

National Agricultural Innovation Project

COLLEGE OF FISHERIES

Central Agricultural University

Lembucherra, Tripura

**Project title:**

“Livelihood Improvement and Empowerment of Rural Poor through sustainable Farming Systems in North Eastern Region”

Under Component – III: Research on Sustainable Rural Livelihood Security (SRLS)

Sub-project title:

Fish-Based Farming System in Dhalai district of Tripura

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2) Dhalai Zilla Parishad, Ambassa, Dhalai, Tripura

Project starting and closing dates: 13th December, 2007 to 31st March, 2014

ACTIVITIES & ACHIEVEMENTS HIGHLIGHTS

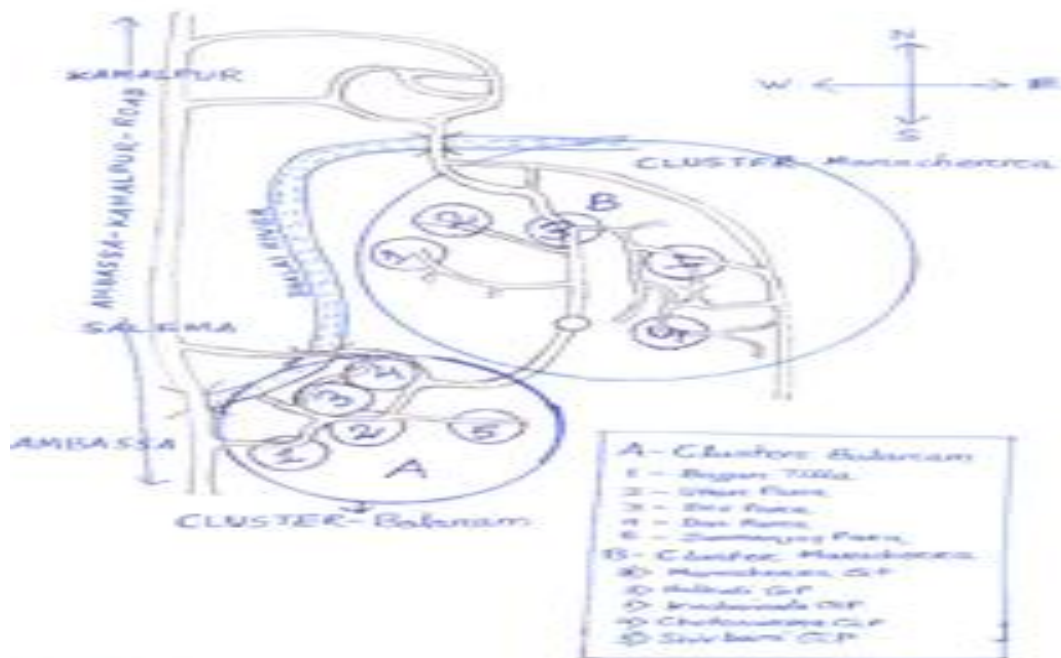
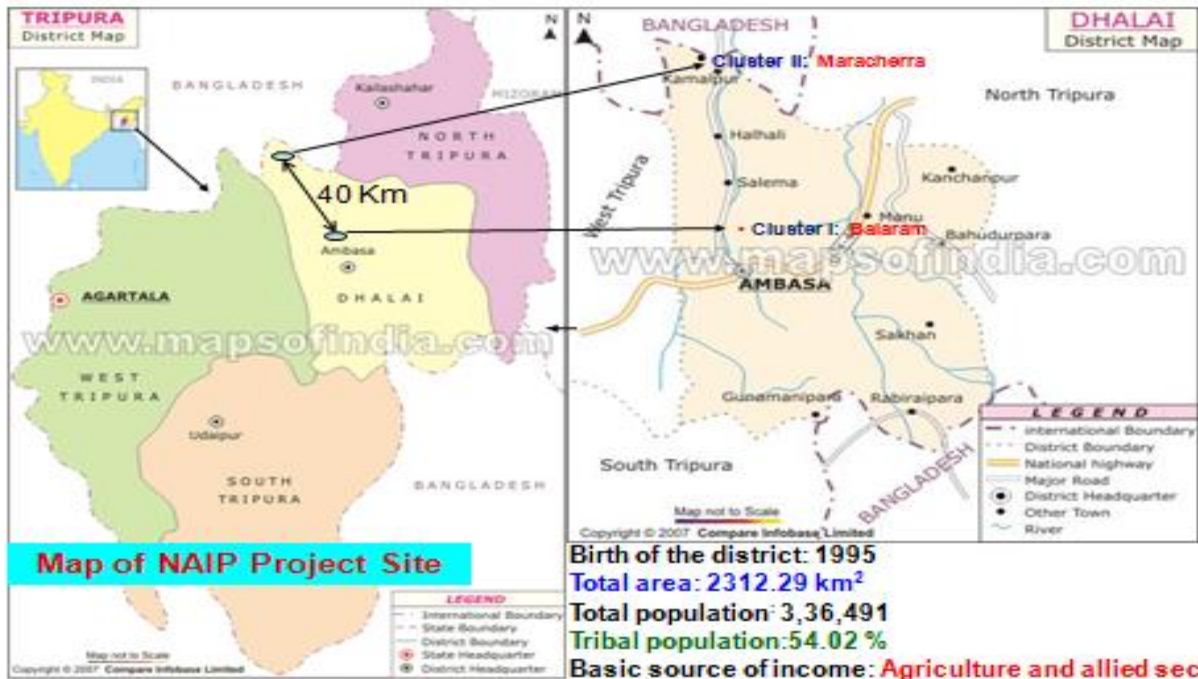
Preface

