SOCIETY OF EXTENSION EDUCATION

RESEARCH ARTICLE

Assessing Farmers' Perception on Disaster Risk Mitigation Practices of Flood Prone areas of Dhemaji district, Assam

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ABSTRACT

Floods, droughts, storms, earthquakes, fires and severe weather conditions have significant, widespread and long-lasting impacts on the agricultural sector. The study was conducted in flood prone areas of Dhemaji district of Assam to assess the farmers' perception on disaster risk mitigation practices and study selected personal, socio-economic, psychological and communication attributes of farmer respondents as well as to find out the relationship between perception of farmers on disaster risk mitigation practices with the selected personal, socio-economic, psychological and communication attributes of the respondents. A multi-stage, purposive cum random sampling design was used in the study for selecting 100 sample respondents. The study revealed that most of the respondents were young to middle aged, marginal farmers and had medium level of formal education. Majority of them belonged to the low and medium level of annual income categories and had medium level of economic motivation, scientific orientation, extension contact and mass media exposure. The perception Index indicates that high majority of the farmers showed favourable perception on disaster risk mitigation practices. Correlation analysis of the independent variables of the study with perception of farmers on disaster risk mitigation practices revealed that six independent variables, viz., size of land holding, extension contact, mass media exposure, age, education and risk bearing ability were positively and significantly correlated with mitigation practices. Appropriate agricultural technology interventions suited for hazards affected areas may be planned keeping in mind farmers' favourable perception on technologies and their socio-economic attributes.

***Key words** : Farmers' Perception; Disaster Risk Mitigation; Perception Index; Flood Prone.*

Multiple disasters have imposed devastating consequences on agriculture, food security and the livelihoods of millions of farmers. Natural disaster mainly floods, draughts, cyclone and hailstorms are posing threat to food and livelihoods security for millions of people. A recent FAO study found that between 2006 and 2016, the agriculture sector absorbed approximately 23 percent of all damages and losses caused by natural hazard-induced disasters in developing countries (FAO, 2018). If not prevented, these impacts will continue to have major negative implications on food security and poverty around the globe. There are multiple pathways to reduce the impacts of natural hazard induced disasters on the agriculture sector, at different levels – including farm level. Prevention and Mitigation are considered as key elements of the disaster risk management (DRM) framework for Agriculture (*OECD/FAO, 2021*).

A number of agricultural disaster mitigation practices are developed, available and being disseminated through various extension and advisory service agencies for the farming community. Numerous studies have been conducted on the adoption of agricultural technologies in developing countries, particularly focussing on socio-economic situations and farm attributes (*Feder et al. 1985*; *Doss and Morris 2000*; *Lapar and Ehuri 2004*). There are many factors that influence adoption decision like individual farmer's behaviour based on the self perception towards new technologies (*Burton 2004*; *Cramerer and Loewerstein 2004*; *Garforth et al. 2004*; *Rehman et al., 2007*; *Azman et al. 2013*; *Datta and Mullainathan 2013*). An analysis

of adoption studies stated that there are three paradigms of reasons why some farmers adopt new technologies and others do not. These are the innovation-diffusion paradigm ; the economic constraints paradigm and the adopter-perception paradigm (*Adesina & Zinnah,1993 ; Prager & Posthumus, 2010)*. The adopter-perception paradigm allows for a level of subjectivity by contending that it is the perceived need to innovate and the perceived attributes of innovations that determine adoption behaviour (*Kivlin and Fliegel,1967, Adesina and Zinnah,1993*. It is stated that favourable perception on developed technologies is another pre requisite for technology adoption. Farmers' perception assessment on disaster mitigation practices is needed to facilitate the adoption for improving their adaptive capacities**.** With this context, a study is designed to assess the farmers' perception on disaster risk mitigation practices, study selected personal, socio-economic, psychological and communication attributes of farmer respondents as well as to find out the relationship between perception of farmers on disaster risk mitigation practices with the selected personal, socio-economic, psychological and communication attributes of the respondents.

