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Analysis and Information Needs for Fisheries Production with Freshwater Aquaculture

Dr. Prabhat Ranjan[1]
[1]*Assistant Professor, (Guest Faculty)*
Dept. of Zoology,
Raja Singh College, Siwan
(Jai Prakash University, Chapra), Bihar India

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Abstract: *The big water bodies covering about 4.3 metres hectare of inland water and 480 km of coastline give very high potential for fisheries and aquaculture production, the subtropical climate and adequate soil and aquatic conditions. Despite this, the development of fish remained very poor and stagnant until 1985. Owing to a lack of funding for science, the few development projects introduced at the time did not achieve the desired results. Consequently , the second and third five year plans did not meet the production goals stated. On the other hand, in 1984 the FRI was developed and improved aquaculture and management practises were subsequently produced, and a positive contribution was made to almost reaching the production target of 1.2 m tonnes, in 1994-95, the final year of the Fourth Five Year Plan.The aquaculture sector in India is a rapidly growing, more than 7 per cent, fish farming sector annually. About 95% of total annual aquaculture production of 5.77 million tonnes is supported by Freshwater Aquaculture. The three main Indian carps (CatlaCatla, Labeorohita and Cirrhinusmrigala) and their "composite carp culture" technologies have brought substantial upward shifts in freshwater development with the inclusion of the exotic three carp (Hypophthalmichthysmolitrix, Ctenopharyngodonidella, Cyprinus carpio) in ponds and tanks. Late in the day, diversification took place by the introduction of medium and minor carps, catfish and murrels.*

Key words: *Fish, Fisheries Production,Ponds, Freshwater aquaculture*

Introduction:

Three main interconnected challenges faced by today's world are poverty alleviation, existing and potential food needs and natural resources management for sustainable development. The key cause of environmental degradation in low-income developing countries is poverty, along with population pressure, land constraints and the lack of adequate intensity development technology (French version Pinstrup-Anderson and Pandya-Lorch, 1994). Food protection and economic growth has been described in many developing countries as essential to aquatic resources. Foreign trade and trade have risen from 32% in 1980 to 38% of global production in 1990 and are heavily traded fishing and aquaculture products. Just 4% of the wheat and rice are traded by contrast (FAO, 1993).

Fish and fisheries play a major role in the Bihar agrobased economy and contribute 73 percent of the overall intake of animal protein, 1.4 million full-time and 11 million part- time jobs and 10 percent to total exports. It is estimated that 73% of rural households fish for subsistence. The focus of attention has been given over the last two decades to crop growth, which has resulted in a rise in cereals production from 10.26 million tonnes in 1972-73 to 19.52 million tonnes, from 137.6 to 167.8 kg in 1992-93, with per capita cereals. In order to achieve a good production increase (BARC 1995), NARS research activities have played an important role. Although the cereal producing country is rising autonomous, its fisheries and livestock sectors have been lagging behind.Only in recent years have we been able to wake up, when the production of fish has struggled to keep pace with the growing population and fishing pressures. It was realised that fish stocks are not inexhaustible and that management on a scientific basis has to be carried out to improve the situation and preserve fish stocks at a sustainable level. The world expects aquaculture to help bridge the gap between supply and demand as natural resources production declines. Under these circumstances, the fisheries sector has become a major focus of the development plans of the country and aims to meet growing people's demand by maximising the use and sustainable development of aquatic resources[1,2,3]. Village dams and ponds can increase fish production through scientific farming, which can boost rural socio-economic conditions by giving them employment. Fish production can be increased through scientific farming. India has a output capacity of 2,212 million hectares of dams and ponds of 3.3 million tones. In our region, the proper use of these water resources is not significantly contributing to our national income. In order to improve socio-economic conditions of fishing communities in India, development is therefore based on exploration and development of different water resources for fishing, welfare and development.

