

## Present Status, Potentials and Future Prospects of Fisheries Development in Bihar

G. B. Chand, Suday Prasad

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### ABSTRACT

The state of Bihar is blessed with potentially rich and varied aquatic resources. There is a vast avenue for the growth of aquaculture sector in Bihar. Fish constitutes one of the single largest and cheapest source of animal protein in the developing countries like India. It has a great promise to provide source of livelihood to poor farmers. The per capita demand of Indian Major Carps like Catla (*Catla catla*) Rohu (*Labeo rohita*) and Mrigal (*Cirrhinus mrigala*) is high, but production and supply is very limited. The total inland fish production of the state during the year 2002-03 was 2.2 to 2.5 lakh tones, in spite of best efforts made by the state to increase its production. So, the development of aquaculture in the state of Bihar needs focal attention for its accelerated growth. In this context, the present study was undertaken to assess the water resources, aquaculture potentials, present status of fish production and their strategies for fish production in Bihar. Majority of fish farmers in Bihar possess small land holding (<1 ha). The current production rate analysis

is an indicator for revealing that there is a wide gap between the existing production and its potentials. Dissemination of fish farming technology has already been instrumental in fetching the attention of many people from all income groups to take up fish farming either in newly excavated ponds or renovated leased ponds having an area ranging from 0.04 ha to several hectares. Therefore, there is an emergent need to pay attention towards aquaculture potentials, strategies development and creating sustainable livelihood opportunities for the increasing population of Bihar.

**Keywords:** Fisheries resources, Fish production, Aquaculture potential, Fish Farming Technology, Sustainable livelihood opportunities, Bihar.

### INTRODUCTION

The human population, particularly in the developing countries is increasing rapidly. Many developing countries like India are presently facing a critical population explosion, Food and employment dilemma. Fisheries and aquaculture is a fast-growing sector in India, providing nutrition and food security to large population of country apart from generating income and employment to more than 14.5 million people (The Economic Times Agriculture July 04 2019). Globally, India stands second in culture fisheries production. China having world's one fifth of population, produces one-third of total fish harvested and two thirds of fish cultivated (Food and Agricultural

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G. B. Chand\*  
P. G. Department of Zoology, Patna University, Patna 800005,  
Bihar, India

Suday Prasad  
Bihar Agricultural University, BPS Agricultural College,  
Purnea 854302, India  
Email: gbchand@rediffmail.com

\*Corresponding author

Organization of the United Nation 2016). It is established fact that fish is rich in protein and essential amino acids. It represents a good source of calcium, vitamin A, B<sub>12</sub> and omega-3 fatty acids. The fisheries sector plays an important role in the Indian economy and upliftment of socio-economic status of fishing communities of state and foreign exchange earnings (Lokesh and Khidrapure 2016). The aquaculture sector has shown over whelming growth of 46.8% during the last two decades. Further, fresh water continues to have a major share out of total aquaculture production of 5.77 million tone with contribution of over 95% in term of quantity (Jayasankar 2018). The fisheries resources in the state of Bihar is chiefly comprised of ponds, tanks, small reservoirs, rivers and water logged areas like ox-bow lakes and chauras (Ahmad and Singh 1991, Kaushal and Sikka 2004). Around 65,000 ha of water areas are covered by ponds and tanks and nearly 35,000 ha of water areas consist of ox-bow lakes and chauras (Ahmad and Singh 1991). At present fish production in Bihar doubled in last 10 years due to sustained efforts made by the state government of Bihar. As per the State Fisheries Department, Govt of Bihar, the total fresh water fish production in Bihar in 2004-05 was 2.68 lakh metric tons which has gone up to 5.7 lakh metric tons by 2015-16.

## MATERIALS AND METHODS

The sources of information presented here in are based on the author's personal experience and knowledge, published literature and various other secondary sources. The present investigation was basically taken up to cover Shahabad and Gaya in South Bihar. The primary data were collected by personal interviews of the fish farmer and Directorate of Fisheries, Govt of Bihar, Patna, which represent different fisheries activities under going and resources available in the state.

Before the actual data collection, several field visits were made particularly to the fish culture ponds, ox-bow lake and fish markets to build up rapport with the fish farmers, producers, sellers, buyers and various intermediaries involved in fish marketing. The secondary source of data on different variables were collected from appropriate government and non-government organizations such as Department and Directorate of Fisheries, Govt of Bihar and published data

**Table 1.** Estimated areas of fisheries resources in Bihar. Source: Deptt. of Animal and Fish Resources (Fisheries) Govt of Bihar.

Sl No.	Resources	Stretch / area (ha)	% area
1	Rivers	3200	0.52
2	Wetlands	500000	81.01
3	Reservoir	25000	4.05
4	Ox-bow lakes	9000	1.46
5	Ponds / tanks	80000	12.96

like journals, reports, and research findings.

