



INDIAN RESERVOIR FISH COMMUNITY AND FISHERIES ENHANCEMENT AND AQUATIC ENVIRONMENT

Akshay Saikar

ABSTRACT

Reservoirs play an important role in the development process of a nation and also play an important role in the fisheries and livelihood security of the local community. Due to population growth, reservoirs are becoming an important supplier of animal protein and employment to people, especially in poor areas. The reservoir has many uses ranging from power generation to irrigation purposes and also provides habitat to fish and other aquatic life and helps in providing food and income to the fish communities. Reservoirs are playing an important role in fisheries in India. Fish communities are often used as indicators of environmental quality. In terms of fish diversity, a total of 117 fish species have been recorded in Indian reservoirs, showing the extent of fish diversity. These reservoirs have both positive and negative effects on fish and other aquatic environments. Therefore, the current study focuses on the synthesis of available information on potential Indian reservoir fish diversity and community structures and the impact on fisheries and other aquatic environments in reservoirs in India. Some strategies have been suggested to conserve the biodiversity of fish in rivers and reservoirs.



KEY WORD: Reservoir, Biodiversity, Fisheries, Aquatic Environment.

INTRODUCTION

Freshwater is important for human society and survives in all terrestrial and aquatic environments. Existing freshwater sources in the form of rivers, canals, reservoirs, lakes, etc. have become widespread in India. More than 11.43 million people depend on these different water systems and their fisheries. Fisheries play an important role in the livelihood and nutrition security of rural India. India's climate ranges from extremely cold to very hot. Due to climate change over the last decade, the climate in India has been unpredictable, so it is important to store river water in the form of reservoirs. In India, reservoirs are an important source of fish production and currently the reservoir fisheries area is approximately one million hectare is one million hectares and with the continuous addition of new reservoirs and energy, the area is likely to grow further in the coming years.

A reservoir is a barrier against the surface of a river, stream or any waterway. Indian reservoirs are distributed from the Himalayas to the South Peninsula. The National Consultancy held at the Central Fisheries Research Institute, Barrackpore in 1997-1997 classified the reservoirs based on their hectare area (1,000 ha) as medium (medium to 1,000 to 5000 ha) and large (> 5000 ha) reservoirs. The total area of reservoirs in India is 1547829 hectares 707,928 ha hectares and 1,530,328 hectares of small, medium and large reservoirs respectively.

Reservoirs can have a huge economic impact in the region where they are located and also at inter-regional, national and global levels. These results are generally evaluated in terms of surplus production of agricultural commodities, hydropower, navigation, fishing, tourism, recreation, drought prevention and flood damage reduction and are referred to as direct consequences. Through the continuous assessment of the impact of dams on aquatic life and the use of Environmental Impact Assessment (EIA), the Government of India has undertaken a number of initiatives such as storage of dams with different fish species, rehabilitation of fish due to construction of dams, animal husbandry programs, environmental modeling, Fish routes for protection of aquatic biota etc. Dams stocks with fish can have many benefits, such as creating new fisheries in general and expanding existing fisheries. Along with all these conservation programs, we should also focus on the study of reservoir fish biodiversity. The study of fish production from the dam should be focused on conservation purposes. The present paper underscores the potential for conservation and conservation of biodiversity in India in the context of fish communities, as well as the challenges of storage augmentation and management and the development of innovative strategies for sustaining river and reservoir fish biodiversity.

RESERVOIR ROLE IN FISHERIES:

Reservoirs 'Man-made lakes' are designed for the purpose of generating electricity and storing water. At the same time, these reservoirs have huge potential for fishing and in return have many economic and social benefits. But so far, reservoirs in India are concerned that they are not contributing as much to fisheries. According to the Associated Chambers of Commerce and Industry of India (Assocham), fish production could grow at an annual growth rate (CAGR) of up to compound by 7 per cent by 2016, more than 4.9 per cent in 2018. Reservoir Fisheries Development has recently gained some importance with the implementation of the World Bank's Shrimp and Fisheries Project for aquaculture fisheries.

The natural flow of all the major rivers in India is regulated to meet the water demand of agriculture and power sector without paying much attention to the fisheries sector. As a result, rivers lost their character and fisheries suffered huge losses. Acute and drastic changes in the entire hydrological cycle of the river through dams and water refraction have affected the tides of most species, especially large carps, which like flowing water. The major dams are the major dams that erode the aquatic environment that is dependent on riverine fishing and disrupt subsistence communities. Table 1 shows the distribution of medium, large and total reservoirs in India. Reservoirs are an incomparable part of our natural landscapes. Reservoirs have great potential to increase fish production and can be developed as a tourist destination using sport fishing. New technologies and innovations need to be put to good use to produce good fish in reservoirs.

