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STUDIES ON IDENTIFYING THE PROBLEMS OF AGRO-TECHNOLOGY PACKAGE FOR EMERGENCY CYCLONE RECOVERY AND RESTORATION IN THE (ECRR) COASTAL AREAS OF BANGLADESH

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ABSTRACT

Howlader NC (2013) Studies on identifying the problems of agro-technology package for emergency cyclone recovery and restoration in the (ECRR) coastal areas of Bangladesh. *J. Innov. Dev. Strategy*. 7(1), 39-44.

A Study was conducted on Agro-technology packaging for emergency cyclone recovery and restoration (ECRR) in the coastal areas of Bangladesh with the objectives of identifying the major problems. The study was conducted using a technical questionnaire based participatory survey in the target sites. The analysis of the data conducted mainly were social mapping, institutional mapping, hazard trend analysis, preparing hazard and livelihood calendar, conducting case studies, climate risk mapping, community history , focus group meetings, hazard Venn diagram, seasonal activity calendar and vulnerability analysis. The results mainly showed that knowledge of the respondent on NARS approved technologies as per categories varied from 10 - 49% respectively for farmers and scientists revealing very big gap for the actual users. only about 41% of the technology developer scientist told that they read the technology for its use, while the others responded less than 5%. However, the 23% implementer field workers responded positively for the purpose. It was recommended from the studies that intensive awareness training should conducted to popularize and ensure the use of the technologies in the coastal disastrous areas.

Key words: *agro-technology, cyclone recovery, coastal Bangladesh*

INTRODUCTION

Climate change has increased unprecedented threats to life and livelihoods of people living in coastal areas of Bangladesh. Over the time, coastal population has confronted a number of tropical cyclones and storm surges, and voluminous salinity ingress. The geographical location of coastal areas along the Bay of Bengal has itself been manifested with such firsthand vulnerability of people to natural disasters followed by negative impacts on their life. According to the research reports, coastal population has confronted a number of tropical cyclones and storm surges, and voluminous salinity ingress (Amin *et al.* 1990a). The combined effects of sea-level rise and subsidence, changes in upstream river discharge, increased frequency and intensity of tropical cyclones, and erosion of coastal embankments pose a serious threat to the natural resource base and livelihood opportunities of coastal communities. The major climate driven natural disasters frequently happened in Bangladesh may mainly be grouped in to the following categories, such as cyclones, saline water intrusion and water logging, storm surge, and irregular monsoon rainfall.

Studies done to assess the trend of hazards since 1960 showed increased frequency **(**Amin 1989; Amin 1992; Amin and Anwar, 1990). From the cyclone during the last 50 years, the people perceived that the frequency and intensity of cyclone was very normal although there happened some severe cyclone, but those were within specific interval compare to the present condition. It was reported that (Anon. 2000; James 2003; Plantinga 1996) noticing of cyclones to be frequent in the Bay of Bengal. Severe cyclone recorded in 1960, 1963, 1970, 1991 and 1997. Among these 1991 cyclone was the worst and catastrophe caused 2500 to 3000 deaths in the coastal zones. The most affected sectors were as follows.

Saline water intrusion: Already the shallow aquifer became saline because of over burdening water crisis. Rough sea or Frequent Signal: Bay or sea signal are now very frequent. 50% of their working days are captured by the rough sea or signal. It is very often and common that no 3 signal is raised. This year already 22 time No 3 signal have risen. Storm Surge: During the signal period the tidal height increases 5 to 6 ft above the normal height. The surge has affected the agricultural field of the area.

Livelihood patterns: The northern part of the union little bit agriculture dependent along with marine fishing. Almost 60% of the total populations are somewhat dependent on marine or estuarine fishing. Others are involved with agriculture, day labour, etc. For the present climatic variability almost 50% of the people remain jobless for 5 to 6 months. Last two years they have failed to harvest their crops (rice), this year also the recent depression destroyed their crops. About 10% of the people temporary decided to migrate elsewhere for search of job. With climate changes and of its increasing degree of impacts, the vulnerability of coastal people goes beyond any of their least coping capacities and remains far off long-term adaptation. The risk of climate change-induced damage to human and economic development in coastal areas of Bangladesh is mounting.

