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Impact study on pond based IFS of Kolhan region, Jharkhand

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Abstract

The economy of our country is predominantly based on rural and agricultural practises. But, agricultural practices have long faced challenges related to low productivity despite of significant inputs in traditional farming methods. To address and acknowledge these challenges, an Integrated Farming System (IFS) approach, particularly Pond based IFS has been adopted and promoted as a sustainable solution for increasing agricultural productivity and farmers income. This study, conducted by Tata Steel Foundation in the Kolhan region of Jharkhand, assessed the socio-economic impact of Pond based IFS among 7068 households across 17 blocks. Data was collected through household surveys, interviews, and participatory rural appraisals. Study showed substantial involvement of middle-aged farmers (71.47%), with most having only primary education (53.83%) and belonging to Scheduled Tribes (70.98%). The majority (94.82%) were male, and over 70% had traditional fish farming experience. Post-intervention, farmers adopted improved add on practices such as liming, manuring, and diversified farming with different enterprises, accelerated significant increase in productivity and income. The average annual income raised to ₹74,256. Higher incomes were linked with farmers, adopted multiple farming enterprises. This study underscores the effectiveness of Pond based IFS in enhancing rural livelihoods through diversified and sustainable farming practices.

Keywords: Integrated farming system (IFS), pond based integrated farming system, socio-economic, income generation, Kolhan division

Introduction

The Indian economy is predominantly rural and agricultural (Roy *et al.*, 2015) ^[4]. Traditional Indian agriculture is mainly focused on manpower, which involves lots of hard work and energy but gets difficult to earn their livelihood because of very less output even though it requires considerable inputs in terms of seeds, livestock breeds, fertilizers, pesticides, energy, feed, and labour. An innovative farming system with maximum productivity and fewer input drives is an urgent need to consider an integrated farming system (Haobijam *et al.*, 2022) ^[2]. According to Soni *et al.* (2014) ^[6] Integrated farming system (IFS) is a multidisciplinary whole-farm approach and very effective in solving the problems of small and marginal farmers who constitute more than 80% of the farming community (Roy *et al.*, 2015) ^[4]. The integrated farming system gives unique opportunities for maintaining and extending biodiversity (Saroj *et al.*, 2019) ^[5]. Integration of various agricultural enterprises that are cropping, animal husbandry, fishery, etc., in the farming system, has great potentialities in the agricultural economy.

Pond based Integrated Farming System is a type of farming which adopt and integrate the component of Livestock,

Horticulture, Aquaculture with the objectives of continuous and stable income generation, employment generation and environmental sustainability (Ghosh and Goswami, 2022) ^[1]. Govt. of India has also promoted Integrated Farming System under National Agricultural Development Programme which got good response in many areas. The integration of farm enterprises often suggested as the means for rapid economic development in India. In view of the growing pressure of population and limited scope of increasing additional income through crop production, diversification of farming practice is considered essential not only for the captivity of the rural masses from the squalid of poverty but also for meeting the demands of Horticulture (fruits, vegetables) meat, fish, eggs, etc. which generally show rising trends with increasing levels of per capita income in the country (Ghosh and Goswami, 2022) ^[1].

Tata Steel Foundation is working in Agriculture domain governed by innovation, sustainability and transformative changes. It prioritises initiatives that redefine farming practices and enable rural communities in the state of Jharkhand to make optimum use of available resources. In the Kolhan region of Jharkhand, the Foundation is working

with 25,000 small and marginal families with a special focus on Pond based Integrated Farming System (IFS) covering around 10,000 families. The various prototypes like fish-cum-duck farming, fish-cum-horticultural plants, etc. fisheries, duck rearing, and horticultural crops have been promoted among majority of farmers, helping them an annual earning of ₹1.5 Lakhs to 2 Lakhs per household.

Tata Steel Foundation is focusing on Pond Based Integrated Farming System from the year 2016 onwards. Thus, the main objective of this study is to assess the status of Pond based IFS farmers of Kolhan region of Jharkhand through its socio-economic condition.

Materials and Methods

The study was conducted in 2023 under Pond based IFS project in 17 blocks of 'Kolhan Division' of Jharkhand. The 'Kolhan Division' of Jharkhand includes West Singhbhum, Saraikela Kharsawan and East Singhbhum districts of Jharkhand in which West Singhbhum has four block, Saraikela Kharsawan has three block and East Singhbhum has ten number of blocks. The selection criteria for study of villages and blocks based on the involvement in Pond based IFS Project under districts and presence of Fisheries activities in that area using random stratified sampling. There were 7068 households involved in IFS in which only 328 were involved in nursery rearing.

