

Marine fisheries management: Possible options

AK ATAUR RAHMAN

WITH the river estuaries Bangladesh has a coastline of 714 Km and an Exclusive Economic Zone (EEZ) of 1,64,000 Km² of which 44 per cent is continental shelf. Bangladesh's coastal waters are rich in the diversity of fishery resources with 475 species of fin-fish including sharks, and rays, a number of shell-fishes including 36 species of shrimp and a number of non-traditional items such as cuttlefish, octopus, oysters and mussels. More than 90 species are commercially important of which Hilsa (*Tenualosa ilisha*, Fig. 1) is the most important contributing over 40 per cent of the total coastal landing. Other important species are Churi (*Trichurus lepturus*, Fig. 2), Loitya (*Harpadon nehereus*, Fig. 3), Koral (*Lates calcarifer*, Fig. 4), Bom-Maitrya (*Euthynnus affinis*, Fig. 5), Rup Chanda (*Pampus chinensis*, Fig. 6), Kata (*Arius thalasinus*, Fig. 7), Karati (*Chirocentrus dorab*, Fig. 8) etc.

Marine catch was only 95,000m. ton in 1975-76. It has increased to about 474,597 tons in 2004-2005. The sector has an estimated (DOE, 2001) 22,500 non-mechanised and 21,400 mechanised fishing boats with 102 authorised industrial trawlers of which 46 shrimp and 40 fin-fish trawlers are in operation and over 200,000 fishermen and support staff are employed in the sector while 1,20,000-4,40,000 people are engaged in shrimp fry collection. The sector earns foreign exchange through export of various marine products including paenid shrimp, frozen, dried and salted fish and shark fins.

Resource status

There had been no study / monitoring of species-wise exploitation pattern of the coastal resources. Stocks of Lakhua (*Leptomelanosoma indicum*, Fig. 9) and Hilsa (*Tenualosa ilisha*) have declined. Results of the past surveys cannot be utilized for management purpose since the fishing effort has substantially (258% since 1975-76) increased. Presently there is better availability of Churi, Maitra, Bom-maitra,

Shore-based enforcement programme may be undertaken by upazila setup and data on movement of vessels and use of gear by non-mechanised artisanal sector be collected and monitored. As an interim arrangement for shore-based catch monitoring covering all the major landing centres of Chittagong, Cox's Bazar, Bhola, Barisal, Patharghata and Khulna be undertaken by the marine survey unit with support of researchers of BFRI and universities for collection, analysis and interpretation of data in respect of stock status for use of the decision makers.

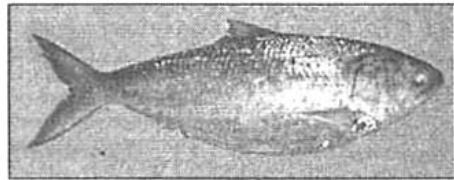


Fig. 1. Tenulosa ilisha

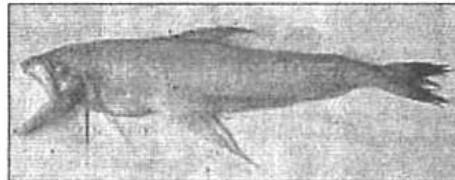


Fig. 3. Harpadon nehereus



Fig. 4. Lates calcarifer

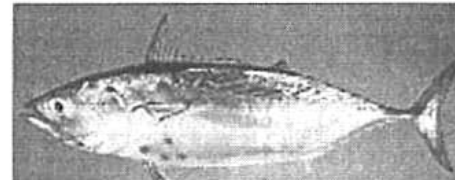


Fig. 5. Euthynnus affinis



Fig. 6. Pampus Chinensis

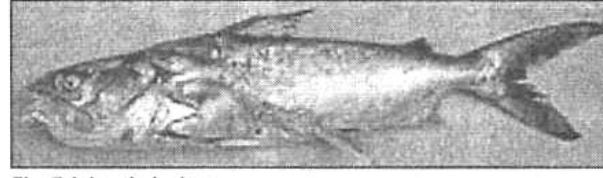


Fig. 7. Arius thalasinus

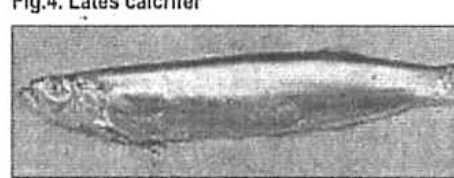


Fig. 8. Chirocentrus dorab

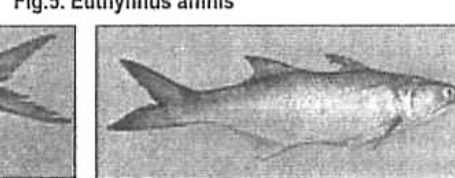


Fig. 9. Leptomelanosoma indicum

Hangor (*Scoliodon sorrakowa*, Fig. 10) in off-shore areas.