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Fisheries Resources And Production

Bihar (India) has been equipped with substantial water supplies, covering a total area of about 4.3 million hectares, covering rivers, estuaries, floodlands, oxbow lakes, reservoirs, flooded paddyfields and pools. The coastline is also 480 km long. Despite this, fish production has been poor in the past with an annual rise of 0.77-2.64 percent, at 0.874-0.856 million tonnes per year between 1984 and 1985 and '89 to 90. However, in recent years production has been expected to increase significantly, from an annual growth of 4.67–7.25 percent in 1993-1994, from 0.856 million tonnes (89–90) to 1.08 million tonnes.This was attributable to the introduction of different R&D programmes. However, it is far from satisfactory performance. Much of coastal and inland water is either inaccessible or under-used. A table below shows the dominant role of the fishing and cattle subsectors in the agricultural scenario. [4-6] [4-6]

Table 1: Growth rate (%) in the agriculture sector (1990-1995)

	1990-91	*1991-92*	*1992-93*	*1993-94*	*1994-95*
Agriculture	1.6	2.2	1.8	1.8	0.2
Subsectors					
a) Crops	1.2	1.7	0.8	0.5	- 2.0
b) Forestry	2.1	2.4	3.0	3.0	4.5
c) Livestock	2.2	3.6	6.2	6.2	9.0
d) Fisheries	5.8	6.5	6.6	8.7	8.5

Source. Source. As reported in the Bihar Observer on 16.10.95, the Director General, Department of Agricultural Extension.

A analysis of previous plans shows, also at the end of the Third Five-Year Plans (1985-'90), that fish production goals of 1.0 million tonnes could not be met. At the end of the fourth five-year plan (1994-1995), the target then was set at 1,2 million tonnes, with a view to rising the intake of per capita fish from 20.5 to 25.0 g / day. An estimated 1,17 million tonnes of output during 1994-'95 were achieved against this goal.

When we look at why the goals set in the first 3 5-year plans can not be accomplished, it can be clearly seen that no significant investment or effort has been made to establish suitable technologies and management practises for aquaculture and fisheries production.The government has only made investments in research in the latter part of the Third Five-Year Plan and the Fourth Five-Year plan, and the results have been generated. It is well known that the national and international research that started in the 1960s to increase wheat and rice yields contributed to the Green Revolution that eliminated the menace of mass hunger in parts of Asia. Researcher investments are important since the only viable means of ensuring adequate supply to fulfil future needs and reduce poverty without an unsustainable deterioration of natural resources[7-9]. Investment in research and technical developments is necessary.

Freshwater Aquaculture

Intensive aquaculture is, however, neither viable nor environmentally compatible in rural Bihar under the present socio-economic conditions. Input for intensive cultivation systems, including high-protein supplementary feeding, is not only costly but also not available to rural farmers. The research carried out in recent years by the FRI demonstrated the feasibility to increase fish production by multi-culture of various carp species, using bypasses and by-products as feeds and fertilisers to more than 6 t / ha.

The capacity to increase the total productivity of farming and profitability in particular among poor-income farming families is a key for sustainable aquaculture expansion. Reasonable management of natural resources, environmental treatment, biodiversity conservation and equal distribution of benefits for producers and consumers are required here (ICLARM, 1993).Fish production systems that integrate easily with the agriculture systems of the various ecosystems and ecoregions must therefore be created. An environmentally friendly farming method, integrated agriculture / aquaculture has high potential for over eight million ha of rice farms throughout the world. Research conducted in recent years showed that fish cultivation can be incorporated into rice cultivation and studies need to be carried out in order to improve integrated agricultural practises for the different rice habitats including medium-lowlands, lowlands and flooded lands. Moreover, a concerted effort (FRI, BLRI) for large scale multi-location research studies is needed for the poultry / duck cumfish culture developed technology.[10]

Development of GIS and ecoregion-specific aquaculture practices

Although the country is small, soil , water and climatic conditions are diverse, as well as 30 major agroecological regions defined by farmers. In comparison, information regarding the features in aquaculture resources can not be obtained in agriculture where the soil and fertility have been mapped to a higher than one-union level. Geographical information system (GIS) must therefore be built for aquaculture and ecoregional aquaculture technology / management practises established[11].

