



European Commission Humanitarian Aid Office (ECHO)



## **An Attempt on Application of Alternative Strategies for Community Based Flood Preparedness in South-Asia (Bangladesh)**



*Living with floods: A common phenomenon of vulnerable communities in Bangladesh*

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### *Floods in Bangladesh:*

Bangladesh lies on the flat alluvial plains in the combined delta of three mighty rivers, the Ganges, Brahmaputra and Meghna. Flood is almost an annual affair in Bangladesh. One fifth to one third of the country is flooded each year during June through October when nearly two thirds of the food grain (mainly rice) is produced. Floods encountered by Bangladesh are of four categories: **(a)** normal monsoon floods, over topping the riverbanks of excess water submerge the adjoining areas. This is normal type of flood which country has to bear with year to year with variation of extent and duration; **(b)** floods due to on rush of rain water down the hill slopes overland and ultimately causing flooding up in the low lying areas; **(c)** flash floods in the eastern and northern rivers, with sharp rise of river water within a matter of days only, followed by sharp fall; **(d)** tidal surge because of tidal fluctuations and water level set-up due to cyclones in the coastal areas (Khatun and Ali 1990). Of these four categories major river floods are of serious concern.

The country has been hit by many catastrophic floods of single or combination of various categories, with variation of duration, resulting in huge loss of lives and properties. For generations, flood plain inhabitants of Bangladesh have been adapted to the annual flood through numerous indigenous strategies, in order to reap the benefit from this recurring natural phenomenon. However these become a major public concern when their impact becomes unprecedented by catastrophic floods such as the occurrences in the years 1954, 1955, 1956, 1974, 1984, 1987, 1988, 1998 and 2000.

With increase in population and growth of physical infrastructures, vulnerability of society to floods has grown. Consecutive floods at times (viz. 1987 and 1988 floods) drastically reduce the percentage growth rate of GDP. The growth rate of GDP dropped down from 4.4 percent in fiscal year FY 1985-86, to 3.9, 2.9 and 2.5 percent during FYs 1986-87, 1987-88 and 1988-89 respectively (Kelly and Chowdhury 2001). The floods of 1998 was the longest lasting in the history of the country causing enormous damages to over two thirds of the country and continued for more 75 days. Major losses were incurred in crops, livestock and poultry, fisheries and

forestry (Ali and Khatun 2001). The usual flood free area i.e. South-western part of Bangladesh was affected by sudden flash flood in 2000 and caused damage of more than TK 800 billion (BDPF 2001). About 98 percent of the earthen houses were damaged, households lost their livestock and poultry and other durable assets. Standing crops like Amon paddy, vegetables, tree resources were lost (CARE Bangladesh 2000).

Since the unprecedented flood of 1998, it was felt that flood forecasting and dissemination services to help the community at the local level to prepare against such events are urgently required. Recently, the Government has undertaken a project, namely, “ Consolidation and Strengthening of Flood Forecasting and Warning Service”. This project focused on capacity building, development of equipment and tools for improved data collection and flood forecasting and further development of dissemination services to communities through the Comprehensive Disaster Management Programme (of UNDP). It is hoped that a community-based approach to flood forecasting would empower local people to correlate the danger levels with past experience, subject to any changes brought about by new infrastructure.

Traditionally people have developed different kinds of coping strategies related to their livelihoods. Of the indigenous responses to flooding in Bangladesh, a significant number relate to agricultural coping measures, including selecting appropriate variety of rice and other crops, depending on the timing and water level as well as type of soil. People also tend to reduce the magnitude of economic loss in crops from floods and erosion, by cultivating low cost varieties or late growing varieties.

Housing techniques are also adapted according to the risk posed by floods and erosion. Houses are built on raised lands or earthen platforms so water cannot reach the plinth in normal floods. They also try not to use any housing material susceptible to flooding like mud but preferably corrugated iron sheet, cemented pillar and walls (but only the rich can afford) and poor people commonly use thatch, bamboo and corrugated iron sheets.

Plantation of water-resistant plants/trees like bamboo, banana, hogla, kolmi and others, next to the homestead, is very common to protect the house from erosion. The plants/trees can be used during floods and after recession of the flood. During the dry season, the kitchen is made in the open courtyard, during flood they make bamboo platform that can be raised when the water level is increasing, and use portable stoves. Food, household items and crops are stored on platform in the main living room. Selling livestock, grains and assets are common in case of catastrophic floods.

