

**Critical Issues of Community Based Flood Mitigation:
*Examples from Bangladesh and Vietnam***

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Abstract

River flooding is regarded as a chronic disaster in many part of Asia. A combination of soft and hard measures is required for flood mitigation, although due to resource constrain, the efforts are mostly restricted to soft measure. Community-based initiatives are found to be more effective in most of the developing countries in Asia, with specific focus on empowerment of local communities, and link the community based activities to local development policies. Community based flood mitigation programs are often faced with two critical questions: issues of sustainability, and issues of upscaling. The current paper analyzes the community-based approaches of flood mitigation in Bangladesh and Vietnam, which have contrasting socio-political system. The common findings in this regard are: 1) local institutions (both formal and informal) play a critical role in sustaining the efforts; 2) integration of community initiatives in the government policies and practices is important to up-scale the efforts, 3) local change agents play crucial roles in grass-root implementation, and 4) synergy of grass-root efforts with the development policy is regarded as the measure of the success of project implementation.

Introduction

Asia is the most disaster-prone regions of the world. Statistics show that 38% of the world's disasters between 1975 and 2000 occurred in Asia. 57% of total casualty in past 25 years belongs to Asia. (ADRC Data Book, 2002). During the same period, flood events contributed to 31% of the total number of events, followed by cyclone or typhoons, contributing 28%. Thus, hydro-meteorological disasters (consists of floods and cyclones) are the most prominent hazards in the Asian region. Asia has several major river systems, which contributes to this high hazard. Asian region is the concentration of high population, and thus, the exposure to natural hazards is also high. Poverty and lack of resources at different levels make people vulnerable. Human sufferings, both in terms of mortality and affected people are prominent in the region. The high toll from floods in the region arises from the interaction of the following factors: living in the flood plains which are suitable to rice and other agricultural products, tropical inter-convergence region subjected to high dynamic atmospheric interactions, and the high population density in the region (Herath 2003). Over time, settlement patterns and the development of land and infrastructures in flood-prone areas have dramatically increased flood frequency, extent, and

subsequent hazards (Blaikie et al., 1994). Increasing numbers of flood disasters are reported in the region, which cause significant financial losses, due to concentration of assets in the flood plains. Thus, not only the life loss, floods have become the most costly natural disasters worldwide (Hewitt, 1997; Palm, 1990).

Traditional approaches to flood control have relied on structural works, including building dykes, floodwalls and levees or modifying river channels (e.g. widening, lining with concrete, or straightening by cutting through channel meanders to shorten the flow distance). These structural approaches, however, have failed to reduce flooding or to reduce ever-increasing economic losses from floods, as economic losses are merely postponed and continue to rise (Mileti, 1999, Musiak, 2003). Embankments further complicate the situation by causing siltation of the river channel and the resultant lowering of its carrying capacity, drainage congestion and water-logging, as evidenced in the Brahmaputra river basin (Gupta 2005). In addition, only focusing on structural approaches is not environmentally sustainable and can cause severe environmental degradation locally and downstream (Burby et al., 1988), including the loss of wetlands and animal habitat. Moreover, prolonged stagnation of the flood and storm water not only affects people's lives, but causes damages to agriculture, and generates health problems due to contamination with the ground water (Gupta 2003). Recent experiences increasingly point out that only structural measures are not enough to reduce the flood losses. Therefore, in many developed countries like Japan, USA, non-structural approaches, such as land use and zoning regulations, land acquisition, and environmental restoration programs, are found to be effective and more sustainable (Gruntfest, 2000, Bechtol and Laurien, 2005).

In developing countries, the flood related problems are far-reaching, affecting the environment and development of the region. Impacts of flood on livelihood have been a major issue, especially in the rural areas, where agriculture, aquaculture are the major livelihoods (Few, 2003, Wisner et al., 2004, Moench and Dixit, 2004). Impacts on health caused by flood have been a topic of major discussion for several years. A recent analysis by Few et al. (2005) has suggested that improving coping response of the communities is the key to the success to reduce health risk, and this is closely linked to economic and cultural issues. For these reasons, flood mitigation in developing countries should be considered as a combination of hard and soft measures. In this connection, restoring the natural functions of rivers and floodplains, planning and management practices, involving the local communities in the river basin management, capacity development of the local institutions are found to be effective measures of sustainable flood management.