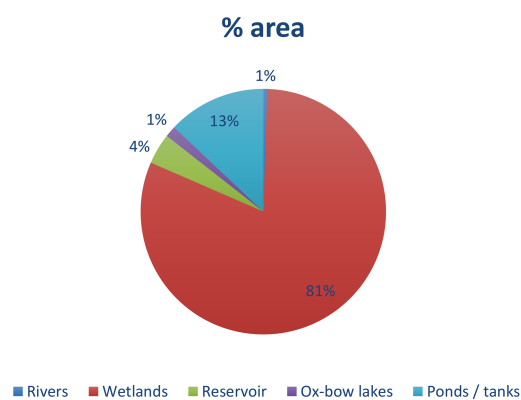
## Data analysis

Using microsoft excel software, data from different relevant sources were coded and recorded in to a database system. To make certain the accuracy of the data recorded at each stage of the survey, simple tubular, percentage analysis was done. After statistical analysis all the relevant data obtained from primary or secondary resources have been scientifically applied in predicting the present status of fisheries in Bihar.

## RESULTS AND DISCUSSION

### Fishery resources and potential

The fishery resources of Bihar state can be broadly divided into three categories: Form oriented fishery resource, Culture-based capture fishery resources and Capture fishery resources. Bihar is blessed with rich natural resources for enhancing freshwater aquaculture production. The status of the fisheries resources of Bihar is shown in Table 1. Although Bihar is a landlocked and agriculturally dominated state, it has vast untapped inland water resources in the form of tanks, ponds, chauras, mauns, reservoirs and rivers, which can profitably be utilized for producing fish and congenial agro-climatic condition for the development of aquaculture. Despite abundance of aquatic resources of Bihar in terms of about 3,200 hectare of rivers, 5,00,000 hectares flood plain wetlands area, 9000 hectares of ox-bow lakes or mauns, 25,000 hectares of reservoirs and 80,000 hectares of ponds and tanks, fish supply is always short of demand in the state of Bihar (Fig. 1). If we consider the development in fishery, the greatest potential lies in farm fishery sector, provided required inputs per hectare per



**Fig. 1.** Pi chart showing the area/stretch of different water bodies in Bihar.

year are positively applied for obtaining sustainable optimal yield per ha. The main farm fishery potential of Bihar lies in ponds and tanks which are distributed throughout the length and breadth of all directions. A judicious and well planned developmental idea in this direct direction can lead to large scale increase in fish production as well as generation of employment in the rural areas of the state.

As per the report of Ahmad (2001) the ponds and tanks in Bihar have potential of producing 0.183 million of fish per year. Table 2 represents the percentage of different types of wetland in Patna and Buxar. These recourses offer a great potential for enhancing fish and shell fish production for domestic and International market (Singh 2004). The rivers passing

through Bihar are important source for their natural fish population and contribute a major attribute towards capture fishery. In both these resources there is scope for development of cage and pen farming.

The 2018-19, Economic Survey Highlighted : Foreseeing the vast resource potential and possibilities in the fisheries sector, a separate Department of Fisheries was created in February 2019. The Government has merged all the schemes of fisheries sector into an umbrella scheme of 'Blue Revolution: Integrated Development and Management of Fisheries resources, both inland and marine'. Presently, the state has 39 Fish Farmers Development Agencies (FFDA), out of which 33 are in functional condition. There are 18 hatcheries in the state - one in government sector, 03 in corporate sector and 14 in private sectors, which could contribute to the raising of culture fish production through scientific fish culture techniques among rural fish farmers besides organizing supplies of inputs. Around 23,000 fish workers have been trained in scientific fish farming.

Although, the average annual production of fish seed is 350 million against the basic requirement of 600 million fry per year (Chaudhry and Kumar 2002, Kumar 2018).

In spite of a great number of fishery co-operative societies in the state i.e. 370, their role in the socio-economic development of the fishermen community is negligible since majority of the fishery co-operative societies in the state have become

**Table 2.** Estimated wetlands areas (ha) of fisheries resources in Patna and Buxar. Source: Wetland report for Ganga River Basin, Environmental Management Plan. June-2012. Consortium Indian Institute of Technology.

