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To study the correlation between inputs of fish farming and return in different size of fish farms in Prayagraj district, Uttar Pradesh

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Abstract
Fish is considered as one of the main foods of non-vegetarian dishes. With the ever-increasing population of the country and the increasing problem of malnutrition, major attention needs to be given to further diversify our food items and enrich their nutritional content. Fishing activity is carried out across India. However, certain constraints and limitations in the fish farming sector like inadequate knowledge of fish farming practices, improper feeds are some problems that hamper the overall production of fish and ultimately the income of fish farmers. The research based on production and sustainability of fish production was carried out in 5 blocks (Koraon Shankargarh Karchhana Handia and Jasara) to understand the current scenario of fish farming practices prevailing in the district Prayagraj. Both primary and secondary data were collected for complete understanding and analysis of the data. It was concluded that in first size-group, a positive correlation between return and the factors like pond area, human labor, manure, and feed were seen and that for fingerlings was negative. Only human labor was significantly correlated with the return. In second size-group, all the explanatory variables/factors were positively correlated with return. But the coefficient for human labor and feed only were significant. In third size-group, the return was positively correlated with all the factors expect manure. The correlation coefficient for human labor and fingerlings were significant at one percent and for others as 5 percent.

Keywords: fisheries, return, pond area, human labor charges (Rs.), improved variety fingerlings, manure and feed

Introduction
Fisheries in India are considered an allied economic activity with a wide potential. The Fisheries Sector is basically a Greenfield Sector. Fresh Water Aquaculture contributes 57 percent and around 70 percent in Marine Fisheries. Currently, India is the second fish producing and second-largest aquaculture nation in the world after China. Fisheries Sector provides direct employment and livelihood to around 16 million people and many more people indirectly and plays a vital role in the Indian Economy. Production of fish has increased from 5.66 MMT in 2000-01 to 12.61 MMT in 2017-18 with a contribution of 8.92 MMT from the inland sector and 3.69 MMT from the marine sector.

It is also having a significant role in the sector of food production assuring nutritional and food security. Resources are diverse ranging from deep seas to lakes in the mountains and comprising more than 10% of the global biodiversity in terms of fish and shellfish species, showing a huge jump in the production of fishes in the country since independence. The marine resources of the country comprise an Exclusive Economic Zone (EEZ) of 2.02 million sq. km, a Continental Shelf Area of 5,30,000 sq. km, and a Coastline of 8,118 km. The potential of Marine Fishery in the Indian waters has accounted for 5.31 MMT constituting about 43.3% demersal fish, 49.5% pelagic, and 4.3% oceanic groups.

Looking at the previous studies and research done, we can observe that only 48.97 percent of available aquaculture resources were utilized for fish production in the state of Uttar Pradesh suggesting the need to expand the fish production (Maurya *et al.* (2018) [8]. Another study in the state of Punjab in Ludhiana reveals that inland fish production was higher than marine fish production during the last three decades and the quantity of fish exports increased more than 14 times. Also, the results of significance confirm the factors like area, labor cost, and marketing cost and how various fish farmers are confronting various issues like fish diseases, flooding, poaching practices, less subsidy, poor or inadequate infrastructure, which needs to be resolved (Kaur 2017). So, a brief view at the past literature shows that there is a vast scope of fisheries sectors and various challenges are associated with it that need to be addressed in

order to make this a flourishing sector in the allied agricultural activities.

Materials and Methods

Prayagraj is the maximum fish-producing district in Uttar Pradesh. The study encompasses various fish farming practices followed in the district including the challenges and difficulties faced by the farmers in various aspects like marketing and finance. The objective is to identify the scope of improvement in fish production, thereby the fish farmer's income and employment. Fish Farmer's survey was conducted in Koraon, Shankargarh, Karchhana, Handia and Jasara, Prayagraj UP.

The selection of sample villages was done as described in the following manner

1. **Sampling Design:** To select block villages and fish farmers, a multistage random sampling technique is adopted.
2. **Selection of district:** Uttar Pradesh comprises 75 districts. Out of which Prayagraj district is selected purposely.
3. **Selection of Development Block:** Prayagraj district comprises 20 blocks out of which Koraon, Shankargarh, Karchhana, Handia, and Jasara are selected randomly.
4. **Selection of Villages:** For the third stage of sampling, a complete list of villages having fishponds is procured from the CDO (Chief Development Office) office of the sample block. 10 such villages in each of Koraon and Shankargarh blocks 9, 11, and 14 villages in Handia, Jasara, and Karchhana blocks respectively and 10% of the farmers are selected randomly out of 54 villages.

Number of Sample Villages

S. No.	Sample Blocks	Total Villages	Sample Villages
1	Koraon	210	10
2	Shankargarh	211	10
3	Karchhana	130	14
4	Handia	132	9
5	Jasara	114	11

1. Selection of Fish Farmers

For each of the selected villages, a list of all fish farmers is prepared. In this category, the number of ponds is 80 and all of them are selected for the study. Owners of these selected ponds based on their pond area are grouped as follows:

A list of fish farmers is prepared out of 80 selected ponds for study and collection of data. They are further categorized according to their pond area as given below

- **Small farmer:** Up to 0.125 ha.
- **Medium farmer:** 0.125 ha to 0.250 ha.
- **Large farmer:** Above 0.250 ha.

