Predictive Factors of Knowledge Level of *Beel* users on Sustainable Development of *Beel* Fisheries

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In the eastern states of India, the flood plain wet lands are locally known as *beel*. They constitute an important fishery resource. Among the Indian states, Assam has the maximum number of *beels* associated with river Brahmaputra and Barak (Sugunan and Bhattachrjya, 2000). Srivastava and Bhattacharjya (2003) stated that Assam *beels* are the most potential and lucrative water resource because they contribute 49.45 per cent of total flood plain wetlands of the country. However, its existing production is a mere 173kg.ha^{-1} year^{-1} against the estimated production potential of 1000-1500kg.ha^{-1} year^{-1}.

It is quite abvious that in order to achieve sustainable development of *beel* fisheries, a study of the knowledge level of *beel* users on sustainable development of *beel* fisheries is quite imperative. Different predictor variables may influence knowledge level of *beel* users in this regard. This study was conducted to find out the existing knowledge of *beel* users as well as its association with different predictor variables (socio-economic) about sustainable development of *beel*. Considering the sustainable development of the *beel*. the study was conducted at *Dek beel* under Kamalpur development block of Kamrup district, Assam.

The study was conducted at *DekBeel located* at the village Bar-Dekpar. The village is located about 15 Km away from Guwahati city. It is an ox-bow shaped closed *beel* of a convenient size of about 7.0 ha water-spread area. The people are living in the surrounding area of the *beel*. From the total population of 650 villagers, a list of 434 surrounding *beel* users, both male and female engaged in different activities was prepared. Again, from the list of 434 *beel* users, 120 respondents were selected by simple random sampling without replacement. Thus, 120 respondents constituted the sample for this study.

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Data were collected during March to June, 2004 by the investigator with the help of a personal interview schedule. Initially, data were collected in the local language and responses were recorded simultaneously in English. Seven predictor variables (socio-economic) namely annual income (X_1), occupation (X_2), land holding (X_3), social participation (X_4), fisheries infrastructure (X_5), involvement of integrated agriculture (X_6) and women empowerment (X_7) were taken into account for the study. These variables were operationalised either as per the procedures followed by earlier researchers or by developing schedules for the said variables. Knowledge scores of *beel* users on sustainable development of *beel* fisheries (Y) was taken the as dependent variable. The responses for the dependent variable were taken by administrating the knowledge test (major items/sub-items analysis procedure) developed by Dana (1987) and Shaikh et al. (1993) with necessary modifications. Respondents were grouped into three categories namely low, medium and high level based on mean and standard deviation of their knowledge scores on sustainable development of *beel* fisheries.

The collected data were checked and put in proper format for coding in IBM sheets. For making simple comparisons, frequency tables were constructed and percentages were calculated. Data were fed into the computer and correlation matrix was prepared. Afterwards, correlation coefficient and regression analysis techniques were used to analyze the data using Statistical Package for Social Sciences (SPSS, Ver.7.5). Again, step-wise multiple regression analysis was followed considering the probability of 'F' as 0. 05 at entry and probability of 'F' as 0.01 for removing the variables to select the best predictors

The study variables viz. fisheries infrastructure, involvement in integrated agriculture, woman empowerment are operationally defined according to relevance in the *beel* fisheries development aspect.

Fisheries infrastructure refers to the infrastructure available to the *beel* users which include cultivable fishpond, availability of nursery and rearing tank for raising of fish seeds, water retaining structure at the *beel*, model fish farm with or without eco-hatchery, craft and gear used in fishing and harvesting.The fisheries infrastructure was quantified with the score of high infrasructure - 3; medium infrastructure - 2; poor infrastructure - 1; no infrastructure - 0.

Involvement in integrated agriculture refers to the involvement of a *beel* user with different agriculture, horticulture and animal husbandry activities besides his/her fisheries activities including ornamental fish farming for effective utilization of land-water resources. This variable was quantified as high involvement-3,medium involvement-2, low involvement-1, without involvement-0.