METHODOLOGY

The present study was carried out in Dhemaji district under North Bank Plain Agro-Climatic Zone of Assam. A multi-stage, purposive cum random sampling design was adopted for the study in order to select 100 respondents. Data were collected with the help of a pretested, structured research schedule, using the personal interview method. A total of fourteen farm disaster risk mitigation practices were considered for the study based on experts' opinion. A Likert type scale was prepared to measure the perception of farmers towards disaster risk mitigation practices. Responses were scored on a 5 point continuum ranging from 5= 'Strongly Agree' to 1= 'Strongly Disagree'. The respondents were asked to rank the statements as per their view point. The perception Index was calculated out using the formula

$$\text{Index on perception} = \frac{\text{Scored obtained by Individual}}{\text{Maximum score}} \times 100$$

The statistical techniques and tests such as frequency, percentage, mean, standard deviation, co-efficient of variation, Pearson's product moment correlation coefficient and t-test were used in the study for analysis and interpretation of data.

RESULTS AND DISCUSSION

Attributes of the respondents : A total of nine independent variables *viz*., age, education, family size, size of land holding, annual income, economic motivation and risk bearing ability, extension contact and mass media exposure were considered for the study. The respondents were categorized on the basis of descriptive statistics in relation to each attribute.

Age, education and family size : A perusal of Table 1 reveals that majority of the respondents (56.00%) belonged to the middle age category followed by young age category (33.00%). Only 11.00 per cent of the respondents belonged to the old age category. The mean value (43.76) indicates that on an average the respondents belonged to middle aged category. The coefficient of variation (29.54%) indicates that the respondents were moderately heterogeneous with respect to their age.

The Table 1 also reveals that majority of the respondents (29.00%) had formal education up to high school level, followed by those having education up to middle school level (27.00%). Significantly, 17 per cent of the respondents were illiterate. A few respondents (11.00%) were primary school passed and 10 per cent of them had higher secondary level of education. Only 2.00% of the respondents were found to be graduates or above. The coefficient of variation (58.98%) indicates that the respondents were highly heterogeneous with respect to their education. The finding shows that the majority of the respondents had relatively low level of formal education, as indicated by the mean value (2.95).

As revealed by table, majority of the respondents (47.00%) in the study area had medium size of family followed by respondents having small family size (44.00%). Only 9 per cent of the respondents had large size of family. The coefficient of variation (36.66%) indicated that the respondents were moderately heterogeneous with respect to their family size.

Size of land holding and annual income : Data presented in the Table 1 reveals that majority of the respondents (57.00%) were marginal farmers followed by small farmers (33.00%). Small proportions were semi-medium (7%) and medium farmers (3%). There were no large farmers among the respondents. The value of coefficient of variation (76.81%) indicated that the respondents were highly heterogeneous with respect to their operational land holding size.

The Table also highlights that 43.00% of the respondents had annual income in the range of Rs. 50001-

Table 1. Distribution of respondents according to their age, education and family size

Category	Score range	No.	%	Mean	S.D.	C.V.
Age						
Young	18 to 35 years	33	33.00			
Middle aged	36 to 59 years	56	56.00	43.76	12.93	29.54
Old	>60 yrs and above	11	11.00			
Education						
Illiterate	0	17	17.00			
Can read only	1	4	4.00			
Primary level	2	11	11.00	2.95	1.74	
Middle level	3	27	27.00			58.98
High school level	4	29	29.00			
H.S. /P.U. level	5	10	10.00			
Graduate or above	6	2	2.00			
Family Size						
Small family	size Up to 4	44	44.00			
Medium family	size 5-7	47	47.00	5.21	1.91	36.66
Large family	size 8 and above	9	9.00			
Size of land holding						
Category	Score range	No.	%	0.979	0.752	76.81
Marginal	Below 1.0 ha	57	57.00			
Small	1.0-2.0 ha	33	33.00			
Semi-Medium	2.0-4.0 ha	07	7.00			
Medium	4.0-10.0 ha	03	3.00			
Large	10.0 ha and above	0	0.00			
Annual income						
Below Rs.22000/- per year (Poverty line)	1	05	5.00	2.93	1.07	36.51
22000 – 50000/- per year	2	32	32.00			
50001 – 75000/- per year	3	43	43.00			
75001 - 1,00,000/- per year	4	08	8.00			
>1,00,000/- per year	5	12	12.00			
Economic motivation						
Category	Score range	No.	%	29.98	5.38	17.94
Low	< 25.89	13	13.00			
Medium	25.89 to 37.32	70	70.00			
High	>37.32	17	17.00			
Risk bearing ability						
Low	Up to 24.96	17	17.00	31.56	5.39	17.07
Medium	24.96 to 35.11	69	69.00			
High	Above 35.11	14	14.00			
Extension contacts						
Low	1 to 2	41	41.00	3.19	0.84	26.33
Medium	3 to 4	54	54.00			
High	5 and above	5	5.00			
Frequency of extension contact	Regularly (2)	Sometimes(1)	Never (0)	100		
VLEW	11	66	23	100		
ADO	2	7	91	100		