Natural resources types and degradation: Their harvestable natural resources are sea for fishing and navigation; groundwater for drinking water which is now depleting very extensively and contaminating by saline water. Natural resource depleted about 50%. For harvesting natural resource the initial investment is very high and risk and uncertainty are also high, but the sea production decreased to 50% or more. They added that the geographical location of coastal areas along the Bay of Bengal has itself been manifested with such firsthand

vulnerability of people to natural disasters followed by negative impacts on their life. Following any disaster, people always remain less able to cope and continue their regular life supporting livelihood function due to few alternative resource endowments in coastal area. Disproportionate resource distribution and access to natural resources and institutional services, particularly landless poor and marginal farmers face extremely vulnerability to disaster shocks. In the context of present situation as regards identifying the problems of agro-technology package for emergency cyclone recovery and restoration in the (ECRR) the research program was with the objectives, such as: i. to assess the available NARS agro-technologies; ii. to identify the promising technologies for the ECRR purpose; and iii. to develop a package guideline for demonstration in the affected area.

MATERIALS AND METHODS

The studies were conducted with some most specific processes as to achieve the outputs as per objectives in the target areas. These are briefly mentioned below.

Sample Population: The study districts were Barisal, Bhola, Patuakhali, Barguna, Pirojpur, and Bagherhat. The respondent categories selected were: i. Public representative (Union/Upazila); ii. Donor agents (NGO); iii. Scientists (NARS), iv. Agricultural Officers (DAE); v. Field workers (DAE/NGO); and vi. Farmers. Total respondent population was about 360 taking minimum 5 respondent from each district and each categories. The survey was done using a technical questionnaire.

Data collection and sorting: These were done using the Agro-Ecological mapping tool for quick understanding of resource topography including agricultural land, water bodies and homestead, location of valuable infrastructures like embankment and road and plausible direction of risks from different hazard in the area. Among the participants, experienced elderly and knowledgeable persons developed the map.

Analysis: Hazard Analysis was done through group exercise, the historical timeline of different hazard events were recorded to look into the hazard trend and impact intensity on the community. While exercising in the tool, participants identified a list of hazard observed and experienced over the time in the area.

Hazard Calendar was developed preparing quick calendar of hazard occurrence time in different seasons of a year as well with to notice its intensity and frequency in the area.

Local resource map were drawn to pinpoints main land types, livelihood activities on each land type and physical infrastructure such as roads, farming methods, irrigated areas, water points, markets, electricity, Banks and Agricultural Extension Offices.

Organizing PRA exercises: To conduct PRA, a suitable venue and date was selected taking into consideration of people's access to participate in the exercises. PRA began on 09th of April' 2011 and continued to 12th of April' 2011. Local Forest Department official selected the venue in a suitable location for ensuring people's ease access and familiar environment. PRA exercises were selected as per aim of the study, focused problems of people in the area and time constraint that participants could actually concentrate during exercises.

Facilitation in exercises: In group works, each PRA exercise was conducted by a facilitator and a note maker. Local facilitator was selected for particular group like women, specific livelihood and disaster prone participant in each exercise. To some extent, PRA team member explained critical section of any topic regarding climate related problems in group work to broaden the discussion opportunity, but with carefully focusing on the topic. For particular experience of elderly and lay persons and women, local facilitator organized the findings for clear understanding. For instance, each hazard has a locally used name in the studied area and the timeline of event was also less clear that local facilitator organized that information with PRA team.

Data collection and sorting: In PRA exercises both qualitative and quantitative data were collected. Data were collected through making note, drawing map, developing calendar on brown paper and also using tape recorder. After each PRA exercise, facilitator presented a brief on the findings to the participants instantly to cross-check and validates the result. Additional information regarding the study site was also collected from local Union Parishad Office, govt. departments such as Forest Department and online database available to access at that time.