### ***ITDG's Experience and Initiatives for long term Flood Mitigation:***

Disaster Mitigation is relatively new programme intervention of ITDG-Bangladesh, based on its international disaster mitigation experience. The organisation is currently implementing an alternative approaches to disaster mitigation through participatory development of technological interventions in housing, agriculture, fisheries, livestock and small enterprise sectors in highly flood prone areas in Faridpur district to reduce risk, losses and vulnerability.

***ITDG's aim is to shift emphasis from short-term relief and rehabilitation to strengthening community's capabilities to better cope with disasters through long-term mitigation measures.***

Following on the experience of the devastating floods of 1998; ITDG-Bangladesh has initiated a long term disaster mitigation programme with the aim of developing, proving, and advocating suitable approaches to natural disasters that contribute to the sustainable development of vulnerable communities.

As a first attempt, a research study was conducted in 1999-2000, to gain an understanding of the livelihood context and coping strategies of disaster-affected

communities in ITDG's working areas. Based on the research findings, ITDG-B has initiated a project, supported by the communities, to mitigate the affect floods, through technological improvement and interventions, for better livelihoods. The project has funded by the European Union Humanitarian Aid Office (ECHO).

The various components/ activities of the project were identified and action plans were developed through PTD (participatory technology development) methods directly with the beneficiaries groups.



*A PRA session with the community: to Identify needs, problems and prospects.*

### ***Livelihoods, Training and Technology development***

Given the land-based nature of most of the livelihoods, people suffer serious damages as a consequence of abnormal floods, like that of 1988 or 1998. It is, however, noted that the consequences of floods on livelihoods differ depending on the land type land ownership status, other resources/assets, alternative disaster

management skills and gender configuration of a household. The majority of households engaged in crop production suffer loss of standing crops, loss of employment during the period. Women mostly suffer from loss of homestead food production activities, such as vegetable gardening, livestock and poultry. There are plenty of fisheries resources nearby their dwellings such as ponds/ditches (made, as a result of earth cutting for raising their homestead and for sources of water), other open water bodies, which are mostly unutilised due to sudden risk of flood and lack of appropriate technology.

The rural housing/shelter is one of the major sectors, which is badly affected by floods almost every year. Among the non-agricultural households, the potters, small producers, petty traders, day labourers suffer the most as their income generation opportunity reduces greatly, during the flood period in each year (3-4 months).

Based on the principle “**Training is for Transformation**”, A rapid participatory needs assessment was carried out in February – March 2002 in four selected villages in Faridpur sadar and Nagarkanda upazila which are regarded as highly vulnerable to floods. Keeping the alternative approach in mind, the needs assessment emphasised on sectoral outcomes e.g. housing, agriculture, livestock, fisheries and

small enterprises activities. Besides, the assessment undertook an in-depth study of the socio-economic and disaster profile of the communities, vulnerability analysis, and seasonal variation. Role of social organisation during and after floods, emergency evacuation and facilities and trend analysis of these related fields. These findings lead to development of the action plan for the programme, in the above-mentioned sectors, based on the current local needs and available resource base.

Finally, groups were identified, options were prioritised and training programmes with demonstration were implemented.



*A training session offered by the livestock expert on livestock resource management in flood prone areas.*

### **Housing model improvement:**

Riverbanks of the deltaic Bangladesh are flooded every year. Faridpur district is situated on the southern bank of the river Padma. This areas is affected by flooding every year, damaging houses, which need repair and maintenance on a regular basis. Aiming to improve this situation, the PRA studied the local building techniques and

materials available in the area, as the project aimed to develop feasible and cost effective flood resistant housing options for the poor. The PRA also identified who is doing what, in order to ensure participation and capacity building of all concerned, including women. Village builders' i.e., masons and carpenters usually construct the roof, posts/pillars and the frame. Both men and women weave mats for the walls. However, construction of plinth, floor and the maintenance of the houses are entirely a woman's responsibility. ITDG-B developed an affordable and durable housing model, in collaboration with local masons, carpenters and with the community partners. The project provided technical skill development training to the local masons (16), carpenters (16) and the selected households 48 (24 female and 24 male) for effective maintenance and further dissemination of the comparatively low cost housing technology to the region. The housing improvement involves appropriate design, materials treatment e.g. wood, bamboo, jute stick to increase durability, improvement for wind protection and plinth protection.

