

## **Fish Farming in Sikkim: A Glimpse of Ground Realities**

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### **ABSTRACT**

Nature has gifted Sikkim with ample water bodies suitable for fish farming in both the lower belt and higher belt. Fish farming in Sikkim is in initial stage although the fisheries related activities were carried out date back from the inception of Fisheries Development Wing under Forest. The fisheries activity is connected with tourism and the educated jobless youth are inspired in the direction of fish culture practices which help them to boost up the economic situation of the people in the rural area. The primary data were collected directly by field observations and interviews with different class groups like fishermen, officials, local people, workers and fishery guards. Primary survey reveals that 36% of the rural household of farmers relies on aquaculture for their livelihood. There are almost 48 species of inland fishes found in Sikkim. The important species of fisheries found in Teesta and its tributaries are Asala, Katley, Buduna, Chepti, Chirkay and Kabrey. Marine fishes are not found in Sikkim. Mashaseer fish which are disappearing from the river system of Sikkim Himalaya due to their habitat destruction.

**Keywords:** Fish culture, inland fishes, marine fishes, fishery guards and habitat destruction.

### **1. Introduction**

India is the third largest fish producing country and the second largest aquaculture fish producer in the world. India contributes about 8% to the global fish production. The country is also home to more than 10% of the global fish biodiversity and is one of the 17-mega biodiversity rich countries. Around 14 million people are engaged in fisheries and its allied activities. Andhra Pradesh is the largest fish producer in the country followed by West Bengal and Gujarat. More than 50 different types of fish and shellfish products are being exported to 75 countries around the world. Fish and fish products have presently emerged as the largest group in agricultural exports from India, with 13.69 lakh tonnes in terms of quantity and Rs. 57586.48 crore in value. The fisheries sector contributes 6.72% in agricultural sector including 1.1% in Indian economy. The 6.31% per capita fish consumption of the country and 10.34% record annual growth rate (Annual Report 2010; Handbook on Fisheries Statistics, 2017).

There is variety of fish species found in the Himalayan belt and Sikkim is one of them recognized years back by many ichthyologists. Cold water fisheries and mountain aquaculture is one of the important promising natural resources to meet the protein demand of the region. In the present scenario it has become necessary to assess overall potentialities of the available water resources and fish biodiversity identification that may help conservation management for local people of the state for aquaculture sustainability. Fish production in mountain streams is very low because of smaller in size and slow growth rate therefore commercial fishery is on a low scale. Small irrigation tanks, ponds, are sometimes used for household consumption. However, lack of awareness and availability of stocking stock seems to be major constraints. In general, the fishing activities in the lakes of Sikkimese very limited and majority of the population involved in fishing either are daily wage labour, farmer, serviceman or businessman. Thus fishing becomes secondary occupation for them. On an average one member from fishing family is engaged in fishing in the river and is able to catch one kg fish after covering a distance of 1.84 km per day (Tamang, 1993).

