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## **Fish Farmers Development Agencies and Farmers Empowerment: An Impact Assessment Study in Uttar Pradesh**

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### **Abstract**

The paper has assessed the empowerment status of fish farmers after the intervention of Fish Farmers Development Agency (FFDA) in the four regions of Uttar Pradesh. From these four regions, one district each was selected. A sample of 159 FFDA beneficiary farmers was covered in this study following simple random sampling method and removing incomplete responses. The Empowerment Index consisting of knowledge, skill, social and economic dimensions has been developed based on the relevant literature and applied within the context of understanding development interventions. The empowerment score of the three-fourths of FFDA farmers has been found in the upper third quartile with an average score of 0.55 on a scale of 0 to 1, indicating that farmers benefitted moderately in terms of their knowledge, skill, social status and economic wellbeing with FFDA's support. The t-test has indicated that the level of economic empowerment was better in Lucknow and Aligarh districts than in Faizabad and Jhansi districts; however, knowledge, skill and social empowerment levels were found to be similar across the districts. The paired t-test has testified improvement in fish productivity (60%), profitability (41.5%) and culture area (72%) after FFDA's intervention. Farmers having FFDA contact for 10 years and above have been found significantly more empowered than those with a shorter duration of FFDA contact.

**Key words:** Fish farmers, FFDA, knowledge empowerment, skill empowerment, social empowerment, economic empowerment, Uttar Pradesh

**JEL Classification:** I38, O13, O33, Q16, Q25

### **Introduction**

The Fish Farmers Development Agency (FFDA), the centrally sponsored flagship programme for freshwater aquaculture development in India, has been providing technical support and financial assistance since 1974. Some of the interventions of FFDA are:

- Encouraging fishing communities and small scale farmers to take fish farming by providing gram panchayat ponds on lease
- Provision of bank loans and subsidies for pond renovation and input supply to take up fish farming on a larger scale
- Ensuring supply of fish seeds at the reliable rate of subsidies
- Providing technical and training assistance at every step of fish farming
- Popularizing new avocation and generating increased employment opportunities for rural masses
- Contributing towards improvement of rural economy by making fish farming economically viable

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- Organizing exhibitions, demonstrations, field trips, etc. to popularize fish culture among the public.

Empowerment is concerned with capability building of individual at the community level to help them achieve greater social awareness, to gain greater autonomy over decision making, to gain greater self-reliance, and in establishing a balance in community power relations (Pomeroy, 2001; Wiber *et al.*, 2009). Since fish farmers are receiving much of the support and services from FFDA, there is significant role of FFDA on the empowerment of fish farmers. A total of 429 FFDA has been sanctioned over successive Plan periods in the country. Since inception of the scheme, these FFDA have covered, at the national level, a water area of about 7.50 lakh ha under improved aquaculture practices with an average productivity of about 2850 kg/ha/year and imparted training in scientific aquaculture to about 9.00 lakh fish farmers. The number of beneficiaries under FFDA is reported to be 13.00 lakh (Planning Commission, 2012–2017). In India, most of the formal technology transfer activities in the fisheries and aquaculture sector are mainly organized around FFDA (Kumar and Ananthan, 2009). Pandey and Dewan (2009) have observed that expansion of aquaculture activities started only after the formation of FFDA in Mirzapur district of Uttar Pradesh. There is some evidence that FFDA has considerably pushed up the level of fish production and extended the coverage of water area under fish farming in Mirzapur district.

The institutional credit has been an effective tool to bring technological and socio-economic changes across the fish farmers. Rao (1991) had mentioned that implementation of FFDA has resulted in increased farm income and improvement in socio-economic conditions of fish farmers in India. Agricultural extension and advisory services play an important role in improving the productivity, profitability, and sustainability of smallholders' farming. Therefore, it is the main pathway to get out of poverty (World Bank, 2008). However, despite being the most important scheme of country, no detailed and macro level study has been carried out with respect to FFDA's influence on the empowerment of fish farmers. The present study has assessed the contribution of FFDA in farmers' empowerment in the large and important state of Uttar Pradesh. The state has the largest number of FFDA in the country with 70 FFDA covering water area of

1,49,595 ha and training of 1,55,404 farmers so far (DoF, 2011-12).