| Scientist/KVK personnel | 1 | 6 | 93 | 100 | | | |
| NGO personnel | 1 | 3 | 95 | 100 | | | |

Mass media exposure	Score range	No. (n=80)	%	Mean	S.D.	C.V.
Low	8 to 10	35	35.00	12.05	2.03	16.85
Medium	11 to 14	54	54.00			
High	15 to 18	11	11.00			

Frequency of mass media exposure	Regularly(2)	Sometimes(1)	Never(0)	Total
Newspaper	12	27	61	100
Television	43	51	6	100
Mobile phone	23	43	34	100
Farm Publication	1	14	85	100
Exhibition	6	21	73	100

Table 2. Perception of Farmers about Disaster risk mitigation practices

Statements	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Flood tolerant rice varieties can withstand the flood water	5(5.00)	66(66)	14(14.00)	9(9.00)	6(6.00)
Short duration *sali* rice Cultivar can be grown for dry spell management	0(0.0)	13(13.00)	69(69.00)	18(18.00)	0(0.00)
Medium duration *sali* rice Cultivar can be grown for dry spell management	0(0.0)	8(8.00)	77(77.00)	15(15.00)	0(0.00)
Short duration *sali* rice Cultivar can be grown in post flood situation	2(2.00)	23(23.00)	62(62.00)	9(9.00)	4(4.00)
Maize can be grown in the driest period of the year	4(4.00)	35(35.00)	44(44.00)	11(11.00)	6(6.00)
Rain water harvesting in farm ponds can help in growing rabi crops	15(15.00)	36(36.00)	39(39.00)	10(10.00)	0(0.00)
Rain water harvesting in farm ponds can help in raising seedling of *Sali* rice	12(12.00)	35(35.00)	41(41.00)	22(22.00)	0(0.00)
Use of organic manure (vermi compost/compost) helps in growing crop in post flood situation	11(11.00)	74(74.00)	13(13.00)	2(2.00)	0(0.00)
Diversification of Farming system may mitigate the farm disaster impact	4(4.00)	43(43.00)	51(51.00)	2(2.00)	0(0.00)
Animal feed can be managed through fodder bank/ growing fodder crops	16(16%)	67(67.00)	13(13.00)	4(4.00)	0(0.00)
Protected cultivation of high value crops helps farmers to recover from disaster loss	3(3.00)	12(12.00)	76(76.00)	6(6.00)	3(3.00)
In-situ rain water harvesting for moisture conservation(mulching) will help dry spell management	2(2.00)	23(23.00)	69(69.00)	6(6.00)	0(0.00)
Double cropping will help farmers to recover from disaster loss	9(9.00)	53(35.00)	32(32.00)	5(5.00)	3(3.00)
Seed Bank will help farmers in post disaster situation	12(12.00)	79(79.00)	16(16.00)	3(3.00)	0(5.00)

75000/- per year and 32 per cent of the respondents falling in the range of Rs. 22000 – 50000/- per year. A small size of the respondents (12%) had annual income above Rs. 1,00,000/-, while 8% of the respondents had annual income in the range of Rs. 75001 – 1,00,000/-.

