

Application of Indigenous disaster adaptive farming methods to reduce risk in south Bengal

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Abstract : India is the second largest populated country and also one of the most disaster prone country in the world. Different types of natural disasters like flood, cyclone, drought, earthquake, and landslides occur here. West Bengal, a state of India is situated in the eastern part of the country. It is the 2nd densely populated state in India. A wide range of hazards including cyclones, storm surges, floods, water logging and salinity, embankment failure in the coastal zone and drought, landslide and earth quake, flash flood in plateau and mountainous region is prominent in Bengal. In this present study an attempt has been made to show various indigenous disaster adaptive farming systems of south Bengal. In this connection, a detailed survey method has been conducted in total eight villages of the concerned area. In the study area, it is observed that farmers applied their local indigenous knowledge in the agricultural field to reduce expected loss from adverse environment. Examples of different types of indigenous practices are make their crop field suitable for irrigation to reduce wastage of water, making clay layer along the boundary to reduce infiltration from 'ail' etc. Also, farmers of this region practice some disaster adaptive farming related methods like bound vegetable trees with bamboo s ticks to reduce cyclone related risks, for betel farming create raised and gradient land for quick drainage.

IndexTerms - Indigenous knowledge, Farming practices, Disaster risk reduction.

1. INTRODUCTION

Indigenous knowledge consists of ideas, experiences, practices and information that have been generated locally or generated elsewhere, but have been transformed by local people and incorporated into the local way of life (Bleik and Veldhuizen, 1993). It is the systematic body of traditional knowledge acquired by local people. This is accumulated by the generation wise experiences as results of informal experiments through trial and error. It is based on practical rather than theoretical facts and it is the asymmetrically distributed traits and which is associated with folk life for higher longevity. The agricultural practices followed by the farmers which are generated by local people and inherited over a long period of time are referred to as indigenous knowledge (Talawar and Singh, 1994). The farmers of south Bengal are living in disaster-prone areas over a number of generations. So they have developed some disaster adaptive local knowledge to minimize the consequences of disasters. The present study is tried to identify indigenous knowledge which can reduce farming related disaster risk in the selected research area and documentation the principles that underpin indigenous practices.

II. STUDY AREA

The present study area is surrounded by Malda district in the north, Bangladesh in the east, Bay of Bengal in the south and Jharkhand state in the west. The study area is located in the southern part of west Bengal, the area is covered 14 districts among 23 and area is covered 66908.86 sq.km. The study is carried maximum number of population (7.41 crore), so it is a highly dense populated part of West Bengal, average population density is 1297 per sq. km excluding Kolkata. More than 60% people depend on primary economic activities.



Fig1. Location of the Study Area

III. METHODOLOGY

The research focuses on disaster adaptive indigenous farming practices in the south Bengal, the livelihoods of the majority of its population are still dependent on agriculture and the agriculture is largely dependent on the available rainfall. For this research I have followed descriptive survey research design and the information has been collected through field work. I have applied purposive sampling method for data collection. For data collection, the study area was divided in to four zones those are western plateau and highland, Rarh, delta and coastal plain. From these zones, four districts were selected for information collection. From these districts, eight blocks and from each block one village were selected for considering the importance of indigenous practices to reduce disaster risk in the study area. From these villages, fifteen respondents were selected from each village randomly who are depends on agricultural activities. For this research I have followed qualitative way and some quantification has been used. The information has been documented through observation.