- **Fish feed and nutrition**

Additional feeding is a must in order to increase fish production beyond the normal productivity of cultivated waters. In addition to development, nutritious food is necessary for maturation and reproduction with respect to protein , fat, carbohydrates , vitamins and minerals, and with adequate energy levels.

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Nutritional requirements differ between organisms and organisms at various stages of their lives. The formulated feeds for specific species are produced in many countries according to their nutritional requirements. Fishing in Bihar is very subjective and does not comply with the existing or basic nutritional requirements of the species cultivated. This hampers production, of course. Therefore, knowing the exact demand of fish is important, in terms of both the main and the trace elements, in order not only to optimise production but also to ensure the quality of aquaculture production, to grow quality feed.Production of farm by-products and waste, which historically are the key sources of fish feed, is reduced by day as a result of persistent flood and drought problems in the region. On the other side, with the growth of aquaculture, the need for additional fish feed rises. Therefore, research is required to establish nutritionically balanced feedingstuffs for carp, cowbird, cream and shrimp kindergarten, breeding and board-pooling using traditional and unconventional feed tools in order to meet the growing needs of the emerging aquaculture industry. Food that plays an important role in the maturity of fish should be produced for species that are not easily mature in captivity. The establishment of a fish feed mill that will enable commercial and experimental fish diets to be produced is essential[12-13].

- **Genetic improvement of cultured species**

Genetic research and breeding systems were responsible for substantial improvements made in agriculture. Although the fish farming industry has been in vogue for decades, advancement in applied breeding technology has not affected the aquaculture market. A few studies in recent years have shown that the capacity for rapid genetic gains in Salmon and Tilapia is typically very high. The aquaculture of fresh water now relies upon the stocks of hatchery. Since the finite brood populations in hatcheries are unintentionally negative, inbreeding occurs. This leads to reduced growth and deformations, which have a significant effect on the development of aquaculture.There is evidence that the capacity for selective pressures in genetically closed systems with limited and sometimes small-growing populations result in the indirect selection with significant traits of the past of life, inbreeding and genetic drift through a range of farm management practises (Doyle, 1983). Because the floodplains and rivers store those hatchery-produced seeds, wild Carp populations could be impacted, too, if care is not taken[14].

Ecological characterization of waterbodies

Bihar has highly diverse aquatic ecosystems, flora and fauna, dynamics of biophysical chemicals This is mainly because of the subtropical environment , natural characteristics, climate conditions, flood-prone and cyclone-prone nature and alluvial soil which originates in deltaic landscaped plainland with a crossroads of more than 250 rivers.

Once estimated at about 6.3 m ha in the broad floodland region, flood control measures (MPO, 1987) reportedly reduced it by around 0.81 m ha. There were a significant number of beels in the floodplains (natural depressions) in the nature that were perennial. The heavy siltation has been growing in waterbodies, turbidity, temperature , salinity and variations of oxygen and other limnological parameters as a result of erosion and construction of a large number of FCD and FCDI structures. The rivers and sea from upstream transportation are nearly 2 billion tonnes of silt. [15] [15]

- **Freshwater aquaculture production in the global context**

Global fish production exceeds 167 million tonnes of which the aquaculture sector contributes 44% (73.8 million tonnes) (FAO, 2016). Capture fishery worldwide is at a crossroads with over 70% of exploited capital, so aquaculture is the only alternative to address much of potential fish demand. The most rapidly developing food field is aquaculture, which grows at a pace of over 7% per year. A lot of studies have shown that aquaculture's role in supplying the much-needed animal protein to the world population is a positive one (Tidwell and Allan, 2001; Sugiyama et al., 2004). The importance of global aquaculture is obvious, representing 63.8 percent out of a total of 47,102,391 t (FAO), of freshwater aquaculture. (FAO 2016).

