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Policy Brief

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Actions Needed to Prevent Fish Biodiversity Loss in Transboundary Rivers

Fisheries in the transboundary river of South Asia

Source: M. Hossain

Purpose

The aim of this policy brief is to:

- highlight the fish biodiversity in South Asian transboundary rivers and its importance on livelihood and food security of the region;
- identify the threats to the fish biodiversity in the shared freshwater bodies of South Asia;
- sensitize South Asian governments and development partners for the need of framing policy at SAARC regional level for conserving and managing the bio-fauna in the transboundary rivers.

Transboundary rivers in South Asia

The South Asian region is bestowed with the Himalayan watershed consisting of three major transboundary river basins: the Indus, the Ganga and the Brahmaputra. The Indus basin consisting of the Indus, Ravi, Beas, Sutlej, Jhelum and Chenab rivers interlinks India and Pakistan. Pakistan and Afghanistan share the Kabul river basin. The Brahmaputra and the Ganges basins interlink India, Nepal, Bangladesh and Bhutan. Bangladesh and India share 54 rivers. In Bhutan the four major river basins, Amo Chhu, Drangme Chhu, Punatsang Chhu and Wang Chhu of Bhutan are shared with India and drain into the Brahmaputra river. Similarly, all the four major river basins of Nepal, Sapta Koshi, Sapta Gandaki, Karnali and Mahakali are the tributaries of the Ganga and shared with India. The diverse fish fauna in these transboundary rivers support the livelihoods and rural economy in the basins and also provide opportunities for fisheries and aquaculture development in the region. In spite of several blessings, these transboundary river basins suffer from natural calamities, floods, drought, landslides, soil erosion and sedimentation. Also, the basins are associated with high

population density, poverty, unemployment, imbalanced development and lack of capital and technology for rapid economic growth. Shared river basins have triggered several disputes between South Asian nations in recent decades. The socio-environmental impact of big dams and hydroelectric power projects, discharge of domestic and industrial wastes, overfishing as well as destructive fishing over the years have significantly depleted the fish diversity and the fishery stocks. Many fish species are threatened with extinction. In the Ganga river system alone over 29 species, of which mainly mahseer *(Tor putitora, T. tor)*, dwarf goonch *(Bagarius bagarius)*, yellowtail catfish *(Pangasius pangasius)*, pangas catfish *(Silonia silondia)*, hilsa *(Tenualosa ilisha)* and long whiskered catfish *(Sperata aor)* are under severe threat.

Threats to fish biodiversity in transboundary rivers

Reduced e-flow

Construction of dams and water-diversion systems in the South Asian transboundary rivers have drastically reduced the ecological flow (e-flow), blocked the migration routes of fishes and disrupted habitats. The migration routes of the major fish species, Indian Major carps, Pangas and Hilsa in Borak-Meghna, Brahmaputra-Jamuna and Ganges –Padma river systems are blocked due to damming and water diversion. Spawning and nursery habitats in the rivers are lost due to low water flow. Hydrological pattern has changed and salinity increased in all the tributaries and distributaries of these rivers. The biodiversity in the rivers is depleted significantly. Siltation disrupted the food web in the riverine ecosystem by decreasing benthic food organisms' availability.

Reduced e-flow in the transboundary river of South Asia
Source: BFRI, Bangladesh

Pollution through agricultural, domestic and industry waste

The water quality index has reached unsafe levels in many rivers of the region due to discharge of domestic, industrial and agricultural waste. Species diversity and density has seriously suffered, fish catch has drastically reduced in the transboundary rivers. Fish from polluted rivers are found to be highly contaminated with heavy metals and harmful microbes, become unfit for human consumption. It is recently known that 550 million people of India, Nepal and Bangladesh on the bank of the rivers Barak-Meghna, Brahmaputra-Jamuna and Ganges-Padma are living with danger of arsenic pollution.

Invasion of exotic species

The invasive alien fishes have caused habitat destruction, introduction of diseases and their causative agents and predation or competition with native species. The threats and the ecological impacts of alien fishes in the Ganga and Brahmaputra rivers are alarming. Transboundary migration and introduction of exotic species viz., *Oreochromis mossambicus, Cyprinus carpio, Hypophthalmichthys molitrix, Ctenopharyngodon idella, Clarias gariepinus* and *Pterygoplichthys disjunctivus* have distributed through the important tributaries of river Ganga basin. There is significant decline in river native aquatic communities. In last four decades, the fish species diversity has changed significantly in the rivers of South Asia. Among 276 freshwater fish species of Bangladesh, 56 are disappeared from the rivers, haors and beels, and 117 are at the risk of disappearance.