Sl. No.	Wetland category	No. of wetland	Total area of wetland	% of wetland	No. of wetland	Total area of wetland	% of wetland
1	Lake/ ponds	1	5	0.02	2	705	18.97
2	Ox-bow lakes / cut off meander	11	207	1.00	5	396	10.65
3	Water logged	14	194	0.94	1	4	0.11
4	River/stream	22	19986	96.65	6	2444	65.75
5	Tanks/ponds	13	87	0.79	8	32	0.86
6	Wet lands (<2.25 ha)	164	164	0.79	136	136	3.66
7	Riverine wetland	2	35	0.17	-	-	-
	Total	227	20678	100.00	158	3717	100.00

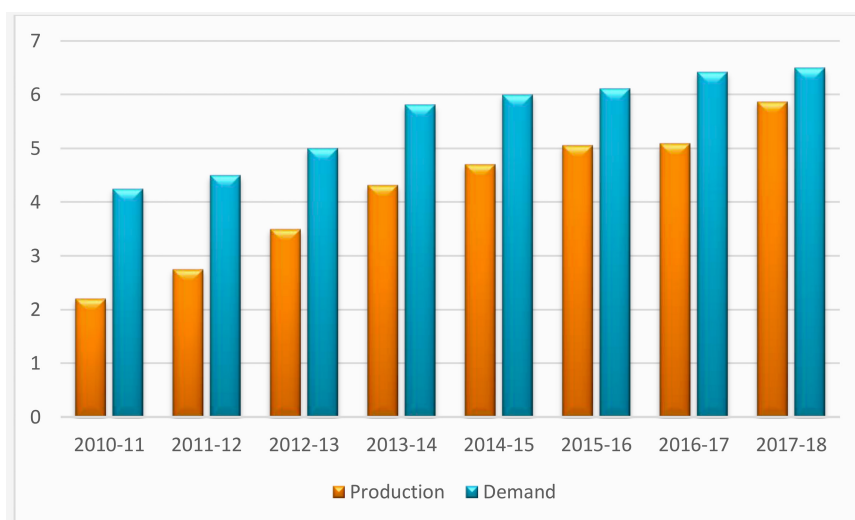


Fig. 2. Histogram showing comparison of year-wise status of production and demand of fish.

non-functional (Kumar 2018). The overfished status of the fisheries resources of rivers of Bihar needs urgent attention in respect of conservation of their resources and regulation of fishing for restoring sustainability of the resources.

### Fishery production and demand

The global production of all aquatic organisms in 2002 was recorded as 132.98 million tones, of which 93.19 million tones came from capture fisheries and 30.79 million tones through aquaculture (Ayyappan and Pillai 2005). However Bihar instead of its vast aquatic resources, still lying far behind in this regard. The status of fish production and actual demand in state of Bihar are represented in Table 3.

A steep rise in the annual fish production has been marked during the last one decade, it has increased from 2.5 lakh tones in 2010-11 to 4.32 lakh tones in 2013-14 and further up to 5.87 lakh tones in 2017-18. The aquaculture sector of Bihar offers a great potential for enhancing fish production for domestic market. With a total of 13.7 million metric tons fish production in 2018-19, India is the second largest fish producer in the world. Out of total fish production, 65% was contributed from inland sector. Almost 50% of inland fish production is contributed

by culture fishery which constitutes nearly 6.5% of global fish production with an overall turnover of Rs 47.62 crore in 2018-19 ( Fig. 2). Fish and fishery product exports emerged as the largest group amongst agriculture exports. As per Economic Times 2019, the sector has been showing a steady growth in the total gross value added and accounts for 5.23% share of agricultural GDP.

### Development of pond fish farming

Blessed with vast aquatic resources and having an extent of estimated water area, there is a great potential to develop fish pond in some of the district of Bihar state. The small and marginal agri-farmers have opportunities to convert their unused, fallow land

Table 3. Year-wise status of estimated fish production and demand in Bihar (lakh tone).

Year	Production	Demand
2010-11	2.2	4.25
2011-12	2.75	4.50
2012-13	3.50	5.00
2013-14	4.32	5.81
2014-15	4.70	6.00
2015-16	5.06	6.11
2016-17	5.09	6.42
2017-18	5.87	6.50

into a fish pond of convenient size (0.1-0.5 ha) with a water depth of 1.25 m to 1.50 m for aquaculture. These ponds could be utilized for poly farming of fish and prawn.

