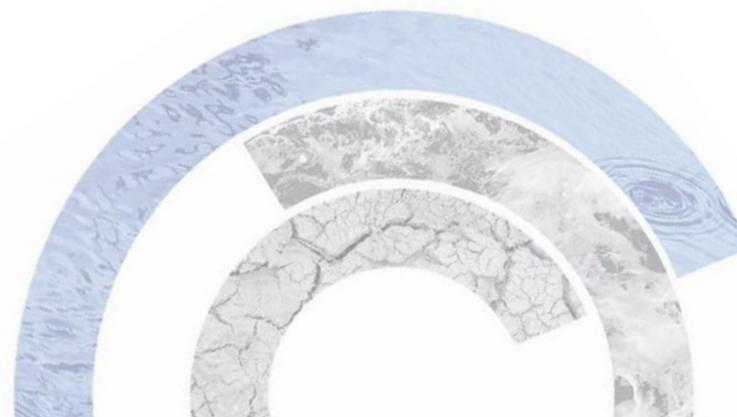
URBANISATION AND SUSTAINABLE WATER RESOURCES MANAGEMENT INDUSTRY PERSPECTIVE

Dr -Ing Marius Mohr

Head of Group Bioprocess Engineering in Water Management and Circular Economy, Fraunhofer-Institute for Interfacial Engineering and Biotechnology (IGB)



Dr.-Ing. Marius Mohr works as a researcher at Fraunhofer IGB since 2004. In 2011, he finalized his Ph.D.-thesis about an anaerobic membrane bioreactor process for wastewater treatment. Since 2013, he is in charge of the group "Bioprocess Engineering in Water Management and Circular Economy". He is working in the fields of wastewater treatment, sludge digestion and water management and was in charge of the research project DEUS 21, where a semi-decentralized urban water management concept was realized in a development area. In 2014, he performed an analysis of eight cities in Asia (Mongolia, China, Vietnam, Thailand, Indonesia, Philippines) for GIZ regarding their potential for lighthouse projects in the context of the Nexus water, energy and food security. He has been working on studies and projects regarding wastewater treatment for different industries (paper, chemistry, pharma, food and beverage).



Enhancing Water Use Efficiency for Sustainable Water Management in Indian Industries

Abstract:

Water resource in India faces multiple challenges. Despite an increasing and competing demand amongst various sectors, the water use in different sectors in India remains inefficient. Industrial water demand in India is expected to increase many folds by 2050, however, compared to international scenario, Indian industries consume relatively higher amount of water for production. It is therefore essential that the current and future path of growth and development in India encompasses strategies for sustainable water management involving interventions like water demand management, enhancing water use efficiency, water conservation, recycle & reuse, etc., through an integrated approach.

In this regard, an immediate opportunity lies with water intensive industries to bring about sustainable water use in the industrial sector. An example for this is that of the Thermal Power Plants that are the largest consumer of water in the industrial sector. A study by TERI (2015) on selective industries indicates that there exists a significant water saving potential in thermal power plants with short term interventions like recirculation/reuse of ash water from ash dyke, increasing the Cycle of Concentration (CoC), reuse/recycle wastewater (zero discharge) as well as long term interventions like switching from wet ash handling to dry ash handling and shifting from conventional wet cooling to dry cooling system (where applicable). Water audit conducted by TERI for a thermal power plant revealed that recycling the drain wastewater can save about 17.9 million m³/year of water with an associated financial saving of about INR 7.2 crore/year. Water saving interventions in the plant involving recycling/reuse of wastewater and water used for ash handling, as well as reduction in specific water consumption of the cooling towers, could potentially reduce the water consumption by up to about 60%. It is thus evident that there exist considerable opportunities in water intensive Thermal Power Plant sector to reduce their specific water consumption and fresh water demand. Corporates can play a major role in enhancing industrial water use efficiency through conducting water audits, mapping water footprints and undertaking water conservation and efficiency improvement interventions within the industry and its entire value chain.

Mr Anshuman

Associate Director – Water Resources Division, The Energy and Resources Institute (TERI)



Mr. Anshuman, Associate Director, Water Resources Division of TERI (The Energy and Resources Institute) has been working in the field of water sector since last 20 years. His key qualifications include M. Tech. in energy & environmental management from IIT Delhi.

His expertise in the water sector lies in the areas related to integrated water resource management, water use efficiency, water quality & quantity assessments where he has carried out several comprehensive research studies in context of the source (surface water, groundwater), issues (water scarcity, pollution, use efficiency etc.), sectors (irrigation, domestic & industrial) and stakeholders (Central/state Governments and local communities). His focus work areas include water use efficiency, water audits; urban water supply & demand management studies; water conservation; watershed management; integrated water resources management (IWRM), climate change and water security amongst many others.

He is currently the member of Technical Advisory Committee (TAC) of National Institute of Hydrology (NIH), Sectional Committee for Water Quality for Industrial Purposes under the Bureau of Indian Standards (BIS) and an advisor at the High Level Advisory Council of Aquatech - organised by Amsterdam RAI & IWA (the International Water Association). Besides this, MrAnshuman is a member of the Jury for Water Digest Water Awards - organised by Water Digest and UNESCO.

German Water Partnership (GWP) - customized solutions for India's rapid urbanization and sustainable water management - engineered in Germany, made in India.

Abstract:

German Water Partnership (GWP) is the Central body for coordination and contact to the German water sector. Promoted by 5 Federal German Ministries, GWP currently has over 350 members from industry, research, and finance, of which Fraunhofer is one. The fundamental aim of the GWP is to make the outstanding German technologies, engineering, know-how and experience in the water sector easily available to partners and clients all over the world.

Some of the core capabilities include, but are not limited to:

- IWRM – Integrated Water Resource Management
- Wet Infrastructure Consultancy, Planning and Design
- Rehabilitation of Water bodies – Lakes, Rivers, Reservoirs
- World's Largest Mechanical Equipments for Waste water & Storm Water Management
- Biological Treatment systems ideal to Indian conditions
- Storm Water Management – Flood Protection integrated with Rain Water Harvesting and Ground Water Recharge; Catchments and Treatment Systems, Combined Sewer Overflows (CSO), and Sanitary Sewer Overflows (SSO).
- Decentralized Waste Water Treatment and Reuse Systems
- Energy Efficient Pumping Systems for Water transport
- Energy Generation technologies – Hydropower Systems, BioMethanation systems, Waste to Energy Systems

Mr Adi Bhujle

Director, Sovereign Tech and Indian Representative,
German Water Partnership (GWP)



Mr Aditya Bhujle is the Director of Sovereign Tech and the Indian representative of the German Water Partnership (GWP) – the India section of which is situated at the Sovereign Tech facilities in Mumbai and Navi Mumbai. A manufacturer and solution provider for the solid-liquid separation industry, Sovereign Tech also acts as an execution and support partner for many projects carried out by German experts in India.

Besides this, Mr Bhujle serves on various advisory boards for the water and environmental organisations in India. He is a graduate from the California Institute of Technology (CalTech) with a double major in mechanical engineering and business and has completed a Master of science programme from the Massachusetts Institute of Technology (MIT) in Aeronautics and Astronautics. Apart from this, Mr Bhujle has been researching on water and energy systems with MIT and on planetary exploration technologies with the Jet Propulsion Laboratory of NASA.

CHAIR

Ms Anandi Iyer

Director, Fraunhofer Office India



Ms Anandi Iyer is the Head of the FraunhoferGesellschaft, India Office since last 9 years. She has more than 20 years of professional experience in playing a leading role in organizations such as the Confederation of Indian Industry (CII), the German Agency of International Cooperation (GIZ), and the Federal Government for Education and Research (BMBF).

