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A Study on Scientific Management Practices of Fish Farming in Raichur District of Karnataka

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Abstract

Fish farming plays great role in meeting the food needs of the country besides crop production, fruit and vegetable production, animal rearing. Hence, the present study focuses mainly on scientific management practices of inland fisheries farming and also analyzes the economics of inland fish production and also identify the market accessibility and different market channels for fish farmers. The study was conducted in Raichur district of Kalyana Karnataka in the year 2022. A total of 120 farmers were selected through simple random sampling and data was collected with the help of interview schedule. Then data was analyzed using various descriptive statistical tools. The overall scientific management practices of inland fisheries farmers showed that 36.28 per cent of the fish farmers were following medium level of scientific management practices, followed by 33.72 per cent of fish farmers belonged to low level and 30.00 per cent of the fish farmers belonged to high scientific management practices of fish farming. The medium level of socio economic status and socio psychological conditions of the respondents were the major reasons that can be imparted from the study for majority under medium level of scientific management. However, much more awareness need to be brought among the farmers regarding better management of the fisheries activity which inturn helps in increasing their annual income.

Keywords : Fisheries farmers, Scientific management practices, Socio-economic

Agriculture in India plays major role in economic development. Besides crop production, fruit production, vegetable production, animal and fish production also plays great role in meeting the food needs of the country. The oldest documented mentions of pond fish culture date back 4,000 years in China and 2700 years in India. Fish production and consumption are currently two of the main areas of concentration in India, which offers enormous potential for the expansion of the fish industry. In addition to contributing 1.10 per cent of the national GDP and 5.15 per cent to the GDP of agriculture, the fishing industry has been significantly boosting employment and the nation's food supply. Due to its high protein content and nutritional value, fish is becoming more and more popular. After China (3,9937 MT.), Peru (7,878 MT.), Japan (7,408 MT.), Chile (6,366 MT.) and the United States (5,493 MT.), India ranks sixth globally in terms of fish production (5,477 MT.). 130882 MT of fish are produced worldwide. (Dept. of Fisheries, 2020).

India is the second largest producer of inland fisheries in the world, next to China. With an average yearly yield of 6.40 million tons, Indian fisheries have advanced significantly over the past 50 years. Inland fisheries are of considerable economic significance to the Indian economy. The main benefits which can be derived from inland fishery development and associated growth can be categorized under different heads, *viz*., nutrition and food supply, sources of income, sources of employment, facilitate investment, controlling mosquitoes and suitable for scientific research and environmental education. (Dept. of Fisheries, 2020). The total fish production in India was 14.16 MT with a contribution of 10.43 MT from Inland sector and 3.72 MT from marine sector during 2019-2020 (Dept. of Fisheries, 2020). In 1990-91, the fish production was 3.84 MT; in 2019–20, it was 14.16 MT. Between 1970 and 2017, the inland fishery's share of the overall fish production increased from 29.00 to 69.00. As a result, the sector's GDP contribution automatically rises. With 29,000 kilometers of rivers, 0.30 million ha of estuaries, 0.19 million ha of backwaters and lagoons, 3.15 million ha of reservoirs, 0.20 million ha of flood plain wetlands, 2.36 million ha of ponds and tanks and 0.72 million ha of upland lakes, India is a country rich in inland water resources. It is known that ponds and tanks are the primary sources of aquaculture production, whereas capture fisheries output from rivers and estuaries contributes only a tiny portion of the total inland catch, even though the production breakdown of various water bodies is not accessible. Reservoirs and floodplain wetlands, which are maintained using culture-based fisheries or other types of augmentation, provide the majority of the inland catch production (Ayyapan and Chand, 2011). The nation's fishing industry directly employs around 14.50 million people. The sector's significance to the nation's economic and livelihood security is demonstrated by the 46,662 crores in foreign exchange profits it generates in 2019-20, in addition to providing for the domestic requirements and livelihood of such a large population (Anonymous, 2020). In India, poly culture of Indian Major Carps (IMC) and Chinese Carps is practiced in fertilized ponds. The three major Indian carps, namely, Catla, Rohu and Mrigal contribute to the majority of the national carp production.