SOCIO-ECONOMIC EFFECT OF RESERVOIR FISHERIES:

Fisheries produce relatively higher incomes for rural households compared to crop farming and afforestation. Therefore, the average income of fishermen is much higher than the income from agriculture. On the other hand, fishing and fisheries in reservoirs is a relatively tough business compared to other economic activities like agriculture and they are less attractive for the younger generation. Potential links between dams and economic growth need to be explored and the real impact of dam reservoirs on local economic growth and development needs to be systematically measured. Cost benefit analysis suggests that dams, on average, are only marginally-effective, despite the large difference between dams and dams.

POLICY CONSTRAINTS:

Reservoir fisheries are relatively underrepresented in the national fisheries industry and therefore receive limited attention from the government. In general, reservoirs are located in remote areas where access to support systems such as technical extension services and marketing-related infrastructure is relatively difficult. Fishermen and fisheries directors are more vulnerable to natural disasters. Various policy analysts have analyzed the awareness of the indirect effects of dams on fisheries and need to properly

evaluate and measure them. The importance and difficulties of assessing the indirect impact of dams have been discussed, according to the World Commission on Earth Report (WCD) and numerous other studies. The use of dams for fisheries can serve as a powerful vehicle for poverty alleviation.

FISH BIODIVERSITY AND DAMS:

To date, efforts to combat the effects of large ecosystems on large dams have had only limited success, due to limited efforts to understand the environment and the extent and nature of the consequences. There are reports that dams can increase fishing in riverine areas, especially as fish under the dam ponds take advantage of the nutrients in the aquifer upstream reservoir. The nature of the cumulative effects on river systems may be significant, but the lack of research on this topic makes predictive assessment difficult. The biodiversity of fish in reservoirs is largely built on the biodiversity of the original rivers, especially on the main river system. However, changes in hydroelectric regimes and biological conditions after deformation can lead to significant changes in fish life. The aquaculture capacity of reservoirs is higher during the first few years of their existence as the reservoir is filled with freshly drained soils, submerged vegetation and other organic matter. Therefore, dissolved water has high fertility, which promotes the growth of bacteria, phytoplankton, zooplankton and benthos. These organisms act directly or indirectly as fish food, resulting in an increase in fish diet on these animals as well as an increase in species that feed small fish.

In terms of fish diversity, approximately 117 fish species coexist in Indian reservoirs and thus exhibit rich fish diversity. Indian reservoirs contain 5.5 per cent food which provides protein rich food to the people living nearby. So far, the number of fish species in Indian reservoirs related to sport fishing is about 23.0%. Thus you need to stock up on dams with more fish that have game-like value. Pong Dam in Himachal Pradesh is famous for its expert fishing. Sport fishing needs to be developed on the concept of ecotourism. Therefore, the development of sport fishing in dams requires different strategies and plans for the enrichment of fish species as the dams have a different environment than the river system. The ornamental fish area is more vibrant and profitable and Indian reservoirs have species of ornamental fish like Pentius SP, Rasbora SP. (56.4%). These fish can be used by the locals in market trade which helps them to increase their economic power. After photography, keeping aquarium fish has emerged as the second most popular hobby in the world. The demand for ornamental fish is increasing day by day, especially in the international market. The newly constructed dam in Doda district of Jammu and Kashmir has stored fish seeds with a population of 15,000. From the Pong Dam reservoir in Himachal Pradesh, two specimens of the Bagridae family, 1 of Cyprinidae, 2 of Channidae, 1 of Siluridae, 1 of Belostidae, 1 of Mastsemelidae and 2 of Cesiridae were collected. The Bachra Reservoir in Allahabad, Uttar Pradesh, consists mainly of low population density rheophilic species. Yerkaalwa Reservoir in Andhra Pradesh is a medium producer and 1 fresh species of fish has been recorded from this reservoir. Also freshwater prawn *m*. There are also *Malcomsoni*. Kulgadhi Reservoir, Madhya Pradesh is the first reservoir in India where *Hypophthalmichthys Molitrix* was first started on an experimental basis. Bhatghar Reservoir in Pune, Maharashtra is an important reservoir in India. 48 species of fish are commonly available in this reservoir.

FISH MIGRATION EFFECTS OF DAMS:

The presence of 46 freshwater fish in Rajghat Dam is 73% of the total fish diversity recorded in Betwa River. They differed in distribution type, size class, and some migratory species such as *Bagarius bagarius*, *Pangasius pangasius*, *Vallago Atu*, *Ceylonia cilondia*, and *Chitala Chitala*. C. The distribution of all migratory fish except for the dams above the Chitla shows less adverse effects. The diversion of water for irrigation has reduced the flow of dams and rivers, making the rapid migration of these fish to the upper and lower reaches of the Botwa River impossible were reported by similar observations. According to the second study, about %%% of fish species have been found in the dam area (protected area) of the Gerua River, with the total diversity reported in various places of the Gerua River tributaries, the Gerua River (species 87 species). They concluded that freshwater protected areas typically have an increase in fish stocks for

endangered species, which are essential for biodiversity conservation and management. The number of fish species has dropped from 107 to 83 as migration through the Xinjiang Dam (China) was hampered. Numerous studies have shown that dams have serious effects on fish collection and fish species enrichment [20,21]. The negative impact of the dam on the *Dydromus* species was more significant at lower altitudes. In the Narmada river on the west coast, there was a decrease in Hilsa dam (experienced 68.24%) in 200-0-05 (66 48.24%) as compared to 1919t-4 (1 200431t) and 2012-13, 2015-16 from later the decline was reported during the period. The construction of the dams has adversely affected the migratory fish like Mahsir and Hilsa. The construction of the most prestigious fish dam in our country has had a very bad effect.

