

**Full Length Research Paper**

# A Conservation Study of Natural Fish Resources under Adverse Aquatic Conditions in India

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## Abstract

The need for conservation of fish resources has been recognized by aquaculturists & fishery scientists for some time. The aim of fisheries management should be to drive long term sustainable benefit through multidisciplinary scientific concept involving population biology, Ecology, Evolution, Genetics and it also embraces the social & economic aspect. Thus it is of great importance to have necessary background knowledge on the pattern and amount of fish diversity. Varieties of anthropogenic activities threaten the existence of fishes and create drastic conditions in the ecosystem that can lead to the loss of endemic species of fishes. As the global climatic conditions are rapidly changing & very little is known about the adaptive values of particular attributes under these conditions there is an urgent need to conserve of existing fish resources. The concept of fish conservation resources in India may have an apparent simplistic look but the measures to be taken for conservation requires creative approaches.

**Key words:** - Genetics, Aquaculture, Conservation

## Introduction

The demand for high quality protein, from aquatic sources is rising gradually with the increasing population in the country. But due to over exploitation, there is considerable depletion in fish populations of economically important species in India. The need for conservation of fish resources has been recognized by fishery scientists for some time, especially in relation to over fishing of natural stock, effect of large scale alternations of rivers & domestication of species through aquaculture. The aim of natural fisheries management should be to drive long term sustainability through conservation of fish resources of India. Conservation of fish resources is a multidisciplinary concept involving Population biology, Ecology, Evolution, and Genetics.

## Fish Resources in India

The diversity of fish resources is the sum total of all the variations present within a fish species at intra- population & inter-population levels. The aim of natural fisheries in India should be to conserve intra- specific diversity of fishes. It doesn't undermine the importance of ecological aspects for conservation planning of fish resources. In India there are 1,444 species of fishes are known to abound over waters.

## Conservation of Fish Resources

The basic aim in the conservation programme is to conserve the genetic diversity of fishes in India. Any such conservation programme, however, is very much complex. The world's aquatic animals comprise a resource that fulfill many human needs and provides a source of genetic diversity. However, many human activities threaten the existence of aquatic animal species. The majority of fish are harvested from population that lives in natural environments in India. The overharvesting of fish resources coupled with pollution, environmental degradation, loss of habitat forced significance depletion of fish resources. The introduction of exotic fish into lakes & streams can produce new fisheries. It can lead to the loss of endemic population & species (Thorpe et al., 1995). Therefore conservation of fish resources is essential to maintain the genetic continuity and adaptability of fish species in the face of continual climatic change. Hence there is need to conserve the fish resources as much as possible to existing variability, there are no alteration to this goal (Rhyman, 1991).

**Status of Fish resources**

In India, out of 762 species featured in IUCN Red Data Book, only 2 species are considered as rare. In 2002-2003, NBFGR identified 4 endangered, 21 vulnerable, 4 rare & 52 intermediate fishes in different parts of the country (ICAR, 2006). Therefore, habitat protection is the best way to insure the ecological sustainability (Gilbert, 1980).

**Strategy of Conservation**

The basic aim for all conservation efforts is to protect the biotic spectrum for present & future generation. Conservation is broad based, cost effective and simplistic approach which can be performed without significant knowledge of biology & genetic diversity of a species. This is of great advantage since our knowledge on genetic diversity is poor. This approach may prove ineffective for the conservation of endangered species. Also by focusing on habitats which possess greatest number of plant or animal species. Therefore, conservation may aim at species specific. To conserve a declining species, precise application of scientific knowledge about its biology, biogeography is required.

**Table1.** Conservation status of fish resources in India

Ecosystem	Total species	Endangered	Vulnerable	Rare	Intermediate
Cold water	157	1	4	-	12
Warm water	454	3	13	2	28
Brackish water	182	1	2	1	4
Marine	1370	1	2	1	8

Source: - Annual Report, (NBFGR)

**Factors affecting Fish Resources**

In India, with the effort of modernization & due to high population pressure the fish resources are under constant pressure of stress. The increasing demand for fish in the country has been leading to indiscriminate over-exploitation of some fishing areas. Destruction of fish habitats are being observed through various agencies. Due to industrialization, the discharges of untreated wastes seriously pollute the aquatic systems adversely affecting the habitat. River Valley projects alter the habitats to the detriment of fishes. Increased water abstraction and also the land development have been destroying fish habitat in the comparable scale.