Karnataka ranks tenth in the nation for inland fish output and sixth for marine fish production. With inland water resources of several kinds, it is one of the wealthiest states in India and accounts for around 9.30 per cent of all inland water resources in the country. This contains 5,813 km of rivers and 5.60 lakh hectares of inland waterways, which include 2.93 lakh ha of large and small tanks and reservoirs totaling 2.67 lakh ha. As a result, the state has a vast amount of room to grow its inland fishing industry. 168.83 MT are produced only from inland resources. From 2004 to 2014, Karnataka's inland fish output was expected to expand at an average yearly rate of about 8.85 per cent. The major inland fish producing districts in Karnataka are Bellary, Davangere, Hassan, Mandya, Mysuru, Shivamogga, Tumkur and Raichur. (Dept. of Fisheries, 2020).

There is still a discrepancy between the supply and demand of fish in the market, despite the fact that fish output in India, particularly in Karnataka, has increased significantly over the years. Therefore, each pond's production needs to be raised in order to balance and match supply and demand. For this reason, inland fish production has enormous potential when scientific management techniques are followed. In fish farming, scientific management techniques are essential since they increase profitability, sustainability and production. (Alam *et al.,* 2017). By applying systematic approaches such as brood stock management, precise feeding, water quality control, disease prevention, farmers can optimize growth rates, reduce mortality and improve the overall health of fish stocks. These practices not only increase yield and quality but also minimize environmental impact, ensuring long-term viability of aquaculture operations. Moreover, scientific management equips farmers with the knowledge and tools to adapt to changing conditions and market demands, fostering innovation and resilience in the aquaculture sector (Goswami and Samajdar, 2016). Every social system has its own unique manifestation of the scientific management of

fisheries. It is commonly acknowledged that advances in fish farming do not spread quickly or smoothly to the rural fish farming communities. In order to successfully transmit current technology it is vital to assess the perceived barriers to the advancement of scientific management practices. The low level of socio economic status of the farmers is the major hindrance and less number of improved varieties, lack of appropriate knowledge regarding feeding of the fishes and proper management practices were the inhibitors for the higher production in fisheries sector. (Bhutti *et al.*, 2022 and Biswas *et al*., 2018).

Raichur district of Kalyana Karnataka region despite being endowed with diverse water resources and a favorable climate, it faces significant socio-economic hurdles, including limited access to modern technologies, infrastructural deficits and inadequate training for local farmers. Consequently, the potential of fish farming remains largely untapped, necessitating a focused study on the implementation and efficacy of scientific management practices in this area. Keeping this in view, the present study has been planned with the following specific objectives to study the scientific management practices of inland fish production in Raichur District of Karnataka.

Methodology

The current study employed an ex-post-facto research design. The Raichur district of Karnataka, India is where this study was carried out. Based on the taluks' largest number of community fishermen, a total of eight villages were chosen from four taluks. Using a random sampling technique, 15 fishermen were chosen from each chosen village and thus a total of 120 fishermen, were considered in the current study.

In this study, the degree of scientific management practices was measured considering the recommended management practices with respect to pre pond preparation, pond preparation, pre-release of fingerlings, selection of fingerlings and its management, feed management, weed management, fish protection management, harvesting and storage management and overall management. All these was scored on a three-point continuum *viz.,* 'Always', 'Occasionally ' and 'never' with a score of 2, 1 and 0, respectively. Thus the total score for each respondent is summed up and later grouped into low, medium and high using mean and standard deviation. For further analysis the data is subjected to descriptive statistics analysis wherever required.

Results and Discussion

Overall Scientific Management Practices of Fisheries Farmers in Inland Fisheries Production

From Table 1, it is clear that, 36.28 0 per cent of the fish farmers were following medium level of scientific management practices, followed by 33.72 per cent of fish farmers belonged to low level and 30.00 per cent of the fish farmers belonged to high scientific management practices of fish farming.