For many countries in the developing world, flood bring new opportunities of livelihoods, e.g., flood water brings fishes to fisherman, brings new fertile soil for agriculture. Therefore, while it is important to reduce the negative impacts of flood, the positive aspects of flood have urged people and communities in the

vulnerable areas to develop the notion “living with flood” or “coping with flood”. Participatory flood management with both hard and soft measures is becoming the key focus area.

In this paper, a few aspects of community based flood mitigation are discussed with case studies from Bangladesh and Vietnam. Based on the case study experiences, some common findings are summarized, which are considered as the critical factors for effective community based interventions.

Issues of Community Based Disaster Management

Definition of community varies based on its perspective. Many people describe community in different ways. MacMillan and Chevis (1986) described community as “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together”. This definition is preferred in the current context because of its general nature. Community includes not only the people living in a certain location, but also incorporates the local government, local business sectors, local academic bodies and non-government organizations.

As more research on development are conducted in various fields in recent years, the approach to disaster mitigation is becoming more and more community-based (Blaikie et.al (1994), , Quarantelli (1989), Mileti (2001), and much more effort has been put into incorporating disaster management aspects into the holistic development of communities (Twigg and Bhatt, 1998, , Shaw and Okazaki 2003). Maskrey (1989) has rightly pointed out that, disaster management should not be treated as one single issue but should be incorporated into the socioeconomic activities of local people. The rationale for community involvement or community-based activities is now well rehearsed (Twigg, 1999). Because community-based activities (and community-based organizations) are deeply rooted in the society and culture of an area, they enable people to express their real needs and priorities, allowing problems to be defined correctly and responsive measures to be designed and implemented. Twigg (1999) also argues that existence of community-based organizations allow people to respond to emergencies rapidly, efficiently and fairly, and therefore available community resources (even it is small in amount) will be used economically. Maskrey (1989) pointed out that ‘top-down’ programmes in which communities are not involved tend not to reach those worst affected by disaster, and may even make them more vulnerable. This is found to be similar in both developing and developed countries, as argued by Shaw and Goda (2003). In Japan, in many rural mountain communities, shift damage risk of one community makes other communities vulnerable. In a river basin system, upstream community should be strongly linked to the downstream community, and communication regarding community level interventions should be well coordinated.

Most disaster management systems are fashioned using command and control management structures, one that is top-down and with logistics centered responses. It can be highly bureaucratic and frequently operates under explicit or implicit political constraints that impinge on the effective delivery of emergency services. Due to this, engagements of the community under this scheme were characterized by the following: a) lack of participation that results to failures in meeting the appropriate and vital humanitarian needs; b) unnecessary increase in requirement for external resources; and c) general dissatisfaction over performance despite the use of exceptional management measures.

Recognizing these limitations, the CBDM approach promotes a bottom-up approach working in harmony with the top down approach, to address challenges and difficulties. To be effective, local communities must be supported to analyze their hazardous conditions, their vulnerabilities and capacities as they see these.

It is common knowledge that the people at the community level have more to lose because they are the ones directly hit by disasters, whether it is a major or a minor one. They are the first ones to become vulnerable to the effects of such hazardous events. The community therefore has a lot to lose if they do not address their own vulnerability. On the other hand, they have the most to gain if they can reduce the impact of disasters on their community. The concept of putting the communities at the forefront gave rise to the idea of community-based disaster management (CBDM). At the heart of the CBDM is the principle of participation. Through the CBDM, the people's capacity to respond to emergencies is increased by providing them more access and control over resources and basic social services. Using a community-based approach to managing disasters certainly has its advantages.