Dhalai District of Tripura is mainly a valley between two hilly terrains namely “Atharamura Range” and “Shakhan Range”, it was created in 1995. The strengths of the district are its huge natural resources, favourable climate as well as adequate and well spread rain fall, vast water areas including 4 major rivers, high literacy rate and strategic location of the district specially connected by National High Way. If all these resources could be utilized properly, rapid development could be achieved but for lack of required infrastructure, the district is lagging behind. It is evident from the district profile that in most of the development parameters it is lagging behind Tripura’s average not to speak of the national average. The main factors for the backwardness of this district are as follows.

Poor infrastructure, b) Poor communication and connectivity facilities, c) Lack of stable economic activities, d) Low productivity, e) Access to proper technology, f) Non-availability of input, g) Increased natural calamities, h) Political disturbance, i) Insurgency problem, j) Poor irrigation facilities (only 16% crop area is covered in the district), k) Poor marketing facilities

Keeping all these in view, the programme entitled “Livelihood Improvement and Empowerment of Rural Poor through sustainable Farming Systems in North Eastern Region” under Sustainable

Rural Livelihood Security (SRLS), Component – III to improve the socio-economic condition of the people of the area is undertaken under National Agricultural Innovation Project (NAIP).



NAIP Cluster Map (not in scale)

Executive Summary

The “Fish Based Farming System” is one of the subprojects under “Livelihood Improvement and Empowerment of Rural Poor through sustainable Farming Systems in North Eastern Region” has been developed by College of Fisheries (CAU) in Dhalai District of Tripura. After introducing, the farmers of the project have adopted 12 types of improved technologies in disadvantageous areas. The improved technologies include - 1. Fish-fruit-veg-pig farming, 2. Fish-fruit-veg-pig-spawn

farming, 3. Fish-fruit-pig farming, 4. Fish-veg-pig farming, 5. Fish-spawn rearing-composite fish culture, 6. Fish-spawn rearing, 7. Fish spawn–composite-veg-medicinal plant farm, 8. Rice–fish-veg–fruit farming, 9. Fish –fruit-mushroom farming, 10. Fish-fruit-goat farming, 11. Fish-fruit farming and 12. Composite culture. In total 53 (twenty-five) numbers of farmers are involved in NAIP technologies incorporated by College of Fisheries, CAU in disadvantageous areas including 5 (five) SHG group. Total 5.21 ha water area and 16.79 ha land area have been selected for adoption of fish culture technology and agriculture allied respectively. By adopting A3 (Aquaculture + Agriculture + Animal Husbandry) technology, the farmers are improving their livelihood gradually. Out of such interventions three were found most applicable for this region which includes 1) Fish-fruit-veg-pig farming, 2. Fish-fruit-veg-pig-spawn and 3) Paddy (Rice) – fish- veg culture For the improvement and empowerment of rural poor, the regular supply of inputs along with the technology and technical knowledge has been provided by College of Fisheries and other partners.