Ms. Iyer is a member of several high level expert committees with CII, FICCI and German Government. She is the Chairperson of the European Business Group (EBG, Bangalore Chapter) and a National Council member of the Country Council of the EBG. She is also member of the Indo-German Expert Group on Green Economy, set up by the Federal Ministry of Environment, Govt. of Germany. Ms. Iyer has pursued her MBA from Strathclyde Graduate Business School, UK specializing in Strategy and Business Communication, and has Masters in German Language. Also, she has won awards on leadership and excellence, including the Outstanding Woman Achiever Award 2013 by ISBR School of Management and Public Relations Council of India.

SESSION 4

6 OCTOBER | 9.30 h - 11.00 h

Chair: Prof Dr Nicola Fohrer, University of Kiel

Speakers:

- Dr Jorge Leandro, Technical University of Munich (TUM)
- Prof Dr Martin Voss, Freie Universität Berlin
- Prof Dr Jochen Schanze, Leibniz Institute of Ecological Urban and Regional Development Dresden
- Prof Dr Dhanya C T, IIT Delhi

Forecasting dynamic flood maps considering hydrological uncertainty

Abstract:

The project FloodEvac, funded by the German Federal Ministry of Education and Research (BMBF), aims at providing spatial and temporal information on flood risk in the event of a flood. In the subproject going to be presented, flood maps of water depths and flow velocities are calculated including model uncertainties.

Any flood prediction is associated with uncertainties. In principle, uncertainties increase if the predicted precipitation has to be included in the flood forecast due to the (small) size of the catchment area. The FloodEvac project takes into account the overall uncertainty of precipitation forecast, hydrological modeling and hydrodynamic modeling.

In this presentation, the influence of the parameter uncertainty of the hydrological model LARSIM is shown. LARSIM is the official flood forecasting model of the Bavarian water administration. To give an example, for the May 2006 event different flood hazard maps of the city of Kulmbach are calculated, showing flood areas for uncertainty quantiles of 10%, 50% and 90%. This information is very important for disaster mitigation, since different protection and evacuation measures can be taken based on diverse vulnerabilities with regard to flood damage.

The flood areas are visualized in an hourly time step in order to determine evacuation paths more effectively. This information will support the rescue forces for optimizing their alert and evacuation plans.

HYDRO HAZARDS - FLOODS

Dr Jorge Leandro

Senior Researcher and Lecturer,
Technical University of Munich (TUM)



Dr. Leandro is currently a Senior Researcher at the Chair of Hydrology and River Basin Management from Prof. Disse at the Technical University of Munich. Before he worked as an Akademischer Rat at the department of Hydrology, Water Resources Management and Environmental Engineering at Ruhr University Bochum (GE). His research focus is on urban hydrology, for which his expertise is built on 5-years' consultant work, a 3-year doctorate at Exeter University (UK), and as Professor Auxiliar at the Universidade de Coimbra (PT). He has a published over 60 publications in numerical, experimental and theoretical approaches, from which 33 are in peer-reviewed ISI Journals. In 2014 one of his articles was commended by the Journal of Flood Risk Management for the Outstanding Paper Award supported by The JBA Trust. In 2015 appeared his first Special Issue as Guest Editor in the Urban Water Journal on Towards more Flood Resilient Cities.



The culture of managing flood events – a comparative approach on India and Germany

Abstract:

Managing floods is a significant challenge for many cities, and the magnitude of such a challenge is expected to grow even further with increasing urbanisation, climate change impacts, and economic development. Research on flood management to a large extent focuses on formal structures and procedures, training and exercise as well as on technical solutions. However, managing risks from disasters is a reflection of the society, wherein culture and socio-cultural influences play a crucial role. Management of a specific disastrous process is structured by historically derived attitudes, beliefs and values, political and legal traditions, socio-economic patterns, concepts of justice, interpretations of risk etc.

This specific culture by and large determines how disaster management is shaped in a particular context. It also signifies how each context has its own influencing factors leading to different solutions to a similar problem. In this regard, the Disaster Research Unit (DRU) of Freie Universität Berlin, Germany, has developed a framework and methodology to identify and analyse crucial socio-cultural factors shaping the management of disasters.

Applying this framework, the presentation will explore and compare the management of extreme flood events of Mumbai, India with those of the Elbe River in Germany. It will discuss results from qualitative interviews conducted with disaster management practitioners in India and Germany under the joint Indo-German Research Project "FloodEvac", subproject "Cultures and Catastrophes", funded by the Federal Ministry of Education of Germany.

Prof Dr Martin Voss

Head, Disaster Research Unit (DRU), Institute of Social and Cultural Anthropology, Freie Universität Berlin and CEO, Academy of the Disaster Research Unit (ADRU)



Martin Voss is an inter- and transdisciplinary working sociologist, university professor for social scientific disaster research, the head of the Disaster Research Unit (DRU) at the Freie Universität Berlin and CEO of the non-profit Company "Academy of the Disaster Research Unit (ADRU)". Born in 1972, he studied sociology, psychology and education at the University of Kiel and received his Doctor (-PhD) in 2006 with a theoretical thesis on catastrophes. Between 2002 and 2007 he held several teaching positions in Kiel, Hamburg and Passau. Besides the study of sustainability, disaster & catastrophes from a social scientific perspective, the further key qualifications of Prof Voss are transdisciplinary security, risk, vulnerability and resilience assessment/evaluation and capacity building in development contexts, with a special focus on Asian countries (esp. Indonesia, Sri Lanka, Thailand, India and China). In this context, he is highly conversant with transdisciplinary and participative methods allowing co-design and co-production of sustainable solutions and culturally embedded technology implementation.

Prof. Voss is the head of several national and international research projects dealing with topics like sustainable development and disaster prevention, societal conditions and organizational structures of recent disaster management systems, human behavior in crisis situations, vulnerability etc. He is member of the executive board of the German Committee for Disaster Reduction (DKKV) and with his private non-profit company ADRU he promotes sustainable development and disaster prevention to the broader public as well as to national and international organizations.



Approaching the flood risk system and implications for its management

Abstract:

Flooding with its impacts is increasingly understood as a comprehensive and complex issue. Comprehensiveness refers to the wide scope of natural and societal components involved, whereas complexity acknowledges the interdependencies between these components as well as the short-term dynamics and long-term change. Comprehensiveness and complexity together ask for conceptualisation and operationalisation of a system: the flood risk system.

The talk starts with an introduction of flood risk as a causal system with its main elements and key processes using the SPRC concept and others. The dynamics and change are included as system's behaviour. A methodological frame for scenario- or ensemble-based coupled modelling is proposed for operationalisation of the system with an intermediate complexity. Examples derived from empirical research are shown to prove the relevance of this approach. The focus is on the representation of uncertainties and the criterion 'robustness' as two examples.

The system's approach is then put in the context of risk management as part of risk governance. Advanced options for risk reduction from the intermediate complexity are amplified with examples from physical measures and policy instruments. In addition, management strategies are uncovered considering both anticipation and resilience. Also here, empirical results illustrate the relevance of the move towards a system's approach.

Finally, preferential research demand is identified for the system's analysis as well as the analysis of management strategies. This is amended by possible societal impacts of these research efforts in the light of the priorities of action according to the UNISDR Sendai Framework.