PRA Tools: The complete PRA study was based on application of different tools and exercise. With focus on people's need and capacity assessment in the context of climate change vulnerability and required adaptation, the tools and exercise were selected. A brief description of each tool was given hereunder.

Social Mapping: Social mapping tool was used to develop a general map of the studied ward for quick understanding of resource topography including agricultural land, water bodies and homestead, location of valuable infrastructures like embankment and road and plausible direction of risks from different hazard in the area. Among the participants, experienced elderly and knowledgeable persons developed the map.

Institutional Mapping: Institutional mapping was carried out to find the relationship level among community members in the studied ward, and with external service providing agencies such as govt. and non-government organizations. The tool provided information on existing inter-community relationship pattern for resource

sharing and their collective response to address sudden shocks and climatic variability. It also revealed the access of studied community to different institutional services.

Hazard Trend Analysis: Applying this tool and following group exercise, the historical timeline of different hazard events were recorded to look into the hazard trend and impact intensity on the community. Elderly and experienced participants were focus for providing information on hazard trend development. A time interval of 5 years was selected to present the frequency of certain hazards and intensity. Depending upon participants' agreed experience, the year interval was selected to find hazard trend. While exercising in the tool, participants identified a list of hazard observed and experienced over the time in the area. Among the list, participants developed a rank of the hazards taking into account of the hazard frequency and intensity.

Hazard Calendar: The tool was applied to develop a quick calendar of hazard occurrence time in different seasons of a year as well with to notice its intensity and frequency in the area. Hazard calendar also showed whether any changes observed due to climate changes such as shifting pattern of rainfall or cyclonic events from usual time of event.

Livelihood Calendar: Livelihood calendar was developed to find the livelihood pattern and identify the gaps and need for the community to adapt to climate change variability. The calendar was developed in two steps; first participants identified the types of primary and secondary livelihoods and dependency percentage for each type in the area. Second, based upon availability of livelihood for income generation, each livelihood was presented in different seasons. Subsequently, the seasonal gaps identified for livelihood and examined adaptation capacity of the community to any climatic variability.

Case Study: Among the participants case study was carried out to selected individuals who have been affected with disasters shocks and living very vulnerable life.

Data analysis: Climate risk maps – identifies areas at risk and vulnerable members of the community.
This also includes analysis of available resources that can be used by community members for climate risk management and involves the community in preparing local risk maps.
Community history (time line) – identifies frequency of shocks and local coping mechanisms.
Focus group meetings – brings together community residents, farmers' groups and associations, formal and informal village cooperatives, landless labours, fishers, livestock farmers, etc., to discuss specific issues.
Hazard Venn diagram – allows participants to identify and analyze the common hazards that take place locally, their magnitude and likelihood.
Historical transect – provides a graphic presentation of the history of climate risks and development in the community with emphasis on the agriculture sector.
Household composition – provides a breakdown of human capital, looking at the labour force, migration, and education status of various socio-economic groups, especially categories of farmers in the agriculture sector.
Local resource map – pinpoints main land types, livelihood activities on land type and infrastructure such as roads, farming methods, irrigation, markets, electricity, and agricultural extension offices.
Ranking – Analyses of problems for community priorities or the significant problems faced by the community.
Seasonal activity calendar – identifies times of working with crops or livestock, in forests, off-farm and domestic work as well as pinpointing gender roles.
Vulnerability context – looks at local shocks and stresses, proportion of households that are food insecure in an average year, bad year, good year and why, and the proportion of households/farmers who are income insecure in an average year, bad year, good year and why.

The questionnaire was developed as to clearly collect information on the following aspects: i. Existing livelihood patterns in coastal Bangladesh, ii. Existing resource base of target groups, iii. Major livelihood and income pattern, iv. Expenditure pattern (whether any resilient savings exist or not), v. Socio-economic status and impact, vi. Identify community structure, vii. Identify community based structure or structure plan/management plan to cope with climate hazards, and Way forward towards integration of target groups in the institutional arrangements (Local, Regional and National).