## Data and Methodology

The study was conducted in four regions, namely Eastern, Western, Central and Bundelkhand, of Uttar Pradesh to understand variations with respect to socio-economic status of fish farmers, fish farmers' empowerment, fish production, etc. if any, across the state. One district each from these four regions, viz. Faizabad, Aligarh, Lucknow and Jhansi, was selected purposively based on the number of ponds and extent of fish farming activities. The information on empowerment status was obtained from fish farmers by using a structured and pre-tested interview schedule, which included statements and questions on knowledge, skills, social and economic aspects of empowerment besides demographic variables. The lists of beneficiary farmers were obtained from the respective district FFDA office for the period 1997-2012 (last three Plan periods). A sample of 200 farmers, 50 farmers from each district was selected following simple random sampling method. However, only 168 farmers were available to be interviewed out of which 9 responses had to be excluded due to lack of completeness of data; thus, the final sample was consisted of 159 farmers (Lucknow-45, Faizabad-39, Aligarh-39, and Jhansi-36). Finally, data were analysed using empowerment index and relevant statistical tools.

## Empowerment Index

Empowerment, in its most general sense, refers to the ability of people to gain understanding and control over personal, social, economic and political forces to act to improve their life situations (Israel *et al.*, 1994). Czuba (1999) has suggested that it is multi-dimensional as it occurs within certain sociological, psychological, economic, and other dimensions. According to Kasmel (2011) and Bush *et al.* (2002), community empowerment has four domains: (i) activation of the community, (ii) competence of the community (knowledge and skill) in solving its own problems, (iii) program management skills, and (iv) ability of mobilizing resources (political, social, intellectual and financial). Broadly, following and adapting the concept of empowerment as outlined by Kasmel and Bush, empowerment in the present study, has been defined and assessed in terms of knowledge, skill, social and

**Table 1. Empowerment dimensions and their indicators**

| Knowledge and skill empowerment variables  | Social empowerment variables  | Economic empowerment variables   |
|--|---|--|
| <b>Recommended aquaculture practices</b> <ul style="list-style-type: none"> <li>• Pre-stocking management (5 practices)</li> <li>• Stocking and harvesting management</li> <li>• Marketing management</li> <li>• Feeding management (3 practices)</li> <li>• Disease management (3 practices)</li> </ul> | <ul style="list-style-type: none"> <li>• Holding any leadership position due to intervention of FFDA</li> <li>• Fellow farmers seeking advice after becoming member of FFDA</li> <li>• Able to convince others to take fish farming</li> <li>• Received any awards after becoming member of FFDA</li> <li>• Rise in confidence level due to intervention of FFDA</li> </ul> | <ul style="list-style-type: none"> <li>• Aquaculture area</li> <li>• Fish productivity</li> <li>• Income</li> <li>• Expenditure</li> <li>• Net income</li> </ul> |

economic dimensions. Sendilkumar (2012) has also studied empowerment dynamics by considering six major components, viz. knowledge empowerment, psychological empowerment, social empowerment, economic, political empowerment and creativity empowerment. Though the fifth dimension ‘political’ was important, FFDAs’ intervention has no direct or indirect relation to this dimension and hence was excluded (Eyben *et al.*, 2008).

Considering the intervention and activities included in the FFDA programme, an empowerment index was specifically developed for studying the empowerment level of farmers considering the four important dimensions, viz. knowledge, skill, social and economic levels. Knowledge and skill levels of the farmers were estimated based on thirteen aquaculture practices; social empowerment was studied based on level of increase or decrease in the five social variables; and economic empowerment was derived considering five important economic variables (Table 1). These four dimensions were separately measured by formulating four respective indices, namely Knowledge Empowerment Index, Skill Empowerment Index, Social Empowerment Index and Economic Empowerment Index. After estimating the total empowerment index, the respondents were classified into three categories, namely low empowerment status (0 – 0.33), medium empowerment status (0.34 – 0.67) and high empowerment status (>0.67) based on index values.

