The Use of Incentives for Sustainable Behavioural Change to Promote Flood Resistance and Resilience

International perspectives on engaging the public to anticipate and mitigate the effects of climate change (flooding)

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1. Introduction

For many years flood stories are documented around the world as history or legend in almost every region on the planet. Flooding can turn even the most harmless looking watercourse into a raging torrent of large scale destruction where any structures may prove no obstacle to its power, it may ruin many crops which can lead to starvation and take away many people's lives. Many governments and international organisations have devised regulations and management structures to cope with flooding. Although, many nations carry out actions that are related to elimination or reduction of the probability of the occurrence or reduction of the effects from unavoidable disasters the lack of incorporation of the local conditions and vulnerabilities act as a hindrance to their success. This bespeaks the need to include local knowledge and skills from specific communities in disaster prevention activities. Hence, in order to gain an understanding on the international perspectives on flood prevention, this section of the report outlines the challenges that local authorities face, the concept of public engagement which has gained its importance in recent past and its applicability. The report further outlines the ways of achieving community engagement in flood prevention by bringing forward the solutions adopted by different countries and finally it identifies three case studies illustrating good practice on community engagement in flood prevention.

2. Challenges to Authorities

Disasters are threatening many parts of the world at a time of the world facing an unprecedented scale of disasters. They appear to be increasing in both frequency and intensity. Asian Tsunami (2004), Bam earthquake (2003), Kobe earthquake (1995), UK floods (2008), tropical cyclone in Myanmar (2008), Italy earthquake (2009), Kashmir earthquake (2005), suicide attacks in World Trade Centre-America (2001), persistent civil wars in certain countries, regular explosions all over the world, are just a few out of the endless list of many disasters. In this context, disasters have become a part of everyday life of humankind of the globe. Statistics indicates that the impact of natural hazards such as flooding in particular on life and livelihoods is also dramatically increasing.

Natural disasters such as floods are becoming more complex and climate change leads to a greater potential for adverse impacts (Aalst and Burton, 2002). Natural disasters have their huge impact at local level, especially on the lives of people who are affected from a disaster. United Nations (2003) describes a disaster as a severe disruption of the functioning of a community or a society causing extensive human, material, economic or environmental losses which goes beyond the ability of the affected community or society to cope using its own resources. In order to address the impact of a disaster and to reduce the occurrence of future disasters, it is important to take corrective measures by managing disasters in an effective way. During recent past, the value of public and other stakeholders' participation has been increasingly recognised at policy level in disaster management (Tippett et al. 2005). However, many communities around the world rely on local or other authorities to take actions in preparing and responding to any flood event. Although, governments and related authorities devise many jurisdictions and management structures to deal with flooding they still face many difficulties in managing it effectively. This section of the report highlights the difficulties that authorities face in different countries.

2.1 Poor management of drainage systems

Due to improper management of water drainage especially within a city, communities and relevant authorities face a severe risk of flooding. This happens when a city's deep drainage piping is clogged with mud and waste or dams are filled with mud. According to The Herald (2007), experts warned

the relevant authorities that Mexico City was at risk of flooding of the kind that devastated New Orleans in the wake of Hurricane Katrina if they don't take necessary steps to unclog the canals, reservoirs and lagoons that make up the municipal sewer system. The foul liquid moves through a more than 70 years old system of hillsides, slopes and gullies feeding the rivers of the Mexican capital. Further, it was highlighted that there is a possibility of flood within the city if the hillsides are not recovered since the earthworks and reservoirs are not holding the water because of the mud that fills them. In addition, it was mentioned that a strong rainy season could put too much pressure on the dams and it may break the walls and release a monstrous wave of putrid wastewater down the hillsides into the lower neighbourhoods of the capital. This indicates the poor management of drainage systems and lack of co-ordination between different authorities during joint actions.

2.2 Inaccurate forecasting of potential risks

During the 2008 flood in Uttar Pradesh in India, more than 770,000 people faced the fury of floods as the Mahanadi in Orissa and the Yamuna were in spate of affecting more areas including the national capital. During this flood there were a total of 61 embankment breaches and relief and rescue workers were facing trouble to reach many of the villages because water had huge current and they were not able to move on boats. This was a severe flood that affected many and thousands of other victims remained stranded in different places. This problem was heightened after a huge quantity of water entered the Hirakud reservoir forcing the authorities to open some 40 of its 64 sluice gates. The release of water from the dam has caused devastation in the coastal districts of Cuttack, Puri, Jagatsinghpur and Kendrapada (Thaindian news, 2008).