Prof Dr Jochen Schanze

Chair of Theoretical and Methodological Basics of Ecological Development, Leibniz Institute of Ecological Urban and Regional Development (IOER)



Professor Schanze is the Chair of Theoretical and Methodological Basics of Ecological Development at the Leibniz Institute of Ecological Urban and Regional Development (IOER) and the Chair of Environmental Development and Risk Management at Technische Universität Dresden. His research addresses inter- and transdisciplinary knowledge on biophysical cause-effect interrelations of human and environmental systems as well as their ability to integrate in management and governance. Beyond this, he also works on theoretical considerations with regard to concepts of systems theories, integrated resource management, risk management and environmental governance. The methodological approaches applied by Prof Schanze range from GIS and multi-model-based simulations to foresight and integrated assessment, mono and multi-criteria evaluation and decision support to measures, instruments and strategies of management and governance with institutions and actors. His thematic focus are sustainable environmental development of regions and cities as well as risks due to natural hazards (e.g. floods, droughts) and climate change with an in-depth expertise related to water. He is a member of the steering group of the Center for Advanced Water Research (CAWR); vice-chairman of the Centre for Sustainability Assessment and Policy; spokesman of the working group "Environmental Crisis" of the Leibniz Research Alliance "Crisis in a Globalised World"; associate editor of Journal of Flood Risk Management; editorial board member of the Journal Climate Services; adviser to the European Commission and DG Research, and evaluator of WHO, EEA, EPCRC, RCN, UBA, WKN, BayKlif, AXA Research Fund, reviewer of several scientific journals, etc.

Modelling hydrological extremes: role of heterogeneity

Abstract:

Recent studies analysing the spatio-temporal characteristics of precipitation and temperature have highlighted an increase in the spatial heterogeneity in the past half-century. Therefore, it is important to investigate the impact of such heterogeneities, while carrying out hydrological modelling at a regional or watershed scale. Focussed to drive "Hydrological Modelling towards Perfection", our study explored the role and extent of heterogeneity in Regional Hydrological Modelling (RHM). Accurate assessment of various model parameters was vitally important and we analysed the response of a catchment to heterogeneous and homogeneous parameter distributions in the hydrological model.

Past studies, have often ignored the heterogeneity in calibration parameters and relied on parameter transferability across different spatial resolutions. Also in many studies, after calibrating the model at a specific spatial scale or for a few grids, parameters were either transferred or interpolated. However, through a spatio-temporal analysis, this study assessed the need for incorporating heterogeneity while calibration (especially the soil calibration parameters); quite different from the manner in which soil heterogeneity (or texture characteristics) was accounted in the past studies. While areal heterogeneity was found to have more influence at finer scales, significantly lesser uncertainty and better simulation of extreme streamflow events were observed for heterogeneous set for all spatial and temporal resolutions.

Subsequently, the fundamental question of "How much heterogeneity (spatial and temporal) need to be considered in hydrological modeling for better predictability?" was also addressed with answers such as: for the basin under consideration, the spatial heterogeneity in parameters can be compromised for the spatial resolutions coarser than 1°, though uncertainty in the determination of parameter value decreases as temporal resolution increases, this variation is not so prominent beyond daily time-step etc. Moreover, it is expected that the aspects of heterogeneity proposed in this study will improvise the hydrologic modeling with better representation of various hydrological processes.

Prof Dr Dhanya C T

Assistant Professor, Department of
Civil Engineering, IIT Delhi



Dr Dhanya C T is presently working as an Assistant Professor in the Department of Civil Engineering, Indian Institute of Technology (IIT) Delhi. Her research attempts to generate fundamental scientific understanding of the hydrological extremes along with improvising the hydrological modeling, to provide early-warning methods and adaptation policies for sustainable water resources management. She is involved in Ministry of Water Resource's National Water Mission and River Basin Study projects. Dr Dhanya has published more than twenty-five research articles in international and national peer reviewed journals having high impact factors. She is the recipient of numerous awards such as "Young Researcher Award" from Ministry of Earth Sciences, "IEI Young Engineers Award 2016-2017 in Civil Engineering Discipline", Young Associate of Indian Academy of Sciences (IASc) and Outstanding Reviewer Award, ASCE. She is also the recipient of DAAD Faculty Exchange scholarship to serve as a visiting faculty in Forschungszentrum Julich, Germany.



SESSION 5

6 OCTOBER | 11.30 h - 13.00 h

Chair: Dr Jorge Leandro, Technische Universität München (TUM)

Speakers:

- Prof Dr Karl Schneider, University of Cologne
- Prof Dr Thomas Braunbeck, Heidelberg University
- Prof Dr A.L. Ramanathan, Jawaharlal Nehru University
- Prof Dr Prosenjit Ghosh, IISc, Bangalore

Addressing the role of stakeholders in integrative modelling of water and nitrogen fluxes

Abstract:

Against the background of an ever growing demand for agricultural products, dwindling groundwater resources, rising levels of nitrogen load and increasing climatic extremes, it is more important than ever to include stakeholders into water resources management. This is from the perspective of protecting our water resources in terms of both quality and quantity. For instance, Nitrate leaching has a significant influence on groundwater quality and nitrogen concentration, and reacts sensitively on changes in groundwater renewal, extraction rates as well as changes in agricultural practices. Also, climate and land-use change affect nitrogen load in the groundwater and its spatial distribution. All these and more, impact groundwater availability and quality, thus further affecting a great number of stakeholders. Alternatively, a large number of stakeholders play an active role in managing groundwater resources, either implicitly by the selection of agricultural crops or directly by groundwater withdrawal or infiltration. Thus, sustainable managing of water resources is as much an issue for natural as it is for socio-economic disciplines. This presentation, therefore, will focus on integrative approaches, wherein both natural and social sciences will address the issue of water resources management not only with respect to modelling but also with regards to stakeholder participation. Building upon the experience gained in the GLOWA Danube and TR-32 projects, the role effects of recognizing stakeholder decisions on nitrogen and water fluxes at the land surface will be addressed. Additionally, the presentation will show how today's ubiquitous availability of modern information and communication technology provides for new pathways to facilitate stakeholder participation, a thing needed to better understand options for adaptations and to facilitate their implementation.

HYDRO HAZARDS - WATER CONTAMINATION

Prof Dr Karl Schneider

Professor for Hydrology and
Climatology, University of Cologne



Karl Schneider is a professor for Hydrology and Climatology. He received his diploma in Geography and Hydrology and his Ph.D. in Hydrology from the University of Freiburg, Germany in 1987 and 1991 respectively. After completing his habilitation research in 1999 at the University of Munich, he accepted an associate professorship at the University of Toledo, USA in 2001. Following this, Prof Schneider went on to become a professor at the University of Cologne in 2002, where he served as the Vice-Dean of the faculty of mathematics and natural sciences from 2008 – 2011 and Dean from 2011 – 2014. Prof Dr Schneider's research focuses particularly on integrative measuring and modelling of water fluxes, plant growth and nutrient fluxes at the land surface.

Water quality matters: options to monitor for water contamination by use of fish embryos

Abstract:

Multiple human activities are associated with an ever-increasing number and amount of chemicals in the environment, where they pose a probable threat to both wildlife and humans. Since water scarcity in many regions of the world requires the use of even potentially contaminated water resources, there is an urgent need for the monitoring of potential adverse effects by water-borne contaminants. Given the fact that fish are THE major traditional model for aquatic vertebrates, acute toxicity tests with vertebrates are an indispensable integral part of environmental hazard identification and risk assessment of chemicals, plant protection products, pharmaceuticals, biocides, feed additives and effluents. Additionally, they are also used in Europe and numerous other parts of the world to monitor the quality of effluents and surface waters to improve the assessment of the status of waters.