**Knowledge and Skill Empowerment Index** — The impact of extension can be directly measured by

relating it to farm productivity as productive efficiency is a measure of farmers’ level of skill and knowledge, often termed as managerial skills as a means of producing a given level of output with minimal inputs (Gautam, 2000). It refers to the specialized knowledge and skill about the field in which a farmer is working, i.e. specific aquaculture practices (Abraham *et al.*, 2010; Ayyappan *et al.*, 2011). For calculating knowledge and skill index, 13 questions/statements were selected (Table 1) and for each question, three choices were given. All responses were measured on a 3-point scale. The total score was obtained by summing the scores of 13 questions/statements, which indicated the level of knowledge and skill empowerment. Subsequently, scores were normalized and categorized as low, medium and high levels of knowledge and skill empowerment.

**Social Empowerment** — Social empowerment is understood as the process of developing a sense of autonomy and self-confidence. Sendilkumar (2012) has studied social empowerment in terms of freeness to work with group members, participation in group activities, involvement in decision making process, participation in grama sabha meetings, free interaction with family members and outsiders, team spirit and leadership quality. In the present study, questions and or statements on five variables directly relevant to FFDAs’ intervention (Table 1) were included and responses measured on a 3-point scale. For each question three choices were given. Total score was obtained by summing scores of five variables which indicated the level of social empowerment.

Subsequently, scores were normalized and categorized as low, medium and high levels of social empowerment.

**Economic Empowerment** — It refers to the economic conditions of farmers. In the present study, it was worked out keeping five major quantitative variables (Table 1). The quantitative information on aquaculture production, area, and cost of production details regarding the previous year were obtained from the respondents. For uniformity, the quantitative information was converted into qualitative information, i.e. classified into 4-point ordinal scale values (4-point scale was used to retain greater variability in the sample). The total score was obtained by the summing scores of five variables which indicated the level of economic empowerment. Subsequently, scores were normalized and categorized as low, medium and high levels of economic empowerment.

Responses for 'Knowledge', 'Skill' and 'Social' variables were scored on a 3-point scale values while responses for 'Economic' variables were scored on 4-point ordinal scale to retain greater variability available in these more quantitative types of economic variables like area, production, income, etc. Finally, as all the summarized responses of four dimensions were normalized and the resultant index values were classified into only three categories of low, medium and high, the differential scaling as indicated above did not have any effect.

The total Empowerment Index was computed by summation of four individual indices after giving differential weightage based on the literature and expert opinion as follows:

$$TEI = KEI*(0.25) + SEI*(0.25) + SoEI*(0.1) + EEI*(0.4)$$

where,

TEI = Total empowerment index

KEI = Knowledge empowerment index

SEI = Skill empowerment index

SoEI = Social empowerment index, and

EEI = Economic empowerment index.

### Statistical Tools

Descriptive statistics like frequency, percentage and mean were calculated for a comparison among the

districts; the tests of significance were utilized to find if there were significant differences between the empowerment of fish farmers before and after becoming the beneficiaries of FFDA, across the district (Sendilkumar, 2012). All the data were analysed using SPSS version 16.0 statistical software.

## Results and Discussion

### Socio-economic Status of FFDA Beneficiaries

The majority (88.1%) of farmers had leased-in ponds with only a few owning pond resources. The average aquaculture farm area was 0.67 ha, and the average pond size was only 0.55 ha. Most of the farmers (55.3%) were middle aged, between 31 and 45 years with average age of 42 years. On an average, respondent farmers had undergone 9 years of schooling, while the literacy rate was 90.5 per cent (calculated for 159 sample farmers, 2012) which is higher than the state literacy rate of 67.68 per cent (Census, 2011). Nearly half the farmers belonged to fishing castes (47.8%) which was mainly included under other backward class categories in Uttar Pradesh, while about 28 per cent belonged to the scheduled caste category. Other backward castes (10.7%) and forward castes (5.7%) constituted the rest. Except 7.5 per cent of Muslims, the majority were Hindus. The average annual income of the majority of fish farmers (65%) was between 1 lakh and 2 lakh. Bijaylaxmi Devi (2011) has studied the socioeconomic profile of fishermen in Loktak lake, where she has found that, the majority of fishermen belonged to the age group of 46 years and of them 91 per cent were Hindus and 8.7 per cent were Muslims.