Table 1

Distribution of inland fisheries farmers according to their adoption of overall scientific management practices

n = 120

Category	Fish farmers	
	Frequency	Per cent
Low (Mean-0.425*SD)	40	33.72
Medium (Mean± 0.425*SD)	44	36.28
High (Mean+0.425*SD)	36	30.00
Total	120	100.00
Mean = 65.60	S.D = 5.78	

Management necessarily is a combination of various functions of planning, organizing, decision making and coordinating of activities to improve overall profits (Chandrasekhar *et al*., 2017 and Ashok Kumar Bansilal & Venkataranga Naika, 2019). Following scientific management practices requires more inputs, labour and heavy investments by the fish farmers. But majority of them are small and medium farmers who cannot afford for the proper scientific management practices in their fish ponds. As most of the respondents were middle aged with small land holding, medium annual income, medium fish farming experience and medium orientation, (Islam *et al*., 2021

TABLE 2

Pre-pond preparation management practices

n = 120

Practice	Always	Occasionally	Never
	F (%)	F (%)	F (%)
Construction fish pond size and shape	120 (100)	0 (0.00)	0 (0.00)
The width of the fish pond	66 (55.00)	54 (45.00)	0 (0.00)
The depth of the fish pond	70 (58.34)	34 (28.36)	16 (13.30)
The slope of the pond	21 (17.50)	55 (45.83)	44 (36.67)
The width of the bund of fish pond	16 (13.33)	47 (39.17)	57 (47.50)
Soil erosion control measures	16 (13.33)	29 (24.17)	75 (62.50)
Installation of mesh at the end of the inlet pipe	49 (40.83)	26 (21.67)	45 (37.50)
Installation of inlet pipe	26 (21.66)	71 (59.17)	23 (19.17)
Installation of drain out water pipe	27 (22.05)	68 (56.66)	25 (21.29)

(F= frequency, % = percentage)

and Kumar *et al.,* 2018) they choose to practice conventional fish farming rather than going for heavy investments in case of scientific management practices. (Mohan Maloth, 2020). Same results were reflected in the form of medium to low management orientation of the fish farmers. The results are in line with the findings of Muddassir *et al*. (2019) and Saha *et al*. (2016).

Pre-pond Preparation Management Practices

All the respondents had constructed the pond in the square or rectangular shape. In order to reduce the capital costs for better economic benefits, farmers used low cost pond construction techniques and materials. In addition, majority expressed that they practiced Pre-pond preparation occasionally due to economic constraints. This even affected the overall management practice level of the respondents because in order to save the construction cost of pond, the slope ratio is not maintained. Hence, it was difficult to go for the scientific management practices of fishes which in turn reduced the yield.

Pond Preparation Management Practices

In study area farmers had better contact with department of fisheries and participated in the fisheries training programmes which gives the idea of soil properties and water pH required for the fish culture. Due to water availability in seasons water has been changed regularly which provide oxygen for the fishes which helps in betterment of their growth. As these pond preparation measures are highly important compared to pre pond preparation management measures, the respondents had adopted them since they are economical.

Pre-relaease Management Practices of Fingerlings

In the study area the farmers had ideal knowledge of maintaining the pH of pond, manuring the pond organically with available resources like cow dung and lime etc. some of the farmers used urea for manuring the pond. (Borah *et al.,* 2019) The farmers had idea of maintaining the water level and match the temperature of the water before release of the fingerlings. The possible reason for farmers under high category because all these practices were know by majority respondents with scientific reasons as they were involved in different training programmes.

Selection of Fingerlings Management Practices

The respondent had the information about different varieties of fingerlings and the farmers had brought the quality fingerlings from the certified institutes like Munirabad fish farm centre. They selected the fingerlings according to the geographical

TABLE 3

Pond preparations management practices

n = 120

Practice	Always	Occasionally	Never
	F (%)	F (%)	F (%)
Maintenance of water pH	77 (64.16)	29 (24.16)	14 (11.68)
Cleaning of the pond is done annually	83 (69.17)	24 (20.00)	13 (10.83)
Maintenance of water level	71 (59.16)	36 (30.00)	13 (10.84)
Testing of soil and water condition	45 (37.50)	60 (50.00)	15 (12.50)
Maintenance of water quality	61 (50.87)	48 (40.00)	11 (9.13)
Measurement of oxygen level in water	31 (25.83)	69 (57.50)	20 (16.67)
Creation of aeration in the pond	69 (57.50)	34 (28.34)	17 (14.16)