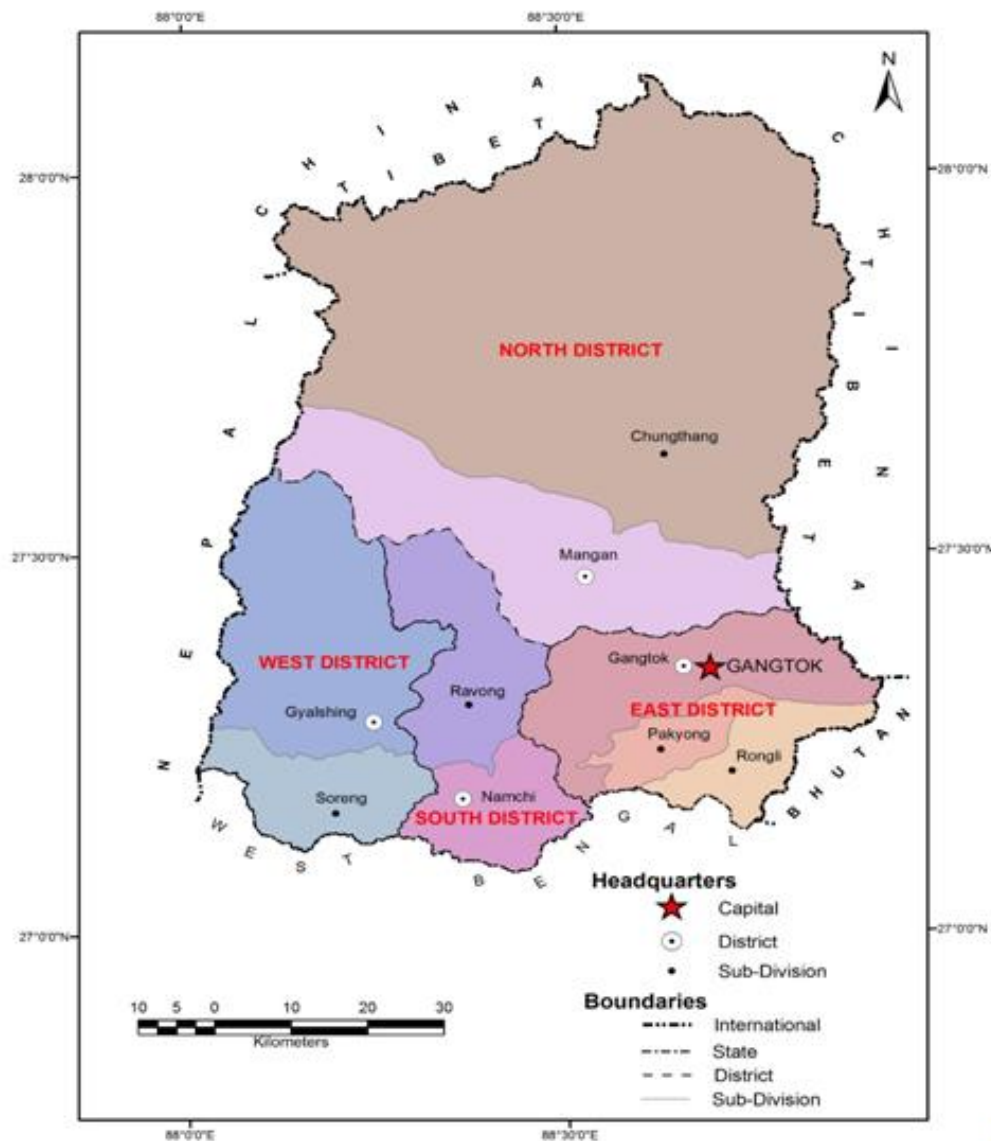
The Pradhan Mantri Matsya Sampada Yojana (PMMSY) is an initiative launched by the Government of India to establish a comprehensive framework and reduce infrastructural gaps in the fisheries sector. Fisheries activities has been stretched out for the advertising of sustainable fish culture as an earnings producing activities in the countryside areas, enhancing nutritious food production, producing additional basis of returns to fish farmers and fisherman, encouraging fishery for tourism and conservation of riverine fish germplasm. The fisheries activity is connected with tourism and the educated jobless youth are inspired in the direction of fish culture practices which help them to boost up the economic situation of the people in the rural area. It has been a significant innovativeness for livelihood security to the countryside people of Sikkim (Haque et.al., 2010).

### **The Study Area**

Sikkim is situated in the Eastern Himalaya spread below the world's third highest mountain peak, Kangchendzonga (8595m) lying between 27<sup>o</sup> 04' 46" to 28<sup>o</sup> 07' 48" N and 88<sup>o</sup> 55' to 89<sup>o</sup> 55' 25" E. To its north lies the vast stretches of Tibetan plateau of the People's Republic of China, to its west is Nepal, Bhutan and China in the East and West Bengal in South (Fig. 1). The entire region is a biodiversity hotspot with impressive botanical and zoological splendour. Sikkim is the second-smallest state in India after Goa in terms of land area. The total geographical area of the State is 7096 km<sup>2</sup>. The State comprises of four districts and nine sub-divisions.