However, given that the scientific value of acute toxicity data for environmental hazard identification and risk assessment is quite limited, in many countries the frequent use of acute fish tests has given rise to ethical concerns since the early 1980s and there is a clear mandate to promote the development of alternative methods and to preferentially use data generated by alternative methods. Originally designed as an alternative for the acute fish toxicity test, the fish embryo test (FET) with the zebrafish (*Danio rerio*) has been optimized, standardized and validated during an OECD validation study and adopted as OECD TG 236 as a test to assess the toxicity of embryonic forms of fish. Given its excellent correlation with the acute fish toxicity test and the fact that – at least in Europe – non-feeding developmental stages of fish are not categorized as protected stages, the FET is ready for use not only for range-finding, but also as a true alternative for the acute fish toxicity test. More research, however, is necessary to fully explore the applicability of the FET to substances.

Prof Dr Thomas Braunbeck

Head, Aquatic Ecology and Toxicology, Centre for Organismic Studies (COS), University of Heidelberg



Dr Thomas Braunbeck is an expert in aquatic toxicology, working in the fields of histology and cytopathology of fish, embryo toxicity and teratogenicity, endocrine disruption, neurotoxicity, genotoxicity and biomarkers. He studied biology, chemistry and physical geography at the Universities of Heidelberg, Germany and London, UK. After he received his PhD from the Faculty of Biosciences, University of Heidelberg, he had several sabbaticals to the Aquaculture Department at the Jacob Blaustein Institute for Desert Research at the Gurion University, Beer Sheva, Sede Boqer, Israel, and to the Department of Medicine, School of Veterinary Medicine, University of California, Davis, USA. Following this, Prof Dr Braunbeck returned to the University of Heidelberg as an Associate Professor of ecotoxicology, ecology and zoology at the Center for Organismal Studies, Faculty of Biosciences. As the head of the Aquatic Ecology and Toxicology Section, he has supervised more than 150 MSc students and 45 PhD students. He has co-authored more than 220 peer-reviewed scientific publications (H-index: 40) and has edited 5 books.



Arsenic and Uranium co-contamination in groundwater of Central Gangetic Plain, India

Abstract:

Arsenic (As) contamination of groundwater in central Gangetic plain has been a reason of serious concern for over sometime, however a relatively newer finding is the Uranium (U) contamination of the same. Both, Arsenic and Uranium have natural and man-made sources such as mining, industries and agriculture. Besides these sources, there are several physio-chemical factors that enhance the solubility and mobility of these elements in groundwater. Hence, the aim of this study is to establish a better understanding of As and U co-contamination and the factors contributing towards their solubility and mobility in the groundwater of central Gangetic plain by emphasizing on: (a) the spatial distribution pattern of As and U, (b) basic hydrogeochemical characteristics and identification of possible relationship between As, U and other physio-chemical parameters and (c) the understanding of possible source with the help of statistical analysis.

Moreover, the observations made as a part of the study showed that both As and U are independent of each other and while Arsenic gets released in a reducing environment by the reductive dissolution of Oxy-hydroxide of metals; Uranium's solubility and mobility is supported by bicarbonate-uranium complex formation. Additionally, the spatial distribution plot of As and U also showed that arsenic is higher in SW part of the study area which is close to the Ghaghara and Rapti river drainage system, whereas Uranium showed a higher contamination in the agriculturally dominated NE part of the study area. However, a possible correlation did not seem to exist between Uranium and Phosphate.

Prof Dr A L Ramanathan

Professor, Environmental geology, Hydrogeochemistry, Biogeochemistry and Glaciology Laboratory, Jawaharlal Nehru University



Prof Ramanathan is an expert in hydrology and water resources including water quality issue. He has published more than hundred papers and 7 books in various peer reviewed journals related to water resources. His work has been supported by various national and international funding organizations and he has collaborated on a number of projects with institutions from other countries like USA, France, Norway, Sweden, UK etc. where few are ongoing and others have been completed successfully. Beyond this, his inter-disciplinary expertise has resulted in transferring his research to meet people's needs in the rural regions which include both field as well as laboratory research. He has been working on Arsenic, Fluoride and Uranium distribution and migration in ground water and also on remediation processes. In this context, the research output produced has been shared with other agencies working on hydro power, water resources, irrigation, drinking water and climate change impact (Himalayan) through collaborative projects. Prof Ramanathan has been awarded the "energising Bharath award" by Bharath petroleum for water conservation in Fluoride affected rural areas.



Seasonal variability of Arsenic in ground water of West Bengal

Abstract:

Ground water in Bengal basin is severely affected by Arsenic (As) pollution and several workers, over the years, have proposed a number of reasons for high As concentration. However, Himalayan sediments (Mc Arthur et. al. 2004) and secondary minerals are considered to be the most accepted source of this element in the Bengal basin with un-decomposed sulphide bearing minerals like pyrite, arsenopyrite, Cinnabar, Niccolite, Enargite and clays being the primary source of Arsenic. Reductive dissolution of Fe/Mn-oxy-hydroxides due to microbial degradation of organic matter present in the sediment and oxidation of pyrite depending on the availability of dissolved oxygen in the water (Fryar, 2011) are considered to be two of the most common arsenic releasing mechanisms. The seasonal variability in arsenic concentration based on stipulated observation showed decreasing pattern upon commencement of monsoon season (Farooq et. al. 2011). This is because, high temperature favor growth of microbial community (Price et. al., 2004) and therefore during summer time (pre-monsoon seasons) high growth rate and decay of organic matter generates anoxic condition; conducive for dissolution of As from the sediment and contaminating the local ground water. In context of this, our study shows how isotopes in water and DIC, microbial count and anion chemistry help understand the role of microbial population driving the Arsenic concentration in the ground water of a few selected wells in the Arsenic affected region of West Bengal.

Dr Prosenjit Ghosh

Professor, Centre for Earth Sciences,
Indian Institute of Science – Bangalore



Dr Prosenjit Ghosh obtained his BSc in Geology from Hansraj College, Delhi University, MTech in Applied Geology from University of Roorkee (Uttar Pradesh) and his PhD from Devi Ahilya Vishwa Vidhyalaya, Indore while working under the supervision of S.K. Bhattacharya at the Physical Research Laboratory (PRL), Ahmedabad. Subsequently, he also was the Postdoctoral Fellow at PRL from 2001-2002. Dr Ghosh was a WMO-IAEA postdoctoral fellow at Max Planck Institute for Biogeochemistry, Jena with Willi Brand and Caltech postdoctoral fellow with John Eiler. During 2006-2007, he worked as an Assistant Professor at Tokyo Institute of Technology, Tokyo, Japan and later joined the Centre for Atmospheric and Oceanic Sciences, Indian Institute of Science in the year 2007 as an Assistant Professor. Following this, Dr Ghosh became a core faculty at the Centre for Earth Sciences in the year 2008, soon after its creation. He also is the adjunct faculty in other departments which includes Centre for Atmospheric and Oceanic Sciences, Divecha Centre for Climate Change and Inter-disciplinary centre for water research.