Any local population would have local knowledge regarding vulnerabilities and capacities. They are repositories of traditional coping mechanisms suited for their specific environment that they have developed from previous experiences in dealing with disasters. Due to exposure and proximity to hazardous conditions, a local population responds first even before assistance from aid givers arrives at times of crisis. By using what is available locally, a timely response is possible. Timeliness in emergency response is critical because this determines how many lives would be saved or how many properties can be prevented from being damaged.

CBDM strengthens social cohesion and cooperation within the community and society. It builds confidence among individuals, households, communities for any undertaking including disaster preparedness and mitigation. Through CBDM it is hoped that communities would be strengthened to enable them undertake any programs of development including disaster preparedness and mitigation.

However, community involvement often faces the problem of sustainability over a longer period of time (Shaw 2004). Government, non-government and international organizations implement various programmes before and after the disasters. Many of them are very successful during the project period, however, some of them gradually diminish as the years passed. There are many reasons for gradual decrease of people's involvement in a project. The most common elements are partnership, participation, empowerment and ownership of the local communities. Unless the disaster management efforts are sustainable at individual and community level, it is difficult to reduce the losses and tragedy. While people should own the problems and, consequences and challenges of any mitigation and/or preparedness initiative, it is necessary to see people's involvement in a broader perspective, which is related to policy and strategy.

The other issue of community based disaster management is the up-scaling of the initiative. There have been too many good practices, however, most of the good practices have remained confined to their local communities only. Their potential in influencing attempts to reduce vulnerability in other parts of the world is enormous. While, an innovative approach is found to be effective in one village, one district, the challenge is how to disseminate the best practices widely.

It has been a common notion that grass root initiatives are the responsibilities of the non-government organizations. NGOs have been the leading actors in this field for several years, and contributed to the development of the field (Jegillos, 2003, Murshed, 2004, Delica-Wilson, 2005). However, many of the NGO activities face the problem of sustainability over a longer period of time, especially once the NGO withdrew from the field. Many of the NGO programs are poorly designed and so they are unable to either attract continuing support or transfer project ownership to communities. Continuation of community activities over a longer period of time needs a policy environment at local level, as well as local institutions to continue the activities. Thus, even though the initiatives are started with the NGO interventions, it is important to link them to the local government activities, and incorporate them into policies to ensure its sustainability and replication of innovative efforts to other parts of the disaster prone areas. Thus, the major challenges of the community based disaster management (CBDM) are: 1) sustainability of the efforts in the community level, and 2) incorporation of the CBDM issues in the policy level. To be effective and to create sustainable impact, the application of the CBDM must go beyond the initiative of communities, NGOs and a handful of local governments. As part of an advocacy for more responsive and effective governance, national and state level governments should look at integrating CBDM in their policy and implementing procedures (Shaw 2004).

Case Study of Bangladesh

Flood in Bangladesh is almost an annual feature of peoples' life that is to a large extent due to its geographical locations and natural drainage system. The major river systems, including the Ganges, the Brahmaputra and the Meghna, pass through Bangladesh to reach the Bay of Bengal. Floods inundate a substantial part of Bangladesh every year from July to September. In a “normal” year about 20 percent of the country is affected but under extreme conditions as much 60-70 percent of the country would be inundated. Frequent flooding exacts a heavy toll especially on poor families in low-lying areas, who either lose their lives or lose what few assets they have carefully accumulated. The floods in 1988 captured the world media's attention as the worst on recorded history inundating nearly 60% of the land area (52 districts out of 64) of the country and affecting 45 million people. The extent of total loss was estimated to be equivalent to \$ 1.2 billion. An estimated 7.2 million dwellings were damaged or destroyed. Often these statistics do not reflect the human misery and the adverse impact on the livelihoods of most individuals, families and communities affected by the disasters (Hassan 2004).