Total population of Sikkim as per 2011 census is 607,688 of which male and female are 321,661 and 286,027, respectively. Density of Sikkim is 86 persons per km<sup>2</sup>, which is lower than national

**Figure 1: Map of the study area.**



Source: Census of India, 2011

average 382 person per km<sup>2</sup>. The sex ratio (number of females per 1,000 males) has improved from 875 in 2001 to 889 in 2011. Literacy rate in Sikkim has seen upward trend and is 82.20 percent as per 2011 population census. Of that, male literacy stands at 87.29 per cent while female literacy is at 76.43 per cent.

The climate of Sikkim experiences variable temperature with summer in the foothills and freezing winter on the high mountains. It has been divided into three distinct categories - tropical, temperate and alpine. The mean temperature in the lower altitudinal zone varies from 5<sup>0</sup>C to 15<sup>0</sup>C during winter and 18<sup>0</sup>C to 28<sup>0</sup>C during the summer months. In the higher reaches, the average temperature never crosses 15<sup>0</sup>C. The general trend of decrease in temperature with increase in altitude holds good everywhere. Average annual rainfall of 2000 mm to 5000 mm mostly concentrated during the monsoon period.

## **2. Data source and Methodology**

The data were collected directly by field observations, interviews, and questionnaire. Literatures review was also done to analyze the present and the past conditions of the fish and fisheries resources of Sikkim. The informations so collected also enabled to determine the various conventional and nonconventional fishing practices being adopted by the local fishermen along with their socio –economic conditions. The primary data were collected directly by field observations and interviews with different class groups like fishermen, officials, local people, workers and fishery guards. The total number of respondent were 100, 25 respondents were selected from each of the four districts East, West, North and South while the secondary informations viz. were collected from different reports, research papers, dissertations, magazines and journals etc.

## **3. Results and Discussion**

### **Aquaculture**

Primary survey as well as discussion with the forest group reveals that very little farmers are involve in fish farming. But it is becoming popular because of the change in food habits and superior protein supplement (Minhas, 1991). Primary survey reveals that 36% of the rural household of farmers relies on aquaculture for their livelihood. Marine fishes are not found in Sikkim because Teesta, i.e. the lifeline of Sikkim and its tributaries are shallow while there are almost 48 species of inland fishes found in it. The important species of fisheries found in Teesta and its tributaries are Asala, Katley, Buduna, Chepti, Chirkay and Kabrey. The climatic condition for fish farming is comparatively more suitable in the East and South district and that is why here fish rearing and nursery of fishes are flourishing better than the other two districts.

Trout fishery, Crap fishery, Riverine fishery, Mahaseer fishery, Ornamental fishery and Reservoir fishery are the fishery development programme of Sikkim (Sharma et al., 2016). In 2015-16 the contribution of fishing sector in the gross state domestic product at current prices is 0.04%.

### **Trout fishery**

In trout fishery, trout seeds are put in the government water bodies under control condition where they breed and thrive. October to February are the breeding period of these fishes. After this period, they are transferred to the private stakeholders and local farmers, which supplement their incomes. Ultara an important gateway to Nepal by trekking is the oldest trout farming village of West Sikkim. Mr. Aitahang Subba, Mr J. B. Rai, Mr K.B. Rai, Ms Lilawati Rai, Mr Hetu Prasad Subba are the leading farmers of this village who are taken up this village to a new height in trout fishery development.

The main constraint in trout fishery is that, there is no any permanent shop, distribution centre or any source from which the trout feed can be purchased at reasonable rate and consistently. Whirling syndrome and fungal infection are the common diseases from which the trout fishes suffer (Sharma et al., 2018). Gangtok, Gyalshing, Dentam, Uttarey and Pelling are the important market of these fishes where they are sold for Rs 600 to Rs. 800/- per Kg. Since, this sector is in nascent stage of development therefore, the required people involvement as well as government support, it is lacking (Pandey, et al., 2015).