SESSION 6

6 OCTOBER | 14.00 h - 15.30 h

Chair: Prof Dr Jayanta Bandyopadhyay, Observer Research Foundation, Kolkata

Speakers:

- Prof Dr Nicola Fohrer, University of Kiel
- Dr Guido Schmidt, India-EU Water Partnership
- Prof Dr Bhallamudi Srinivasan Murty, IIT Madras
- Prof Dr Subashisa Dutta – IIT Guwahati

Managing multi-functional river basins: the interconnectedness of water, food and biodiversity

Abstract:

River basins fulfill multiple tasks for our society. Besides providing water resources for drinking and irrigation, river basins are also used for agricultural production, settlement areas, industry and habitats for aquatic and terrestrial species. Sustainable river basin management demands that not only one goal is optimized on the cost of other functionalities. Solutions have to be found where multiple goals are considered and the cutbacks of the optimization for one goal only have to be made visible as a basis for sound decisions.

Thus integrated and interdisciplinary modelling approaches can serve as valuable tools in this process. Ecohydrological modelling chains are used to link land use, hydrological processes and biodiversity. They show how for example land use decisions or climate change affect water and matter transport and lastly the occurrence of aquatic species. Examples from China and Siberia will be used as showcases.

INTEGRATED RIVER BASIN MANAGEMENT

Prof Dr Nicola Fohrer

Director, Institute for Nature and Resource Conservation, Department of Hydrology and Water Management, University of Kiel



Dr Nicola Fohrer is a professor of hydrology and water resources management at Kiel University since 2003. Her working focus is ecohydrology, water quality and water management in rural areas and she has a long standing experience of working in India, China and Russia. Dr Fohrer is currently president of the German Hydrological Society (DHG) and area coordinator for water at the Indo-German Centre for Sustainability at IIT Madras since 2010. She serves as a member and spokesperson in the DFG review board for water science since 2012. Besides this, she has been a member of the Leibniz Senate Commission for Evaluation since 2017 and was also the chair of the scientific board of the German National Committee of IHP/HWRP of the UNESCO from 2008 to 2014.



IRBM in the European Union, and its transferability to India

Abstract:

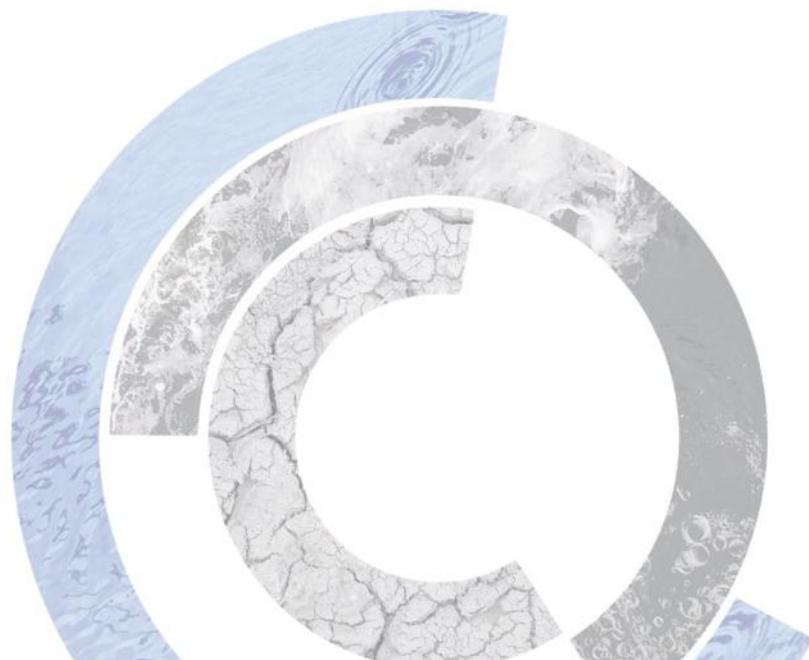
In the past years, India has started developing river-basin wide Integrated Water Resource Management Plans, with current activities in at least 4 major basins. This action can benefit from the experience of the European Union Water Framework Directive implemented since 2000. In this regard, some of the most interesting aspects might be improved monitoring, targeted data and knowledge improvement (such as on the Water Exploitation Index +), and the consistent use of the DPSIR approach focusing on measures to be taken. Some of the key learned lessons from the European exercise will be presented, focusing on Water quantity issues as addressed by the 2012 "Blueprint for Water" and the current streams to consider water-energy-land-climate-biodiversity nexus as a way of improving water security.

Dr Guido Schmidt

India-EU Water Partnership



Dr Guido Schmidt is a doctorate in Environmental Engineering and a consultant by profession. Having 25 years of experience in the design and development of programs, he has worked on more than 100 projects with various NGOs, engineering, consultancy and research firms and is currently employed by Fresh-Thoughts Consulting GmbH. Aiming at better understanding, preventing and/or solving water and environmental problems and conflicts, Mr. Schmidt is currently involved with the Horizon 2020 research project "Sustainable Integrated Management of the NEXUS of water-land-food-energy-climate for a resource-efficient Europe (SIM4NEXUS)". Besides this, he is also involved in different consultancy projects such as the "European Innovation Partnership on Water", the "India-EU Water Partnership", a "Water-Energy-Land-Biodiversity-Nexus Evaluation in the South-East of Europe" for GWP-Med, and the Assessment of River Basin and Flood Risk Management Plans for the European Commission.



Prof Dr Bhallamudi Srinivasan Murty

Professor, Department of Civil Engineering, Environmental and Water Resources Engineering Division, IIT Madras

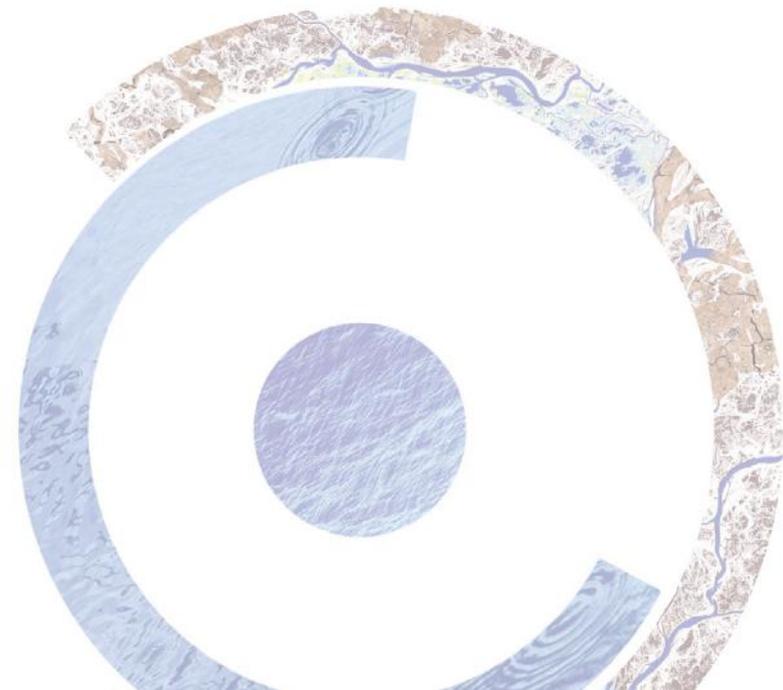


Adyar River: Need for Integrated Basin Management

Abstract:

Adyar River is one of the major water ways in the city of Chennai. Damaging floods in this river in December 2015, resulting in almost 400 deaths and an economic loss to the tune of 150,000 million rupees, followed by severe water scarcity problems in Chennai in the years 2016 and 2017, highlight the importance of integrated river basin management approach for proper utilization of Adyar waters. Total length of the Adyar River is 42 km, out of which 24 km is within the Chennai Metropolitan Area (CMA). It receives surplus from 450 tanks in the catchment, besides outflow from Chembarambakkam lake, a major drinking water reservoir in Chennai. Modeling studies have shown that the damaging floods of 2015 were more due to runoff from the upstream areas than the release of surplus water from Chembarambakkam. In this context, it is to be noted that this upstream catchment area is fast developing and may be subjected to significant land use changes. Adyar is a tidal river, and impending climate change and sea level rise will have tremendous effect on the quality and quantity of water in this river. It also receives a lot of untreated and partially treated wastewater, making it a much polluted waterway and there is much GHG emission from its estuary. All these factors underscore the importance of integrated river basin management for Adyar River. Water management studies for this river currently underway will be presented in this talk.

