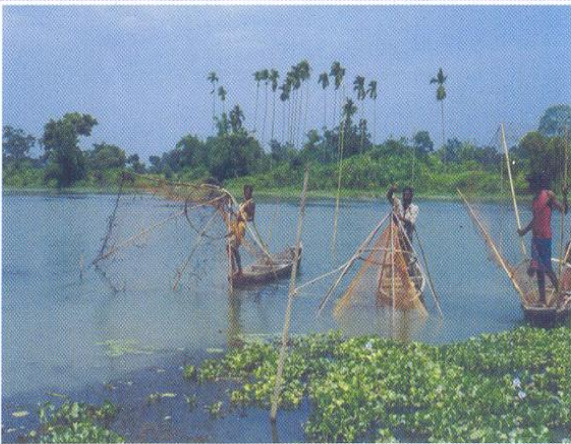


FLOODPLAIN WETLANDS MANAGEMENT



Introduction

Floodplain wetlands (beels) are low-lying areas bordering rivers, which are inundated by floodwaters from the main river or from their catchment areas during the rainy season. India has extensive areas covering 2.02 lakh ha under floodplain wetlands. These wetlands are mainly distributed in Assam, West Bengal, Bihar, Manipur, Tripura, Arunachal Pradesh and Meghalaya. These water bodies are locally known as beel, maun, chaur, haor, anoa, pat, etc. Beels represent rich areas for fisheries having very high fish production potential (1000-1500 kg ha⁻¹yr⁻¹). However, most of the beels are not properly managed resulting in low fish yield (100-300 kg ha⁻¹yr⁻¹) from them. Thus, they need to be scientifically managed in order to realize their production potential.



Categorization of beels for management

Beels are a heterogeneous group of water bodies that differ from one another in size, shape, riverine connection and habitat variables. Thus, it is difficult to prescribe a uniform set of management guidelines for all the beels. For the purpose of fisheries management, beels are broadly divided into perennially open (i.e., beels retaining riverine connection throughout the year), seasonally open (connected to rivers only during the rainy season) and closed ones (cut-off from the parent river) depending on the nature of riverine connection. Further, based on size and ease of management, they are divided into very small (effective water spread area <20 ha), small (20-99 ha), medium (100-499 ha) and large beels (500 ha and above).

Management options

Management options suitable for different types of beels (e.g., open/closed, large/small, etc.) can be broadly grouped under capture fisheries and various forms of fisheries enhancements (including culture-based fisheries and aquaculture) depending upon the extent of human intervention in the management process.

Capture fisheries

In most perennially open and large beels, natural fish stocks are harvested with little human intervention either on the habitat variables or on the fish stocks. Here the manager should aim at conservation and sustainable use of natural fish stocks. This can be achieved by allowing natural replenishment of fish stocks (recruitment) through conservation of the habitat and its fish stocks.

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Conservation of habitat : The following steps are suggested for conservation of the habitat.

- i) Clearing/controlling infestation of aquatic macrophytes by suitable means.
- ii) Desilting the connecting channel and marginal shallow areas of the beel.
- iii) Retention of sufficient water levels during dry season (by minimizing water outflow and abstraction).
- iv) Prevention and control of aquatic pollution.



Conservation of fish stocks : Measures suggested for ensuring recruitment of natural fish stocks are:

- a) Allowing free migration of brooders and juveniles of major fishes from the beel to the parent river and vice versa.
- b) Identification and protection of breeding grounds of commercially important fishes (e.g., closed regions).
- c) Conservation measures suggested for the protection of brood stock and juveniles are:
 - i) Strict adherence to restrictions on minimum landing size for different commercial fish species.
 - ii) Increasing or decreasing the fishing effort for optimizing fish production or to prevent over-fishing.
- iii) Observing fishing holidays during the monsoon season to ensure spawning success.
- iv) Banning or phasing out destructive fishing methods like mosquito nets, dewatering, fishing with explosive/piscicide etc.
- v) Diversification of fishing methods to avoid selective over-fishing.



Community enforced regulation is more effective than government enforcement.

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determining the success of culture-based fisheries in a beel are selection of species, species ratio, stocking density, size at stocking, size at recapture, species management, fishing effort and selection of fishing gear.

Fertilization : Since most beels receive a lot of nutrients from their catchments and have large organic matter reserves, external fertilization (i.e., application of inorganic/organic fertilizers) is usually not required; in its place bottom raking (with/without liming) is suggested. However, fertilization may be required to increase the fish yield of a beel when it is regularly stocked in high densities. Because of the high costs involved, it can be practiced only in very small closed beels. Wherever possible, the beel should be fertilized through discharge of nutrient-rich wastewaters from agriculture/ animal husbandry to reduce the cost involved.

Engineering of the environment : This measure aims at improving the levels of reproduction, shelter, food resources and vital habitat. Brush parks, which are popularly known as katal/jeng, pit/chek (Assam), phoom (Manipur), etc. are the most common environmental engineering techniques practiced in beels. These parks mainly act as sheltered areas. These are constructed by barricading a dense patch of floating macrophytes with split-bamboos tied on to bamboo poles driven into the bottom (with or without submerged bamboo/tree branches underneath). These are usually erected immediately after the monsoon season (August-September) and harvested during the dry season (January-March).

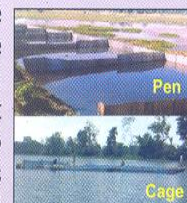


Elimination of unwanted species : In culture-based fisheries, populations of unwanted (predatory and weed) fishes having lower ecological efficiency should be controlled to ensure better growth and survival of stocked species. However, it is difficult in large beels infested with aquatic macrophytes. Repeated operation of netting using shore seines, boat seines and gill nets of appropriate mesh size; use of long lines, traps etc. are normally employed for controlling undesirable fish populations in beels. Allowing the fishers a greater share in the catch of undesirable fishes is helpful in selective fishing of such species. Biological control of small weed fishes by keeping a limited population of predatory fishes having moderate sized mouth (e.g., **Chitala chitala**, **Aorichthys aor**, etc.) is another low-cost option.

Habitat modification : Fingerlike projections present in certain beels can be cut-off to create fish ponds. These ponds can be

used for raising carp fingerlings for stocking the main beel. The detached areas can also be used for extensive or semi-intensive aquaculture to enhance fish production from them after the rearing operation is over (which usually lasts for 2-3 months).

Pen and cage culture : Fish culture in pen and cage enclosures in beels can be developed parallel to the enhancement of their capture fisheries. The Institute has successfully demonstrated pen culture technology in beels of Assam, West Bengal and Bihar both for rearing of carp fingerlings and for growing of table fishes including prawns. The field trials were carried out using locally available materials (bamboo) for pen construction and following semi-intensive culture system. The Institute has also been carrying out experiments on cage culture in the beels of Assam and West Bengal using cheap and locally available materials.



Aquaculture : Here the whole beel is managed as in pond fish culture involving stocking, fertilization, elimination of unwanted species, management of soil and water quality, feeding, health management, etc. Semi-intensive and intensive aquaculture can be practiced only in very small closed beels. Further, the possible adverse impacts of semi-intensive/intensive aquaculture on the beel environment and the cost-benefit ratio of this option should be carefully considered.

Management enhancement : This measure aims at improving the monetary and aesthetic values of a fishery (e.g., sport fishing, eco-tourism, etc.). This may also involve changing from open to limited access policy (i.e., leasing system) or adoption of a community management approach for more effective management.

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