### Empowerment Status of FFDA Beneficiaries

#### Knowledge and Skill Empowerment of FFDA Beneficiaries

Knowledge and skill empowerment of FFDA beneficiaries was estimated based on 13 specific aquaculture practices that were grouped under four broad categories, namely pre-stocking, stocking and harvesting (including marketing management), feeding management, and disease management. It can be inferred from Table 2 that more than 50 per cent farmers were fully aware about the pre-stocking and disease management practices, but they were not fully skilled



**Table 2. Extent of knowledge and skill of FFDA beneficiaries in Uttar Pradesh**

| Aquaculture practices              | Extent of knowledge (%) |                 |           | Extent of skill (%) |                   |             |
|------------------------------------|-------------------------|-----------------|-----------|---------------------|-------------------|-------------|
|                                    | Fully aware             | Partially aware | Not aware | Fully skilled       | Partially skilled | Not skilled |
| Pre-stocking management            | 62.3                    | 19.5            | 18.2      | 46.5                | 25.8              | 27.7        |
| Stocking and harvesting management | 43.4                    | 54.7            | 1.9       | 20.1                | 74.2              | 5.7         |
| Feeding management                 | 26.4                    | 50.3            | 23.3      | 2.5                 | 44.7              | 52.8        |
| Disease management                 | 54.1                    | 28.3            | 17.6      | 27.7                | 42.8              | 29.6        |

to apply those practices at the field level. It could also be inferred that FFDA beneficiary farmers were well aware about the stocking and harvesting management which is the most vital practice in fish farming, but the application at the field level was not satisfactory. This was most probably due to the quality of training that they had received from the FFDA. It was also seen during the field visit to beneficiary farms that the farmers were aware about the important aquaculture practices but because of some financial constraints or lack of technical guidance in specialized, practices they were not able to fully apply it in their fields.

Tables 3 and 4 provide value of knowledge and skill empowerment of FFDA beneficiaries. It could be seen that nearly 58.5 per cent farmers scored above the overall knowledge empowerment index value (0.63), which was quite striking. In the case of skill empowerment, the skill level of farmers was found to be significant as about 47.2 per cent farmers scored

above (0.57) in their skill empowerment index. The knowledge and skill empowerment indices were found to be significantly correlated (0.857\*\*) and other indices also had a positive association with skill and knowledge empowerment of FFDA beneficiaries (\*\*correlation is significant at 1% level of significance). It was also found that farmers who had a longer contact with FFDA and had attended more number of trainings were more empowered in terms of knowledge and skill (Tables 10 and 11).

Sendilkumar (2012) has also analysed knowledge empowerment in terms of awareness of information, knowledge and skills possessed by the respondents before and after joining the GALASA (Group Approach for Locally Adapted and Sustainable Agriculture) programme. It was revealed that the mean scores of all the dimensions of empowerment increased significantly after joining the GALASA programme by the farmers. The major reason for knowledge

**Table 3. Fish farmers' knowledge empowerment (N=159)**

| Degree of knowledge empowerment   | Frequency | Per cent | Mean value | Standard deviation |
|-----------------------------------|-----------|----------|------------|--------------------|
| Low (0-0.33)                      | 32        | 20.2     | 0.16       | 0.098              |
| Medium (0.34-0.67)                | 34        | 21.4     | 0.51       | 0.106              |
| High (>0.67)                      | 93        | 58.5     | 0.84       | 0.079              |
| Knowledge Empowerment Index (KEI) | -         | -        | 0.63       | 0.285              |

**Table 4. Fish farmers' skill empowerment (N=159)**

| Degree of skill empowerment   | Frequency | Per cent | Mean value | Standard deviation |
|-------------------------------|-----------|----------|------------|--------------------|
| Low (0-0.33)                  | 46        | 28.9     | 0.15       | 0.087              |
| Medium (0.34-0.67)            | 38        | 23.9     | 0.53       | 0.095              |
| High (>0.67)                  | 75        | 47.2     | 0.82       | 0.090              |
| Skill Empowerment Index (SEI) | -         | -        | 0.57       | 0.296              |

**Table 5. Fish farmers' social empowerment (N=159)**

| Degree of social empowerment    | Frequency | Per cent | Mean value | Standard deviation |
|---------------------------------|-----------|----------|------------|--------------------|
| Low (0-0.33)                    | 45        | 28.3     | 0.26       | 0.065              |
| Medium (0.34-0.67)              | 68        | 42.8     | 0.47       | 0.080              |
| High (>0.67)                    | 46        | 28.9     | 0.84       | 0.118              |
| Social Empowerment Index (SoEI) | -         | -        | 0.52       | 0.242              |

empowerment was their participation in the training programs conducted by various development agencies in the study area, as was also reported by Sendilkumar (2012).

