MEETING REPORT

Recognizing efforts and leadership in the area of water management and conservation*

Access to freshwater is one of the biggest crises that India faces, considering the pace at which it is developing and urbanizing. The growing population, increasing urbanization, changing lifestyles, rapid economic growth and unsustainable utilization of natural resources have brought freshwater scarcity to the forefront of issues requiring resolution as well as policy-making. It has nudged both users of water as well as the service providers of water-related solutions to rethink strategies for water sustainability and wastewater management. Therefore, the need is to bring all stakeholders to a single platform and take steps towards integrated water management.

The Federation of Indian Chambers of Commerce and Industry (FICCI) organized a conclave to provide a platform for policy debate and to showcase initiatives by Indian industry in sustainable water management. FICCI has been working consistently to promote water conservation strategies within its member companies and civil society members. The conclave was attended by over 100 participants from 10 states of India, including industry practitioners, policy-makers, non-governmental organizations, government bodies, environment advocates and civil society members.

The conclave focused on a paradigm shift to ensure equitable sharing of responsibility and to gather all the stakeholders for a coordinated approach towards the common goal of sustainable water management. The aim was to highlight new adaptive strategies, business models to reduce, recycle, reuse and redesign concepts, where the water sector should both essay old solutions as well as innovative approaches to sustainable water management.

In the inaugural session, Shashi Shekhar (Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India) outlined key tenets for a paradigm shift in sustainable water management. He expressed the need to take into account the complete ecosystem and have a holistic approach. He also mentioned that there is no evaluation of the sum total of command area of aquifers vis-à-vis the sum total of command area of reservoirs, and highlighted the urgent need for a participatory approach to water management as the first condition of reform. The emphasis was also laid on finding ways of ensuring groundwater flow into aquifers through rainwater harvesting and protecting the natural recharge systems. He also suggested the industrial sector to focus on demand-side management to match the supply-side push, besides doing robust water budgeting and accounting.

Mihir Shah (Bharat Rural Livelihood Foundation, New Delhi) spoke on the basic tenets of a paradigm shift in sustainable water management and the reform agenda of the government. He highlighted the importance of (a) democratization of water management, in which states handing over the management of water of command areas to associations of farmers; (b) states need to be given an incentive towards reforms in this direction; (c) providing last mile connectivity to the farm level to close the gap between irrigation potential created and irrigation potential utilized. Reforming irrigation would also help release water for other uses by having innovative technology for water recycling and reuse. There is also need for a national movement around revival of our rivers, understanding the interconnection between economic development and the larger ecosystem, and the need for continuation of the National Aquifer Management Programme[1].

In managing water resources sustainability, there is need for having shared vision and responsibility for water augmentation, greater accountability, an incentive framework for going beyond compliance, and a coordinated approach to water supply and management, according to Naina Lal Kidwai (FICCI Water Mission). The policy managers at the event discussed the need to have at least a minimum provision of water to industry to be able to even recycle and reuse it; usage of irrigation water more efficiently and freeing up good quality water for drinking purposes through a holistic approach.

The conclave had three major themes focusing on, 'Enabling policy and regulatory framework for sustainable water management'; 'Water–industry–agriculture nexus: harnessing the interdependencies' and 'Water use efficiency in industries'.

The first plenary session focused on developing an enabling framework for recognizing water as a shared resource and for promoting integrated water resource management, on both supply- and demand-side dimensions of water use.

India is rapidly urbanizing and undergoing an industrial transformation, where water for urban and industrial uses has gone up substantially, and reallocation of water between various sectors often creates social tensions and conflicts. The challenges that need to be defined are of describing specific regulatory policies to address issues of pricing, incentives for contribution to water management, challenges, and good governance to exemplify the role of industry in efficient water management. Emphasis was laid on reuse of treated wastewater by the private sector with effective, simple-to-operate and low-cost solutions.

The discussion also focused on groundwater depletion that is a concern in India for many years, but increased demands on our groundwater resources have overstressed aquifers in many areas of the Indo-Gangetic Plains, and peninsular India[2]. In addition, groundwater reduction occurs at scales ranging from a single well to aquifer systems underlying some states. The extents of the resulting effects depend on several factors, including pumpage and natural discharge rates, physical properties of the aquifers, and natural and human-induced recharge rates. K. B. Biswas (Central Ground Water Board, Haryana) discussed how depleted groundwater can be recharged through mapping recharge zones and emphasized on having a strict policy in place for the same. He also underlined the importance of change in agricultural

*A report on India Industry Water Conclave and FICCI Water Awards at FICCI, Federation House, Tansen Marg, New Delhi.

practices, creating mass awareness programmes for the farmer community and having solutions that are holistic in nature.