Prof Bhallamudi has obtained his Doctoral degree in Civil Engineering from Washington State University, Pullman in 1989 and has taught at IIT Kanpur and IIT Madras since then. He has been holding the full professor post at IIT Madras since 2004 and was the coordinator for Socially Relevant Projects for five years. Currently, Prof Murty is the coordinator for Indo-German Centre for Sustainability at IIT Madras. Prof. Murty's research areas include pipe and open channel flows, surface water quality modelling, contaminant transport, computational hydraulics and optimization. He has guided ten doctoral students and has published 65 papers in reputed peer reviewed journals. He has handled several important research projects funded by the MoWR, DRDO, and GAIL (India) Ltd. and has been a consultant to several organisations in India.



Flood and bank erosion resilience concept for the Brahmaputra Basin

Abstract:

Brahmaputra river is one of the world's largest, braided and morphologically dynamic river systems draining out monsoon rainfall-induced discharge and sediment load from Eastern Himalayas and other western mountains. As the temporal and spatial variation of flow and sediment load is too high, high rates of bank erosion, shifting of channel and braiding formation are always associated with monsoon floods and flash floods. From observed hydrological data and satellite analysis during 1970- 2010, the average width of the main river has been seen to have increased from 4.2 km to 8.5 km and many tributaries have changed its meandering to braided form. A 10-year return period flood inundated more than 40% of its valley area affecting more than 4 million people. Not only that, road, railway and bridges were damaged significantly and economic condition of the rural people was also affected. Due to frequent floods and loss of land and houses resulting from bank erosion, more than 0.7 million people have lost their livelihood which has further resulted in a large scale migration of young people from their villages.

Despite, the construction of 5000 km long embankment along the Brahmaputra and its tributaries during 1950 to 1980, sediment load, channel instability, reduction of wetland storages and improper hydraulic design of road and railway drainage structures have increased frequency of flood inundation area and its damage. Moreover, since 1980, the condition of flood protection structures such as embankment, revetment, etc. have also deteriorated due to lack of scientific management. Hence, considering the last 60 years, one can say that flood inundation, damaged data and hydrological modeling and the overall damage from floods has exponentially increased from the year 1980. In a nutshell, flood management in the valley needs to be scientifically readdressed with recently available geospatial information, socio-economic data and hydrological modelling concepts for flood and bank erosion resilience society development.

Prof Dr Subashisa Dutta

Head, Department of Civil Engineering, IIT Guwahati



Dr Subashisa Dutta is presently working as a professor and head in the Department of Civil Engineering, Indian Institute of Technology Guwahati. His research interests are hillslope hydrology, distributed hydrological modelling, flood management, advanced satellite remote sensing and fluvial processes. In the last one decade, he has been extensively carrying out research on hydrodynamic, fluvial and ecological processes in the large width braided channel in the Brahmaputra river by conducting in-situ, flume experiments and mathematical modeling. He is presently serving as an associate editor in the Journal of Hydrology and has published more than 50 journal papers and 100 conference publications.

CHAIR

Prof Dr Jayanta Bandyopadhyay

Visiting Distinguished Fellow, Observer Research Foundation, Kolkata



Dr Jayanta Bandyopadhyay completed his doctorate in engineering from the Indian Institute of Technology Kanpur, following which he turned his professional attention to the inter-disciplinary area of the complex interface between the natural environment and human economic activities. He has been a consistent researcher on various critical policy issues related to environment in Asia, especially the rivers originating in the Himalaya. He was a member of the Senior Professional Staff at the International Centre for Integrated Mountain Development (ICIMOD) in Kathmandu, where he was involved in the study of Himalayan waters. In 1991 he was invited by the UNCED Secretariat in Geneva to prepare a draft of the chapter on the world's mountains for Agenda-21, the global environmental action plan approved in the 1992 Rio Earth Summit. In 1993 he joined the International Academy of Environment (Geneva) as a Director of Research. He then accepted an invitation from the Indian Institute of Management Calcutta to join the Institute as a Professor in 1997 and establish the Centre for Development and Environment Policy until he retired in 2012.

His research in the past 25 years has been guided by the objective of generating trans-disciplinary public interest knowledge on critical issues related to the natural environment, and in particular, the hydrosphere. He was a Coordinating Lead Author in the global report of the Millennium Ecosystem Assessment and an expert reviewer for the UNEP-IPCC in the area of climate change and water. He has been the President of the Indian Society for Ecological Economics (2006-8) and a Fellow of the India-China Institute in The New School, New York. He is an adviser to the Water Diplomacy Program at Tufts University, Medford, USA and has published more than 140 papers, books, articles, etc. His recent book published by Springer (Switzerland) is Environmental Sustainability from the Himalayas to the Oceans: Innovations and Struggles in China and India.

SESSION 7

6 OCTOBER | 16.00 h - 17.30 h

Chair: Prof Dr P K Joshi, Jawaharlal Nehru University

Speakers:

- Ms Theresa Frommen, PhD Student, Freie Universität Berlin & Ms Dharmistha Chauhan, Mahila Housing SEWA Trust
- Ms Marcella Hansch, Pacific Garbage Screening (NGO)
- Dr Rahul Peethambaran, IISc Bangalore
- Ms Tarini Mehta, PhD, University of Cologne
- Ms Vinnarasi R, IIT Delhi
- Ms Neha Khandekar, The Energy and Resources Institute
- Ms Ekashmi Rathore – Falling Walls Winner

Development of a participatory groundwater management in peri-urban low-income communities – One project, two perspectives

Abstract:

Women in slums of India are most affected by the effects of climate change, e.g. water stress, heat waves, vector-borne diseases. The project "Women's Action towards Climate Resilience for Urban Poor in South Asia" aims at improving the resilience of slum communities against these effects by enabling women to take influence in decision-making processes about issues related to sanitation, water supply, hygiene etc. The project is led by the Indian NGO 'Mahila Housing SEWA Trust (MHT)' with more than 20 years of work experience in urban slum communities throughout India. The Hydrogeology Group of Freie Universität Berlin, Germany, conducting research in India since 2005, is one of 17 partners in the interdisciplinary project. Amongst urban planners, social workers, urban health researcher, insurance and communication experts, Freie Universität Berlin is the only hydrogeological institution in the consortium. The Hydrogeology Group is responsible for the development of a participatory water management based on hydrogeological research in two peri-urban low-income communities in Jaipur.

Two sides, the hydrogeologist and the social worker, the scientist and the practitioner, will share their experiences of the cooperation. We will discuss following questions: What are the expectations on both sides; What are the challenges transferring interdisciplinary theory into practice; How should science be communicated to be accepted by the local population and incorporated by local NGOs? To sum up, what do we have to learn from each other in order to be able to work together in an effective way?