### Social Empowerment of FFDA Beneficiaries

The social variables, viz. measures of confidence, leadership, persuasiveness and social recognition, were considered for constructing the 'Social Empowerment Index' (SoEI). It can be seen from Table 5 that the social empowerment of FFDA beneficiaries had improved only moderately due to the intervention of FFDA programme as about 30 per cent farmers scored above the mean score (0.52) of social empowerment index. This can be explained as the FFDA programme was not intended to address or change the social status of beneficiaries, but was rather perceived to only indirectly contribute. Since FFDA programme has no direct association with the social behaviour of fish farmers, the impact of FFDA on the social status of beneficiaries was found to be moderate.

It must be noted here that social status is a derived impact of many related factors besides knowledge, skill and economic levels of an individual. However, SoEI had positive correlation (\*\*correlation is significant at 1% significance level) with knowledge (0.326\*\*), skill (0.331\*\*), economic (0.358\*\*) and overall empowerment (0.484\*\*) of FFDA beneficiaries, though strength was weak. It was also evident from Table 11 that farmers who attended more number of

trainings and had a longer contact with FFDA, were found to be socially more empowered. Sendilkumar (2012) has reported that the confidence level and courage of the respondents in farming (paddy cultivation) increased considerably after joining GALASA programme. It can also be seen that team spirit and leadership quality of the respondents improved after joining the programme.

### Economic Empowerment of FFDA Beneficiaries

It refers to the economic conditions of farmers. It was worked out keeping five major variables (Table 1). The fish production and income relate to the year 2013. Table 6 indicates the economic empowerment index of FFDA beneficiaries. The economic status of many farmers was quite high as nearly three-fourth farmers (76%) had the mean economic empowerment index score of >0.50. The correlation results revealed a positive and strong relationship of economic empowerment index with overall empowerment of FFDA beneficiaries (0.860\*\*) as well as other indices (knowledge- 0.530\*\*; skill- 0.590\*\*; social- 0.358\*\*) (\*\*correlation is significant at 1% significance level). It can also be seen from Table 11 that farmers having good knowledge about the fish farming, were found to be economically better off.

Sendilkumar (2012) has studied the economic empowerment of farmer members based on the selected parameters like income, savings habit, investments, financial management skill, extent of dependency on

**Table 6. Fish farmer's economic empowerment (N=159)**

| Degree of economic empowerment   | Frequency | Per cent | Mean value | Standard deviation |
|----------------------------------|-----------|----------|------------|--------------------|
| Low (0-0.33)                     | 41        | 25.8     | 0.17       | 0.102              |
| Medium (0.34-0.67)               | 73        | 45.9     | 0.50       | 0.101              |
| High (>0.67)                     | 45        | 28.3     | 0.82       | 0.091              |
| Economic Empowerment Index (EEI) | -         | -        | 0.50       | 0.258              |

**Table 7. Kruskal Wallis test to assess economic empowerment in four districts of Uttar Pradesh**

| Variable                   | District | N  | Mean rank | Significance level |
|----------------------------|----------|----|-----------|--------------------|
| Economic Empowerment Index | Aligarh  | 39 | 81.68     | < 0.01             |
|                            | Lucknow  | 45 | 98.95     |                    |
|                            | Jhansi   | 36 | 64.31     |                    |
|                            | Faizabad | 39 | 66.5      |                    |
| Fish productivity (kg/ha)  | Aligarh  | 39 | 92.5      | < 0.01             |
|                            | Lucknow  | 45 | 105.85    |                    |
|                            | Jhansi   | 36 | 52.53     |                    |
|                            | Faizabad | 39 | 56.19     |                    |

money lenders, purchasing of input, etc. and found that the income of respondents was increased, which might be due to increase in the yield obtained after joining the GALASA programme. Agricultural extension and advisory services had a positive effect on farm productivity of Ethiopian smallholders (Elias *et al.*, 2013).

The impact study of development programme MGNREGA revealed that the scheme has been successful in increasing the income by providing wage employment to rural households in Dungarpur district of Rajasthan where 51 per cent households, who reported yearly income up to ₹ 25000, admitted that MGNREGA jobs had contributed ₹ 5000 to ₹ 10000 in the yearly income of their family (Pamecha and Sharma, 2015).