**Process followed to develop housing:**

- ❑ **Participatory need assessment**
- ❑ **Selection of highly vulnerable households**
- ❑ **Identification of local masons and carpenters**

- ❑ **Individual (HH) need identification and case study preparation**

- ❑ **Draft design by the experts**

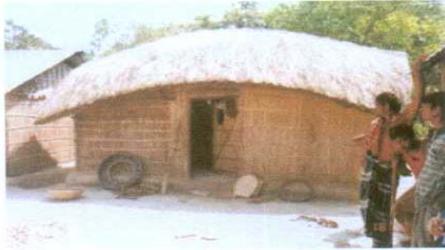
- ❑ **Participatory design workshop**

Two design workshops were held on appropriate flood resistant housing options just before the implementation. Both male and female members from identified households attended the workshops. Local carpenters and masons also attended the workshops. A five-member team of architects and engineers contracted by ITDG Bangladesh, facilitated the workshop discussion in a very interactive and participatory manner with the participating villagers. The structural improvements that were agreed upon in the workshops are as follows:

- ❑ Introduction of windows in the houses for proper ventilation
- ❑ RCC posts with footings
- ❑ Short RCC stumps and treated bamboo post
- ❑ Treated jute stick woven mat partitions to increase durability
- ❑ Introduction of better bracing and fasteners for protection against high wind
- ❑ Plinths and floors made with mix of soil, cement and coarse aggregates
- ❑ C.G.I sheets as roofing material to reduce maintenance cost

Following the workshop, the group of architects and engineers together with local

masons, carpenters and the participating villagers have started the construction of the houses.



A room with traditional Bangla roof

*Common housing in flood prone areas: need to remake every year.*



A house under construction



A happy owner with her daughter

In the first stage of the housing development ITDG-B has demonstrated a total of 24 houses in four villages for the most vulnerable households e.g. widows, disabled, unemployed older citizen, member of the minority community.

### **Promotions of Flood friendly agricultural practices to mitigate floods and to reduce risk.**

Food insecurity is an issue during floods due to damage and loss of food crops. The lack of income opportunity also accompanies food insecurity. The needs-assessment looked at fisheries, livestock and agricultural practices to identify opportunities for interventions that will not only reduce their vulnerability to floods but will improve the food-security situation of households at the time of disaster.

ITDG-Bangladesh has worked in three villages in Faridpur district with 100 households supporting agriculture, fisheries and livestock activities, focused on flood friendly technologies, aimed to reduce risk and vulnerability in pre, ongoing and post flood situation.

### **Creating opportunities for flood friendly fish culture.**

Fish culture is an opportunity in the flood prone areas during flood, but the villagers have very little interest in fish culture as they incur loss when the fishes float away as floodwater pours in. Besides, the knowledge about managing fisheries resources is limited. To minimise the knowledge gap, ITDG-B has undertaken to develop and disseminate appropriate flood friendly fisheries technologies, through skill

development and demonstration of the technologies to the community participants. A total of 48 beneficiaries have been supported by the project to adopt appropriate technologies for fish culture in pre, ongoing and post flood situation. Some of the options were identified with the community are

#### ***Small-scale homestead pen culture:***

*Pen is a kind of fence usually made of bamboo (locally called baba) it is generally use to protect pond embankment which has connection with open water body. The option has implemented to protect the entire embankment of the ponds. The fencing will stop the stocked fingerlings/fishes from escaping into the open floodwater. The design of the traditional pen fencing has been modified for the flood plain by placing a trap, which will entrap wild species from open water. Later the full-grown trapped fishes have consumed by the household while comparatively smaller fishes restocked in the pond for their further growth. Such fish culture technique in flood prone areas will encourage culture of fish during flood season and at the same time ensuring regular fish consumption of a household from wild catch while allowing smaller culturable species to grow in protected ponds, thereby addressing bio-diversity and conservation issues of open water fish species.*

#### ***Trap pond management:***

*Trap pond management is an artificially created environment by preparing bushes with tree branches. The bushes are used by wild species as shelter. The bushes also grow various algae, providing food to wild species. Trapping is a sustainable open water fishing technique vis a vis the use of current net as it acts as a mini sanctuary for small and large fishes before they grow to a reasonable size for catch, additionally it act as breeding ground of indigenous species.*

#### ***Enhancement of wild catch through improved traditional gear:***

*Since the cultivable lands remain under water for four to five months, trapping gear development can increase open water catch efficiency and can help the people without resource base to increase access to animal protein and earning opportunity during flood*