The information was collected through Household survey with the help of Community Resource Persons (CRPs), block-coordinators, and like-minded partners of Tata Steel Foundation. Household heads were treated as the respondents of the study. Different tools i.e., interview schedule, focus group discussion and participatory rural appraisal were used for data collection. To achieve the objective of the study information collected on various aspects like age, education, gender, caste, farming experience, annual income, annual expenditure and different components of farming. The obtained data were tabulated and necessary graphs, tables were prepared with the mean and standard deviation (S.D.) values using MS excel program and SPSS.

Results and Discussion

This result deals with the representation and interpretation of collected data during the field study. Data were collected through personal interviews with structured interview schedule. The results were organized in the following

Table 4: Caste Category of Pond based IFS farmers

Class Category	No. of Respondents	Percentage
Gen	75	1.06
OBC	1895	26.82
SC	67	0.94
ST	5017	70.98
PVTG	14	0.20

Fish farming experience

It was found that approx. 70% farmers were traditional fishers. They do not had knowledge about scientific method of fish culture. Sometime they used to harvest their crops after 2-3 years. They do not use feed, manure or any other chemicals for improving the water quality of ponds and

manner.

Age distribution

The majority (71.47%) of the farmers belonged to the middle age groups (40-60 years) followed by young age group (below 40 years) 23.07%. Old age group (above 60 years) accounted for 0.05% only. It can be said that there is more involvement of Middle age people in farming. Similar finding reported by Ghosh and Goswami (2022) ^[1] in a study done in South 24 Parganas, West Bengal.

Table 1: Age distribution of Pond based IFS farmers

Age Distribution (Years)	No. of Respondents	Percentage (%)
Young (<40)	1631	23.07
Middle (40-60)	5052	71.47
Old (>60)	385	0.05

Education

The majority (53.83%) of the farmers were educated up to Primary level followed by secondary level (13.76%), higher secondary level (7.62%) and graduate and above (3.59%) whereas 21.17% of the respondents were illiterate.

Table 2: Education level of Pond based IFS farmers

Education	No. of Respondents	Percentage (%)
Illiterate	1497	21.17
Primary education	3805	53.83
Secondary education	973	13.76
Higher Secondary	539	7.62
Graduate	254	3.59

Gender

Majority (94.82%) of the respondents were male. However, female constituted 5.18% of the respondents.

Table 3: Gender profile of Pond based IFS farmers

Gender	No. of Respondents	Percentage (%)
Male	6702	94.82%
Female	366	5.18

Caste Categorization

Most (70.98%) of the farmers belonged to Schedule Tribes followed by Other Backward Class (26.82%), General (1.06%), Schedule Class (0.94%) and Primitive Vulnerable Tribal Group (0.20%).

health of fishes. None of the fish farmers found involved in nursery farming. After the intervention of Pond based IFS fish farmers became skilled in fish culture (Nursery farming and grow out culture). Most of the farmers started liming and manuring in their ponds fortnightly or monthly to improve the water quality of pond and for production of

natural food for fishes. Information Education and Communication (IEC) materials provided by the Tata Steel Foundation to the farmers also helped them in scientific way of fish culture.

Major components of Pond based IFS

The major component of Pond based IFS presented in the table below.

Table 5: Major components of Pond based IFS

Crops	Livestock & Poultry	Fisheries	Secondary Agriculture
Pulses Fruits Vegetables Creepers Plant	Cattle Piggery Goat Chicken Duck	Composite Fish Culture Fish Nursery Farming Paddy cum Fish Culture Prawn Culture Paddy cum Prawn culture	Vermicomposting Azolla Culture Mushroom culture