Based on the results of Kruskal Wallis test, it could be inferred that there is a significant difference among the selected four districts in terms of their economic empowerment. The FFDA farmers in Lucknow and Aligarh were economically more empowered than farmers in Jhansi and Faizabad (Table 7). This can be attributed largely to the higher fish productivity observed in the former districts as compared to the later which itself can be considered as a factor of better adoption of scientific fish farming practices (Pooja *et al.*, 2015). It was also attested by the intensification of fish culture activities observed during the field visit in these districts.

### Economic Impact Analysis (Paired t-test)

Paired t-test was performed to assess the economic impact of FFDA's intervention on beneficiary-farmers, before and after they had joined the FFDA program. Only 26 farmers among 159 respondents were found

practising fish farming both before and after becoming the beneficiary of FFDA, and hence this test was conducted only for this set of sample farmers. Table 8 gives a significant correlation and mean difference by comparing different economic parameters regarding the impact of FFDA programme on fish farmers before and after FFDA intervention. The test was conducted at 99 per cent of confidence interval with 25 degrees of freedom for each economic variable. The sign 2-tailed value for all variables is less than 0.01. The test testified that fish productivity (60%), profitability (41.5%) and culture area (72%) improved significantly after FFDA intervention. Therefore, it can be surmised that FFDA interventions significantly improved the economic status of fish farmers.

In another study (Shukla, 1999), a considerable increase in average fish production of the respondent farmers in Raibareli district of Uttar Pradesh after their membership in FFDA, has been noted. Desai (1979) had also reported that the average annual income of a beneficiary household increased by 34 per cent vis-à-vis household income of non-beneficiaries, while the average annual net income of beneficiary small farmers increased by 77 per cent in the case of Small Farmers Development Agency program. Olujenyio (2006) has also found a significant difference in mean yields in all the four crops of the farmers and between the mean score of hectare of land cultivated by the farmers before and after the inception of the agricultural development programme.

The number per household of members engaged in fish farming increased by 2.5-times vis-à-vis the previous number, which implies that FFDA-Raibareli has succeeded in generating more employment (Shukla, 1999). The impact of extension programmes is



**Table 8. Paired t-test values (N=26)**

| Variable                  | Pair        | Mean values    | Paired t-test significance |
|---------------------------|-------------|----------------|----------------------------|
| Productivity (kg/ha/year) | Before FFDA | 2,057          | <0.01                      |
|                           | After FFDA  | 3,438 (60%)    |                            |
| Area (ha)                 | Before FFDA | 0.65           | <0.01                      |
|                           | After FFDA  | 0.90 (72%)     |                            |
| Income (₹/ha)             | Before FFDA | 1,20,570       | <0.01                      |
|                           | After FFDA  | 2,83,609 (43%) |                            |
| Expenditure (₹/ha)        | Before FFDA | 54,123         | <0.01                      |
|                           | After FFDA  | 1,46,347 (37%) |                            |
| Net profit (₹/ha)         | Before FFDA | 57,007         | <0.01                      |
|                           | After FFDA  | 1,37,235 (42%) |                            |

*Note:* The values within the parentheses indicate percent increase after as compared to before joining FFDA program.

associated with improvements in productivity and household income. However, a worldwide review of agricultural extension services shows that the impact of these services on rural livelihoods has been mixed: very high rates of return in some cases and negligible achievements in other cases (Rivera *et al.*, 2001; Anderson and Feder, 2007), though in the present case it has been positive.

#### **Overall Empowerment Level of Beneficiary Framers due to Intervention of FFDA**

A perusal of Table 9 reveals that overall empowerment level of fish farmers was quite impressive with nearly three-fourths of them scoring above the average value on empowerment scale. Though it cannot be concluded deterministically that FFDA has done exceedingly well, it may safely be surmised that farmers have been certainly benefitted from FFDA in terms of their knowledge, skill, social status and economic well-being. Sendilkumar (2012) has studied the empowerment of farmers through GALASA programme in Kerala and concluded the programme led to empowerment of farmers in all its

dimensions and thereby assured sustainable rice production in the state. In another impact study of Agricultural Development Programme (ADP) on farmers in the rural areas of Nigeria, West Africa, it was shown that the majority of farmers (51.39%) fell within the 'medium' impact level score on the impact table constructed, about 32 per cent fell within the 'high' impact level score, while 16.67 per cent fell within the 'low' impact level score (Olujenyo, 2006).