Decline in CPUE for motorised boats using large meshed gill net (LMD) has been noticed. A large percentage of boats currently remain idle. Shrimp trawlers are experiencing declining CPUE and are currently concentrating in shallow water and come in conflict with artisanal boats. Estuarine set bag nets, push nets and beach seines catch post larvae and juveniles of marine fauna resulting in restriction of growth. Intense exploitation with high fishing effort on limited resource is the present trend.

DOF management issues

Management of marine fisheries is highly focused on activities of industrial trawl sector. There is no management and monitoring of artisanal sector which operate from Barisal,

Bhola, Patuakhali, Barguna and other areas where fishing pressure is increasing alarmingly.

Marine wing of DOF has a staff strength of 183 which is only 4.2 per cent of the total (4363) strength. Manpower structure for major work of marine resources conservation, law enforcement, surveillance and monitoring is extremely weak. No manpower is allocated in Cox's Bazar, Barisal and Khulna region and other coastal areas from where most artisanal fishers operate.

Management options

To carry out the job of management and monitoring of marine resources, management

responsibility currently vested with the marine wing of DOF in Chittagong be decentralised and allocated to coastal districts and upazilas. Management regimes for trawl sector, mechanised boat sector and non-mechanised artisanal sector shall be re-organised by specifying their fishing gear and area of operation. Marine Ordinance and Rules shall be revised and updated to resolve conflicts among stakeholders on exploitation of limited resources.

Trawl sector management

The Deputy Director of marine wing in Chittagong shall be responsible for regulating fishing operations by trawlers in off-shore areas beyond 40 meter depth. Functions of the trawl sector management regime shall be licensing, catch monitoring, surveillance and other activities related with protection of marine reserves, mesh size, closed seasons, breeding grounds protection, pollution control.

Mechanised boat management

There are an estimated 21400 mechanised boats (Fig. 11) operating marine set bag nets, long lines and drift gill nets in near and off-shore areas of the Bay. Marine Fisheries Rules allow the operation of these boats up to a depth of 40 meters. However, the rules do not prohibit their fishing operation in shallower near-shore waters. These near-shore areas are fished by a large number of non-mechanised artisanal boats using estuarine set bag nets (Fig. 12), beach seines, trammel nets and push nets. The National Fisheries Policy gives priority to this group of small-scale fishermen and conserves the coastal area for use of small-scale sector. Coastal areas up to 10 km from the shore be reserved and allocated to small-scale artisanal sector while the area from 10 km off the shore up to a depth of 40 meter in the sea be allocated to mechanised boat owners.

Artisanal boat management

Artisanal/coastal boats mainly use estuarine set bag nets, beach seines, trammel nets as well as small-mesh gill nets. An estimated 22,000 boats operate in estuaries, river mouth and near-shore areas. National Fisheries Policy gives priority to small-scale fisheries sector and conserves the coastal areas for small-scale fishermen. The following strategies are suggested:

Upazila Fisheries Officers of the coastal upazilas shall be responsible for management and regulation of non-mechanised fishing boats operated in the estuaries, river mouths and near-shore areas extending up to 10 km in the sea. A Coastal Fisheries Officer (CFO) is proposed to be placed in each of the 47 coastal upazilas for monitoring of boat, gear, catch and marketing of fish.

Proposed re-organization of marine fisheries

For reorganisation of the marine sector several actions are proposed. The marine sector shall be supported by a cadre of specialist staff with skill and training in marine resource management. The existing post of Director (Marine) based in Chittagong will be transferred and placed in the headquarters of the Department of Fisheries in

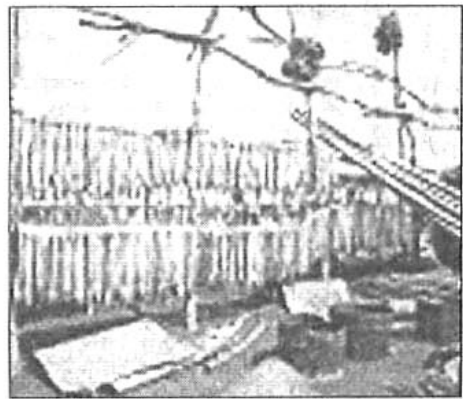


Fig. 2. Drying of Churi in Dublar Char

(MFOs) will be created in the revenue set up for allocation to the coastal districts with mandate to perform coastal fisheries function. The newly created MFOs will assist the concerned DFOs in all activities related with the management of mechanised commercial boats.