*season. Traditional trapping gears are generally made of bamboo cans and net. Which locally called Doari, Darki etc. Traditionally it has one inlet called valve but it has modified and added three more inlets in the gear. This addition has increased the catch per unit effort. This gear has to placed in small canals with flowing water and the valves need to be facing the opposite direction of the water flow. In case of big water bodies such as river, bill, series of doari can be placed but close to embankment.*



***Fencing pond for fencing floods***

#### ***Suitable options for Agriculture in flood prone areas:***

Agriculture is the primary and major occupation of the villagers. Almost every household depends on traditional methods of cultivation. But they feel their own practices and methods need to be improved through technological support as they are not being able to maintain the optimum production level and quality. Seed preservation is one of the major issues of the farmers living in flood prone areas. Each of the households involved in agriculture have their own seed preservation methods. They mostly preserve paddy, wheat, vegetables, onion, garlic etc. but, have to suffer loss almost every year due to floods, due to lack of proper seed preservation techniques and storage

facilities. This in turn results in farmers becoming dependent on commercially available seeds and purchasing seeds from the market also becomes expensive for them, which interrupts normal production system especially for the poor farmers.

Also through a complete participatory needs assessment and technology development approaches with the communities, the project demonstrated some prioritised options in agriculture sectors with the aim to minimise risk of floods and continuation of production by adopting alternative measures during flood and secure food production. The options are:

***Homestead vegetable production through pit cultivation methods.***

*“Homestead vegetable production through pit culture” is an indigenous technique for growing vegetables and other plants and crops as soon as the floodwater recedes. Making a series of pits in homestead and placing organic manure or compost in water proof sacks inside the pits. Later the sacks were placed and the pits were covered with soil. This preparation remains under water during the flood and its fertility increases over the period. Therefore, once the flood water recedes, finding fertile plots for growing vegetables and plants is not difficult. This technique also used and tasted by ITDG-B particularly in sand bar for bulk production after flood.*

***Seed production and preservation techniques:***

*Seed production and preservation techniques included a series of activities to maintain good quality, germination rate, and to ensure locally available seeds in flood prone areas, which were included selection of seeds, harvesting, proper drying, packaging, storing, re-drying etc.*

- ***Plantation of flood resistant trees for protection of homestead, fruit production, income and for domestic uses.***



***The pit: Preparing for income generation***



***Pits provide banking service during flood***



***A trip to the final destination***

***Application of technical management of Livestock resource to reduce risk.:***

Livestock and poultry are important assets for the char dwellers and a major source of income. This sector significantly supplements their livelihoods to minimise losses in agriculture sector caused by floods. More or less every household in these areas

rear livestock and poultry. According to the PRA findings on an average more than 80% households rear cattle, goat, chicken and ducks. Rearing cattle is an important economic activity for sale of milk and to fulfill festival demand. Sale of poultry product e.g. eggs, meat is an important source of additional income for women. The sector incurs losses as a result of high mortality rates, due to sudden disease attack in pre and post flood situation. Due to lack of fodder management it is difficult to keep the livestock healthy and manage their appropriate feed during flood. To address these major technical problems the project has identified and developed options for the improvement of the livestock sector in the selected flood prone villages. The interventions have implemented for the improvements of the sector with probable solutions, which were;

***Skill development training on feeds and disease management for poultry and livestock:***

*Fodder is the main problem for cattle and goat during the flood season. The project has trained the community how to prepare and storage of fodder by using locally available items. Generally the straw was used to prepare emergency food. The straw were chopped into smaller piece and preserved in a waterproof polythene sac. During feeding the straw mix with molasses, ricebran, urea and lime to maintain the physical demand with the minimum supply of food.*



***A demonstration session on Fodder management for livestock during flood***



***Storage of fodder to meet the crisis***



***Secured feeding during flood***

- ❑ ***De-worming of the cattle and goat immediately before and after flood season***
- ❑ ***Vaccination campaign for livestock in pre and post flood season***

*Health management of animals particularly goat and cow is very difficult in flood prone areas. Susceptibility to disease during and after flood is very common and the percentage of mortality is very high. The project has implemented series of deworming and vaccination campaign to prevent and protect some of the common bacterial and viral diseases e.g. anthrax, PPR and black quarter found in flood prone areas. Through the assistance of local community extensionist and*

*livestock department. The campaigns were organised pre and post flood situation.*



***Vaccination: The preventive measure for disease prevention***

- ❑ *Support to develop commercial duck farming*



***An initiative to enhance commercial duck farming by the women group***

These activities were carried out with the assistance of local service providers (RCE) to ensure continuous/long term support for the communities after project intervention.