- **Freshwater aquaculture production trends in India**

Aquaculture production in India has been increasing

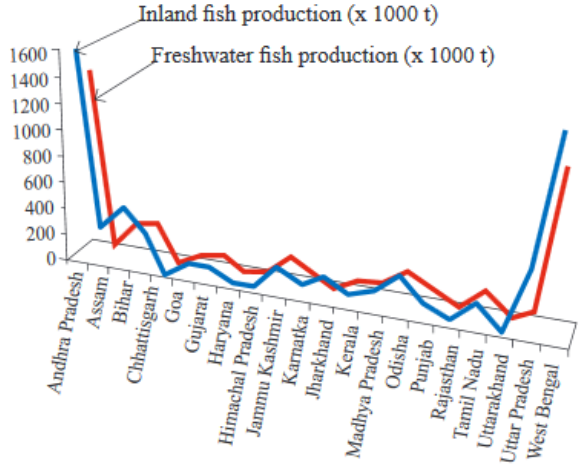

Figure. 1. State production of domestic and freshwater fish in India

The figure was steadily 5,77 million tonnes in the years and in 2015-16 (Fig . 1). The three main indigenous (IMC) carp (Catlacatla), rohu (LabeoRohita) and mrigal (Cirrhinusmrigala) are contributing to the bulk of carp production in the region. The second largest group is the exotic species, the silver carp, the grass carp, Ctenopharyngodonidella and the common carp, Cyprinus carpio. Currently, the productivity of national freshwater fish is substantially increasing from 0,6 t ha-1-yr-1 (1974) to 3 t ha-1-yr. Many farms have shown productivity

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levels of 8-12 t ha-1 year-on-year (Jayasankar, 2014). Furthermore, the development of freshwater aquaculture started to diversify, with the addition of medium and small carps, catfish, mud. Only the gigantic freshwater crawling (Macrobrachiumrosenbergii), while carps and other finfish are produced for domestic use, has been the only species from freshwater to the export. Development of M. recently. Rosenbergii plummeted, whereas Penaeus vannamei greatly improved that of white legged shrimp.

State issues are the creation and execution of resource use and leasing policies. They're done for the purpose of improving the weak system and the local communities' cooperative system. Initially funded with World Bank funding, the FFDA programme of the central government used the bulk of the initial financing for inland water bodies for aquaculture initiation. Fish farmers received scientific, financial and expansion assistance for fishing in village ponds and tanks based on cultural heritage (Katiha et al., 2005)[16].

Major players in freshwater aquaculture in India

The top producers of freshwater fish in aquaculture include Andhra Pradesh, West Bengal ,Bihar and Chhattisgarh. The top two producers of fresh-water fish are in Andhra Pradesh, which produces about 15 Lakh tof fish, 92 percent being shipped to other states, and in West Bengal, where about 13 LKT of fish are currently manufactured and still mainly from Andhra Pradesh[16]. In addition, freshwater aquaculture production includes Bihar, Chhattisgarh, Assam and Jharkhand.The former State has a marginal dependence on fish from other States, with around 20 per cent being distributed to foreign nations, while the latter receives about 25% from Andhra Pradesh for the internal market. The latter has a marginal dependence on fish in the former State. Assam manufactures about 2 lakh t, but still provides about 30 percent of its fish demand from other countries with a strong domestic demand. Jharkhand produces approximately 1 lakh t of freshwater fish, but still needs 20% of the domestic demand from external countries. The cage culture of Jharkhand pangas in reservoirs (Jayasankar, 2014)[16] is ready to substantially enhance its freshwater fish production.

Inland fish farming and associated considerations

Aquaculture Resources India provides a variety of natural resources for improving the development of freshwater aquaculture: 2.42 million hectares of pools and tanks; 1,07 million hectares of beels, jheels and deerted waters; 0.12 million kilometres of canals; 3.15 million hectares of reservoirs and 0.72 million hectares of uplands. Current use in aquaculture is just around 35% of ponds and tanks. Small and marginal farmers in East India particularly are home to ponds of less than 1 ha. In general, state-owned or communal pounds are rented out for 3-5 year periods (Katiha et al., 2005)[17]. Image. 2 portrays state figures of different species in India in development. Carps The availability of inputs and the monitoring capacity of farmers to investe in various regions affects the form of cultural systems adopted. Inputs are limited, except for the seed stocked in the extensive aquaculture system. It exploits the efficiency of nature.Fertilization and feeding are also implemented for the enhancement of production in semi-intensive systems .. Information on composite carp culture is available; sewage-fed fish farming; weed-based polyculture; biogas slurry-fed fish farming; integrated poultry, pig, ducks, horticulture fish farming and plummeting crops (Sinha et al., 1973; ICAR, 2005)[18].