Similarly the UFO/SUFOs of the 63 coastal upazilas are required to be mandated to perform all activities related with the management and control of artisanal fisheries. To support these crucial activities 63 entry-level positions of Coastal Fisheries Officers (CFO) shall be created in the regular setup of DOF to assist the concerned SUFO/UFOs in the discharge of functions related with artisanal sector management.

Shore-based enforcement programme may be undertaken by upazila setup and data on movement of vessels and use of gear by non-mechanised artisanal sector be collected and monitored. As an interim arrangement for shore-based catch monitoring covering all the major landing centres of Chittagong, Cox's Bazar, Bhola, Barisal, Patharghata and Khulna be undertaken by the marine survey unit with support of researchers of BFRI and universities for collection, analysis and interpretation of data in respect of stock status for use of the decision makers. Memorandum of Understanding between these agencies be signed and implemented. Shore-based programmes shall include:

- Determination of species-wise exploitation pattern
- Identification of over-exploited and under-exploited stocks
- Determination of optimum fishing efforts in different fishing areas
- Changes in species composition and abundance
- Optimum mesh sizes of various fishing gear
- Exploration of cephalopods and other shell-fish resources
- Taxonomic study of all marine fauna and preparation of field identification guide
- Determination of catch per unit effort of different gear

Assessment and monitoring of deep-sea resources are pre-requisite for sustainable management of marine resources. Stock assessment programmes are required to be continued to provide valuable information about the status of different fish and shrimp stocks to the resource managers. For that matter the marine survey unit of the department should continue the stock assessment programme and efforts should be taken to acquire the logistic of a modern survey vessel.

AK ATAUR RAHMAN is Editor, Asiatic Society of Bangladesh.



Fig. 11. Mechanised boats

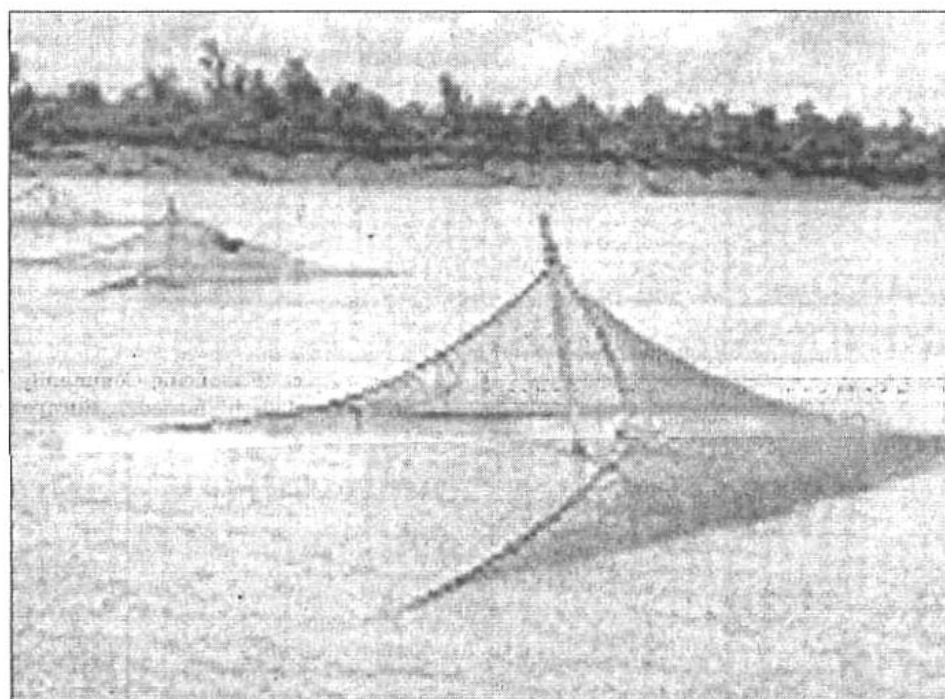


Fig. 12. Estuarine set bag nets

Gulshan Lake: An ecologically critical area

DR MD SOHRAB ALI

EXCHANGE of energy between the aquatic environment and its adjacent terrestrial ecosystem is a continuous process and thus, they are influenced much by each other. Land-based activities around the aquatic ecosystem have a crucial effect on energy inputs to it. For proper functioning of an ecosystem, there must be a balance between inputs and use of energy. Exceptions to this would be damaging for both the ecosystems.