Overview of sub-projects

Fisheries constitute a significant sector of the Indian economy not only from the point of view of food supplies and foreign exchange earning but also for potential for generating employment. As agriculture and allied activities like fishery along with other components are the main sources of livelihood for the people of Tripura. Fisheries play an integral part of the economy of Dhalai district of Tripura. Fish-based farming system is a system is an approach to provide multiple crop production from the unit land. Improving farm production through integrating modern technologies into the existing farming system is essential for the enhancement of household food and income security. To improve the livelihood of the rural poor of this district the modern scientific knowledge of Fish farming and other agricultural practices are provided by College of Fisheries (CAU) from the year 2008 under “Livelihood Improvement and Empowerment of Rural Poor through sustainable Farming Systems in North Eastern Region” of National Agricultural Innovation Project (NAIP). It has proven as a cost-effective practice for marginal and poor farmers. During the current year some new steps has been taken for the betterment of livelihood of the rural poor. The main aims of the sub-project are as follows:

- To enhance farmers’ income through increased productivity of fisheries.
- To increase food security and enhance income through productivity enhancement of vegetables, fruits, paddy and animal husbandry.
- To develop market access technology/ Innovation.
- To transfer the technology/ Innovation.

Research Achievements/Innovations

Objective-wise Activities and Achievements

Objective 1: Evaluation and validation of indigenous and improved farming system models for enhancing production in agro-ecosystem of disadvantageous areas of NE region for sustainability, profitability and competitiveness:

- **Identification of ITKs and their validation in project sites:** Total nine (9) types of indigenous knowledge based methods have been identified from the project area-

- i. Integration of animal and plant component in fish based farming system has been identified as three (3) type viz., (a) Fish-cum-vegetable (bottle gourd) culture, (b) Paddy-cum-Fish Culture and (c) Fish-cum-duckery.
- ii. For the Protection of fishes from enemies the farmers of Maracherra practice the use of bamboo and tree twigs in the pond.
- iii. Ponds water is used for the protection of bamboo from damage at Maracherra.
- iv. Fishing Equipment has been identified as 7 types.
- v. Bamboo based household products have been identified as 30 types from both the clusters.
- vi. Medicinal plants have been identified as 25 types from both the clusters.
- vii. Pest management practices have been identified as 5 types from both the clusters.
- viii. Handloom products have been identified as 3 types.
- ix. House decoration pattern and Ranguli has been identified as 3 types.



Integrated fish farming (fish-duck farming)



Bamboo made fishing trap (conical)



***Cassia fistula* (To kharung plant): bark used for gastric and jaundice by Debbarma community**

- **Inventorization of soil, water and vegetation resources in the district using modern tools and procedures:** The soil and water parameter of 53 nos. of pond sites are studied and evaluated for proper monitoring. Evaluation and validation of constrains in fisheries sector and preparation of aquatic system health card for further intervention for sustainability and profitability.



Inventorization of soil, water and vegetation resources in the district using modern tools and procedur

- **Input supply and program implementation:** 53 Beneficiaries field, 5 SHG groups and 1 MCS.



Input supply to the beneficiaries

Objective 2: Addressing the constraints of deliverables to facilitate the community/people to harness optimum benefit from agriculture sector:

• **Development of Fish based farming system:** For the proper development Fish based farming system 12 interventions patterns are practiced which includes:

1. Fish-fruit-veg-pig farming, 2. Fish-fruit-veg-pig-spawn farming, 3. Fish-fruit-pig farming, 4. Fish-veg-pig farming, 5. Fish-spawn rearing-composite fish culture, 6. Fish-spawn rearing, 7. Fish spawn-composite-veg-medicinal plant farm, 8. Rice-fish-veg -fruit farming, 9. Fish -fruit-mushroom farming, 10. Fish-fruit-goat farming, 11. Fish-fruit farming and 12. Composite culture.

1. Total nos. of beneficiaries: 53.
2. Total nos. of SHG groups: 05.
3. Total nos. of Co-operative society: 01.
4. Water area coverage: 5.21 ha water area has covered for fish farming.
5. Land area: 16.79 ha land area has covered for fruit, vegetable, rice, mushroom, pig and goat farming.