YOUNG MINDS ON WATER

Ms Theresa Frommen

Researcher, Hydrology Group, Institute of Ecological Sciences, Department of Earth Sciences, Freie Universität Berlin



Ms Theresa Frommen is a young researcher at the Hydrogeology Group of the Freie Universität Berlin (FU Berlin), Germany. She received her B.Sc. in Geological Sciences from FU Berlin in 2011 and has successfully completed her studies in Hydrogeology in 2015. She started research in India in 2013 in the frame of the EU project *Saph Pani*, working on the investigation of ammonium contamination at a Yamuna River well field in central Delhi. Since 2015, she is the principal researcher responsible for the *Jaipur Case Study* within the *Global Resilience Partnership*. The case study deals with participatory groundwater management and the ways to overcome the gap between science and society and takes place in close cooperation with the project lead Mahila Housing SEWA Trust (Indian NGO). Ms Frommen is doing her PhD within this project and is based in Jaipur since 2016.

Ms Dharmistha Chauhan

Strategic Adviser, Mahila Housing Sewa Trust (MHT)



Ms Dharmistha Chauhan is an economist and has been involved for around 17 years in the field of gender and community-led sustainable development. She has worked extensively in both rural and urban parts of India, for enabling people's participation in land and water management. Besides working for various Civil Society Organisations (CSOs), she has also been an adviser on gender and climate change to the Government of Gujarat. She is also actively involved with UN Women being posted as a Consultant to the Ministry of Women and Child Development on gender budgeting as well as working with various State Governments and CSOs on the issue of gender responsive local governance. Ms Dharmistha is currently working as a strategic adviser to the Mahila Housing Sewa Trust (MHT), a grass-root organisation working towards enabling basic services, housing rights and resilience for the urban poor in India. She is also the convener and operational head of the Global Resilience Partnership (GRP) project being implemented by MHT and its partners in 7 cities of South Asia.

Pacific Garbage Screening

Abstract:

We the humans are destroying the basis of life on Earth – our oceans, by dumping around 10% of the entire produced plastic packaging as waste in them. This is the greatest ecological issue of our time and so far there is no solution to this issue. However, Pacific Garbage Screening is my solution for clean oceans. This innovative idea revolves around the concept of a platform that floats within the garbage patches of the oceans in order to collect plastic waste and the special construction allows to filter plastic particles out of the water. This approach of inverted sedimentation works through a combination of several different processes and does not use nets or other filter systems which endanger ocean life. The floating plastic waste is then converted into energy and biodegradable plastics. With my green start-up, me and my passionate team of volunteers are now preparing a feasible prototype.

The innovative approach of the platform serves as a visionary guideline. However, a lot of research is required for its realization. Moreover, the idea is to get financial resources to offer jobs to students so as to prove the idea and develop a feasible technology. Besides this, another important goal of this project is to raise awareness amongst people regarding the pollution of our oceans.

Ms Marcella Hansch

Founder, Pacific Garbage Screening



Marcella Hansch is an architect and founder of the green non-profit start-up Pacific Garbage Screening e.V. As an architect, Marcella is working for the office Carpus + Partner AG in Aachen (Germany) after having worked for architectural offices in Arnsberg and Vienna (Austria). Marcella studied architecture at the RWTH in Aachen. Her master's thesis was about the Pacific Garbage Screening project, and she still receives support from the RWTH Aachen to realize it. For her engagement and her innovative project, Marcella won the "25 Women Award – Women, whose inventions change our lives" of the magazine EDITION F in 2017, the German federal award "EcoDesign – young talent" in 2016, and was nominated for the GreenTec Award and the Querdenker ("Lateral Thinkers") Award in 2014.



Stable isotope ratio in tap water across the Indian region during dry season: observations and insights

Abstract:

Tap water used in the Indian water distribution system is primarily derived from regional ground water. In a study conducted by us on tap water stable isotopic composition, 127 tap water samples were collected across the country covering all major cities. These samples were collected within a period of one week in the month of November 2016 to minimize any effect due to the temporal shift in rainwater composition. The isotopic signature recorded in the tap water samples across the region registered values between the range of -13.5 to 0.1‰ for $\delta^{18}\text{O}$, whereas the corresponding δD values ranged between -101 to -2.6‰ . The isotopic signature found in the tap water mimicked the isotopic composition recorded in the precipitation from GNIP stations over Indian landmass. Beside this, the tap water samples showed a strong latitudinal dependency ($r=0.7$) with a slope of $-0.2\text{‰}/^\circ$ latitude, consistent with the latitudinal effect seen in the rainwater isotope ratio from Indian region. The region of maximum enrichment was found over central western India; whereas the minimum value recorded for tap water samples was from Northern India. In addition to this, the spatial patterns were also evaluated by recording difference in the rainwater and tap water isoscape. This helped in demarcating regions of positive and negative anomalies i.e. regions with excess water and those with water scarcity respectively. Interestingly, the negative regions revealed from our study closely matched with the region of ground water depletion using satellite based observation (Rodell et al., 2009). Also, the transfer of isotopic signatures from meteoric water to ground water and then tap water further showed to aid finger printing of the regional signature from ecological, anthropological and forensics artifacts.

Dr Rahul Peethambaran

Research Associate, Divecha Centre for Climate Change,
Indian Institute of Science – Bangalore



Dr Rahul Peethambaran obtained his MSc. Meteorology from Cochin University of Science and Technology, Cochin and PhD from the Indian Institute of Science, Bangalore under the supervision of Dr. Prosenjit Ghosh. He is currently working as a Research Associate at Divecha Centre for Climate Change, IISc. Bangalore. During his PhD research period, he has done extensive research on understanding how isotopic composition of the Indian monsoon rainfall and water vapour is controlled by atmospheric processes and monsoon circulation features. Besides this, he has also worked on the latitudinal variability and isotopic composition of water vapour and rainwater over the Southern Ocean, while participating in the 2013 Indian Southern Ocean Expedition. Moreover, Dr Rahul has also contributed to the Journal of Geophysical Research: Atmospheres along with Dr Ghosh and Dr S K Bhattacharya.



Environmental Impact Assessments of Hydropower Projects in the Indian Himalayas: Law, Policy and Practice

Abstract:

A discussion on sustainable development of the Himalayan region is incomplete without reflecting on hydropower projects in the region. Himalayan rivers are a key resource for energy generation; India, Nepal, Pakistan and Bhutan plan to build over 400 dams in the Himalayan region. Laws and processes have been mandated to ensure that such development projects are conducted in a sustainable manner, including conducting Environmental Impact Assessments (EIAs). Failure to conduct thorough and un-biased EIAs paves the way for governments to give environmental clearances even when violations of environment, wildlife and forest laws are taking place. EIAs often fail to assess environmental impacts accurately and deal inadequately with key issues, such as downstream impacts, impacts on catchment areas, cultural and demographic changes, social and ecological impacts of forest land acquisition and so forth. Furthermore, Social Impact Assessments (SIAs), as important as EIAs, especially in regions such as the Himalayas that are home to a number of socio-culturally vulnerable and ethnically diverse communities, should also be conducted.

This study will look at the factors that govern India's decision-making process regarding dams in the Himalayan region and how decisions in favour of hydropower projects are arrived at, with a focus on Environmental Impact Assessments and Environmental Clearances. It will then present approaches that can be advanced for environmentally and socially sound decision-making in the Himalayan region.

Ms Tarini Mehta

Advocate specializing in environmental and human rights law
LLB (University of Warwick, UK), LLM (University of Cambridge, UK)



Tarini Mehta is an environmental and human rights advocate and consultant, with an LLB from the University of Warwick (UK) and an LLM from the University of Cambridge (UK). She has worked at the Indian Council for Enviro-Legal Action as a Senior Manager – Research and Legal Affairs, as well as with the EU Fundamental Rights Agency (an agency that provides expert advice to EU institutions and Member States); Lawyers Collective (a human rights law firm) and Society for Child Development. She enjoys writing and regularly contributes articles to academic journals.