**Decline in Fishery stocks due to Stresses**

As a result of stresses, lucrative capture fishery no longer exists in certain areas of India major riverine systems. Jhingran mentioned that there are evidences of decline in Gangetic stocks, especially major carps and their seed availability. In the middle and the lower stretches of Ganga total fish yield had fallen from 50.3 kg/ha/yr in post 1981 period to 22.0 kg/ha/yr in post 1992 while major carp yield has dropped from 13.3 kg/ha/yr to 4.6 kg/ha/yr. The hilsa landing has dropped from 14.3 kg/ha/yr to 4.6 kg/ha/yr. The hilsa landing has dropped from 19.0 t/yr to 1.92 t/yr at Allahabad and from 4.0 to 0.83 t/yr at Bhagalpur. Depletion of stocks in stretches of Godavari & Cauvery, and brackish water lagoon, Chilka, have already been registered. The capture fishery of the Mahseer in the upland rivers has also shown a drastic decline. The reported decline of Catla fishery with increase of the exotic silver carp catches from Govind Sagar reservoir is no less alarming.

In the marine front most of the commercially important fishes, barring oil Sardine, have been showing declining trends in different coasts. There is a report to indicate that 4 species of fishes are even endangered while 21 species are threatened and 20 species have already become rare. It is being confirmed through several studies. The above facts themselves strongly advocate the requirements of effective conservation of fish resources.

**In-situ Conservation**

The conservation of endangered / threatened species of fishes in particular calls, for preservation of their habitat in as natural state as possible. Such interests can be fostered by prohibiting any project liable to give rise to a major change in the environment by refining the fisheries Act. The laws regarding treating of industrial effluents before discharging to the natural waters need tightening. For protection of fishes effectively, the Indian fisheries act need to be modified with stricter provisions of closed seasons in specific places like breeding grounds/ deep pools. The government of Gujarat has enforced a marine park protecting the ecosystem as a whole in the Gulf of Kutch, the govt. of India has been planning a National Marine Park in the South East Coast in Palk Bay including crusedy islands upto Tuticorin.

### ***Ex situ Conservation***

Maintenance of the stock in a suitably constructed fish farm (hatchery) and restocking of seed in nature, if necessary, is an important step in conservation of endangered / threatened /rare species. We, in National Bureau of Fish Genetic Resources (NBFGR), is going to have a fish farm (hatchery) where we would maintain largest feasible genetically effective population size of selected endangered /threatened species avoiding inbreeding through selective breeding, reducing the captive period as far as possible, maintaining separate stocks of distinct populations to prevent among population variance. The study of genetics of these stocks would include genetic analysis to determine how variation is distributed within the species and best how to preserve that variation. We would also like to work on reintroduction of juveniles of selected species to the natural waters for obvious reasons.

### ***Establishment of Gene bank***

With a view to ensuring ex situ survival/Conservation of endangered/ threatened stocks, experiment has been initiated on cryopreservation of gametes for establishment of gene banks. In a continued experiment, cryopreserved common carp sperm was observed to be 80% motile on 140<sup>th</sup> day & Rohu on 60<sup>th</sup> day. At NBFGR it is also proposed to take up experiments on cryopreservation of eggs and gametes in near future.

### ***Coordination and community participation***

The active cooperative venture by all the various fisheries and zoological organizations, both in state and central levels with whole hearted support of the industrial section would be necessary to accomplish the task. A mass awareness on conservation of fish genetic resources and the active participation of the community as a whole can bring the desired result in a vast country like ours as has been emphasized by Swaminathan. I hope that this symposium would initiate community participation at the highly prioritized national programme level.

### **Recommendations**

The aquatic environment is very dynamic and subject to vary widely under different circumstances. The changes in aquatic environment coupled with intensive fish culture technologies can severely stress the physiological system of fishes. Therefore, basic approach should be regulation on human activities and reduction of pollution level. Regulation may be self imposed or state imposed. Self imposed regulation means public awareness through education. This may be supplemented by the state imposed restrictions such as formulation and implementation of appropriate laws. Imposing ban on fishing particularly during the breeding season, restricting the fishing gear for not catching small and immature fishes. In some situations, as in the case of rivers, stretches may be declared as sanctuary and its location may be altered in respect of time for safeguarding the fauna. However, difficulties are there for natural fisheries resources for its openness to public participation. The main concern of endangered species is its small population size. If population density is critically reduced, it may be necessary to enhance the natural population by captive breeding. The interactions of wild & domesticated species need more detailed study & there should be an amplification of live & molecular gene banking efforts to in- situ conservation. Research on genetically modified aquatic organisms should continue to evaluate their potential benefits with greater understanding of potential environmental impacts.

### **Conclusion**

The basic approach should be regulation on human activities and reduction of pollution level. Regulation may be self imposed or state imposed. Self imposed regulation means public awareness through education. We can conserve the good breeds of fishes, by imposing ban of catching small and immature fishes, mainly in the breeding season.

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