Integration of vegetable, fruits and animals (pigs) in fish based farming system



DEE, CAU visiting Fish-rice-fruit farming system at Balaram

Hon'ble VC, CAU visiting Fish-rice-veg-fruit farming, Maracherra

DR, CAU visiting Fish-fruit-veg-pig farming , Balaram

Objective 3 Capacity building, skill up-gradation, information access and promotion of activity specific SHGs:

- Total four eight (8) Training (on / off campus) programme and two (2) Exposure Visit cum Training programme has been arranged for Capacity building, skill upgradation, information access and promotion of activity specific SHGs.



Capacity building and skill up-gradation through training and personal interaction

Objective 4 Employment generation through agro-processing and value addition including storage, packaging, transportation and marketing of the produce:

- For the Employment generation through agro-processing and value addition including storage, packaging, transportation and marketing of the produce following programme has been taken:
(i) Formation of planting material grower:

8 nos. of beneficiaries' field has been encouraged for supply of banana sucker and 4 nos. of beneficiaries' field has been to the local farmers as well as the NAIP farmers.



Formation of planting material grower at project site

(ii) Fish seed grower:

The fish spawn has been supplied from the College Fish Farm to five (5) beneficiaries, one (1) S.H.G and one (1) M.C.S for the benefit of the poor farmers and the availability of the quality fish seed in local area.



Enhancement of fish seed grower for the availability of the quality fish seed in local area

SUCCESS STORIES

Success Story -1

Fish-Rice-Vegetable-Fruit Farming System in Dhalai, Tripura

Name of the farmer with complete address

Shi Surjasen Satnami, Vill+P.O. Chotosurma, Maracherra, Dist Dhalai. Tripura.

Details of intervention or novelty etc.

- Construction of pond and channels in the rice field.
- Construction of bundh around the channel and pond.
- Fingerlings of catla, rohu, mrigal, c. carp, s. carp and prawn are stocked for rearing.
- The Gomti variety of rice seed transplanted at the rice field.
- The embankment and the rice field after harvesting is used for vegetable cultivation like potato, beans, gourd, cabbage, tomato etc.
- The fruit crops like banana and papaya were planted on pond embankment.
- The total cultivable area of Mr. Satnami is 0.36 ha including water area of 0.12 ha.

Methods

- Organization of various training programme on fish based farming system for proper utilization of land, water and other natural resources, development of location specific model, deliverable of inputs like quality fish seed, fish feed, lime, high yield rice seed, vegetable seed and different planting materials etc.
- The monitoring and maintenance of fish pond, rice field, fruit field, vegetable field, pest management, and soil and water quality were followed regularly for better production.

Qualitative & Quantitative Impact

- The significant outcomes of the intervention are furnished below in the table 1 and 2.

- In traditional paddy-cum-fish culture the production of fish is only 600- 800 kg/ ha/yr.
- Under the present intervention fish productivity is recorded as 1,250 kg/ ha/yr and 1,333 kg/ha/yr during the year of 2011-12 and in 2012-13 respectively.
- Sri Surjasen Satnami of Maracherra earned a net income of Rs. 27,700 in the year 2011-12 and Rs. 32,275 in the year 2012-13 from his IFS model involving fish-rice-vegetable and fruit farming from an area of 0.36 ha (Table 1 and Table 2).
- The productivity is going to be increased regularly.
- The farmer has learned about the scientific integration of fish, vegetable, fruits and rice for better economic benefit.
- He has learned about the scientific farming system and their management.
- The other farmers are now very much interested to adopt the same module in their field.



Farming system of Sri Surjasen Satnami (Before intervention)



Farming system of Sri Surjasen Satnami (After intervention)



Mature and pre-harvesting stage of rice



Vegetable cultivation at IFS



Fish harvesting stage

Table 1. The status of productivity before and after intervention

Total Area (0.36 ha)	Name of crops	Production (in Kg)			Productivity (Kg/ ha)		
		Before intervention	After intervention		Before intervention	After intervention	
			2011-12	2012-13		2011-12	2012-13
Land Area= 0.24 ha	Vegetables (Bottle gourd, Potato, Ridge gourd, String bean, Local bean)	0	3,550	3575	0	14,791	14,895
	Rice = kg	100	280	285	416	1,166	1,187
	Fruit (Banana, Papaya)	0	0	150	0	0	625
Water area (Before intervention= 0.8 After intervention= 0.12 ha)	Fish	25	150	160	312	1,250	1,333