RESULTS AND DISCUSSION

The results obtained from the studies are sequentially mentioned after analysis and described in this chapter along with tables and graphs.

Composition of the respondents

The characteristic composition of the respondent included and get involved in the study is given in the Table 1. The results show that the population taken from different categories is found to be mostly uniform and at per with the expectation of the methodology.

Table 1. Percent composition of the respondents as per categories

Age: % within 35-55 yrs	Gender % Male	Qualification % graduate +	Experience 10 yrs +
39	81	47	42

The district wise distribution of survey participants as given in the Table 2 showed mostly uniform participation of different categories of persons indicating that all are concerned with the emergency cyclone recovery and restoration needs.

Table 2. Percent composition of the respondents as per Districts

District	Age: % within 35-55 yrs	Gender % Male	Qualification Percent graduate +	Experience 10 yrs +
Barisal	43	67	41	63
Bhola	26	73	38	46
Patuakhali	29	89	48	45
Barguna	42	91	58	51
Pirojpur	36	72	24	37
Bagherhat	49	84	35	58

Fig. 1. Coastal typical area study site

Knowledge of the respondents on technologies

A typical cropping system as to physiographic character based technology need and housing area of study sites is given in the Fig. 1. The results obtained from the study on the knowledge of the respondent on NARS approved technologies as per categories indicate that the knowledge varied from 10 to 49% respectively for farmers and scientists revealing very big gap for the actual users. It is a negative factor for system. Still the knowledge level of the technology developers themselves was found to be low (Fig. 2). Similar results were also reported by several workers previously while working with the environmental based livelihood in the coastal regions (Alam *et al.* 2012; Amin *et al.* 1990b).

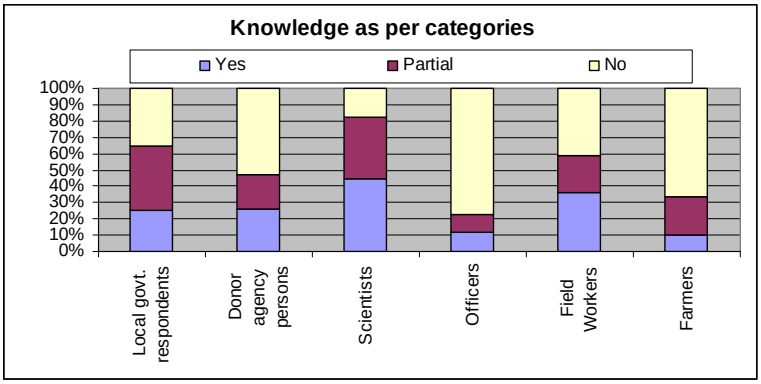


Fig. 2. Knowledge on Agro-technologies of the respondents as per categories

Knowledge of the respondents as per Districts

The knowledge levels of the beneficiaries and the implementers as per districts show that (Table 3) the clear "Yes" was within the range 10-29% indicating a poor status of the situation.

Table 3. Percent composition of the respondents as per Districts

District	Yes	Partial	No
Barisal	23	35	32
Bhola	25	32	43
Patuakhali	29	42	39
Barguna	12	11	77
Pirojpur	26	33	41
Bagherhat	10	23	67
Mean	21	29	50

The results show that the yes response was overall low but Patuakhali District got slightly better yes answer followed by Pirojpur but it was found to be lowest in the Bagherhat District followed by Barguna.

The existing disaster management framework in Bangladesh was largely organized to deal with recurrent extreme events, whereas coastal zones in Bangladesh were also confronted with a range of creeping climate risks, such as increasing salinity trends in coastal freshwater and drainage congestions. Specific activities on agro-technology transfer were found to be very low which might cause poor response in these respects.