The Below Poverty Line (BPL) category accounted for 5% of the respondents. The mean value (2.93) indicates the low annual income level of the respondents, while the coefficient of variation (36.51%) indicated that the respondents were moderately heterogeneous with

respect to their annual income.

Economic motivation and risk bearing ability : The findings related to economic motivation and risk bearing ability are presented in Table 1. It is evident from the table that majority of the respondents (70.00%) had medium level of economic motivation, followed by 17.00% with high level of economic motivation. Only 13 per cent of the respondents were found to have low level of economic motivation. The coefficient of variation (17.94%) indicated that the respondents were relatively homogenous with respect to their economic motivation. The standard deviation figure (5.38) also shows that respondents by and large spread around the mean value (29.98), which explained medium strength of economic motivation.

The Table highlights that majority of the respondents (60.00%) had medium level of risk bearing ability, followed by 17.00 per cent with low level of risk bearing ability. Only 14.00 per cent of the respondents were found with high level of risk bearing ability. The standard deviation value (5.39) and the coefficient of variation (17.07%) indicated that the respondents were homogenous with respect to their risk bearing ability. It is stated that high annual income and more operational landholdings increase the risk bearing ability of the farmers. On both these aspects the respondents were poor and hence they did not have high risk bearing ability.

Extension contact : The findings presented in Table 1 reveals that the majority of the respondents (54.00%) had medium level of extension contact followed by 41.00 per cent with low level of extension contact and only 5.00 per cent of the respondents were found with high level of extension contact. The value of co-efficient of variation (26.33) indicated that the respondents were relatively homogeneous with respect to their extension contact.

The distribution of respondents according to frequency of contact with different sources is presented in Table 1. It is evident from the Table that 11.00 per cent of the respondents had regular contact with VLEW. Only one to two respondents were found to have regular contact with ADO, Scientist /KVK personnel and NGO personnel. Majority of the respondents (66.00%) had contact with VLEW sometimes, followed by 7.00 per cent of the respondents who contacted with ADO sometimes and then 6.00 per cent had contact with Scientist /KVK personnel. Only 3.00 per cent of them were found having contact with NGO personnel

sometimes. Majority of the respondents (above 90.00%) never contacted ADO, Scientist /KVK personnel and NGO personnel and 23.00 per cent had never contacted with VLEW.

Mass media exposure : It is evident from Table 1 that majority of the respondents (54.00%) had medium mass media exposure, followed by 35.00 per cent with low mass media exposure. Only 11.00 per cent of the respondents had low mass media exposure. The value of co-efficient of variation (16.85) indicated that the respondents were relatively homogeneous with respect to their level of mass media exposure. The distribution of respondents according to frequency of use of different mass media is presented in Table 1. It is evident from the Table that majority of the respondents (43.00%) used television regularly followed by 23.00 per cent used mobile phone regularly and 12.00 per cent of the respondents used newspaper regularly as their source of information. While 6.00 per cent visited exhibition regularly and only one to three respondents used farm publication and attended demonstration regularly as their source of information. Majority of them (51.00%) used television sometimes followed by 43.00 per cent of the respondents who sometimes used mobile phones as their source of information. Only 21.00 per cent and 19.00 percent of respondents sometimes visited exhibition and demonstration while 27.00 per cent and 14 per cent of them sometimes used newspaper and farm publication as their information source. Majority of them (85.00%) never used farm publication followed by 78.00 per cent of the respondents who never attended demonstration as source of information while 73.00 per cent and 61.75 per cent of them never visited exhibition and used newspaper as their source of information. A sizeable number of respondents (34.00%) never used mobile phone and only 6.00 per cent of them never viewed the television as source of information.

