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POTENTIAL USE OF VILLAGE TANKS AND FARM PONDS FOR AQUACULTURE IN KARNATAKA, INDIA– A CASE STUDY

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ABSTRACT

The state of Karnataka in southern India has an excellent tropical climate, for the development of freshwater fish culture, in water storage tanks of villages and farm ponds. Small scale rural aquaculture in village water storage tanks and farm ponds in general, utilizes polyculture of carps and is practiced with the utilization of low to moderate levels of inputs, especially organic-based fertilizers and feed. The main problems faced by fish farmers are, poaching and water availability. Under Sujala-III (Karnataka Watershed Development Program –II, World Bank) project in Davanagere district, Karnataka fish culture demonstration was conducted with a group of farmers having short seasonal water bodies. The study revealed that a production of about 2319 to 2996 Kg/ha could be achieved from farm ponds and water storage tanks through integrated use of locally available biological resources. This implies an excellent opportunity for improving the rural economy through the development of small-scale fish culture enterprises. In this project, a greater emphasis was placed on improving the knowledge and skills of the farmers and their farming practices so that in the future they would be in a position to expand their activities with financial assistance made available locally.

KEYWORDS: Village Tanks, Farm Ponds, Aquaculture, Davanagere, Amur, Catla, Nile Tilapia

INTRODUCTION

Small water bodies of villages are available aplenty in the state of Karnataka and have great potential for aquaculture. As the total potential and effective water spread area of small water bodies of villages are estimated to be 0.063 million ha (m ha) and 0.048 m ha respectively, compared to 0.008 m ha of brackish water area. These could be classified as a category of inland water resource for aquaculture. Small water bodies of villages are characterized by good aquaculture productivity, possibility of monitoring by individual farmers, support to integrated farming, organic fish production and supplementary income; they are highly under-utilized for aquaculture. Most of the marginal farmers in Karnataka have small fragmented land holding where modern large scale fish production technologies with large inputs do not offer any solutions to their problems. These farmers have small farm ponds and water storage ponds in their agricultural lands. Utilization of these small water bodies for fish culture could contribute to improving the livelihoods of the rural poor, enhancing food and nutritional security, and generating employment in rural areas. In the present study, an attempt was made to introduce a farmer participatory small-scale fisheries extension program in watershed villages of Harapanhalli and Jagalur talks in the Davanagere district of Karnataka, under Karnataka Watershed Development Program -II (Sujala-III, world bank) "Livestock support and extension activities project", for four years, starting from 2014. The project utilized the farm ponds and water storage tanks, for the on- farm demonstration of composite fish culture, two

species culture of Catla and Amur, Amur and Nile tilapia culture, poly culture of freshwater prawn with carps and integrated fish farming with livestock and Horticulture. Constant follow-up and technical support was given to these farm ponds throughout the study period. The objectives of the project was demonstration of fish production modules in short seasonal water through local farmer participation, dissemination of technologies, development of an appropriate aquaculture package of practices suitable for the target community and to create a farmer-based extension system.

MATERIALS AND METHODS

Farm Ponds

Farm ponds are earthen dugouts with a minimum of two hectares of catchment area. Their dimensions vary from 144 to 225 M^2 and water retention periods vary from six to seven months in a year (Fig. 1). Farm ponds are more important for aquaculture due to their large numbers.

Water Storage Tanks

Water storage tanks are eaten or part/fully stone/concrete-inlaid ponds at an elevation for storing of bore well/ ground water. Their dimension varies from 150 to 2000 M^2 and water retention period vary from seven to eight months in a year. Stored water flows through the bottom outlet to crops by open channel (Fig. 2).

Figure 1: Fish Farm Pond

Figure 2: Water Storage Tank

Protocols Followed

Initially, a baseline survey was conducted to assess the socioeconomic condition, needs and resources of the participating farmers. It was observed that the farmers lacked the knowledge, skills and experience for fish farming. Farmers in the project areas identified the benefits of and constraints of productive fish farming (Table 1). In selecting villages, several training programs were conducted to participating farmers to impart skills required for composite fish culture with different species combination, two species culture of the Amur and Catla, integrated fish farming, with livestock and horticulture, introduction of new species of Amur carp, poultry cum fish culture, Poly culture of fish and

prawn and Nile tilapia culture in farm ponds. A total of 22 farmers who possessed small to medium sized farms, ponds of 144 to 225 M^2 size and water storage tanks of 150 to 2000 M^2 sizes were selected as the beneficiaries of the project (Table 2).

Most of these water bodies were seasonal in nature with an average depth of 2.5 ms and water retention period of about 6-7 months. Intervention conducted where composite fish culture with different species combination, two species culture of the Amur and Catla, integrated fish farming with livestock and horticulture, introduction of new species of Amur carp, poultry cum fish culture, poly culture of fish and prawn and Nile tilapia culture in farm ponds. For each intervention 2-4 on farm demonstration were conducted for a period of 6-7 months by following standard pre stocking, stocking and post stocking management protocols. The farmers participated in this project cultured fish in their ponds for the first time and actively cooperated in field demonstrations that were undertaken to develop an appropriate method for the specific area and people. Farmers were given critical inputs like seed, feed and lime and linked to the Department of Fisheries for further support.