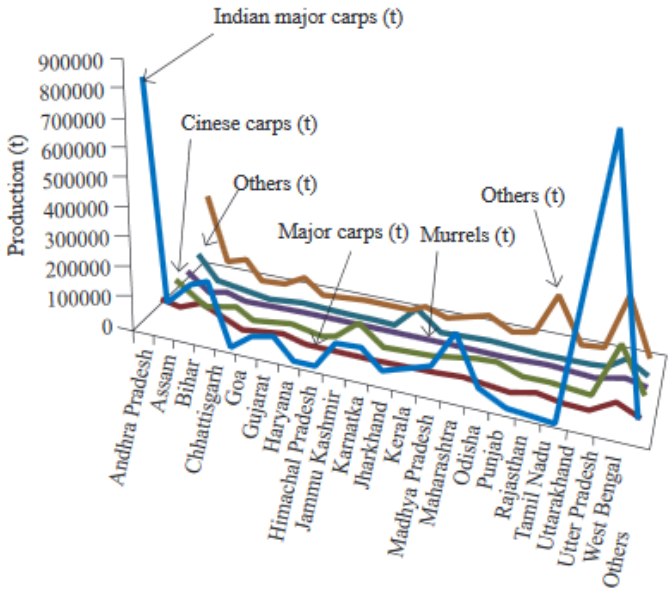

Figure. 2. State statistics of major freshwater aquaculture fish species in India

Standardized are the best possible production rates of 3-6 t ha-1yr-1. The development of 10-15 and20-50 kgm-2 yr-1 respectively, has been achieved by intensive cropping systems such as cage culture and running-water fish cropping (Tripathi et al . 2000; Katiha et al. 2005).Some of the important policy elements in freshwater aquaculture management include:

- Policy support for the release to the aquaculture production of a broad tract of unused, non-remunerative agricultural land
- Provision by indigenous feed technology of high quality feed with low FCRs
- Production and supply of good quality seeds for broodbanks and approved hatcheries.
- Promote the cultivation and use of diverse cultures of indigenous species;
- Using new production and quality improvement technologies
- · Policy support for credit and insurance companies to offer appropriate credit and insurance coverage to the industry

- Policy directives for the mapping and creation of nodal databases for GIS-based land and freshwater resources
- Putting technical leaders in state departments and building capacity for their officials into the sector's skilled management
- Promote creative technology generation research and development through the use of indigenous expertise in line through farmers' needs.

CONCLUSION:

In order to realise the maximum potential, there are many biological , social and economical constraints. Studies conducted in various countries to evaluate the effect of research on agriculture have concluded that research has increased the production of a given resource and is very economically productive. The early stages of fisheries research in Bihar; previous investments in this research were insignificant. The resources should be managed and used on a sustainable basis in order to conserve and maintain fishery resources for the good of current and future generations. This includes ongoing research support. The research areas described in this article are sufficiently extensive to help the authorities devise suitable management planning in accordance with natural, economic and equitable principles for conservation of resources and optimization of production.To achieve this aim, the government must commit long-term research funding assisted by trained staff. By growing the rank of the director to the director general, just like any other similar organisation, the organisational structure of FRI must be improved. The research centres and fisheries research laboratories in the 19 main district headquarters also need to be established.

Both planners and the industry are involved in the future of the aquaculture market. The rising importance of aquaculture in global fish production and the fact that catch fish possibly can not satisfy the growing demand for fish as the world population increases, have increased interest. Due to the growing decrease in marine capture rates. Since indiscriminate fishing means that the exploitation of poor people is not dependent on marine fishing alone.Aquaculture can provide a solution to starvation, low wages and unemployment problems by creating jobs and earning. These provisions obviously rely on the crop species and intensity of activity, most notably aquaculture. The pledge to be a viable alternative to fish catching. Aquaculture contributions to overall growth must not be overlooked, considering a growing decline in fish from natural sources, and a rise in jobs and income needs of small fishermen and other socio-economic classes.