(F= frequency, %= percentage)

TABLE 4

Pre-release of the fingerlings and its management practices

n = 120

Practice	Always	Occasionally	Never
	F (%)	F (%)	F (%)
Addition of lime if pH is less in the pond	75 (62.50)	31 (25.33)	14 (11.67)
Maintenance of water level in fish pond	81 (67.50)	39 (32.50)	0 (0.00)
Adding of cow dung/ poultry manure to the pond	62 (51.67)	42 (35.00)	16 (13.33)
Adding of urea / SSP before the release of fingerlings to the pond	23 (19.16)	58 (48.34)	39 (32.50)
Maintaining of water level for 2 days before the release of fingerlings	83 (69.17)	37 (30.83)	0 (0.00)
Adding of SSP and urea monthly	15 (12.50)	46 (38.34)	65 (54.16)
Sensitization of the fingerlings	51 (42.50)	38 (31.67)	31 (25.83)
Management of the aqua pest	17 (14.16)	56 (46.66)	47 (39.18)
Nutrient management in inland fish management	23 (19.16)	38 (31.66)	59 (49.18)
(a) 'N' content in soil and water is maintained	22 (18.33)	46 (38.33)	52 (43.34)
(b) 'P' content in soil and water is maintained	25 (20.83)	41 (34.17)	54 (45.00)
(c) 'K' content in water is maintained	26 (21.66)	18 (12.50)	76 (63.34)

(F= frequency, %= percentage)

conditions which can survive and has low morality rate. For the fingerlings, stocking density is considered as prime factor, for their better survival and growth. It depends on species, size of fingerlings and was carried out according to the expert's suggestions. The farmers disinfected pond with bleaching powder before stocking to reduce the rate of infection in the pond. The farmers also practiced growing combination of three to four indigenous species of Indian major craps which provide the more income with in the same fish pond for farmers (Prodhan and Khan, 2018).

TABLE 5

Selection of fingerlings and its management practices

n = 120

Practice	Always	Occasionally	Never
	F (%)	F (%)	F (%)
Information about different fingerlings is collected before selection of fingerlings	45 (37.50)	48 (40.00)	27 (22.50)
The fingerlings are selected according to geographical conditions prevailing	28 (23.33)	66 (55.00)	26 (21.67)
The size of the fingerlings is measured before stocking	71 (59.16)	33 (27.50)	16 (13.34)
The stocking density is maintained	42 (35.00)	64 (53.34)	14 (11.66)
The fish varieties are grown different ratio's	65 (54.16)	39 (32.50)	16 (13.34)
The fingerlings varieties are changed according to availability	65 (54.16)	37 (30.84)	18 (15.00)
The fingerlings are disinfected before stocking	34 (28.33)	62 (51.67)	24 (20.00)
Provision of aeration to the pond whenever its required	59 (49.17)	45 (37.50)	16 (13.33)

(F= frequency, %= percentage)

Feed Management Practices

Feeding is one of the principal methods for increasing the fish production. The scientific feed management practices suggested by the experts even though helps in increasing the body mass of the fishes quickly, they are costly and unafford able by the respondents. So, most of the fish farmers are using alternate available food which had low protein in them like, rice polish, gluten and dry bread pieces with salt tolerant plants which could not provide complete nutrient requirement for fishes. Hence, fish's weight and yield got affected.

Weed Management Practices

The reasons for this was, in the study area there existed high weed infestation and the farmers were aware of the losses caused due to this infestation which would affect the growth of the fishes. Also farmers regularly checked the presence of unwanted fishes which may create the competition between fishes for food and oxygen. Hence, the farmers had checked the presence

TABLE 6

Feed management practices

n = 120

Practice	Always	Occasionally	Never
	F (%)	F (%)	F (%)
The feed required for the fishes is given through natural/organic	87 (72.50)	33 (27.50)	0
The feed is given to the fingerlings and fishes in the form of pellets / floating	15 (12.50)	68 (56.66)	37 (30.84)
The feed is provided according to the body mass of the fishes	77 (64.13)	29 (24.67)	14 (11.00)
Feed is given thrice a day in suitable concentration	35 (29.16)	64 (53.34)	21 (17.50)