Table 1: Benefits and Constraints of Productive fish Farming

Sl. No.	Benefits	Constraints
1	Increase in fish availability	Lack of knowledge, skills and experience in fish farming
2	Food security	Lack of quality fish, seeds for stocking in ponds
3	Income generation	Lack of capital
4	Employment generation	Lack of support from Government agencies

Table 2: Relationships between Pond size and fish Production and Survival

Sl.No.	Pond Category	Pond Size (M^2)	Number of Ponds	Species Stocked	Stocking Density	Mean Fish Production (Kg/ha)	Mean Fish Survival (%)	Duration of Fish Culture
1	Farm ponds	144	8	Catla, Rohu, Mirgal, Amur and Common carp	10000/ha	2050-2870	67.93	7-8 months
		225	6			2250-3350	68.63	
		441	1			2312	64.46	
2	Water storage tanks	150	1	Nile tilapia	10000/ha	1550	70.15	6-7 months
		225	1	Nile tilapia	15000/ha	2180	69.54	
		560	1	Catla, Rohu and Prawn	Fish-5000/ha Prawn-20000/ha	Fish-643 Prawn-238	Fish-63.35 Prawn-54.84	6-7 months
		1100	1	Catla and Amur	10000/ha	2559	66.75	7-8 months 7-8 months
		1200	1	Catla, Rohu,and Common carp	10000/ha	2712	66.15	
		2000	1	Catla, Rohu,and Amur	10000/ha	2770	65.90	
		2000	1	Catla, Rohu and Prawn	Fish-5000/ha Prawn-20000/ha	Fish-635 Prawn-314	Fish-73.06 Prawn-59.25	6-7 months

RESULTS

The results of the project were encouraging. A summary of the fish culture demonstration conducted for seven months is given in Tables 2 and 3. The results indicated that in farm pond of 144 M^2 a production of more than 2150 to 2870 Kg/ha with average survival of 67.93 and in farm pond of 225 to 441 M^2 a production of more than 2250 to 3350 Kg/ha with average survival of 68.63. In water storage tank of 150 to 560 M^2 a production of more than 643 to 2180 Kg/ha with average survival of 67.68 and in water storage tank of 1100 to 2000 M^2 a production of more than 2559 to 2770 Kg/ha

with average survival of 68.23. This indicates the feasibility of fish culture in seasonal water bodies with low inputs. It was also observed that farmers could not obtain better fish production from large sized ponds compared to small sized ponds. This may be due to the lack of resources for the required inputs and inadequate management skills. It was noted that production from the pond could be increased if the fish grew to a bigger size before harvest. Generally, the farmers made the final or bulk harvest when the water level of the pond went down to a minimum as most ponds were seasonal in nature. The surplus fish was either sold at the local market or distributed in the village on any auspicious occasion/ceremony. The study revealed that, in most of the demonstration ponds, Catla, Amur and Common carp exhibited better growth and survival, when compared to Rohu and Mirgal. Amur stocked at a density of 9,000/ha ponds, exhibited better growth and survival than Amur stocked at a density of 10,000/ha pond. Polyculture of Catla, Rohu and Prawn, stocked at a ratio of 20:10:70, respectively, exhibited better growth and survival than the stocking ratio of 25:15:60. Nile tilapia stocked at a density of 15,000/ha pond, exhibited better growth and survival than tilapia stocked at a density of 10,000/ha.

Table 3: Details of net fish Production and Economics

Sl.No.	Pond category	Pond size (M^2)	Number of ponds	Mean fish production (kg/ha)	Mean fish survival (%)	Total operational cost (Rs)	Total income (Rs)	Net income (Rs)
1	Farm ponds	144	8	2050-2870	67.93	1250-1457	2500-4350	1600-2900
		225	6	2250-3350	68.63	1500-1890	3650-5354	2100-3610
		441	1	2312	64.46	3076	8080	5004
2	Water storage tanks	150	1	2150	70.15	1060	3579	2519
		225	1	2980	69.54	1200	4200	3000
		560	1	Fish-643 Prawn-238	Fish-63.35 Prawn-54.84	3081	6212	3131
		1100	1	2959	66.15	7830	26106	18276
		1200	1	2712	66.15	8460	28043	19583
		2000	1	2770	65.90	13500	44333	30833
		2000	1	Fish-635 Prawn-314	Fish-73.06 Prawn-59.25	13600	25906	12306

CONCLUSIONS

In Karnataka, aquaculture in small aquatic water bodies such as farm ponds and water storage tanks that retain water for a period of 7 to 8 months can be conveniently utilized for fish culture. Fish culture in farm ponds and water storage tanks can be operated with resources available within the family as a household enterprise. The main problems faced by fish farmers were poaching and scarcity of water to maintain a minimum level for the fish during the dry months. However, the project was able to motivate some of the village farmers to undertake fish farming activities to earn their livelihood. Several farmers around the project site also started fish farming. Some farmers from non-project areas visited the project areas to get technical assistance from the project beneficiaries. The initiatives under the project have made a significant contribution to the promotion of aquaculture in the area. However, more field trials under the guidance of scientists are required to refine and improve the technologies for increasing production per unit area of pond.

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