MEETING REPORT

Linking rivers, barrages and fish migration*

Regulating fluvial systems by dams, barrages and construction of inter-basin link canals, has severe impacts on fish populations across the world’s rivers. In India, all major fluvial systems are interrupted by a series of barriers. This includes small weirs to large dams and salt-water barriers preventing saline incursion to the estuarine lakes. One major reason for decline in the populations of commercially important and ecologically unique fish species has been the blocking of migratory routes of spawners to upstreams or to the estuarine areas.

Interlinking of rivers — linking all major rivers in the Himalayas and peninsular India through an extensive barrier and canal system has been recently projected as the ‘silver bullet’ to all water problems in the country. The proposal has received unstinted support from all developmental aspirants. India’s Supreme Court has also provided necessary legal clearance to the project, overruling all ecological and socio-economic concerns raised against the plan. This project is feared to obstruct the natural flow of rivers impeding the movement of fishes, impacting their population, as well as leading to a homogenization of fish fauna and, most importantly, the livelihood of the fishers.

Commemorating the World Fish Migration Day (WFMD) 2016 and the 20th Anniversary of the Ashoka Trust for Research in Ecology and the Environment (ATREE), Bengaluru the Community Environmental Resource Centre of ATREE and the Kerala University of Fisheries and Ocean Sciences (KUFOS) organized a national consultation and panel discussion on ‘Linking Rivers, Barrages and Fish Migration’. The main aim of the gathering was to create awareness about the impacts of barrages on fish migration and fishery resources.

The Fresh Water Working Group (FWWG) of the Society for Conservation Biology (SCB), World Fish Migration Foundation and The Kerala Chapter of Indian Science Congress Association (ISCA), also collaborated with the event.

Mara Pandian (Principal Secretary to the Departments of Environment, Forests and Fisheries and Vice Chancellor in-charge of KUFOS, Kochi inaugurated the Seminar. V. Narayan Pillai (Central Marine Fisheries Research Institute (CMFRI), Kochi), Himanshu Thakkar and Parineeta Dandekar (South Asia Network for Dams, Rivers and People (SANDRP), Pune), K. V. Jayachandran (KUFOS), Nachiket Kelkar (ATREE), V. V. Binoy (National Institute for Advanced Studies, Bengaluru), A. Bijukumar (Department of Aquatic Biology and Fisheries, University of Kerala, Thiruvananthapuram), Rajeev Raghavan (KUFOS) and E. V. Radhakrishnan (CMFRI) were the panelists. Priyadarsan Dharma Rajan (ATREE) moderated the sessions. Close to 80 delegates, including fisheries and conservation researchers, social scientists, environmental activists, graduate students and representatives from the fisher communities participated in the seminar and subsequent discussions.

All speakers equivocally stressed that most Indian rivers and their tributaries have one or more dams, and several barriers have been built to regulate salinity in major estuaries. As a result, the breeding migration of fish and shellfish has been greatly impacted leading to reproductive failure and changes in population recruitment patterns. Although some mitigation measures have been proposed and implemented (e.g. fish ladders) their success has been exceedingly poor.

Kelkar opined that dams and barrages are the sole reason for the collapse in riverine fisheries-based livelihoods in India. Species such as the hilsa (Tenualosa ilisha), Pangas (Pangasius pangasius), anguillid eels (Anguilla bengalensis, A. bicolor) as well as the Indian major carps (catla, rohu and mrigal) have become commercially extinct in many upstream reaches of the Gangetic and peninsular Indian rivers. On the other hand, booming production in freshwater aquaculture has created a somewhat false impression that India has an overall large ‘inland fish-based economy’. In the midst of this, riverine fisheries stand today as a failed economic sector that is threatened by further depletion and damage from impeding river ‘development’ projects.

V. V. Binoy discussed how human induced rapid environmental changes (HIREC) could trigger undesirable behavioural patterns or block the expression and modulation of vital behaviours under crucial circumstances in fishes, leading them into an evolutionary trap and extermination. Migratory fishes are the foremost victims of HIREC, as such species may need to utilize different sensory mechanisms, behaviours and cognitive traits to obtain biologically significant resources such as food, mate and shelter, as well as to avoid the threat of predation in different microhabitats through which they migrate.

Jayachandran mentioned that barriers and river linking affect the downstream flows and result in the drying-up of rivers during summer. Several freshwater prawns (e.g. Macrobrachium spp.) and fishes need to migrate to their spawning grounds to complete their life cycle. Linking rivers and obstructing migratory pathways overlooking the life-history needs of fish and shell fish populations could lead to the extirpation of several important species. Bijukumar, who discussed the importance of environmental flow requirements between marine and freshwater systems, proposed an ecosystem approach considering environmental flows, habitat heterogeneity and hydroecological relationships for the conservation of migratory fish stocks.

Dandekar pointed out that, riverine fisher communities—one of the most vulnerable sections of Indian society—are not recognized as legitimate water users, nor considered when decisions regarding dams or environmental flows are made. Thakkar said that environmental impact assessment (EIA) should be conducted with due considerations to biotic, ecological and social impacts, and scientists need to be proactive while carrying out critical assessments of EIA reports.

* A report on National Consultation and panel discussion on ‘Linking Rivers, Barrages and Fish Migration’ organized by Ashoka Trust for Research in Ecology and the Environment (ATREE) and Kerala University of Fisheries and Ocean Sciences (KUFOS) on 21 May 2016 at KUFOS Seminar Hall, Kochi, Kerala.
Chemistry for harmonious development and a sustainable future*

Advances in chemistry in recent years have undoubtedly created considerable benefits for humankind which have led to improved health, enhanced quality of life, a better environment and more sus-


tained development. At the same time, new scientific discoveries may lead to new risks, including the potential for new chemical compounds to be used in chemical warfare. The rapid increase in the use of chemicals and their build-up in our environment also come at a price for human health and biodiversity. Many toxic chemicals have been associated with direct impact on global warming, polluted air and water, causing chronic health problems. As our understanding of chemistry and science increases, so must our sense of responsibility towards harnessing chemistry for humanity’s cherished goal of peaceful, happy and harmonious coexistence. It is also important to raise awareness and educate people regarding various beneficial uses of chemicals, recent innovations, potential risks, trends and practical challenges in the field of chemistry.

In an endeavour to provide a common platform for researchers and students from academia and industry to share their valuable views, experience and