### ***Diversifying opportunities in small enterprise sector during flood:***

Importance of small income earning activities in the livelihoods of rural people is immense. Almost each and every household carry out small on farm and off farm economic activities to complement their income from primary occupations, which for

the majority of the villagers is agrobased. Some of these activities found in the village are; livestock rearing, paddy threshing, chicken and duck rearing, selling milk, weaving, shoe making, blacksmithing, small scale fish culture, growing vegetables, selling vegetables, making molasses from date juice, rent-a service of power tiller and tailoring. During floods, in general, their economic activities slow down for various reasons, but most importantly, due to the difficulties in transportation, storage and drying. This result in minimum or no cash flow during floods seasons, which affects their normal life. The project identified jointly with the community and has implemented some of the small enterprise options through skill training and demonstration support aiming to generate earning opportunities, and ensure support for the other community members during flood situation. Under the small enterprise development initiative a total of 67 entrepreneurs in four villages who have been supported by the project to develop and run ten individual small enterprises with coping mechanisms to reduce risk and vulnerability aiming to generate income during, before and after floods situation are:

- ❑ ***Shoes making***
- ❑ ***Weaving (handicraft items)***
- ❑ ***Blacksmithing***
- ❑ ***Bamboo & Cain product making***

- ❑ Tailoring
- ❑ Preservation of Garlic & Onion
- ❑ Mat making with local materials
- ❑ Power Tiller
- ❑ Carpenter
- ❑ Boat making

(\*Selected enterprise during floods)



*Demonstration session: A Part of skill development training*

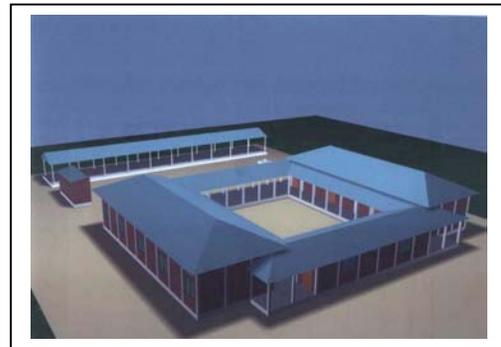


*Initiatives for small enterprise development to reduce vulnerability*



**Refuge site development and evacuation plan (proposed):**

The project had a plan to develop refuge site in highly vulnerable areas having capacity of 150-200 households. The project has emphasized to procure government *khas* land or any land donated by the local rich for the benefit of the community peoples. To achieve the target the project had a unsuccessful lengthy negotiation with local union parisad body, government officials and the community. A management committee supported by the local government, upazila administration and the representative from the local health department and NGO representatives with all necessary facilities were under plan.



*Proposed refuge shelter*

**Evacuation Plan:**

This plan has involved the development of a trained group within the community equipped with rescue facilities e.g. boat, for rapid evacuation of the vulnerable people with their belongings during emergency and assist the refuge site management committee

for better management during the crisis period.

### **Gender perspective:**

It is evident that women's vulnerability to disasters can not be minimised without understanding the prevailing gender relation and its impact on women's coping ability to disaster. Development interventions for disaster mitigation and management must have adequate gender focus and must incorporate substantial gender analysis.

The project activities have ensured involvement of women and men- in housing, homestead agriculture, livestock and fisheries and small enterprise. The project especially emphasised on involving women- destitute women, female headed households. In housing 50% were women owners who directly benefited. The technologies, skills and practices promoted through the project were easily manageable, affordable and adaptable, both men and women equally participated and benefited. In all interventions women participants were more than 50%.

### **Networking and policy advocacy:**

Since the project has operated as a part of regional activities and worked in five South-Asian countries namely India, Pakistan, Bangladesh, Sri Lanka and Nepal had strong international network and also within the country with other ECHO partners in Bangladesh e.g. Oxfam, RDRS, BDPC and ITDG. The project has successfully shared its learning through a number of international workshop and cross visit to improve and disseminate ideas.

### **Observed changes:**

*Through the diversified and holistic intervention for the flood prone communities some positive changes and improvement in their livelihoods pattern were visible. For example, the alternative agricultural cropping pattern has given them partial access to food security and earning during flood. Reduction of mortality of livestock resources saved their assets from sudden losses, fisheries interventions have provided additional income opportunity and nutritional support during lean period. Diversified small enterprise activities helped to generate earning and working opportunity for men and women during this period of low economic activities. In summary, diversified technological options, skills development, awareness and capacity building of disaster affected communities into the mainstream development practices in an integrated way, can reduce risk and vulnerability.*

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