As stated above, many parts of rural Bangladesh are flood-prone, however, the characteristic of 1988 flood was that it strongly affected the urban and semi-urban lowland flood prone areas, causing extensive damages to buildings and infrastructures. The damages to these relatively new urban clusters are considered as the results of unplanned growth, and demonstrated the need for a more comprehensive flood plain planning. As a result, the Government of Bangladesh with multi-donor support, launched the Flood Action Plan (FAP) in order to formulate and implement technical, economical and environmental rehabilitation and protection measures to counter the adverse effects of annual floods throughout the country. FAP 23, one of the major components of the Flood Action Plan, reviewed and evaluated the possible performance of ongoing flood proofing activities. CARE Bangladesh with the financial assistance from the USAID undertook a 5 years (since fiscal year 1999) Flood Proofing Project. Flood proofing is defined as: the provisioning of long-term, structural or non-structural measures that can be taken by individuals, families or communities to mitigate the effects of floods. The project is being implemented through a partnership arrangement by CARE, Local Government Engineering Department of the Government and local partner NGOs and Union Parishads (UP) in 1,000 communities in active flood plains in 20 high flood risk sub-districts. These communities experience regular annual flood as they are either located in the active flood plains of major rivers' channels or the tectonic depression areas. This makes the project's geographical set-up wide spreading. Among this wide area, detailed study was conducted in Kurigram district (northern part of Bangladesh) an active flood plain formed along and or within the Brahmaputra River (Figure 1).

The primary reason of designing and implementing this project is to reduce the adverse impact of flood in the lives of the rural flood prone communities who get

inundated every year. The scale of inundation differs from year to year as determined by the flooding character. Relative economic losses to the magnitude of flooding leaves behind innumerable resource poor vulnerable and vulnerable to next year's flood. The poor, vulnerable communities cannot develop a strong coping mechanism of their own as they lack information and skill development options. Thus, the project was so designed as to enhance the local coping capacities, and to institutionalize the efforts at the local level. Community's involvement from the inception phase was important, since CARE came to the field with an open and flexible agenda.

The project had following components: Community Mobilization and Awareness, Household Flood Proofing Measures, Small Scale Agriculture, Social Forestation, Infrastructure (building flood shelter, raised tube well, house levels), Community Resources Management, and Income and Livelihood Protection (Figure 2). All the activities were implemented through a community committee (Local Project Society), with representatives from local government, local residents and local NGOs. The project arranges extensive training for capacity building of LPS members and links the LPS with other development agencies and local government for sustainability of FPP interventions. The project also formed Mother's club, Adolescents and Children Forum in each community and provide education on flood preparedness, health, nutrition, etc. Apart from training and capacity building, the project also conducted several structural measures with homestead raising, evacuation center, latrines and tube well raising, and embankment construction etc. Beside these, the project introduced small-scale agriculture, social forestation and river erosion control measures. All these elements were linked to the local livelihood and income generation activities.

This is to mention that the project areas are located in the stable islands (termed as “Char” in local language) within the river. There are several islands appear and disappear every year in the river, and some of them become stable islands over several years, due to accumulation of silt and clay. There is a problem of land ownership of these islands, since there are located in the middle of the river. At many instances, people from the mainland migrate to these small islands, and live there without proper land ownership. Consequently, the social status of the region was not high, and people start to migrate back to the main land or nearby towns after some years. In the above context, two most important aspects of the intervention were: how to build confidence in communities and how to sustain any intervention at local level. For confidence building the essential was to involve people in the process of decision-making and implementation of flood-mitigation activities.. Involvement of people and communities started with identifying the “Change Agents” in each village. They included local school-teachers, businessman, mosque leader, etc. Training programs were conducted for them, and they were consulted heavily in the initial period of decision-making. The essential idea was to send the message of safer living through these Change Agents. The other important change agents were the mothers, who were responsible for the health and

sanitation issue of the children. A Mother's Club was formed in each village, and training (consists of health and sanitation, home gardening etc.) was provided to them. Then, trained mothers took the responsibility to train other mothers in the same village. This process was found to be effective in reaching wider female group in a rather conservative society, and found to be deep rooted in the communities in terms of their daily lives and livelihoods.

The involvement of local government was the other critical issue, which was ensured through the local project society. The society was independent in its operation, but was closely linked to the local government (Union Parishad, which is the lowest level government, in-charge of several villages). The members of the society are the local elected leaders, head of the Union Parishad (appointed government officer), local school teachers, mosque head, business leaders etc. Local project society and other participating agents instrumental with clear vision, management capacity, adequate knowledge, information and true facilitation are found to be fundamental for the success of community based interventions. Legal status of CBOs and linking with other development initiatives was the key factor in linking the activities with the local governments.