The concept of women empowerment, here, is related to involvement of women *beel* users in each stage of *beel* development programme. Fisherwomen generally play a significant role in the general livelihood of fishermen families. They can contribute significantly to the fisheries and aquaculture activities besides their day-to-day work. Empowering the women to take decisions on different fisheries development activities, equitable distribution of profit, formation of women led Self Help Group for effective development and management of *beel* fisheries etc are important for sustainable *beel* fisheries. This variable was analyzed by taking responses from the respondent on the following points. For each of these, dichotomous type of questions were structured. Here, while scoring, 'yes' response of the *beel* users was awarded with score of 1 and for 'no' response, the score '0' was given. For finding out the total scores of woman empowerment for sustainable development of *beel* fisheries, the scores for each item were added.

a) Fisherwomen should not be involved in any kind of fisheries activities.

b) Fisherwomen if engaged in different fisheries activities, will not get enough time to perform their domestic duties.

c) Fisherwomen should stay at home to take care of their family only.

d) Fisherwomen should be involved in scientific fish culture including pre stocking, stocking and post stocking management activities.

e) Fisherwomen can be involved in fish seed raising easily.

f) Making and repairing of net weaving is a good source for fisherwomen involvement.

g) Fisherwomen should not take part in any organizational activities including formation of women led Self Help Group for effective development and management of *beel* fisheries.

Results and Discussion

Background Information of Beel Users

The study revealed that as many as 84 (70%) *beel* users were from higher caste followed by 22 (18.33%) from scheduled caste and remaining 14 (11.67%) from other backward caste (Table1). This may be due to the fact that higher caste people dominated the locale of the study. Moreover, with the abrupt change of employment and economic scenario in the state, fisheries and aquaculture has gained much importance as an alternative measure of livelihood for the farming community, as it can easily provide employment opportunity to all segments of people-young and old, educated and uneducated, male and female, job seekers and jobless or even school-dropouts and so on. Besides,

Table 1: Distribution of Respondents according to Caste (N = 120)

Category	Frequency	Percentage
a) Higher caste	84	70
b) Scheduled caste	22	18.33
c) Other backward caste	14	11.67

most of the respondents were educated but unemployed. Considering the profit and returns from fisheries and aquaculture, perhaps, they confined their mind to take it as their new vocation for livelihood.

In regard to annual income (Table-2), majority 47 (39.2%) of the *beel* users were from middle annual income group (Rs. 26,000-50,000/-) followed by 38 (31.7%) from low-income group (up to Rs. 25000/-). The remaining 35(29.1%) were from higher income group(More than Rs.50000/-)

Table 2: Distribution of Respondents according to annual income (N = 120)

Category	Frequency	Percentage
a) Low (up to Rs.25,000)	38	31.7
b) Middle (Rs.25,000-50,000)	47	39.2
c) Higher (More than Rs.50,000)	35	29.1

Further, majority (35%) of them indicated agriculture as their major profession with average land holding of 24.43 *kathas* (S.D. = 14.69). Most of them (51.7%) were members of more than one organization and found to have medium level of women empowerment scores. However, majority of them (43.3%) had poor fisheries infrastructure with medium involvement in integrated agriculture (45%). The study indicated that majority 58 (48.4%) of the *beel* users had obtained medium knowledge scores with respect to sustainable development of *beel* fisheries (Table 3). This may be due to the fact that majority of the *beel* users were from the higher caste with agriculture as their major occupation. As most of them (51.7%) were members of more than one organization, it enable them to share different views relating to agriculture and aquaculture during different social meetings and/or public gathering. Further, they may collect different information from other information sources regarding development and management of *beel* fisheries.

Table 3: Distribution of Respondents according to knowledge (N = 120)

Category	Frequency	Percentage
a) High knowledge scores (more than 80)	16	13.3
b) Medium knowledge scores (56-80)	58	48.4
c) Low knowledge scores scores (30-55)	46	38.3

Predictor Variables (socio-economic) and their relationship with Knowledge Level of *beel* Users

Correlation analysis (Table 4) indicated that out of seven predictor variables (socio-economic), six variables namely annual income (X_1), occupation (X_2), social participation (X_4), fisheries infrastructure (X_5), involvement in

integrated agriculture (X_6) and women empowerment (X_7) were found to have positive and significant association with the knowledge level of *beel* users. However, land holding was found to have no association with their knowledge level in this regard. The positive and significant association ($P<0.01$) of annual income and occupation with *beel* users knowledge level on sustainable development of *beel* fisheries may be due to their gathering more information through different information sources like radio, TV, newspaper, etc. for effective utilization of common property resources like *beel*.