IV. DISCUSSION

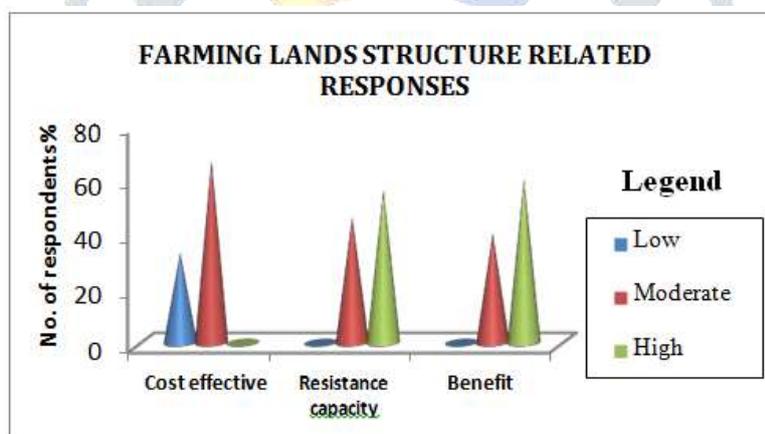
In this study it has been tried to identify these sort of knowledge in the selected study area. As this study is concerned with framing related disaster risk reduction. The study focuses exclusively at the application of local knowledge and did not explore knowledge without any resulting action. Additionally, the practice may have recently evolved, but has already been adopted.

Indigenous disaster adaptive knowledge for farming:

A. In the region of Western Highland:

a. Utilization of the land for Farming in adverse condition

In the region of western highland topographically belongs to plateau type and igneous outlier is found diversely. With sandy loamy textured lateritic soil is found here. Agricultural field is developed in the basin type area, so the slope of land is very high. However, due to the presence of impermeable rock in lower layer of soil (depth 1.5-2 feet) and lack of sufficient organic materials, sheet erosion tendency is found in rainy season in this area. The average depth of the soil in this area is 6-9 inches and PH is 5.8-6.8. Maximum families of this area are dependent on agricultural activities. Therefore, they make the land to be utilized in this environmental condition. Due to the slope oriented nature of the land there is a division of agricultural lands into small plots and make an 'ail' which is wide and high (width 2-2.5, height 1.5-2 feet) around the farming land along with slope for storing rain water and to protect soil erosion. They also use cow dung and rotten straw in the cultivated land because soil of this area is very incoherent due to lack of organic materials. To utilize and cultivate the land the villagers follow the above mentioned Indigenous disaster adaptive knowledge for farming in Western Highland. The outcome of the method to cultivate the land and its benefits are shown below.



Source: Field Survey, Dec'17

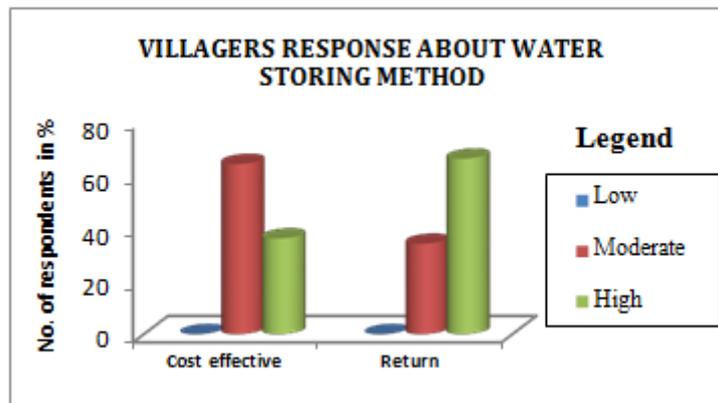
b. Build well for adequate water supply

In this semi-arid region water scarcity is one of the main problems. Due to inadequate water in the dry season people in this region suffer badly. Building a well without government help is not possible for the dwellers because it is quite expensive. For household purposes and other necessary activities, they dig well in the villages. It is a traditional way for accessing daily need. These wells get recharged in the period of monsoon which in turn is able to supply water throughout the year. They use this for cultivation of land in close proximity through pump, but it is possible only for those farmers who have it of their own.

c. Digging pond for rain water storing

Once in a year paddy is cultivated here during the rainy season. But sometimes it can be spoiled or fall prey to the uncertainty of rainfall. To survive in this situation, they dig pond in a separate place especially beside the agricultural fields keeping the pond one side open according to the slope, so that the pond would get recharged maximum in the rainy season and they use it for agricultural purposes or other necessities. But it is only applicable to rich farmers. However, in some cases local government has dug some

ponds for community uses. Due to high porosity of soil, infiltration rate is very high here. Therefore, to control the wastage of water they soak top layer of land by using pump. According to villagers this type of water storage system is somewhat expensive for them but its benefit is highly anticipated. The diagram drawn below shows its construction and benefit related responses in percentage.