Gulshan-Baridhara Lake was declared an Ecologically Critical Area (ECA) in 2001. Continuation of all sorts of banned activities in the ECA has turned it into an ecologically dead lake. This has been manifested recurrently through the death of fishes, receiving media coverage vigorously each year.

Importance of the lake: In the context of very scarce recreational opportunity in Dhaka city, this lake could be an important recreational point for city dwellers. Despite being a source of ground water recharge, the lake has a very important cooling effect on the city environment. Also this lake is a source of drinking water for wild fowl and other animals in the area. Physiography of lake: The lake is elongated in a north-south direction and surrounded mainly by residential areas and some industrial units as well. The lake is fragmented into four parts by culvert type structures. Openings of such structures appear to be very insufficient for free flow of water among different parts of the lake. This

badly affects the dilution of pollution loads, dissolution of oxygen into lake water and as a result, the localised effect of pollution sometimes becomes so severe that it causes death of aquatic organisms, such as fish.

Water quality: Pollution load (Biological Oxygen Demand/BOD) measured in the lake has been much greater than the critical level for fisheries (Table 1). Also, there is spatial variation in BOD load in different parts of the lake. In the middle points of each part of the lake, BOD load is smaller compared to the end-points (in longitudinal direction) or close to culverts. A similar trend in Dissolved Oxygen (DO) levels is observed throughout the lake. These negative impacts might have originated due to fragmentation of lake habitat that hinders lake water movement and ultimately affects load accumulation capacity of the lake.

Temporal variations in DO level in lake water (considering a 24-hour cycle) are observed (Fig. 2). The deep green colour of water indicates the presence of an algal bloom in the lake, owing to high pollution load. After daybreak, as the sun is high, the DO level in lake water reaches its maximum around noon, due to algal photosynthesis by which oxygen is released into lake water. The DO level begins to decline as the sun goes down. At night, through to early in the morning, high respiration demand for oxygen causes exhaustion of oxygen in the water, leading to a DO level near zero. Such a temporary anaerobic condition might have been

In the context of very scarce recreational opportunity in Dhaka city, Gulshan Lake could be an important recreational point for city dwellers. Despite being a source of ground water recharge, the lake has a very important cooling effect on the city environment. Also this lake is a source of drinking water for wild fowl and other animals in the area.

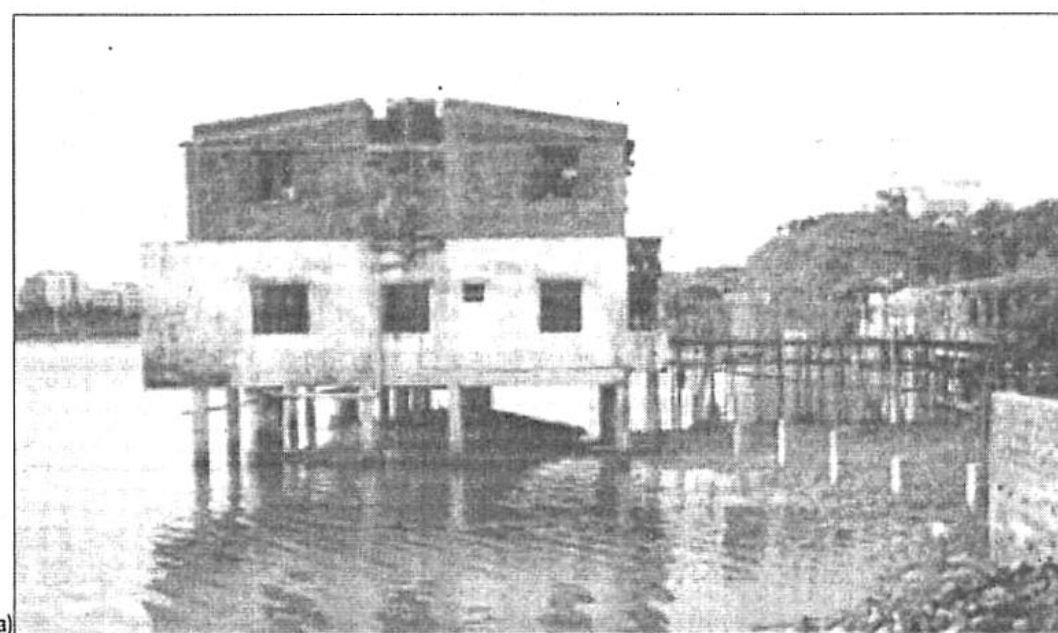


Fig. 1. (a) & (b). Examples of encroachment (photos taken in 2006). (c) Death of fishes (photo published in The Daily Star in 2007)

responsible for the death of fishes in the lake.