The second plenary session included a debate on industry and agriculture since both depend on water; hence, there is a need to address the interdependencies and interlinkages between these two sectors. Many industries are interested, involved and investing to increase water use efficiencies in the agriculture sector, for providing benefits that go far beyond reduced water use. The second plenary session underlined linkages, challenges, opportunities, solutions and case studies based on smart agriculture and off-grid applications for water–energy nexus, which are initiated by corporates for the better management of water in the agriculture sector. One such case study discussed was showcased to have a water stewardship approach using sound practices on water efficiency and conservation in the private domain.

The forum also gave the opportunity to industry members to demonstrate responsible behaviour and proactive initiatives in the realm of water use efficiency through innovative technologies and solutions through its third plenary session. The discussion was on initiatives that go beyond mere compliance to exploring and implementing innovations to stay ahead of the curve. The aim was to showcase initiatives by industry towards sustainable water use and reuse, and recycling of treated wastewater. The industrial sector showcased its work in the domain of reuse of treated wastewater for reducing water consumption, effluent treatment plant-based effluent network system, rainwater harvesting and practising zero waste water discharge.

The takeaway for the participants was to shift the focus from a scenario where there is inequitable allocation of water, skewed share of responsibilities for water augmentation, and disproportionate burden of pricing vis-à-vis water use, to a scenario where there is shared vision and responsibilities for water augmentation, greater accountability, an incentive framework for going beyond compliance, and a coordinated approach to water supply and management.

The forum reflected on the need to ensure that areas of Public–Private-Partnerships in water are executed as sustainable business models and in a time-bound manner. It was further echoed that the government should propose a framework for recognizing water as a shared resource and for promoting integrated water resource management. The need for protecting the limited freshwater resources and their important role in preserving human and ecosystem health can only be achieved through collective wisdom to produce recommendations which offer practical, effective solutions to counter the catastrophic degradation of such resources.

1. *Manual of Aquifer Mapping*, Central Ground Water Board, Ministry of Water Resources, Government of India, 2012; http://cgwb.gov.in/INTRA
2. *Groundwater Management and Ownership*, Planning Commission, Government of India, 2007; http://planningcommission.nic.in/reports/genrep/rep_grndwat.pdf

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MEETING REPORT

Paleoceanography*

The 12th International Conference on Paleoceanography (12 ICP) was attended by more than 700 participants, including scientists and students from 34 different countries. The theme of the five-day conference was 'Paleoceanographic view of global climate change'.

The conference provided the participants an opportunity to update their knowledge about the newest discoveries, development of new proxies and current state of knowledge in palaeoceanography. The conference was structured around five themes: (1) timescale and rates of change; (2) development, calibration and application of new and existing paleo-proxies; (3) understanding biogeochemical cycle, biota and evolution; (4) system dynamics and ocean–ice–continent interactions, and (5) reconstructing the future using paleoceanographic tools.

Appy Sluijs (Chair of 12 ICP) welcomed all the participants and gave an outline of the meetings and discussions to be carried out during the next few days. The conference had oral presentations in the morning sessions, and the afternoon sessions were for poster presentations. These were followed by perspective lectures in the evenings. Several companies dealing with palaeoceanographic instruments and analytical facilities, participated in an industrial exhibition.

A wealth of data was presented on accurate age constraints in palaeoceanography. New results of globally distributed benthic oxygen isotopic records were employed to refine time series, called Prob-stack, using profile-hidden Markov model. New isotopic records clearly demonstrate that climatic variability on astronomical, orbital and millennial timescales can be documented from well-preserved benthic/planktic foraminiferal tests. It was shown, for example, that accurate orbital calibrations can be achieved from an integrative study of deep-sea benthic stable isotope and palaeomagnetic data. Discussions on the last interglacial (LIG) episode during the late Quaternary, presented an invaluable opportunity to investigate the response of polar warming in relation to different components of the Earth system. Extraction of this information from marine archives relies mostly on stratigraphic alignments to different reference chronologies in climatic archives, which have limitations and result in less accurate

*A report on the '12th International Conference on Paleoceanography' held at Utrecht, The Netherlands, during 29 August–2 September 2016.