

Drinking Water

Source, Treatment and Distribution

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PREFACE

The world's freshwater resources are facing tremendous pressure both quantitatively and qualitatively. More than one billion people do not have consistent access to potable water and more than twice that number lack access to sanitation. The rapid economic growth, social transformation and technological developments that have occurred in the world since the 19th century have been partly due to well-engineered strategies for storing and transporting water to meet the demands of various users. In India large irrigation canals were built in the past two centuries and many multipurpose water resources projects were built in the 20th century. Their main emphasis was on water supply, flood control and/or power generation. However, unsustainable groundwater abstractions, deterioration of the quality of surface and groundwater and extremely reduced flow of rivers are just a few amongst the multitude of water problems that not only India but also many parts of the world are facing today. The solutions to current and future problems will not mostly be found in groundbreaking technological breakthroughs, but instead in rethinking the current water usage and management practises, as well as adapting to these changes.

In this context, it is widely accepted that integrated water resources management (IWRM) holds great potential as a solution for many problems because of its cross-sectoral approach. IWRM is an approach to land and water management that seeks to balance human, industrial, agricultural and environmental needs. Riverbank filtration (RBF) can be considered as an element of IWRM due to its sustainable character. Aquifer recharge through induced infiltration of surface water in rivers, channels and lakes is an important process which is used to provide raw water for drinking water production and industrial water use. Large cities and industrial centres often developed at locations where surface water was available for water supply and transport. If groundwater resources near the cities are insufficient, aquifer recharge may become an important alternative for ensuring stable drinking water supply.

RBF has been used for many decades worldwide to provide drinking water to communities located by surface water bodies, typically rivers. In India, concerted efforts to fully realize the potential of RBF and to understand and scientifically document the processes involved is required. Hydrogeological conditions at several riparian Indian cities indicate that these cities would be suitable for the successful adoption

and implementation of RBF systems. Though RBF systems are seen as having a great potential for improving both the quantity and quality of water supplies throughout much of India, there are a number of feasibility issues that must be considered regarding the sustainability of such systems in the country that need to be addressed. There is a need to exchange latest on-going research and ideas from India, Germany, The Netherlands, Canada and Thailand about RBF for treatment of drinking water at an affordable cost and to develop consensus among different stakeholders, namely organizations from central and state governments, individual national and international experts, R&D organizations, universities, NGOs and related private industries.

Thus, the objectives of the workshop are to acquaint the participants with RBF and its application in various countries, to provide the participants with knowledge on relevant water quality parameters for RBF, to highlight the relevance of groundwater modelling for managing RBF schemes, to present recent results of detailed hydrogeological investigations at RBF locations and to provide a discussion forum for various stake holders.

Fruitful collaboration between Indian and German research institutions and water companies in the field of RBF in north India has been promoted since 2005 through various applied research and dissemination projects such as the EU-India Riverbank Filtration Network (2005-2006), Clogging of River Beds and Wells at Bankfiltration Sites in Uttaranchal (2006-2007), Cooperation Centre for Riverbank Filtration in Haridwar (CCRBF; since 2007), Capacity Building for Riverbank Filtration (2008), Indo-German Riverbank Filtration Network (RBFN; 2008-2010), Sustainable Urban Water Management (since 2009), Establishment of a Groundwater Monitoring Network for the City of Dehradun (2009-2010) and Development of Riverbank Filtration for Sustainable Quality & Quantity of Drinking Water in Hill Regions of Uttarakhand (2010-2012). These projects have been supported by the Water Technology Initiative of the Department of Science and Technology, Government of India (DST-WTI), Uttarakhand Council for Science and Technology (UCOST) of the state Department of Science and Technology of the Government of Uttarakhand, the European Union's Economic Cross Cultural Programme, German Academic Exchange Service (DAAD), the German Federal Ministry for Education and Research programme "India and Germany - Strategic Partners for Innovation" (BMBF), the GTZ-ASEM joint programme of the German Technical Cooperation and the Ministry of Environment and Forests (Government of India), as well as the German

and Indian water companies Stadtwerke Düsseldorf AG (SWD) and Uttarakhand Jal Sansthan (UJS) respectively. The University of Applied Sciences Dresden (HTWD), the Department of Civil Engineering at the Indian Institute of Technology Roorkee (IIT Roorkee), the Institute for Water Chemistry at the Dresden University of Technology and the Water Technology Center of the German Gas- and Waterworks Association in Dresden (DVGW-TZW) are the key Indian and German organisations that have conducted collaborative applied research on RBF and related drinking water aspects in Uttarakhand since 2005.

In order to continue the international collaboration on applied research in the field of RBF in South Asia, efforts are underway by the National Institute of Hydrology (NIH) in Roorkee and the University of Applied Sciences Dresden in Germany to jointly establish the Indo German Competence Centre for Riverbank Filtration at NIH.

The organisers of the workshop would like to thank the various authors and their co-authors from the Delft University of Technology (The Netherlands), Ghent University (Belgium), INRS University, Laval University and Génie Experts-conseils in Quebec (Canada), the Groundwater Research Center at the Khon Kaen University, the Department of Groundwater Resources of the Ministry of Natural Resources and Environment and the firm Hydrogeoscience (Thailand), the HTWD, DVGW-TZW, SWD and the firms Hydrosystemtechnik GmbH (HYDROSYS), bbe Moldaenke GmbH, CONDIAS GmbH and Adensis GmbH (Germany), the Department of Chemistry at the IIT Madras, the Bureau of Indian Standards, IIT Roorkee, NIH, UJS, DST-WTI and the firm DHI (India) Water & Environment Pvt. Ltd. for presenting at the workshop.

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