Perception of farmers about disaster risk mitigation practices : The perception of farmer respondents about disaster risk mitigation practices was assessed using a set of 14 statements. The findings are presented in the **Table** 2 and it reveals that majority of the respondent were agree with a few statements related to seed bank, use of organic manure/vermicompost, fodder bank, flood tolerant rice varieties and double cropping. About 79.00 per cent and 74.00 per cent of farmer perceive that seed bank and use of organic manure will help them in growing crop in post flood situation. Bulk of the farmers (67.00% and 66.00%) believe that animal

Table 3. Perception Index of farmers Respondents

Value	Category	No.	%
1-19	Highly Unfavourable	0	0
20-39	Unfavourable	0	0
40-59	Somewhat favourable	18	18
60-79	favourable	79	79
80-99	Highly favourable	3	3
Total		100	100

feed can be managed through fodder bank and flood tolerant rice varieties can be grown in flood situation.

The Table also indicates that majority of the farmer respondent are confused with other disaster risk mitigation practices such as medium and short duration *sali* rice cultivar for dry spell management and post flood situation, protected cultivation, *in-situ* rain water harvesting and diversification of farming system. Most of the farmers (77.00% and 69.00%) are confused with the statements on medium duration *sali* rice cultivar and short duration *sali* rice cultivar for dry spell management. About 69.00 per cent and 62.00 per cent of the farmers are neither agree nor disagree with statements on *in-situ* rain water harvesting for moisture conservation (mulching) for dry spell management and growing short duration *sali* rice cultivar in post flood situation. However, a sizeable 22.00%, 18.00% and 15.00 % of farmer respondents are disagree with the statements on rain water harvesting in farm ponds for raising seedling of *sali* rice, short duration and medium duration *sali* rice cultivar for dry spell management respectively.

A perception Index was also calculated for each respondent and based on the scores obtained, respondents were grouped into five categories. The categories of farmers respondents based on their frequency; percentages are presented in the **Table 3**. The perception Index indicates that high majority (79.00%) of the farmers showed favorable perception on disaster risk mitigation practices whereas 18 per cent showed somewhat favorable perception and the rest (3.00%) belonged to highly favourable group.

Correlation coefficient between perception of farmers on disaster risk mitigation practices and the selected attributes of the respondents : The findings of **the Table 4** indicates that size of land holding, extension contact, mass media exposure are significantly correlated at the 0.01 level and the other variables, i.e., age, education and risk bearing ability are correlated at the 0.05 level with perception of farmers on disaster risk mitigation

Table 4. Correlation coefficient between perception of farmers on disaster risk mitigation practices and the personal attributes of the respondents

variable	(r)	't' value
Age	0.210	2.126308*
Education	0.271	2.775962*
Family size	(-)0.026	0.25747[NS]
Size of land holding	0.462	5.156918**
Annual income	0.061	0.604996[NS]
Economic motivation	(-) 0.121	1.20671[NS]
Risk bearing ability	0.230	2.339607*
Extension Contact	0.793	12.88**
Mass Media Exposure	0.412	4.47**

**Significant at the 0.01 level of probability;
*Significant at the 0.05 level of probability;
NS indicates Non significant;
Degrees of freedom (df) = 98

practices.The strength of the relationship, as indicated by the 'r' values, suggest that the relationship are fairly strong with size of land holding , extension contact and mass media exposure while it is of moderate strength for the remaining three correlated variables. The relationships are found to be non-significant for the other three independent variables, *i.e.,* family size, annual income and economic motivation with perception of farmers on disaster risk mitigation practices. The findings of the present study are substantiated by the findings of *Kumari, et al. (2020)* and *Manjusree, R.V. et al. (2022).*

CONCLUSION

Most of the farmers showed favourable perception on disaster risk mitigation practices and believed that stated mitigation practices are useful for farming during extreme weather events. Adaptive capacities of farmers and rural youth can be improved with disaster risk mitigations practices to face the challenges of farm disaster through skill-oriented training and increasing the extension contact and mass media exposure. Appropriate agricultural technology interventions suited for hazards affected areas may be planned keeping in view the farmers' low annual income, marginal to small size operational land holding and favourable perception on technologies.

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