Overexploitation of fishery resources

South Asia is the thickly populated region of the world. Excessive food demands, improved fishing gears and weak river management regulations led to over exploitation of fisheries resources in the rivers. Overexploitation led to serious threat to aquatic biodiversity in the rivers. The genetic diversity and the species abundance are lost. The livelihood of people of riverine and lake communities suffered seriously.

Climate change

Climate change impacts, glacier retreats, changed monsoonal rain pattern, increased flooding and drought caused altering stream flow and threatened the aquatic ecosystems in the rivers of South Asia. The altitudinal shift in agro-ecological zones due to increased temperatures led to mobility of many fish species to higher altitudes. Invasion of aquatic plants, water hyacinth *(Eichornia spp)* and African catfish *(Clarias gariepinus)* in hilly regions of Nepal are the visible impacts of global warming. Similarly, a warm water species, glass fish *(Chanda sp)* has been established in Kulekhani reservoir at the mid hill region of Nepal after the reservoir became warm. In basins, where run-off and discharge rates are expected to increase, the seasonal inundation of floodplains of Karnali, Narayani and Koshi river systems the fish yields have increased as larger areas of ephemeral spawning and feeding areas are exploited by several native riverine fish species.

Overfishing in river of Bangladesh Source: M. Hossain

Priority policy actions

Database on biodiversity of transboundary rivers

- Develop a regional database on fish fauna biodiversity in all the South Asian rivers.
- Molecular tools for taxon identification, which exploits diversity among DNA sequences, can be used to identify fishes and resolve taxonomic ambiguity including discovery of new species. DNA barcodes and establishing evolutionary linkages using molecular tools could be of immense utility in sustainable exploitation, management and conservation of fish species.
- Genetic characterization to assess the distribution and pattern of genetic variability at intra- as well as inter- specific level populations, through the use of genetic markers.

Restoration and conservation of biodiversity in the transboundary rivers

- Ecosystem conservation and decrease loss of natural habitats, breeding, nursery and grazing grounds by restricting construction of dams, regulating water withdrawal and managing waste discharge to the rivers.
- Restriction on fishing of threatened fish species, a complete ban on catching the juvenile, bans on use of destructive gears such as electrofishing equipment, poisons and explosives, and restricting fishing effort by gear type, location, season and method of deployment.
- Mass-scale breeding, seed production and river ranching of threaten endemic species and establish fish sanctuaries in riverine ecosystems to maintain fish biodiversity.
- Safeguard of genetic diversity through setting up of regional fish gene bank viz., SAARC FISH GENE BANK in forms of Brood Banks, Cell lines, Stem-cell line, DNA bank and cryopreserved gonads, and sharing of genetic pool.
- Disease control through establishing pre-entry and post-entry quarantine systems.

Biodiversity management through participation from all levels

- Setting up of a multi-stakeholder committee at SAARC level for regional rivers' management.
- Encouraging community participation in river fisheries and biodiversity management.
- Learning from available international laws on rivers and their management.
- Harmonizing existing policies available with the SAARC Member States and formulation of appropriate action plan for fish biodiversity conservation in the transboundary rivers.
- Incorporating the values of biodiversity and ecosystem services into policy and management decisions.

Building capacity for utilization and sharing of benefits derived from biodiversity

- Increased participation at the local level for biodiversity management in the rivers by strengthening local leadership and improving communication, education and public awareness.
- Develop professional capacity of educators and communicators through training and exposure visits.
- Developing common research and development platforms and exchange of researched information on IBI (Index of Biotic Integrity), breeding biology, migration routes and patterns, breeding grounds, spawning season and spawning time of riverine fishes.
- Implementing national and local sustainable development strategies through local level initiatives.

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Where has this come from?

The policy brief is prepared from the outcome of the SAARC Regional Consultation on 'Policy framing on fish biodiversity management in transboundary rivers' held at Bangladesh Fisheries Research Institute, Mymensingh, Bangladesh in 2016. The SAARC Member States' focal point experts discussed the issues related to transboundary rivers and their biodiversity. The committee discussed the need for framing a SAARC regional policy on fish biodiversity management in transboundary rivers of South Asia. The governmental, non-governmental organizations and academia also participated in the meeting and discussed the issues.

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