Case Study of Vietnam

In contrast to Bangladesh, Vietnam has a different socio-cultural and political system, especially in terms of governance (community party system is the main pillar of governance in Vietnam, in contrast to democratic governance in Bangladesh). On cultural and social aspects, while religion is an important part of society and culture in Bangladesh (mosques playing an important role in the local community), for Vietnam, it is more the local festivals which matters as the social events. . Situated in the tropical monsoon zone close to the typhoon centre of the western pacific, Viet Nam is one of the most disaster prone countries in the Mekong region. Currently, 70% of the 73 million people in Viet Nam live in disaster-prone areas, with the majority of the people in the Central region. Losing crops and homes in floods and storms keeps many rural Vietnamese trapped in a cycle of poverty. This has been intensified in the recent years with major floods occurring more frequently, and thereby leaving the communities unprepared (CECI 2004).

The current study area Thua Thien Hue province is located in Central Viet Nam, with a variant geography of mountains and coastal plains (Figure 3). It is subject to severe climatic hazards such as typhoons, floods, droughts and forest fires. Climate change has caused these conditions to worsen in recent years, causing devastation to the entire province, notably vulnerable rural populations in mountainous areas and along the province's coastal zone. Increased severity and duration of these natural hazards have had disastrous effects. Although the relationship of climate change and its impacts as disasters are yet to be clearly specified, some recent publications and project

implementation have tried to link the disaster events to climate change impacts (Nguyen et al. 2001, CECI 2004, IMH 2005)

In November and December 1999 there were two floods occurred in the Central region, which were considered to be the largest in last hundred years. From 1st to 6th November, due to the cold front in combination with the tropical convergence and a tropical depression, cyclonic rain occurred in large areas in this region causing severe flooding (the first flood). According to reports of the Central Committee for Flood and Storm Control (CCFSC) and Hydro-meteorological Services of Vietnam (HMS), some areas of the region received twice their mean rainfall in just three or four days (Hoang et al. 2005). Flood water inundated large areas in nine provinces, resulting in loss of life, extensive physical damage and severe economic losses. Consequently, the region's development was set back and affected communities had to go through a lengthy recovery process.

Based on the geographical and climatological features and the disaster conditions of all types of the country, the Government of Vietnam made decisive policy for each zone as follows:

- For Northern Part of Vietnam: It is to strengthen dyke system and flood retardation and diversion structures, to improve flood resistant coefficient of constructions, and to protect essential population and economic areas against flood.
- For Central Part of Vietnam: Central Vietnam is narrow and topographically complicated, frequently affected by storms, and rapidly rainwater concentrated resulted in flooding. The decisive policy is to supplement active measures for flood prevention and mitigation, as well as for familiarising with floods.
- For the Mekong River Delta: The decisive policy is to prepare measures for living with floods, to minimise damage caused by floods as well as to make use the advantages of floods for the sustainable development.

Thus, in the northern region, it is more on “*positively prepare for and prevent flood*”, while, in the Mekong region in the south, it is more on the “*coexists with flood (living with flood)*”, and in the Central part, it is on “*positive preparedness, mitigation and management*”.

Many international donors were assisting the Viet Nam Government to create a partnering strategy and prepare disaster resistant investment projects for sustainable development of Central Viet Nam through Natural Disaster Mitigation (NDMP 2002). One significant initiative was that of CECI, a Canadian NGO, and was funded by CIDA (Canadian International Development Agency), under Canada Climate Change Development Fund. The project components were (Figure 4): 1) stakeholder and resource mapping, 2) vulnerability, capacity and need assessments, 3) training programs for the “Change Agents,” 4) development of simplified climate change scenario and its impacts as flood, 5) awareness raising campaign, 6) participatory development

of “Safer Village Plans” and “Safer Production Plan”, and 7) Implementing specific components of the planning through sub-projects (CECI 2004).