Table 2. The status of income from the farming system before and after intervention

Name of Crops	Net Income (in Rs)		
	Before intervention	After intervention	
		2011-12	2012-13
Vegetables (Bottle gourd, Potato, Ridge gourd, String bean, Local bean)	0	13,700.00	14,200.00
Rice	1,500.00	4,000.00	4,075.00
Fruit (Banana, Papaya)	0	0	500.00
Fish	1,500.00	10,000.00	10,500.00
Total net income*	3,000.00	27,700.00	32,275.00
Cost of production	2,200.00	18,500.00	20,200.00
B:C Ratio	2.36	2.49	2.52
Employment (man-days)	33	65	75

Success Story -2

Fish-Vegetable-Fruit Farming System in Dhalai, Tripura

Name of the farmer with complete address

Santirneer SHG, Vill+ P.O. Balamam, Dist Dhalai, Tripura.

Details of intervention or novelty etc.

- The existing land and water area has been renovated for scientific fish based farming system intervention.
- The adjacent plain land and dykes has been designed to cultivation of vegetable and fruits.
- The farm pond was renovated to improve water retention throughout the year for fish culture and also fruit or vegetable farming was done on the adjacent land and dykes to minimize soil erosion.
- Six (6) fish species were stocked in the ratio of catla (2.5): silver carp (1): rohu (3): grass carp (0.5): mrigal (1.5): common/ amur carp (1.5). Initial stocking density was @ 12,000 nos. /ha and periodical stocking @ 8,000 nos./ha.
- The vegetable (bottle guard, pumpkin, brinjal, local bean) cultivation was done on pond embankment as well as on adjacent plain land and dykes whereas the fruit crops like banana, papaya and amropalli were planted only on pond embankment.
- Present intervention was undertaken by Santirneer SHG, Balamam in an land area of 0.16 ha + Water area of 0.32 ha (total 0.48 ha).



Farming system of Santirneer SHG(Before intervention)



Farming system of Santirneer SHG (After intervention)

Methods

- Organization of various training programme on fish based farming system for proper utilization of land, water and other natural resources, development of location specific model, deliverable of input like quality fish seed, fish feed, lime, vegetable seed and different planting materials etc.
- The monitoring and maintenance of fish pond, fruit field, vegetable field, pest management, and soil and water quality were followed regularly for better production.

Qualitative & Quantitative Impact

- The significant outcomes of the technology after intervention are furnished below in the table 1 and 2.
- It is clearly evident that the group is enhancing their income after the intervention from fish as well as vegetable and fruit crops.
- The productivity of fishes has increased to 2656 kg/ ha/yr from 241 kg/ ha/yr after intervention.
- The group is going to increase their economic returns by adopting Fish-Vegetable-Fruit Farming System.
- The fish-crop integration model will facilitate enhanced production and more return to the group.
- The intervention has also helped in conserving the natural resources by checking soil erosion.
- The intervention has opened multiple options for the group to earn their livelihood in more efficient as well as sustainable way.



Activities by the students of COF at farm site of Santirneer SHG

Table1. The status of productivity before and after intervention

Total Area (0.36 ha)	Name of crops	Production (in Kg)			Productivity (Kg/ ha)		
		Before intervention	After intervention		Before intervention	After intervention	
			2011-12	2012-13		2011-12	2012-13
Land Area= 0.16 ha	Vegetables (Bottle gourd, Pumpkin, Brinjal, Local bean on dyke and adjacent areas)	750	2450	2500	4,687	15,312	15,625
	Fruit (Banana, Papaya, Litchi, Amropali)	0	0	170	0	0	1,062
Water area = 0.32ha)	Fish	241	835	850	753	2,609	2,656

Table 2. The status of income from the farming system before and after intervention

Name of crops	Net Income (in Rs.)		
	Before intervention	After intervention	
		2011-12	2012-13
Vegetables (Bottle gourd, Pumpkin, Brinjal, Local bean on dyke and adjacent areas)	500.00	12,500.00	12,750.00
Fruit (Banana, Papaya, Litchi, Amropali)	0	0	850.00
Fish	15,000.00	52,200.00	53,100.00
Net income (total)*	16,500.00	64,700.00	66,700.00
Cost of Production	7,000.00	43,500.00	44,000.00
B:C ratio	3.35	2.48	2.51
Employment	29	56	65