The impact of intervention of development institutions is not seen universally positive. For example, the impact evaluation of agricultural extension programme in Kenya revealed that 66 per cent opined that their welfare had become worse than it was earlier, while only 25 per cent reported that it had improved. Similarly, in the case of agricultural productivity, more than 72 per cent thought it only declined further than before, while 25 per cent regarded it had improved (Gautam, 2000).

#### **Kruskal Wallis Test for FFDA Members**

Kruskal Wallis test indicated significant differences in various socio-economic variables of beneficiaries

**Table 9. Fish farmers' overall empowerment (N=159)**

| Degree of empowerment   | Frequency | Per cent | Mean value | Standard deviation |
|-------------------------|-----------|----------|------------|--------------------|
| Low (0-0.33)            | 39        | 24.5     | 0.22       | 0.060              |
| Medium (0.34-0.67)      | 59        | 37.1     | 0.53       | 0.094              |
| High (>0.67)            | 61        | 38.4     | 0.78       | 0.081              |
| Total Empowerment Index |           |          | 0.55       | 0.230              |

**Table 10. Kruskal Wallis test for FFDA members**

| Variable                | Length of FFDA membership | N   | Mean rank | Significance level |
|-------------------------|---------------------------|-----|-----------|--------------------|
| Age                     | <10 years                 | 101 | 60.91     | < 0.01             |
|                         | 10-20                     | 38  | 97.50     |                    |
|                         | >20                       | 20  | 143.15    |                    |
| Education level         | <10 years                 | 101 | 92.97     | < 0.01             |
|                         | 10-20                     | 38  | 68.95     |                    |
|                         | >20                       | 20  | 35.52     |                    |
| Skill Empowerment Index | <10 years                 | 101 | 73.64     | < 0.05             |
|                         | 10-20                     | 38  | 89.12     |                    |
|                         | >20                       | 20  | 94.78     |                    |
| No. of trainings        | <10                       | 101 | 69.29     | < 0.01             |
|                         | 10-20                     | 38  | 90.37     |                    |
|                         | >20                       | 20  | 114.40    |                    |
| Fish productivity       | <10 years                 | 101 | 79.76     | < 0.05             |
|                         | 10-20                     | 38  | 76.36     |                    |
|                         | >20                       | 20  | 88.12     |                    |

in terms of their length of association or membership in FFDA programme with test values for age, education level, number of trainings and skill empowerment being either less than 0.01 or 0.05 (Table 10). While it is understandable that old farmers had higher number of years of membership whose education levels were also relatively lower than of younger farmers, what was surprising was that the same elderly group of farmers having membership longer than 10 years, scored higher on skill empowerment as well as produced more fish per unit area than the more educated and relatively younger cohorts. More importantly, greater extent of association with FFDA also meant higher number of training programs attended by farmers and higher fish productivity underscoring the overall positive contribution of FFDA programme. These findings support another study (Sendilkumar, 2012) that the contact with institutions and linkage with development departments by the respondent farmers remarkably improve most of the dimensions of their empowerment.

#### **Kruskal Wallis Test for Trainings Attended by FFDA Members**

From Table 11, it is evident that fish productivity as well as all the dimensions of empowerment increased significantly with respect to number of FFDA training programmes attended by the beneficiary farmers. The test value for the entire variable was found to be either

less than 0.05 or 0.01. Training provided by the FFDA resulted in increase in knowledge and skill of fish farmers and was organized at the right time with need-based course content with appropriate physical facilities (Shukla, 1999). This only further strengthened the positive impact of FFDA program in terms of achieving higher fish yield through scientific culture practices and increasing farmers' income and welfare levels.