Having list of the package technologies as per categories

According to the results (Fig. 3 and Table 4) only 9% have the list of the packaged technologies, while value was only 14% who actually are the members of the local emergency implementation groups indicating a very poor performance of the system.

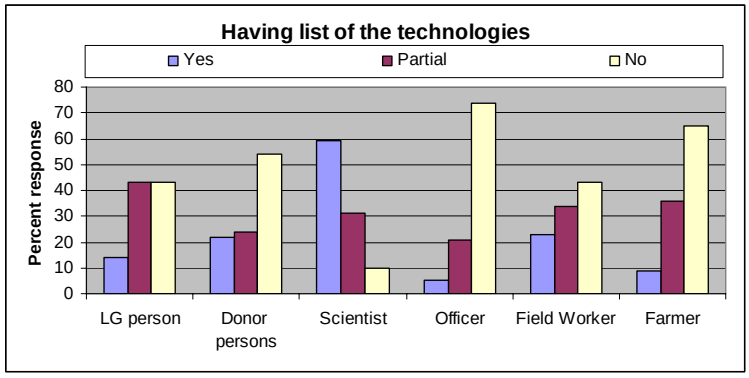


Fig. 3. Persons having the list of the technologies

Table 4. List of the package technologies as per Districts

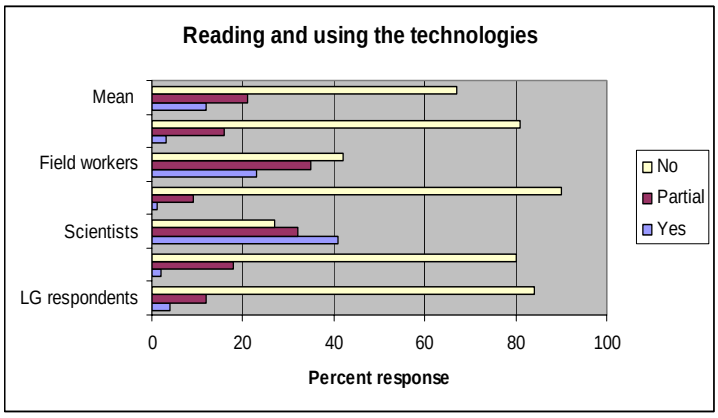
Parameter	Yes	Partial	No
Barisal	27	31	32
Bhola	25	32	43
Patuakhali	29	38	39
Barguna	12	15	77
Pirojpur	29	37	44
Bagherhat	10	21	69
Mean	22	28	50

Reading and using the technologies as per categories

The research findings obtained on the issues of reading and using the categorized technologies are given in the Table 5 and Fig. 4. The results show that only about 41% of the technology developer scientist told that they read the technology for its use, while the others responded less than 5%. However, the 23% implementer field workers responded positively for the purpose (Fig. 4).

Table 5. Reading and using the technologies as per Districts

District	Yes	Partial	No
Barisal	17	21	42
Bhola	20	31	49
Patuakhali	21	33	46
Barguna	12	25	67
Pirojpur	29	37	44
Bagherhat	11	21	68
Mean	19	28	53



.Fig. 4. Reading and use status of the Agro-technologies

CONCLUSION

The physical setting of areas was highly sensitive to tropical cyclone, storm surge, rainfall and high tide. Natural resource endowment in the area comprises mangroves, agricultural lands, and river, canal and fish ponds. The large size of agriculture lands for farming paddy and vegetables is located inside the coastal embankment. Only a small amount of land is also cultivated outside the embankment due to higher risk of storm surges and high tide. Almost all agriculture lands are currently cultivated with two seasonal rice crops and vegetable and pulse varieties. Apart from agriculture, given close distance to river and canals, fishing activities are a broad source of fishing activities throughout a year. But in all case of agricultural activities use of improved agro-technologies were found to be minimum. Community people indeed have different sorts of experience and perception regarding their vulnerability to climate changes and subsequently certain limit of adaptation capacity and need NARS technologies according to their need which are still not available.

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