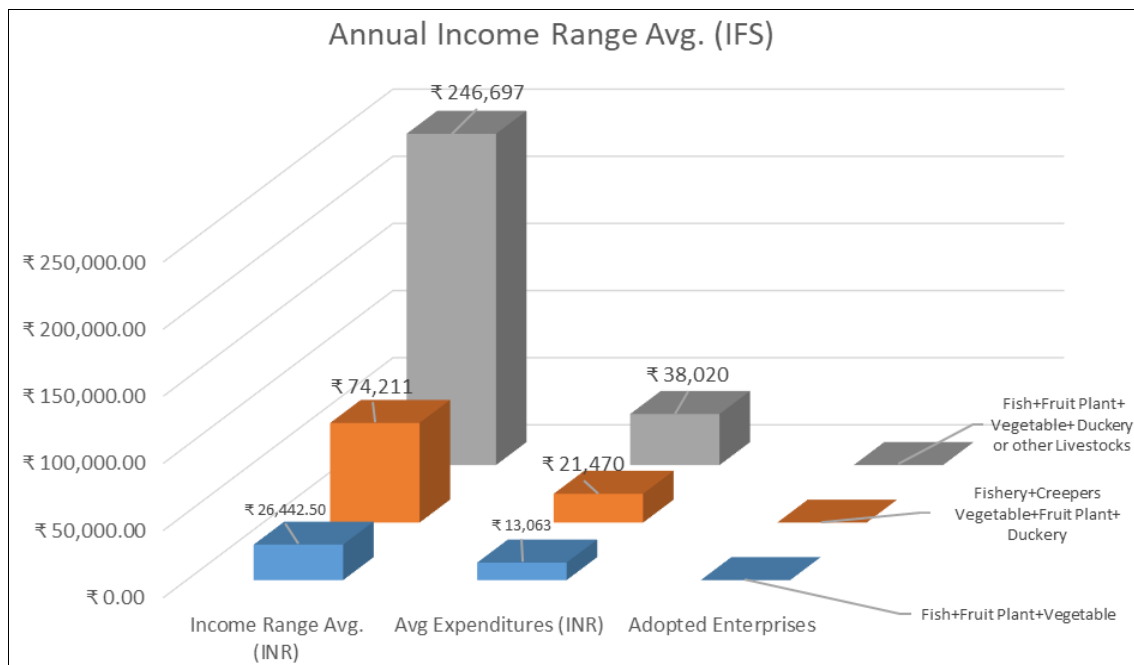
Annual income and Expenditures

Majority (78.28%) belong to middle-income group (Avg ₹74211), followed by 12.82% who had high income (₹

246697) and 8.90% of farmers had low income (Avg ₹26442.5).

Table 6: Annual income of farmers from Pond based IFS

Sl. No	Income Range Avg. (INR)	No. of Respondents	Percentage (%)	Avg Expenditures (INR)	Major Adopted Enterprises
1	₹ 26442.5 (₹ 20120-32765)	629	8.90	₹ 13063	Fish+Fruit Plant+ Vegetable
2	₹ 74211 (₹ 32765-115657)	5533	78.28	₹ 21470	Fishery+ Vegetable+ Fruit Plants +Duckery
3	₹ 246697 (₹ 115657-377736)	906	12.82	₹ 38020	Fishery+ Fruit Plants+ Vegetables+ Duckery or other Livestock



Graph 1: It shows the relation in three series of Enterprises

The farmers who engaged in only Fisheries, Fruit Plant and Vegetable had the total avg income ₹26442.5 while the farmers who adopted the Fishery, Duckery, Vegetable & Fruit Plants had income ₹ 95601. The farmers who had engaged in Fish Nursery, Fish Grow-out, Vegetable, Fruit Plants, Duckery or other Livestocks had Avg. Net income ₹246897 from approx. 23 dismil of average pond size and some nearby areas.

Conclusion

It has been proven from this study that the net income is directly proportional to number of enterprises i.e. adoption of five enterprises provides more net income than three or

four enterprises. Saroj *et al.* (2019) [5] also stated that use of interrelated enterprises in Integrated farming system reduced cost and increased productivity of farmer. Integrated horticulture cum fish farming is not only economically viable, but socially acceptable also (Lekshmi *et al.*, 2020) [3].

The implementing team had reached the 7068 no.s of Farmers while each one had got impacted throughout the connection with the project team. Lives altered i.e. Individuals on a path of transformation through TSF's programme are 5533 no.s of farmers while Lives transformed i.e. Individuals whose lives and contexts have irreversibly altered for the better through TSF's

Programmes are 906 in nos.

The implementation of Pond based Integrated Farming Systems (IFS) in the Kolhan region of Jharkhand has highlighted significant socio-economic benefits for small and marginal farmers. Integrated agricultural enterprises such as Fisheries, Horticulture, and Livestock, were able to increase Productivity and substantially income of the farmers. The data revealed distinctive improvement in their annual income of the farmers who adopted multiple enterprises within the IFS framework.

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