Factors responsible for the imbalance:

- Direct discharge of untreated sewage and dumping of solid wastes into the lake.
- Surface runoff during the rainy season that carries pollutants from the catchment area of the lake.
- Fragmentation of lake ecosystem by culverts that hinders free movement of water.
- Discharge of industrial waste into the lake.

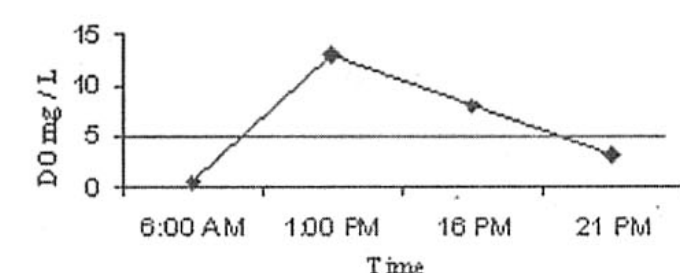


Fig. 2: Variation in DO level during of 24-hour cycle. Note: Red line shows critical level of DO in water

through surface runoff.

- Ensure free movement of lake waters.
- Stop industrial wastewater discharge into the lake.
- Design fine scale activities for

environmental conservation of the lake.

Dr. Md. Sohrab Ali is Deputy Director (Technical/CC), Department of Environment, Agargaon, Dhaka. E-mail: mssohrab.ali@yahoo.com

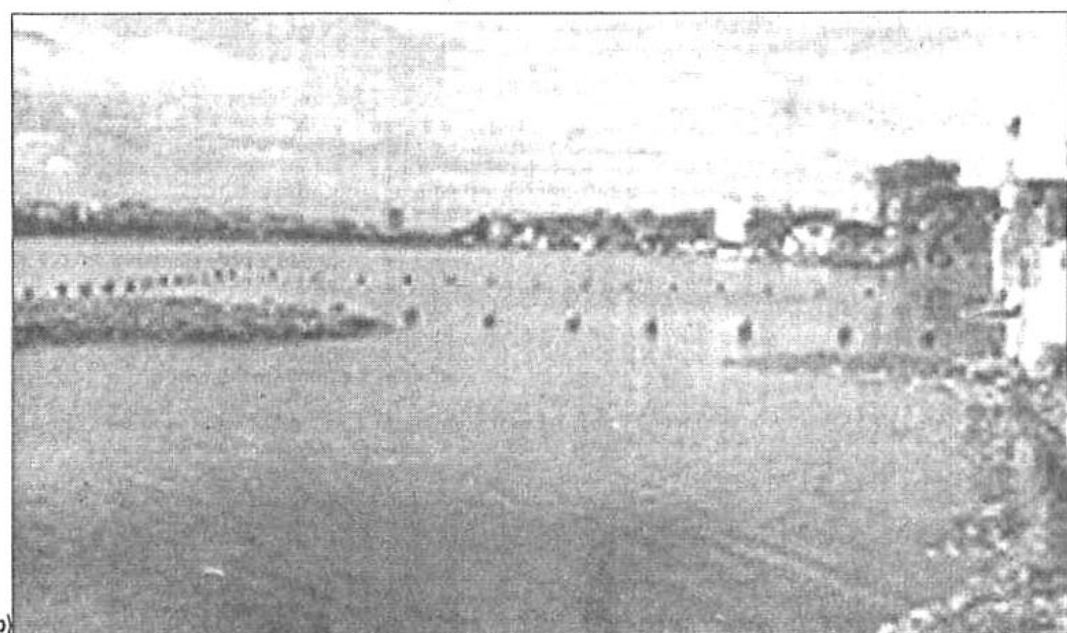


Fig. 1. (a) & (b). Examples of encroachment (photos taken in 2006). (c) Death of fishes (photo published in The Daily Star in 2007)

- Encroachment on the lake.
- Performing commercial and other banned activities in the ECA.
- Lack of effective conservation activities of the lake ecosystem, etc.

Recommendations:

- A lake management authority comprising all stakeholders could be formed for the conservation of the lake.
- Delimiting the boundary of Gulshan lake to save it from encroachment.
- Manage household discharge: identification of pollution sources, quantification and selection of treatment option(s).
- Manage solid waste in the area to reduce pollution load



Parameters	Measured value (mg/l)	EQS (mg/l)
BOD	10 - 25	6 or less
DO	1 - 7	5 or more

EQS = Environmental Quality Standard (for fisheries)