Sustainable Livelihood Support Through Enterprise Convergence in Pond Based Farming System

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Introduction

It is paradoxical to note that Odisha with rich natural resources, is one of the poorest states of the country because of poor resource base of the farming community. The ST and SC farmers constitute 44% of total population who earn their livelihood under a fragile rain-fed and drought prone agro-eco-environment. Balasore district is naturally endowed with Dhan, Pan and Mina viz. Paddy, Betel vine and Pisciculture since time immemorial. Most farmers are small and marginal (84%) having too small farm size to employ the family labour force round the year due to mono-cropping. Under these circumstances integration of more than one production components are desirable for better utilization of available resources at the command of the farmers i.e. Integrated Farming System (IFS) approach.

Conceptual Definition

Farming system focuses on:

- The interdependencies between components under the control of household and,
- How these components interact with the physical, biological and socio-economic factors, which is not under the control of household.
- Farm household is the basic unit of farming system and interdependent farming enterprises carried out on the farm.
- Farmers are subjected to many socio-economic, bio-physical, institutional, administrative and technological constraints.
- The operator of the farming system is farmer or the farming family.

The basic aim of IFS is to derive a set of resource development and utilization practices. Which lead to substantial and sustained increase in agricultural production (Kumar and Jain, 2005). Integrated farming system are often less risky, if managed efficiently, they benefit from synergisms among enterprises, diversity in produce environmental soundness (Lightfoot, 1990). The household, its resources and the resource flows and interactions at the individual farm levels are together referred to as farming system (FAO, 2001).

Pond based farming system dominates in the coastal agro-ecosystem which is no different in case of Balasore district. On the face of shrinking land holding and increase number of small and marginal farmers in the district, it has been of paramount importance to integrate various

agro-enterprises like field and horticultural crops, fishery, poultry, duckery, apiary and mushroom cultivation etc in a pond based agri-convergence approach. Out of very many IFS models promoted by Krishi Vigyan Kendra, Balasore, an ideal case of Sri Ranjan Kumar Bhuyan is analysed below for simulation elsewhere by potential farmers and farm women. A marginal farmer of Katisahi village of Baliapal block, Sri Bhuyan has been able to demonstrate a harmonious integration of field and horticultural crops, live stock and allied agri-enterprises with emphasis on inter component interaction as well as recycling of products and bi-products which forms the main stay towards food security and sustainable livelihood.

Ranjan Kumar Bhuyan was having small farm house (240 m²), general area for children play (120 m²) and 4000 m² land under pond based farming system (Table 1). He has taken various enterprises based on available resources. They (component of IFS) were as follows (1) rice in the field and (2) fish in the refuge pond, trenches and also in the rice fields, (3)vegetables(radish, brinjal, okra, pumpkin, tomato, poi, spinach, coriander etc), (4) pomology (lemon, papaya, banana, guava, coconut, etc) (5) agro-forestry(teak was grown on dyke). Climbing vegetables like ash gourd, ridge gourd, country beans, bottle gourd, etc were grown on the platform hanging over the trenches. The area occupied by each component was given in the Table 1. The schematic diagram of enterprises and their interaction was given in the Fig 1 and 2.