Analytical Tools

Correlation Analysis

Correlation analysis is the statistical tool, which is used to describe the degree to which one variable is linearly related to another (Richard and David, 1999). To measure the strength of the correlation between two variables as per need the correlation coefficient (R) was calculated as under

$$r = \frac{\sum (X - \bar{X}) \sum (Y - \bar{Y})}{\sqrt{\sum (X - X)^2} \sqrt{\sum (Y - Y)^2}}$$

Where, r – Coefficient of correlation between variables X and Y

$\bar{X}$ – Arithmetic mean of variable X.

$\bar{Y}$ – Arithmetic mean of variable Y.

Correlation coefficient varies between – 1 and + 1. Sign of its magnitude reveals the nature of correlation i.e., direction of changes in one variable due to change in other. Further, irrespective of its sign a value nearer to zero depicts lower degree of correlation and conversely nearer to one depicts higher degree of correlation. 't'-test is applied to test the significance of correlation between the two variables.

Result and Discussion

Table 1: Correlation between Return from Fish Production and the Explanatory Variables for First Size-group

Explanatory Variables	Return	Pond Area	Human Labor Charges (Rs.)	Improved Variety Fingerlings	Manure	Feed
Return	1	0.375	0.777*	-0.014	0.206	0.375
Pond Area	0.375	1	0.492	0.702*	0.284	1.000*
Human Labor	0.777*	0.492	1	0.266	0.176	0.492
Improved Variety Fingerlings	-0.014	0.702*	0.266	1	0.065	0.702
Manure	0.206	0.284	0.176	0.065	1	0.284
Feed	0.375	1.000*	0.492	0.702*	0.284	1

*Significant at 1 percent level

In first size group, a positive correlation between return and the factors like pond area, human labor, manure, and feed were seen and that for improved variety fingerlings was negative. Human labor was significant at 1 percent. It was non-significant at permissible levels in other cases. Hence, enhancement in the pond area expenditure can add to the returns. A non-significant impact on income is seen in case of expenditure on improved variety fingerlings and better feeding.

Table 2: Correlation between Return from Fish Production and the Explanatory Variables for Second Size-group

Explanatory Variables	Return	Pond Area	Human Labor Charges (Rs.)	Improved Variety Fingerlings	Manure	Feed
Return	1	0.364	.759*	0.239	0.097	.442**
Pond Area	0.364	1	0.243	0.555*	-0.132	.702*
Human Labor	0.759	0.243	1	0.098	0.02	0.257
Improved Variety Fingerlings	0.239	.555*	0.098	1	-0.041	0.342
Manure	0.097	-0.132	0.02	0.02	1	-0.153
Feed	.442**	.703*	0.257	0.257	-0.153	1

* Significant at 1 percent level
**Significant a 5 percent level

In second size-group table-2.0 indicates that the explanatory variable expenditures were positively correlated with return and all were not significant. Significance was seen only in human labor at 1 and 5 percent level of significance. So, it can be concluded that an increased return can be seen if there is an increase in the expenditure on human labor and feed. Non-significant impact on income is seen in expenditure on improved variety fingerlings. A positive and significant impact on income is seen on expenditure on better feeding in second size-group

Table 3: Correlation between Return from Fish Production and the Explanatory Variables for Third Size-group

Explanatory Variables	Return	Pond Area	Human Labor Charges (Rs.)	Improved Variety Fingerlings	Manure	Feed
Return	1	.381**	.566*	0.452	-0.385	.423**
Pond Area	.381**	1	.665*	0.739	-0.095	.834*
Human Labor	.566*	.665*	1	0.804	-0.116	.813*
Improved Variety Fingerlings	.452*	.739*	0.804	1	-0.147	.850*
Manure	-0.385	-0.095	-0.116	-0.417	1	-0.141
Feed	.423**	0.834	0.813	0.85	-0.141	1

* Significant at 1 percent level
**Significant at 5 percent level

In third size-group table-6.26 shows that the correlation was positive between return and the factors like pond area, human labour, improved variety fingerlings and feed and that for manure was negative. But all were significant. Significance was seen in human labor and improved variety fingerlings at 1 percent and 5 percent in case of pond area, manure and feed. So, it can be concluded that expenditure on pond area, human labour, improved variety Fingeling, manure and feed increase the returns in third size group.

Conclusion

With the current analysis on the study on the objective of correlation between returns and inputs of fish farming, it can be concluded that the correlation analysis in first size-group, a positive correlation between return and the factors like pond area, human labor, manure, and feed were seen and that for fingerlings was negative. Only human labor was significantly correlated with the return. In second size-group, all the explanatory variables/factors were positively correlated with return. But the coefficient for human labor and feed only were significant. In third size-group, the return was positively correlated with all the factors except manure. The correlation coefficient for human labor and fingerlings were significant at one percent and for others as 5 percent

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