Source: Field Survey, Dec'17

B. In the region of Moribund and Mature delta:

Drought and cyclone is very common disastrous event in this region. To reduce this type of disaster related risk they have acquired some knowledge. They have adopted some indigenous practices which may help to reduce risk from weather related hazards or disasters.

a. Making clay layer along the boundary of paddy field

In the region of delta, for paddy cultivation farmers of this region make a clay layer along the boundary which reduces infiltration from 'ail' and some days after sowing farmers scramble the mud with hands and this process helps the growth and reduces water demand because it reduces crack formation possibility. According to field survey from the selected village in this region almost every farmer follows this method.

b. Making of drain for irrigation

Drain making (termed as 'Nala' in Bengali) in the field for irrigation is a very common trend in this region. They make the drains with mud along the boundary of the cultivated land. It is more environmental friendly than concrete drains because mud drains keep the infiltration system running otherwise the destruction of the concrete drains can lead to the disposal of solid materials which may decrease the land quality quite unlike the mud drains. But now some farmers use plastic pipe for reducing water wastage.

c. Water saving irrigation in vegetable field

The farmers of this region make their crop field suitable for irrigation and make some plots and divide it by a small drain and sowing vegetables or trees along the drain. When there is a need for irrigation they give water along the drains. Therefore, water is not needed to be given to all fields which reduce wastage of water for irrigational purposes. More than 80% farmers follow this water saving irrigation method.

d. Paddy Seeds germination

Seed germination is a traditional process in this region for 'Boro' cultivation. Farmers of this region drench the seeds in a mud container for one or two days. After that they shift it and keep it in jute packet for warming. After one or two days they open it and spread them on a sheet and spray water. When the germination process is complete they make a seedbed (khola) in the field and sprinkle it. After two or four days they sprinkle some ashes in this 'khola'. This process is applied because in winter germination is not easy and ash sprinkling reduces the saline content and in the morning they break dew layer for a better growth. They also make some divisions within the 'khola' to protect the germinated seeds from diseases which may spread randomly otherwise. This method is followed by more than 85% farmers.

e. Reduction of the cyclone related risks of crops

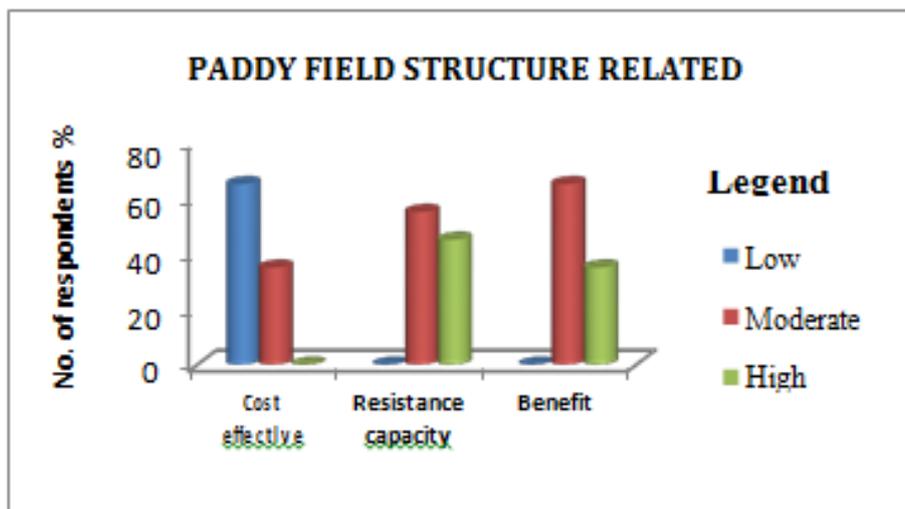
The farmers of this region bound vegetable trees such as banana trees, sugarcane and chilly plant with bamboo or bamboo sticks with nylon wire or in some cases bound trees with one another by nylon wire. This reduces cyclone related risks. Apart from these, after cutting the paddy the farmers store it in the field to save it from going stray on the way while moving it to the 'khamar' during rain or storm. According to field survey more than 70% farmers follow method.