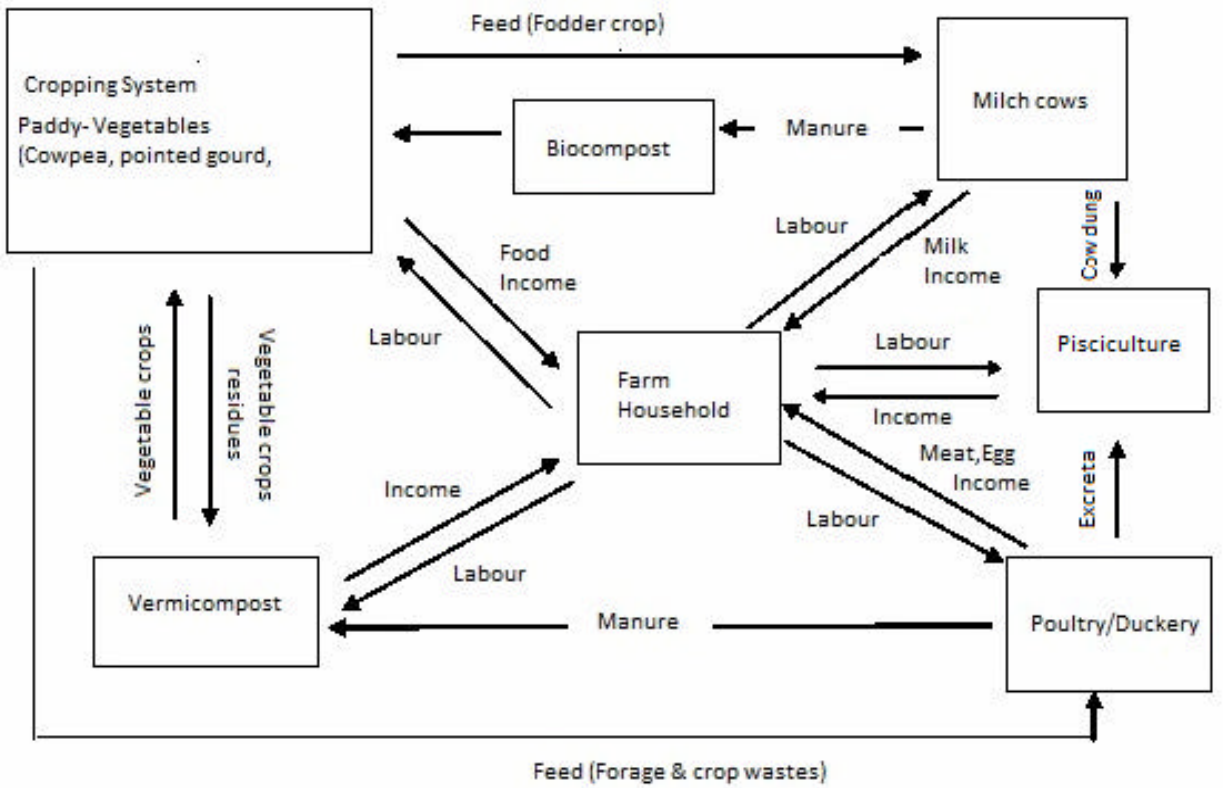

Fig.1. Resource flow model of Integrated Farming System

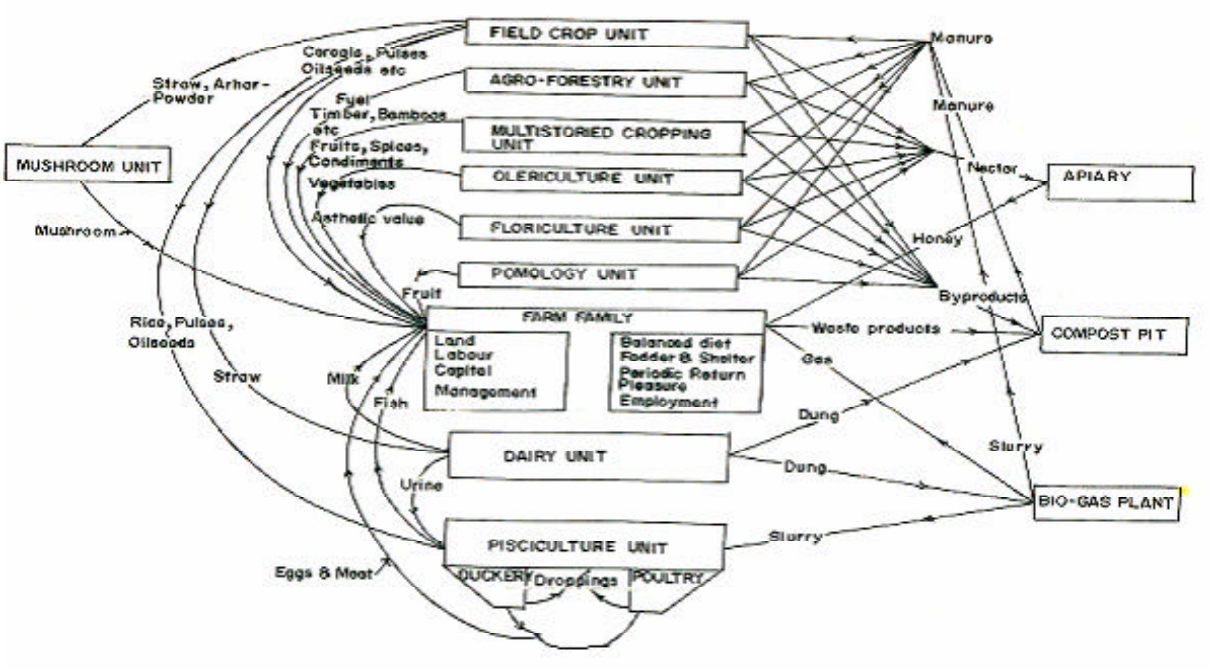

Fig. 2. Interactions among different components of Farming Systems

Table 1: Area allocation to different component in farming system

Component	Particular	Number of units/plants	Area(m2)
Field crops	Low land rice (Sarala/Kanchan)		1600
Vegetables	Brinjal, tomato, okra, pumkin, bitter gourd, cucumber, etc		1420
Fruits	lemon	2	30
	Guava	5	50
	Mango (Baiganpalli, Sinduri)	3	40
	Coconut	12	220
	Papaya	20	80
	Litchi	2	20
	Banana	40	100
Floriculture	Marigold, Jasmine	50,12	60
Agro-forestry	Teak	4	40
	Drumstick	1	16
	Bamboo	25	90
	Tamarind	1	20
	Karanja	4	32
	Sahada	3	12
Fishery	Pond system	1	120
Dairy unit	Cowshed(4cows& 4calves)	1	50
General areas	For Children to play and other needs	1	120
Farm house	Including threshing floor	1	240
Total			**4360**

The main objective of pond based farming system is (1) to generate maximum income and employment by combining different enterprises namely field crop, multi-storeyed cropping, pomology, olericulture, floriculture, fishery, duckery, poultry, mushrooms, apiary, biogas, agro-forestry and commercial nursery by recycling product and by products. This farm pond based model is intended for farmers of the coastal districts having two ha of land with a pond. Shade loving crop plants such as ginger, turmeric and pine apple were planted under the coconut trees. One poultry unit had been installed at one of the corners of the pond with the idea that the droppings of the birds would directly fall into the water to help the growth of the planktons. The model also had a duckery unit. A biogas plant was installed to meet the energy need of the family. Slurry generated at the plant was used as manure for crops and a part of it was diverted to fish pond to encourage the growth of the plankton. Every early morning raw dungcollected from the bullock shed of the central farm was fed to the biogas plant. Brinjal, okra, cowpea and maize were grown in *Kharif* while tomato. Watermelon, cucumber, bitter gourd, and bottle gourd etc , were grown in the *Rabi* season. Fodder crop was grown to supply greens to the dairy. Banana, mango, ber, lemon and yam had been planted around the pond to utilize all the available space. An ornamental unit was developed in front of the farm house to provide the mental food. The area allotted to different components of the farm is mentioned in **Table 1**.