#### **Conclusions**

The study has investigated the empowerment level of fish farmers, especially the FFDA-members in the state of Uttar Pradesh. Overall, the empowerment level of fish farmers attached with FFDA has been found quite impressive with nearly three-fourths of them scoring above the average value on the overall empowerment scale. The 't-test' has also revealed a significant impact of FFDA intervention on the economic status of fish farmers in Uttar Pradesh. The knowledge and skill empowerment of FFDA-beneficiaries has been found quite notable while the beneficiary farmers benefitted only moderately with respect to their social attributes probably because the FFDA programme has no direct role in the social upliftment of farmers. While age of farmers has shown a positive relationship, education level has revealed a negative relationship with the length of FFDA

**Table 11. Kruskal Wallis test for trainings attended by FFDA farmers in Uttar Pradesh**

| Variable                    | No. of training attended | N  | Mean rank | Significance level |
|-----------------------------|--------------------------|----|-----------|--------------------|
| Fish productivity           | 0                        | 38 | 62.20     | 0.05               |
|                             | 1-2                      | 7  | 76.29     |                    |
|                             | 3-4                      | 71 | 82.93     |                    |
|                             | 5-6                      | 35 | 89.94     |                    |
|                             | >7                       | 8  | 98.31     |                    |
| Knowledge Empowerment Index | 0                        | 38 | 67.05     | 0.05               |
|                             | 1-2                      | 7  | 72.21     |                    |
|                             | 3-4                      | 71 | 77.40     |                    |
|                             | 5-6                      | 35 | 95.43     |                    |
|                             | >7                       | 8  | 103.88    |                    |
| Skill Empowerment Index     | 0                        | 38 | 67.21     | < 0.05             |
|                             | 1-2                      | 7  | 76.64     |                    |
|                             | 3-4                      | 71 | 78.13     |                    |
|                             | 5-6                      | 35 | 91.17     |                    |
|                             | >7                       | 8  | 111.44    |                    |
| Economic Empowerment Index  | 0                        | 38 | 63.50     | < 0.05             |
|                             | 1-2                      | 7  | 63.36     |                    |
|                             | 3-4                      | 71 | 83.64     |                    |
|                             | 5-6                      | 35 | 87.66     |                    |
|                             | >7                       | 8  | 107.12    |                    |
| Social Empowerment Index    | 0                        | 38 | 56.46     | < 0.01             |
|                             | 1-2                      | 7  | 92.57     |                    |
|                             | 3-4                      | 71 | 82.26     |                    |
|                             | 5-6                      | 35 | 91.93     |                    |
|                             | >7                       | 8  | 108.56    |                    |
| Empowerment Index           | 0                        | 38 | 61.49     | 0.01               |
|                             | 1-2                      | 7  | 73.00     |                    |
|                             | 3-4                      | 71 | 80.57     |                    |
|                             | 5-6                      | 35 | 93.56     |                    |
|                             | >7                       | 8  | 109.69    |                    |

membership. The skill empowerment of FFDA-farmers and with that fish productivity as well, increased significantly with the duration of FFDA membership. Hence, it was only logical that farmers having longer contact with FFDA had a higher level of economic and overall empowerment status.

However, there is a large scope for further improvement. The historical regional disparity within the state of Uttar Pradesh is a constant challenge for development agencies. Ironically, the regions which are productive in terms of aquaculture, are economically backward. The regional disparities across the state need to be addressed at a broader level. Unlike

the states of Jharkhand and Chhattisgarh, the involvement of NGOs/CBOs and women-SHG in the fisheries development is rather minimal. Intensification of aquaculture has not been uniform and widespread. Effective FFDA-programmes could play a major role in contributing to horizontal expansion by bringing more area under scientific fish culture as well as vertical expansion by increasing the average productivity through best management practices, species diversification and intensification. To make this happen, training and extension programs within the Fisheries Department shall receive a greater priority. Training and infrastructure facilities at district level

need to be strengthened along with recruitment of technically qualified staff. Networking coupled with involvement of progressive fish farmers in training programmes would generate greater impact among fellow farmers as has been successfully demonstrated in the case of Jharkhand's *Matsya Mitra* program where progressive fishers and fish farmers co-opted to spread the message of fisheries development. The FFDA-farmers themselves suggested to modify the training curriculum as well as delivery to make it more specialized and diversified, incorporating adequate field visits. With the recent Skilling India programme providing much-needed focus on capacity building of the Indian youth to take up self-employment, the state Fisheries Department should seize the opportunity to give a new life to the budget-starved FFDA programme with renewed focus, institutional innovations and innovative delivery systems.

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