Dealing with the non-stationarities in hydrological extremes under changing climate

Abstract:

Hydrological extreme events, though occur rarely, adversely impair the water resources management. While rarity often limits the application and efficiency of models in simulating these events, recent revelation of climate change further aggravates this issue. Current extreme events all over the world clearly indicate that the magnitude and frequency of extreme events are increasing. Moreover, many recent studies have reported that the nature of extreme climatic events is changing over time and therefore, we cannot employ traditional statistical approaches to model these events. To address the non-stationarity in the extreme events, we apply multidimensional time-varying risk framework and their uncertainties using Bayesian inference. This helps in strengthening the reliability of infrastructure designs and the management of water systems in the changing climate. The non-stationarity in the observed trend in the parameter of probability distribution is extracted using moving window approach. The proposed time-varying risk framework will reduce the complexities involved in the extreme event modelling and can be applied for all stochastic multi-dimensional systems that are under the influence of changing environment.

Ms Vinnarasi Rajendran - Dr Ing.

Department of Civil Engineering, IIT Delhi



Ms Vinnarasi Rajendran is presently doing her doctoral research in the Department of Civil Engineering, Indian Institute of Technology (IIT) Delhi. She completed her Master's from IIT Guwahati in 2012 and has worked as an assistant professor at Sharda University, Greater Noida before joining IIT Delhi. Her current research attempts to identify the agricultural and hydrological drought prone areas in India and quantify the associated spatio-temporal severity and extent. This is done by hydrological modelling, and investigating the occurrence and distribution of extreme events in future from projections of various regional circulation models for different future scenarios. She has published 4 articles in peer reviewed journals. Beyond this, her research interests include Hydroclimatological Modelling, Stochastic Process, Uncertainty Analysis and Extreme Event Modelling. During Open House 2016 at IIT Delhi, Ms Rajendran also received a Certificate of Merit for Best Poster.



A snapshot of life in the Himalayas: research, observations and policy lessons from Uttarakhand, a state in the Northern Indian Himalayan region

Abstract:

Both climate model and perception based studies suggest pronounced warming in the mountainous regions, and increased erraticism in rainfall along with a rise in events of high intensity rainfall. Due to changing rainfall patterns, farmers are starting to perceive productivity losses due to frequent pest attacks or rainfall not occurring on time.

There is evidence of increased warming, which may lead to a shortening in the maturity period of winter crops and amplified pest infestation. In the plains, agriculture is largely dependent on groundwater irrigation, which is leading to over-exploitation and depletion of groundwater resources.

With springs drying up and reducing stream discharge, there is high risk of water scarcity, issues of access and availability in the region. Alongside this, the state continues to build hydropower projects, amidst socio-environmental conflicts and risks of glacial lake outburst flooding (GLOF) and glacial fragmentation. In presence of the above challenges, mountain communities are adapting by continuing to follow traditional practices and diversifying their livelihoods, while there also is a heavy out-migration from rural areas.

My research has been focusing on attempting to answer the policy gaps by minimising trade-offs between hydropower development and livelihoods. Besides, my work offers insights for river ecosystem conservation in the form of an important policy instrument called ecological flows. Lastly, by engaging with various multi-disciplinary experts and conducting science policy dialogues, I have been involved in trying to build capacities on addressing climate change issues and integrating it in larger planning of management of key sectors like agriculture, water and energy.

Ms Neha Khandekar

Consultant, The Energy and Resources Institute,
New Delhi



Ms Neha Khandekar is working as a senior environmental researcher; studying agro-ecosystems based interactions between bio-physical and socio-economic factors. She particularly has over four years of first hand work experience in the Himalayan region, handling socio-ecological systems challenges. She has a triple major Bachelor of Science degree in Biotechnology, Zoology and Chemistry and a Master in Water Management from TERI University. During her career, Ms Khandekar has assisted and later lead research in areas of hydrology modelling, participatory geographic information system mapping, ecological flows, water-energy-food-nexus and climate change adaptation in rural agrarian and peri-urban systems of Ganga Basin. With her training in water management and a strong background in field based research through her work at the grass-root level with non-governmental organisations like People's Science Institute and TERI, Neha aspires to blend her physical and social science knowledge to inform policies and decision-making in areas of rural water based livelihoods.

Breaking the wall of slow death: safer water, smarter tomorrow

Abstract:

Clean water is of vital importance for humans; still, more than one billion people lack access to it. Rapid industrialization and development of nuclear energy have led to the discharge of heavy metal ions and radionuclides into water resources. Toxic heavy metal ions (Hg^{2+} , Pb^{2+} , Cd^{2+} , Tl^+) and radionuclides (^{137}Cs , ^{89}Sr , ^{235}U , ^{59}Fe , ^{57}Co , ^{65}Zn etc.) are major pollutants in such type of wastes and pose a serious threat to humankind and the environment due to toxicity, non-biodegradability and bioaccumulation. In order to overcome this, a potassium intercalated layered metal thiophosphate, $\text{K}_{0.48}\text{Mn}_{0.76}\text{PS}_3 \cdot \text{H}_2\text{O}$ (K-MPS-1) has been designed for the removal of heavy metal ions like Pb^{2+} . Following this, the Pb^{2+} adsorption and ion exchange kinetics of K-MPS-1 were studied in detail and a better performance than the state-of-art materials like clay, zeolites, activated carbon, etc. was observed. This material is capable of efficient removal of Pb^{2+} (>99%) from very dilute concentrations (1–100 ppb) selectively even in the presence of other monovalent and divalent cations such as Na^+ , Ca^{2+} and Mg^{2+} . Also, it can withstand and remove Pb^{2+} in harsh pH conditions of polluted water.



Ms Ekashmi Rathore - Dr. Ing.

Jawaharlal Nehru Centre for Advanced
Scientific Research, Bangalore



Ms Ekashmi Rathore has completed her B.Sc. (Hons) in Chemistry from Hindu College, University of Delhi and obtained MS degree from the New Chemistry Unit, Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore. She has been awarded for the best MS thesis of the year 2016-2017 for her work on selective sequestration of heavy metals and radionuclide from water by layered metal chalcophosphate. She is currently doing her Ph.D. under the supervision of Dr. Kanishka Biswas in JNCASR. She is pursuing research in the solid state chemistry of metal chalcogenides/halides, 2D materials, water purification and thermoelectrics. Ms Rathore has published two research papers till date in the Journal of Physical Chemistry C and Chemistry - A European Journal. She has also been declared as the winner of Falling Walls Lab India 2017.

CHAIR

Prof Dr P K Joshi

Professor, School of Environmental Sciences,
Jawaharlal Nehru University



Professor P K Joshi is a Professor at the School of Environmental Sciences, Jawaharlal Nehru University, New Delhi. Before shifting to New Delhi, he was a scientist with the Indian Institute of Remote Sensing (IIRS), Dehradun - a premier training, education and research institution of the Indian Space Research Organization (ISRO).

Originally trained as an environmentalist and then as an ecologist, Prof Joshi has been involved in the development of skills in remote sensing and GIS, with a firm scientific research basis. His research has been recognized by the Indian Academy of Sciences (INSA) and the National Academy of Sciences India (NASI) through the prestigious Young Scientist Medal awarded in 2006 and 2009. Apart from this, Dr Joshi recently received the National Remote Sensing Award by ISRS/ISRO and has also been a DAAD Research Ambassador.

NOTES

NOTES

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