Since last two decades, freshwater aquaculture has evolved from a domestic activity to a small industrial activity in South Bihar. But still the fish farming practices are old and traditional as evidenced by the fact that most of the fish farmers stock only the Indian Major Carps (IMC) fish seed in the seasonal pond and harvest the fish without following any scientific fish culture practices after six months. Even altered non-scientific stocking densities and species ratio have been reported sometimes depending upon the availability of fish seed. In extreme survey report, it was found that the main farmed fish species in these areas were IMC (Rohu, Catla and Mrigal). Some exotic carps like Common Carp, Grass Carp and Silver Carp and some other group of fishes like *Pangassius* and *Rup Chanda* are also considered for farming due to their known traditional fish culture technology, higher growth rate and good market price. The IMC is the main preferential fish food for a selective or elite class of piscivore community, while Singhi, Grass Carp and freshwater small prawn are also preferred secondarily. As far as, a trend in fish cultural practices in Bihar is concerned, it is predominated by either mono-farming or composite fish farming with IMC. Now this is high time to promote poly-fish farming of IMC and some suitable exotic carps along with fresh water prawn (Prasad and Singh 2006). There is also enormous scope to encourage integrated fish farming involving poultry, piggery, cattle, horticulture, paddy cum fish culture. Besides the Euryalferox (Makhana) cum fish farming in central Bihar has also immense potential for contributing a major chunk in GDP. The integrated fish farming of air breathing fishes and aquachest nut is another emerging area that needs to be addressed properly. The vast resources of flood plain in terms of mauns, chauras, beels and taals along the Ganga basin offers a tremendous scope for the fisheries development along with the way of socio-economic development of the region. Kaushal and Sikka (2004) reported fish yield from these wetlands is low (100-200 kg ha<sup>-1</sup> yr<sup>-1</sup>) in spite of high production potential (1000-2000 kg ha<sup>-1</sup> yr<sup>-1</sup>). So, there is an emergent need to develop strategies for

the best possible utilization of these aquatic resources.

### Future prospective and recommendations

In recent years, inclusion of Giant fresh water prawn, *Macrobrachium rosenbergii* as a cultured species in inland aquaculture has gained good scope of growth in Bihar. It can be cultured in either monoculture or in poly culture with carps. The existing ponds and tanks would need to be developed by desilting and dredging, wherever required, as a basic step for the purpose of semi intensive aquaculture. Fish seed is the basic input for inland fish farming. Its demand has increased enormously in the recent past, but the supply of fish seed is not sufficient. Controlled induced breeding of major carps and exotic carps for production of quality fish seed for fish farming will prove to be a viable solution to overcome these main bottlenecks for further advancement in inland fish farming in the state.

Therefore, the Government of Bihar and Fisheries Department should try to establish at least one hatchery in each district of Bihar, to cater the demand of fish seed to local fish farmers. Ecological experts and Fish Health Managers have to be appointed regularly to monitor and manage the fish culture practices in Bihar. Fish entrepreneurship has to be promoted for efficient fish marketing. A series of scientific researches has to be carried out on various aspects of fisheries development in different agro-climatic conditions of the state in collaboration with State Fisheries Department, Universities and ICAR based Fisheries Research Institutes. A better understanding of the ecological conditions of water bodies for storing and stocking of fish and fingerling crop / year will definitely add in total fish production of the state.

There is an immense potential for the excavation and construction of new ponds and tanks in different low-lying unused fallow land available in the state. The construction and maintenance of ponds and ample supply of fish seed at subsidized rates, proper constitution of fish marketing intermediaries, creating scientific consensus among fish farmers by arranging fish training programs and workshop at Village/Gram Panchayat and District level, provisions for maximum involvement of fisheries co-operative societies for the

welfare of fishermen community and judicious and valid implementation of Government policies for the socio-economic upliftment of fishermen are the possible strategies to enhance the status of aquaculture sector in Bihar.

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#### REFERENCES

- Ahmad SH (2001) Development of Freshwater Aquaculture in Bihar. Situation, progress, problems, potentialities and strategies. Published by Department of Institutional Finance and Program Implementation, Govt Bihar, pp 61.
- Ahmad SH, Singh A (1991) Fishery Development of Ox-bow (Mauns) of Bihar. *Fishing Chimes* 11(3):59—62.
- Ayyappan S, Pillai NGK (2005) Inland fisheries in global context. *Ind. Farming*. 55(9) : 40—42.
- Chaudhry RN, Kumar M (2002) Status of Fisheries Development in Bihar and Future Plans. *Fishing Chimes* 22 (1) :7 1.
- Food and Agricultural Organization of the United Nation (2016) The State of World Fisheries and Aquaculture, Contributing to Food Security and Nutrition for all, pp 200.
- Jayasankar P (2018) Present status of freshwater aquaculture in India - A review. *Ind J Fish* 65 (4):157—165.
- Kausahal DK, Sikka AK (2004) Fish Farming in Bihar- Current Status and Future Perspectives. *Appl Fisheries and Aqua* 4 (2): 67—69.
- Kumar S (2018) Future Prospects of Fisheries Development in Bihar and its some selected ox-bow lakes of Muzaffarpur district. *Ind J Agric Allied Sci* 4 (1) : 27—30.
- Lokesh GB, Khidrapure G (2016) Status and prospects of fish and fish product marketing in Karnataka. *J Inland Fish Soc Ind* 48 (2) : 48—55.
- Prasad S, Singh H (2006) Brief history and prospects of freshwater prawn farming in North India. *Agric Situation in Ind* 63(6): 395—398.
- Singh H (2004) Multilocation demonstrations to promote scampi *Macrobrachium rosenbergii*, farming in North India. *Appl. Fisheries and Aqua* 4 : 63—66.