C. In the region of Coastal belt and Active delta:

Cyclone and its related flood are like an annual phenomenon among the villager; they have acquired some knowledge to reduce agriculture related cyclonic risk. They have developed some indigenous practices and skills through experiences which might reduce the risk from prevalent hazards or disasters. These are as follows –

a. Construction of a high ‘ail’ along the boundary for storing rain water

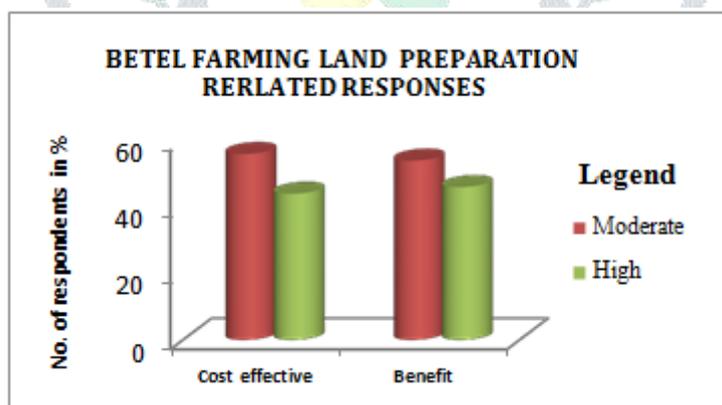
The farmers of Sunderban make a high ‘ail’ along the boundary paddy field for storing rain water because in this delta region fresh water is not available for irrigation. Along with it a high and wide ‘ail’ is cultivated with plantations for its permanency. And also they wrap up the climbers around the bamboo sticks to protect it from salinity and cyclonic related damages.



Source: Field Survey, Dec’17

b. Create raised and gradient land for Betel farming:

Betel is a sun loving plant but produces better quality leaves in the wet zone and intermediate zones rather than in the dry zone. So the cultivator makes proper arrangements of shade on the field through jute stalk or straw or use old cloth (Bengali term: ‘Saree’). Irrigation is essential for successful cultivation of the crop along with a good organic soil. Systematic drainage system is the most important need for betel vines growth. They create a raised land as compared to the adjacent areas, providing proper gradient on both sides for quick drainage.



Source: Field Survey, Dec’17

CONCLUSION

Indigenous knowledge is very much relevant and useful to reduce sufferings from disaster. Due to its geographic characteristics, it is a disaster prone region and every year the people of this area experiences various hazards and disaster (like; flood, cyclone and drought) of different magnitudes. So, community people use their traditional knowledge to reduce severity of disasters as well as their suffering.

Despite the high population density and nagging poverty, the government must create avenues so that people’s exposure and sensitivity to climate-related risks are reduced through adequate disaster risk reduction programmes and poverty alleviation strategies. Indigenous knowledge is more qualitative and geographically specific in contrast to scientific knowledge. Early and necessary adaptation steps need to be taken at the national and regional levels in order to reduce people’s vulnerability due to

irregular rainfall and other climate change related risks. Each and every community has some specific indigenous knowledge to protect themselves from common disasters, the study of which may improve our ability to explore the social context of natural disasters.

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