The important part of the project was the initial discussion with the local communities and local government officials to identify the needs and priorities at local levels. This was done through series of mapping exercises, and vulnerability, capacity and need assessments. This was a rather lengthy process, but was effective in generating local participation of the government and communities. The other aspect of the project was training and capacity building of the “Change Agents”, which in this case were the leaders of the mass organizations. In Vietnam, there are several mass organizations as a part of the communist party system, targeting different groups, like farmers association, women association, fisherman association, youth association, and so on. The leaders of these mass organizations play important role in community mobilization during the disaster, and were also crucial in the reconstruction and recovery process, as evidenced from 1999 flood (Hoang et al. 2005). In 1999 flood, the Youth Union was the most effective mass organization for rescue and relief, followed by Veteran Association. Women Association played a crucial role in the relief and reconstruction process, helped in community kitchens, and household level data collection of the affected communities. Training component for the Change Agents were: orientation training on climate change issues and impacts, and specific training on agriculture, aquaculture, and awareness raising of the school children.

Following the training programs, planning process were initiated in the village levels, which produced safer village plans and safer production plans. Essential components of the safer village plans were: livelihood and socio-economic status, basic infrastructures, assessment of current situation and local capacities, specific plan of actions on preparedness, response and recovery, and proposals for implementations of small-scale projects. The safer production plans consist of main production activities, specific production conditions for agriculture and aquaculture, advantages and disadvantages of production, and measures taken for the enhancement of production. The development process of the plans was important. It was a participatory process, with the involvement of commune government, village heads and mass organization leaders, and facilitated by CECI project team. The plans were authorized by the commune governments, and were considered parts of the development plans of the village.

Following the planning process, specific small scale projects were implemented, based on the available resources. Examples include: construction of commune roads in the higher ground, multipurpose schools as shelters, sanitary latrines, drinking water system etc. The characteristic part of these projects was the co-financing from the local government (commune-level) and individual funding from the beneficiaries. This process was able to create a strong ownership of the local community, and thus ensured the sustainability of these activities over a longer period of time.

Conclusion

The two case studies presented here, show that the flood effect to the communities goes beyond the damages of buildings and infrastructures. It affects the livelihood of the people, and it also has an impact on the development issues in the communities, especially on health and education. The two case studies tried to focus on linking the community activities with the local government initiatives, and a strong cooperation between the government, community and the NGOs was observed in both cases. Both these projects were implemented by NGOs, however, their roles were more as facilitators and catalyst. Although working in two different geo-political context, CARE and CECI's approaches had significant similarities, especially on community consultation and decision making, training of change agents, and institutionalizing the initiatives in the local government systems. For an initiative to be sustained over a number of years, it needs a system, which consists of key people, key instructions. In both cases, the key people are the change agents: for Bangladesh, it is the local elected leaders, mosque head, teachers, local businessman; and in Vietnam, it is the mass organization leaders. The institutions are the local governments in both cases: the project society formed in the local government in Bangladesh, and the commune government in Vietnam.

Since both these countries are prone to flood, there are tremendous amount of local knowledge and expertise, which were accumulated over a number of years. In both the projects, utilization of these local knowledge was high priority, and its linkage to new technology was essential. Right information to the people was essential, and this was done through the training programs. People's attitudes are important, and to make an changes in the action, it needs to linked to the local economic activities, in terms of possible incentives. Therefore, trainings on agriculture, aquaculture, home gardening were important. Participation of local communities is an important issue, and both the cases put significant emphasis on it.

Figure 5 shows the conceptual framework of community based initiatives, focusing on the essential issues. Policy and institution are key factors for the sustainability at government level, while the incorporation of change agents and appropriate information make it sustainable at grass-root level. The institutional issues in both cases emphasize the need to strengthen the local institutions rather than creating new institutions. Training and capacity building of change agents is observed in both cases. Crucial information dissemination to different stakeholders was also found to be important, and state-community partnership was one the main product of both initiatives.