REFERENCES:

1. ICLARM. (1993). *From strategy to action.* ICLARM's medium term plan for 1994-98. International Center for Living Aquatic Resources Management, Philippines, 76p.
2. ISLAM, A.K.M.N. (1976). 'Contribution to the study of marine algae of Bangladesh'. *BiblothecaPhycologia,* 19: 1-253.
3. KHAN, M.G. (1994).' Present status and future plan for sustainable marine resource development'. IN: *Sustainable development of marine fisheries resources in Bangladesh.* M.A. Mazid, V.R.P. Sinha and Md. Kamal (eds.): 30-37.
4. KIM, C.K. (1993). 'Biodiversity, conservation and inventory: Why insects matter'. *Biodiversity and Conservation 1:* 191- 214.
5. MACLEAN, R.H. and JONES, R.W. (1995). *Aquatic biodiversity conservation.* A review of current issues and efforts. Ottawa, ON, SIFR, 1995. 56pp.
6. BARC. (1995). *Strategic plan for the National Agricultural Research System to the Year 2010 and Beyond.* Bangladesh Agricultural Research Council, Dhaka, March 1995. Mimeo.
7. BHUIYAN, A.K.M.A., BEGUM, N.N., BEGUM, M and HOQ, M.E. (1989). *Survey of potential fish feed ingredients of Bangladesh on the basis of their availability and biochemical composition.* Final Report. Fisheries Research Institute, Mymensingh,
8. DOYLE, R.W. (1983). An approach to quantitative analysis of domestication selection in aquaculture. *Aquaculture,* 33:167-185.
9. ENRLICH, P. and WILSON, E.O. (1991).' Biodiversity studies: science and policy'. *Science* 253. 758-762.
10. FAO. (1993). 'Fishery statistics: commodities.' 1991. *Yearb.Fish.Stat.* 73: 395p. FAO, Rome.
11. MACLEAN, R.H. and JONES, R.W. (1995). *Aquatic biodiversity conservation.* A review of current issues and efforts. Ottawa, ON, SIFR, 1995. 56pp.
12. MAZID, M.A. (1994).' Research support for sustainable marine fisheries development. IN: *Sustainable development of marine fisheries resources in Bangladesh.* M.A. Mazid, V.R.P. Sinha and Md. Kamal (eds.): 41-45.
13. PAGCATIPUNAN, R.N. (1982). *A report of the development of shellfish resources in Bangladesh.* FAO/UNDP Fishery Advisory Services Project (BGD/81/034) and Fishery Resources Survey System(BGD/79/015): 82p.
14. PINSTRUP-ANDERSON, P. and PANDYA-LORCH, R. (1994). *Alleviating poverty, intensifying agriculture, and effectively managing natural resources.* Food, Agriculture, and the Environment Discussion Paper 1.

International Food Policy Research Institute, Washington, D.C. Mimeo.
15. TSAI, CHU-FA and LIAQUAT ALI. (1985). 'Openwater fisheries (carp) management program in Bangladesh'. *FisheriesInformation Bulletin,* Vol. 2, No. 4. BFRSS, Dhaka, Bangladesh.
16. Katiha, P. K., Jena, J. K., Pillai, N. G. K., Chakraborty, C. and Dey, M. M. 2005. Inland aquaculture in India: Past trend, present status and future prospects. Aquac. Econ, Manag.,9: 237 - 264
17. Jayasankar, P. 2014. Recent advances in freshwater finfish aquaculture: Prospects and constraints. In: Sinha, V. R. P. and Jayasankar, P. (Eds.), Aquaculture - New possibilities and constraints. Narendra Publishing House, New Delhi, India, p. 1-12.
18. Sinha, V. R. P., Gupta, M. V., Banerjee, M. K. and Kumar, D. 1973. Composite fish culture in Kalyani. J. Inland Fish. Soc. India, 5: 201-208.