

Reservoir Fisheries Management for Employment generation



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Reservoirs are large man-made ecosystem which is also called as artificial lakes. They were mainly constructed for the purpose of generation of hydro-electric power, water supply and irrigation. Fisheries is an additional benefit from this water body. The reservoirs in India have high fish production potential; however, the actual fish production from these water bodies remains low. The low fish yield could be attributed to poor adoption of scientific management strategies. The scientific management of reservoirs may lead to the enhancement of fish production and productivity, thereby contributing to livelihood and nutritional security of the rural people. Management strategies for fisheries developments include culture based fisheries management for small and medium reservoirs, stock management in large reservoirs, Species enhancement and table fish production through cage culture in medium and large reservoirs. Implementation of most recent technologies such as Electronic Data Acquisition System (eDAS) and enumeration of fishes using Hydroacoustics in reservoirs may help in better management of the resource.

Culture-based Fisheries:

- ◆ Culture-based fisheries (CBF) means stocking of fishes, allowing the stock to grow utilizing the natural fish food resources and harvesting them at an appropriate size.
- ◆ The number of fishes to be stocked, the size at stocking, the period of growth and harvesting size determines the success of CBF.
- ◆ The small reservoirs which retain water for sufficient period and with no possibility of natural recruitment are ideal for practicing culture-based fisheries.



- ◆ Modern modeling tools generate outputs that assist the manager in: (a) selection of species for stocking (b) determination of stocking density, stocking size, size at harvest and fishing efforts and (c) assessment of fish yield potential through estimation of limnological parameters

Stock Enhancement:

- ◆ Stock enhancement practices are suitable for water bodies like large and some medium reservoirs that do not support sustainable fisheries through self-recruiting fish populations.
- ◆ Stock enhancement involves stocking of fish into the reservoirs, allowing the stock to grow by utilizing the natural fish food resources followed by conservation of resources to allow natural breeding and recruitment and harvesting them at an appropriate size with regulation.
- ◆ It involves heavy initial stocking and creating conditions that are conducive for capture fisheries.



- ◆ The stock is managed through a number of management actions such as imposing mesh-size regulations, closed fishing seasons and conserving habitats to allow natural recruitment and growth of target species.



Species enhancement:

- ◆ The supplementation of fish stocks of appropriate fish species at right proportions helps in augmenting fish production from reservoirs.
- ◆ The selection of species must be done based on various attributes such as availability of fish seed, food resource, feeding habits, growth rate, market demand, etc.

- ◆ In India, the reservoirs are generally stocked with Indian Major Carps (IMCs). Apart from IMCs, *L. calbasu*, *L. bata*, *C. cirrhosa*, *Tor* spp., *Etroplus suratensis* are also suitable for stocking in reservoirs. Reservoirs with a predominant density of molluscan fauna and aquatic weeds can be stocked with *Pangasius pangasius* and *Hypselobarbes pulchellus*, respectively.
- ◆ Stocking seeds of endemic carps such as *Labeo kontius*, *Barbodes carnaticus*, *Gonoproktopterus dubius*, *G. kolus* and *Tor khudree* need to be promoted in reservoirs located in Peninsular reservoirs.



Cage culture:

- ◆ Cage culture is an aquaculture system where the fishes are reared from fry to fingerling, fingerling to table size or marketable size in an enclosed volume of water within netting or screening that allows free exchange of water with the surrounding water body.
 

- ◆ Intervention of cage culture technology at large scale through public private partnership (PPP) mode in reservoirs can boost and bridge the gap between the current production and expected production potential.
- ◆ Studies conducted by CIFRI indicate that raising fingerlings from cages is profitable and could solve the problem of providing fingerlings for stocking in Indian reservoirs.

- ◆ Likewise grow out culture practices of highly priced fishes will also help in employment generation.

Pen culture:

- ◆ Pens are fenced enclosures made along the margins of watersheds with natural bottom of the water body forming the bottom of the pen.
- ◆ Polyculture in different species combinations based on the availability of natural food is more suitable for fish pens.
- ◆ Large size fingerlings are suggested for stocking in pens for higher survival and growth. Site selection and regular monitoring is important to elude damage to the pen due to natural calamities like flood or typhoons.
- ◆ Pen culture can be efficiently utilized to exploit the different food niche of the water body to generate additional income.



Enumerating the fishes using acoustics in reservoirs:

- ◆ Fisheries acoustics is the use of underwater sound to detect, enumerate, measure the distribution of fish, other living marine, freshwater resources and describe their habitat.
- ◆ The movement of sound underwater is known as Hydroacoustics and this technology is growing rapidly.
- ◆ In fisheries, the objective is to get information on the abundance of fish and invertebrate species to derive population estimates and to set harvest rates.
- ◆ In ecology, this can be used to obtain spatial, temporal patterns in distribution and abundance as well as for answering questions as habitat choice, predator-prey interactions, and food web dynamics.



Electronic Data Acquisition System (eDAS) for reservoirs:

- ◆ In inland fisheries, collection of fish catch data is fraught with difficulties because of multiplicity of factors such as inland water bodies are innumerable, geographically wide-spread and the fish landing centres are mostly inaccessible.
- ◆ To overcome the data acquisition issues in inland fisheries, ICAR-CIFRI Develop an Electronic Data Acquisition System (eDAS) to capture fish catch data from reservoirs (using mobile phones) directly into a data base in the computer system
- ◆ This mobile application (eDAS) could be used to get fish catch data from reservoirs and also from all other inland water bodies on daily basis.
- ◆ Implementation of eDAS would help building an authentic database for inland fishery resources and fish production of India.
- ◆ Fisher-women (as *Fishery Friends*) can be trained to send data using eDAS as that would facilitate women-empowerment and create employment opportunity as fisheries friends are paid an honorarium.



ICAR-CIFRI, being the premier institute in inland fisheries development of the country, has developed various management practices and technologies such as culture based fisheries, stock enhancement protocols, cage and pen culture, eDAS and use of hydroacoustics for sustainable increase in fish production from reservoirs.

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