### **Crap Fishery**

Crap fishery development programme is initiated to make hay while the sun set of the mid-latitude water resources. Crap seeds are put in the public water bodies and after flourishing they are transferred to the different farmer's private water bodies (Tamang, 1993). Almost 636 farmers have been assisted from Rs. 2000/- to Rs. 5000/- under fish farmer's development agency scheme, with the total financial implication is Rs 21.50 lakh.

Similarly, under cold water fishery and aquaculture scheme 132 farmers were given financial assistance of 9 lakhs while under national fishery development board, Sikkim (NFDB) scheme 275 farmers were benefited as Rs. 7.07 lakhs were spending on fish culture training and total financial implication was Rs. 37.71 lakh. Apart from the above stated financial assistance under these schemes, NABARD also provides loan to these crap farmers from which farmers are benefiting and supplementary their income.

### **Riverine Fishery**

For sustaining and benefiting to the local farmers, management of riverine fisheries was enforced through fisheries act of 1980. Every year 600-700 fishermen are registered under this act (Haque et al., 2010). Annually 120 MT of 48 species of fishes are found in the 900 km length of flowing Teesta river system. Fishery department of Sikkim organizes various awareness programmes on conservation of riverine fishery in consultation with the different stakeholders. Fish sanctuaries

for conservation of fish diversity and related infrastructure development are under process in Sikkim (Haque, et al., 2010).

### **Mashaseer Fishery**

Mashaseer fish locally known as ‘Sahar’ also known as the ‘king of Game fish’ is an endangered species of fish which are disappearing from the river system of Sikkim Himalaya due to their habitat destruction by anthropogenic activities and natural calamities (Pushpa, 1993). So to avert such unpleasant situation, one small mashaseer farm has been constructed at Baguwa in South Sikkim to sustain mashaseer population in river system of Sikkim by artificial stocking of mashaseer seeds in it. Recently, with the collaboration of mountain fisheries development, directorate of cold water fisheries research centre, ICAR, Bhimtal has made operational this farm.

### **Ornamental Fishery**

Ornamental fish also known as ‘living jewels’ are mainly reared in an established aquarium. The government of Sikkim has established such aquarium in Gangtok and Geyzing for the awareness of farmers, local people and for academic knowledge to researchers and students. Outside the Rajbhawan, Gangtok, two such aquariums are installed. Sikkim fisheries directorate in collaboration with the central institute of fresh water aquarium, Bhuwaneshwar are trying to popularize ornamental fish farming among the different stake holders particularly the educated unemployed youth for which National fisheries development board is providing financial assistance.

### **Reservoir Fishery**

In reservoir fishery only those fishes are reared, which the ecology of the reservoir suits them (Wichern, 2017). From this prospective, the ecology of the Dikchu hydro power reservoir, suits mashaseer fish seeds and therefore it has been stocked there for the experimental basis in order to establish such fishery development programme in Sikkim. All programme is set to increase the existing 10,000 mashaseer fish seed to 60,000 such seed in recent year. New policies and programmes are drafted and are under processing for fish seed rearing in all the proposed 27 hydro power project, in the entire state of Sikkim, which will open new ventures of livelihood options in coming days.

Research and development programme for new potential and commercially important fish species, infrastructure and capacity building for fishery development is on. State fisheries directorate has under taken such initiative to strength this important livelihood option. For this fisheries awareness centre cum training centre at Rangpo and Geyzing has been started. For

learning carp and trout fish farming collaboration has been done between the Himachal Pradesh state government, Orissa state government and Sikkim government (Sharma, et al., 2017).

#### **4. Conclusion**

Fishing farming in the state is emerging, at as low pace but the potentials and perspectives are encouraging in ensuring new and better means of income to the farmers. However, down the line there are many limitations, which if not addressed in time may obstruct the growth of this sector. Trout fishery and Carp fishery are well developing in Sikkim. Ornamental Fishery has also good prospect for livelihood. Reservoir Fishery can be done with the objective of sustaining fish production yield from the riverine resources for the economy benefit of the local fisherman.

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