MITIGATION PROGRAMS:

Mitigation is the process of reducing the damage caused to natural habitats by dam construction. This may include restoring, enhancing, or creating. It is as easy to reduce as it is difficult to relocate planned activities on the site or build new areas as wet land as compensation for the destruction of that space. Before building a dam, we need to come up with some plan to save and protect the important gems of our country from extinction. Launched in 1970 at Lonavla, the Mahsir Project can be described as the largest Indian conservation effort since Project Tiger and is a great example of environmental conservation and development. Tata Electric Farm Lonavla, which is dedicated to the conservation of Mahsir species through breeding and other programs, has shown good results.

FISH WAYS GENERATION:

Fish ladders and even water-filled fish lifts can also be built into the dams to improve the survival of fish, especially migratory fish. Most of the dams in India do not have any fishing route for juvenile or adult fish. Better research methods and other finishing techniques can be used in the construction of the fish path which can improve the efficiency of the model path and screens. Construction plans should be considered along with the fish route before constructing the dam.

POTENTIAL RESERVOIR FISHERIES:

India has 1, 67070 small reservoirs with a total water surface of 15 1 33 36 36 ha. At least 100 of them are under scientific study. Along with the conservation of natural fish biodiversity, the reservoirs can also hold tourist recreation and boating which will help in providing employment to the people of the area. Different culture practices can be adopted in the reservoir to increase the production in fisheries. Fisheries e.g. Fish production in reservoirs can be increased by using various cultural factors like cage culture, pen culture etc. This culture system will not only be useful in increasing the production of fish in the reservoir but will also help the fishermen in raising their standard of living. A simple method of fish culture thus, there is ample scope for increasing fish production in reservoirs. Reservoir cage culture and pen culture are two of the most widely used systems in fisheries in India. But this system is not used for most experimental purposes for commercialization or to enrich the population in reservoirs. Reservoir water from Indian reservoirs with 3.15 m hectare of water reserves and only from small, medium and large reservoirs respectively 50, 20 and 8kg/ha/year. The yield per hectare is likely to be enhanced by culture based fisheries to increase fish production from such sources.

COVE CULTURE:

In addition to the cage and pen culture, another fish culture called cove culture is being adopted in Asian countries like China and Vietnam. In this system of culture the cove separates the alternate flood and open creek from the main reservoir using an earthen dam or a barrier net. There are several advantages of a cove in cage and pen culture because the use of cove does not compete with agriculture for land or affect the normal water storage and vapor use in the reservoir and the use of cove does not compete with agriculture for land or affect normal water storage and reservoir discharge. Cove culture involves splitting the reservoir with a cob in the mouth of the cove. The mesh is usually hung from a steel cable between

floats. To protect the fish, the top of the barrier net can be extended to the surface of the water surface and the bottom of the net can be covered with mud by a heavy stone bag. Cove culture is not practiced in India till date but it can be used as an alternative method to increase fish production in dams. Some cases of cove culture have been reported in China, Vietnam and Bangladesh. Cove culture has been practiced in China since the 1960s by building earthen dams. Coves can provide fish with abundant natural foods and natural habitats and can be an ideal choice for biodiversity conservation.

CONCLUSION:

With these cultural practices we need to prioritize other things like environmental flow, reliable and effective fish pass or ladder installation, increase in economic fisheries resources, method of using effective fishing gear and more stringent rules for fish conservation in dams. Effective eradication of harmful animals and development of integrated fisheries system reservoir storage along with indigenous and other commercially important fish can increase the fish production of the reservoir. The Madhya Pradesh Fisheries Federation has taken this step by various government agencies across the country, including the seeds of Soneri Mahsir brought from the Cold Water Fisheries Directorate (DCWFR), Bhimtal by stockpiling the Kerwa Dam in Bhopal. Reservoirs have both positive and negative effects on fisheries. The dam has a somewhat positive social impact but it is at the expense of our nature and other forms of life. The construction of the dams has resulted in a mix of several fish species that have created new gene pools and introduced many more invasive species. Dams can greatly improve fishing biota, especially due to tail-end fisheries in the lower reaches of the dams, which are rich in nutrients from upstream reservoirs.

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