Economics

Table-2: Economics of Integrated farming system

Component (Mandays)	Area(sq.m) (Rs)	Gross return(Rs)	Investment	Net Return(Rs)	Benefit cost ratio	Labour needed
Crops						
Rice	1600	2100	1100	1000	1.91	14
Vegetables	1420	35180	9260	25920	3.79	96
Fruits	540	9960	2030	7980	4.9	39
Floriculture	60	300	50	250	6.0	1
Agroforestry	210	2100	375	1725	5.6	7
Fishery	120	2300	700	1600	3.28	8
Dairy	50	14,600	500	9600	2.92	83
G.Total	**4000**	**66540**	**18515**	**48075**	**3.59**	**248**

The economic analysis of pond based farming system revealed that the gross income of Rs.66540 was obtained by investing Rs.18515 (Table 2). This system provided employment of 248 mandays with benefit cost ratio of 3.59. The net income from the pond based farming system was Rs.48075. The risk of economic loss in this system was minimum.

Conclusion

Thus it is implicit that the entire concept of Integrated Farming System (IFS) through agro-enterprise convergence revolves round the interactive use and efficient utilization of land, labour, capital cum available resources. An analysis of the enterprise distribution and economic profile of the model of IFS unit above concludes that pisciculture dominated pond based farming system with 4 broad components like crops, horticulture, fishery and allied non crop (mushroom, apiary, lac etc.) can be advocated for the food security and sustainable livelihood support of small and marginal farmers/farm women of Balasore district. This is in practice, an efficient and dependable alternative again the prevailing rice-pulses cropping system involving high risk factors.

Floriculture on the bund and ducks in the pond

Cauliflower on pondbund

Double row system of Papaya on pondbund

Double row system of Papaya on pondbund

Banana and tomato crop on pondbund

Single row system of papaya on pondbund

Farming system at Rahapada

Farming system at Katisahi

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