(F= frequency, %= percentage)

TABLE 7

Weed management practices

n = 120

Practice	Always	Occasionally	Never
	F (%)	F (%)	F (%)
The pond is checked for the presence of weed plants	96 (80.40)	24 (20.60)	0
Weeds are removed from the pond every month	83 (69.16)	37 (30.84)	0
Biological control for weed management	47 (39.16)	56 (46.66)	17 (14.18)
Unwanted fishes are removed from the pond	75 (62.50)	31 (25.87)	14 (11.63)

(F= frequency, %= percentage)

of weed, unwanted fishes and eradicated them regularly. Farmers used lime and bleaching powder for the effective pond management. As this is a compulsory, important practice and easy to carry out, majority of the farmers practiced weed management regularly.

Fish Protection Management Practices

In Raichur district, the farmers followed low fish protection management practices. Fish farmers had less awareness about the disease management and prevention of the disease, which is the major factor for decrease in the yield, respondents had less information of various disease management practices. This resulted in using varied rates of chemicals in order to reduce the fish diseases which has affected the water quality in fish pond. Another reason was many of the farmers were unaware of modern techniques which can help in regaining the health of fishes and pond water quality. This affected the yield of fish.

Harvesting and Storage Management Practices

Very few large farmers had used the modern method of harvesting like usage of the modern equipment (nets and boats) which reduced the labour cost and time for harvesting fishes. Farmers had used the ice boxes and maintained them at chilling temperature for transporting fishes to markets. But the medium and small farmers used traditional methods because of their economic constraints. (Salam *et al.,* 2020). Only few farmers had knowledge about the feed conversion ratio which provides the information about harvesting period of the fishes. These reasons clearly elicits possible reasons for majority being under medium and low adoption

TABLE 8

Fish protection management practices

n = 120

Practice	Always	Occasionally	Never
	F (%)	F (%)	F (%)
Fishes health condition is regularly checked	83 (69.16)	37 (30.84)	0
Contacting the experts for getting suggestions to regain the fish health	50 (41.63)	56 (46.67)	14 (11.60)
Preventing the pond from entry of insects and parasites	66 (55.00)	34 (28.34)	20(16.66)
The diseased fish are removed from the pond	53 (44.16)	48 (40.00)	19 (15.84)
The ponds are drained and treated with suitable chemicals	35 (29.18)	62 (51.66)	23 (19.17)

(F= frequency, %= percentage)

TABLE 9

Harvesting and storage management practices

n = 120

Practice	Always	Occasionally	Never
	F (%)	F (%)	F (%)
Fishes are harvested by checking the feed conversation ratio	53 (44.18)	41 (34.16)	26 (21.66)
Modern method of fish harvesting are practiced	66 (55.00)	38 (31.67)	16 (13.33)
Partial harvesting of the fishes	39 (32.50)	63 (52.50)	18 (15.0)
Nets are cleaned and spread in sun to dry after each harvesting	63 (52.50)	39 (32.50)	18 (15.00)
Best harvesting methods are followed	77 (64.16)	43 (35.84)	0
Fishes are washed and iced at chilling temperature	88 (73.33)	32 (26.67)	0

categories of scientific management practices. (Muddassir *et al*., 2019).

The study provided a clear cut idea that the farmers were not practicing the scientific management practices & were completely avoiding them. They are slowly adapting themselves to the new practices. As majority of them are with poor and medium levels of socio-economic and socio-psychological back grounds, they didn't choose the practices which are economic for them. Even though many trainings and various schemes are available for them, various reasons like non availability of quality fingerlings within their locality, heavy cost of the equipment, more time requirement to replace water regularly and laborious work, high labour cost etc., stopped them from adopting to effective and scientific techniques. (Salau *et al*., 2014). To overcome all these problems, government should take more number of initiatives to help the fisheries farmers and widen their support. The subsidies and other beneficial schemes need to be provided correctly to the farmers and the promotion of new scientific practices need to be done effectively. The extension personnel also should take more responsibilities to transfer new and cost effective technologies to the farmers and help them in getting reasonable market prices for their investments made. All these activities will help and motivate the farmers to undertake the scientific management practices effectively and get their income doubled.

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