The significant association of ($P<0.01$) social participation and knowledge level of *beel* users, infers that higher the social participation, greater is the chance of social interaction with different sections of people and higher is the level of knowledge. Positive and significant association ($P<0.01$) of *beel* user's involvement in integrated agriculture and their knowledge level revealed that through the active involvement in integrated agriculture with fish farming practices viz. fish cum rice, fish cum pig, fish cum horticulture, etc, a *beel* user can gain sufficient knowledge and experiences on effective utilization of agricultural land resources to enhance the productivity of the land area in a sustained manner so that per unit area productivity of land is ascertained. Similar justification may be put forth for the positive and significant association ($P<0.05$) of fisheries infrastructure and the knowledge level of *beel* users.

Further, positive significant association ($P<0.01$) of women empowerment and knowledge level of *beel* users on sustainable development of *beel* fisheries indicates that knowledge level of *beel* users increased with the increase of level of women empowerment in a systematic way. This may be due to the fact that through empowerment, they get maximum chance of involvement in different types of beel fisheries development and management activities, because, they can take decisions themselves, can organize themselves under the leadership from this type of women led fisheries activities which finally helps in the development of social capital as a whole.

Table 4: Socio-economic Factors associated with knowledge level of *beel* users

Sl. No. code	Predictor variables	'r' values
X_1.	Annual income	0.45**
X_2.	Occupation	0.25*
X_3.	Land holding	0.14^{NS}
X_4.	Social participation	0.54**
X_5.	Fishery infrastructure facilities	0.21*
X_6.	Involvement in integrated agriculture	0.40**
X_7.	Women empowerment	0.63**

NS = Non significant

* = Significant at 0.05 level of probability (P<0.05)

** = *Significant at 0.01 level of probability (P<0.01)*

Regression analysis (Table 4A) further revealed that out of seven predictor variables, only three predictor variables viz. women empowerment (X_7), involvement in integrated agriculture (X_6) and annual income (X_1) were found to be most significantly contributing predictor variables that explained the variability of *beel* users knowledge level on sustainable development of *beel* fisheries.

Table 4A : Variables affecting Knowledge Level of Beel users

Sl.No.	Sl. Code No.	Predictor Variables	Beta co-efficient	't' value
1.	X_7	Women empowerment	8.445	6.664**
2.	X_6	Involvement in integrated agriculture	4.613	3.699**
3.	X_1	Annual income	3.968	2.749*
	Constant	**20.59**	**5.51**	

* Significant at 0.05 level of probability (P<0.05)

** Significant at 0.01 level of probability (P<0.01)

Table 4B : Multiple Regression analysis of factors affecting knowledge level of *beel* users

Step No	Variables	Variables name	R	R^2	Adjusted R^2	SE (estimate)
1.	X_7	Women empowerment	0.630	0.397	0.392	12.13
2.	X_6	Involvement in integrated agriculture	0.681	0.464	0.455	11.48
3.	X_1	Annual income	0.705	0.497	0.484	11.77

Table 4B indicates best fitted multiple regression equation following stepwise method where 'F' value to enter is 0.05 and to remove is 0.01. Adjusted R^2 (Table 4B) indicates that the three-predictor variables included in the regression equation, now, can predict 48% of *beel* users knowledge level on sustainable development of *beel*. The required regression equation is given by : (using table-4A)

$Y = 20.59 + 8.45 \times X_7 + 4.61 \times X_5 + 3.97 \times X_1$

Here, R^2 = 50%, Adjusted R^2 = 48%, Standard Error (estimate) = 11.17

Conclusion

From the above findings of the study it can be concluded that for sustainable development of *beel* fisheries on a long-term basis, maximum emphasis should be on building social and physical capital of *beel* users. As, women empowerment emerged as the most crucial factor that contributed significantly to the *beel* users knowledge level on sustainable development of *beel* fisheries, activities aimed at women empowerment need encouragement for creation and formation, building and enhancement of beel users' social and physical capital as the ultimate aim of sustainable *beel* fisheries.

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