A “culture of coping with crisis” and “culture of disaster reduction” exist in all communities, and thus any risk assessment process should involve participation of people and incorporates their perception of vulnerability and capacity. Community and supporting agencies share common motivation and ownership for the initiation and sustainability of community based disaster management. Genuine people’s participation within capacity building objectives, with specific focus on important vulnerable groups like women, elderly and children is found to important in both cases of Bangladesh and Vietnam. Involvement of the Mother’s Club in Bangladesh, and Veteran Association, Women Association in Vietnam, training and awareness raising of school children were part of these activities. For training and capacity building, wider stakeholder involvement and participation, effective networking and knowledge capitalization were essential to make the training effective into actions.. Legislation and incorporation of community based disaster management in development planning and budgeting is extremely crucial and serves the major pillar of the policy integration. This, in both cases ensured the local government co-financing of project implementation.

In summary, following are a few general statements which are applicable to different context of community activities: 1) local institutions (both formal and informal) play a critical role in sustaining the community initiatives; 2) integration of community initiatives in the government policies and practices is important to up-scale the efforts, 3) local change agents play crucial roles in grass-root implementation, and 4) synergy of grass-root efforts with the development policy is regarded as the measure of the success of project implementation.

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Figure Captions

Figure 1. Map of Bangladesh showing the project location in Sirajganj district.

Figure 2. Community based interventions: a) flood shelter in the raised ground, b) raised tube well as a sanitation measure, c) Change agent training, and d) Mother’s club discussing the community based income generation scheme and health issues.

Figure 3. Map of Vietnam showing the project location in Central Thua Thien Hue Province

Figure 4. Community based interventions: a) school building as the new flood shelter, b) raised latrine as sanitation measure, c) change agent providing training on climate change issues, and d) mass organization leaders discussing common issues.

Figure 5. Community based flood management framework



Figure 1. Map of Bangladesh showing the project location in Sirajganj district.



Figure 2. Community based interventions: a) flood shelter in the raised ground, b) raised tube well as a sanitation measure, c) Change agent training, and d) Mother's club discussing the community based income generation scheme and health issues.



Figure 3. Map of Vietnam showing the project location in Central Thua Thien Hue Province



Figure 4. Community based interventions: a) school building as the new flood shelter, b) raised latrine as sanitation measure, c) change agent providing

training on climate change issues, and d) mass organization leaders discussing common issues.

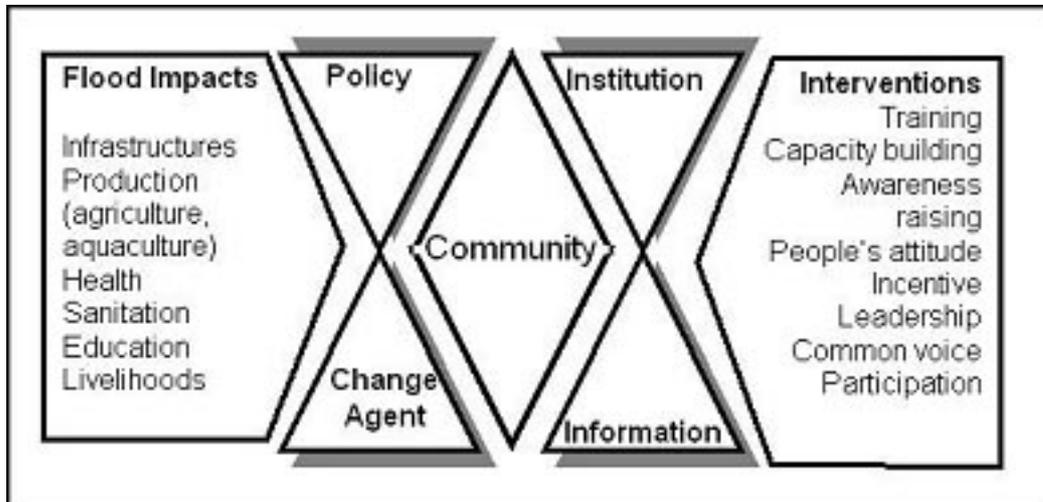


Figure 5. Community based flood management framework