



The Journal of the Indian Institute of Science is on the verge of completing 100 years of publication in 2014. Since it has started its publication, this journal has addressed issues concerning science, engineering and technology in many frontier areas of research, development and its application. In recent years we have concentrated on publishing state of the art review articles in cutting edge areas of science and engineering to stimulate research in the young minds in these areas. One of the main aims of these articles is also to address issues concerning status of Indian research.

Since UN mandated year 2013 is an international year of water co-operation, the editorial board decided to commemorate this event by dedicating this special issue of this journal. Prof M S Mohan Kumar, Department of Civil Engineering, IISc, has been invited to be the guest editor for this special issue. He and his colleagues decided on the contents and the format of this issue dealing with many aspects of water. Articles were invited from experts across the world to address issues related to water yield, usage, control and its application in areas such as precipitation distribution; agricultural systems; urban water systems; climate change effect of water resources; floods; groundwater and rain water harvesting in urban catchments to name a few. The use of important tools such as remote sensing and satellite communication in water resources planning and management have been addressed. In the context of India, it may be worthwhile to explore water cooperation in all its literary sense and the articles in this issue are definitely illustrative.

I take this opportunity to thank Prof M S Mohan Kumar and his colleagues, Prof D Nagesh Kumar and Prof M Sekhar for their commitment and passion in bringing out this eventful issue. I would also like to thank our office staff at the journal office, Ms Kavitha Harish and Mr Anoop Simha for their timely and meticulous work and Ms Naina Saimaa for the beautiful cover page she has created.

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## Water Management in Changing Environment

This special issue is published to mark 2013 as the International Year of Water Cooperation as mandated by the UN. There is a need to learn from experiences of different countries and from our country and also cooperate to handle the mammoth task of “Water Management in Changing Environment”. Both climate change and urbanization are expected to have a significant impact on the water resources both in terms of its availability (with pronounced variability with space and time) and quality. It is going to be a great challenge for urban utility managers to manage water supply and waste water systems efficiently. Our National Water Policy also stresses on efficient use of this precious resource with a clear message for better water management in all sectors. It also focuses on problems arising due to climate change as well as rapid urbanization and on new technologies to address them. So sustainable water management at all levels is the key issue.

The review articles published in this issue are invited from experts working in different areas of water resources such as: climate change effect, remote sensing applications, flood hazard prediction and management, water quality mitigation, groundwater-driven agriculture, smart urban water supply systems and stormwater harvesting. All the papers are peer reviewed and this has enhanced the quality of the papers.

Srinivas' paper on regionalization of precipitation over India is an overview of the underlying concepts as well as advantages and limitations of procedures to deal with variability in precipitation that have been developed over the past six decades with an emphasis on studies carried out in India which could give water yield calculations as well as prediction of floods. Nagesh Kumar and Reshemidevi discuss about the successful use of remote sensing tools for water resources modeling across USA and other parts of the globe. The authors have further shown that using these tools flood prone areas of Kosi River basin could be clearly demarcated.

The effect of climate change on water resources such as availability, quality and irrigation demand has been extensively studied both at a local as well as at a regional scale and the role of uncertainties has been lucidly brought out by Rehana and Mujumdar. Ashish Sharma revisits the design flood estimation and the role of the warming climate on this important process and presents it concisely with reference to Australia. Rajesh Srivastava has discussed on the effect of climate change on groundwater dynamics, which is neither simple nor direct, and this has been presented along with mitigation and adaptation strategies to combat the same with a clear direction for future research.

Crops play an important role in the fractionation of recharge to groundwater, and due to changing climate, their role is further enhanced. Sreelash and others discuss a coupled crop model with groundwater model for applications to groundwater irrigated agricultural systems that uses both ground and satellite based data along with the calibration of the STICS crop model leading to an efficient crop-water management system.

To address the issues of contaminant transport in variably saturated zone, Jirka Šimůnek and others present a fully developed HYDRUS flow and transport model to understand and also predict physical/chemical/biological transformation of the contaminant as it flows through the porous media (predominantly vadose zone). These models are useful especially in managing agricultural fields as well as in constructed wetlands.

Vijay Shankar and others discuss root water uptake based on the previously published work on performance evaluation of a few important root uptake models suggesting the need for a nonlinear representation of water uptake with depth, using which an optimal irrigation scheduling can be developed to maximize irrigation water use.



The paper on stormwater harvesting by Dharma Hagare makes an effort to estimate the cost of supplying stormwater to consumers based on a study in Australia which shows that the larger urbanized catchments are the most suitable locations to implement stormwater harvesting projects. In order to minimize the supply-demand gap and to assure good quality of water to consumers in urban cities, new techniques or models are helpful to manage water distribution systems (WDS). Our paper reviews the existing urban water supply management methodologies and discusses way forward for proper management of water supply systems which leads to the development of smart water system. The paper by Dragan Savić and others also describes two examples of intelligent systems; the first deals with failure-management decision-support system for water distribution networks, and the second deals with urban drainage systems and the utilization of rainfall data to predict urban flooding in near real-time.

We hope that the review articles presented in this special issue will bring in new ideas to tackle water management issues and also initiate new research in this area.

I wish to thank Prof Guru Row, Editor-in-Chief, *Journal of the Indian Institute of Science*, for giving me the opportunity to be the editor for this issue. I thank the experts for contributing the review articles and the referees for their timely and critical reviews. I would like to thank my colleagues Prof Nagesh Kumar and Prof Sekhar from the Department of Civil Engineering, IISc, Mr Anoop Simha and Ms Kavitha Harish from the Journal office for their valuable suggestions, help and excellent support in preparing this special issue.



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