2.3 Inflexible nature of flood management and political influence

Another problem which authorities face is the difficulty of providing community specific responses during an emergency state and also their lack of ability to take actions within the given power. During 1997 Red river flood, community members from certain flood prone areas felt that the government's mandatory evacuation order during the 1997 flood was inappropriate (Buckland and Rahman, 1999). As per the governmental policy regarding flood mitigation, they have encouraged rural households to flood-proof their houses by constructing permanent and temporary dikes around

them. However, since sandbag dikes are vulnerable to leaks there was a need monitor these preventive measures from a general collapse. In addition, due to water seepage in certain places there was a need for continuous pumping of water from the basements. This too required a continuous monitoring in the event of equipment malfunction, clogging, or electrical failure.

However, a government or a relevant local authority evacuation order was commonly given for both towns and rural communities. In most of the circumstances, these orders are mandatory evacuation orders. This lead to a dispute among people, because certain communities who had a need to monitor their flood preventive measures were also forcefully evacuated. In the case of Red river flood, the authorities failed to explore the community dynamics bound up in this issue as it generated much controversy in the communities. Although the order was just one of the actions taken by government, the level of sensitivity of the issue had a tremendous effect on public's perception on authorities' performance. According to a study on 1997 Red river flood (Buckland and Rahman, 1999), the respondents supported the essence of the mandatory evacuation order for certain parts of the flood prone areas where the risk of flooding is high and for young, old and disabled people. However, the tension and the perception created among community people from the process of implementation of the order resulted in further challenges to authorities for future flood management activities.

According to a study on 1997 Red river flood, it was found that the evacuation order was implemented with a little consultation with municipal officials (Buckland and Rahman, 1999). Further, the evacuation order was delivered to all municipalities, and was implemented by a combination of local authorities and the Royal Canadian Mounted Police and armed forces personnel. It was highlighted during the study that municipal officials received an unsigned facsimile ordering the evacuation of all municipal residents, excepting emergency personnel. In addition it was pointed out that the authority and municipal officials were in a very difficult position because on one hand if they have to fully implement the evacuation order they would lose community support and on the other hand if they disobey the order they were feared about the reduction in government rehabilitation funds. This shows the lack of ability of the centralised system to consider the local situations which resulted in the failure of top down disaster risk measures to suit the different locations and different groups. Moreover, the consequences of bureaucratic and political nature in management of these events can be well noticed from these difficulties.

2.4 Ineffectiveness in communication and lack of inclusion of local knowledge

During March 2001 low pressure system passed over the North Coast area of New South Wales which brought extensive torrential rain that caused serious flooding on several river systems. Local authorities faced difficulties in carrying out an effective warning and evacuation due to community's perception about the risk (Pfister, 2002). Since some people are not or less risk averse, they do not respond to evacuation order immediately. In addition, other priorities such as waiting for other family members, unwillingness to leave their livestock, etc. and other signals such as unwillingness or movement of other members from their neighbourhood may interfere with immediate response to warning messages. Another important aspect which authorities lack in their communication is their inappropriate use of method of communication to all community people. Due to lack of mental or physical capability, some people cannot respond to these general warnings. Further, due to different priorities, languages and levels of understanding these messages were not conveyed or understood by some groups of people. In short, the diversity in population was not considered by the authority. Some groups were largely excluded from most networks and they were not able to receive any warnings even where the system appears near perfect.

Lack of inclusion of local knowledge during these mitigation stage resulted in unnecessary evacuations of local people which ultimately became a widespread source of speculation. Due to a very different perception of some members of the community with regard to the probability and severity of the risk and the ability of some residents who can correctly predict the progress of the flow of flooding without any dramatic flow of water due to their previous experience authorities found that their messages to communities didn't have an effective response.

2.5 Unwillingness for change and, Lack of regular update of information and systems

According to a study by Osti and colleagues (2008) it was found that governments of some flood prone countries are still lagging in accepting flood mitigation agenda in their national development plan. Further, it was stated that flood mitigation policies in developing countries either do not exist or are not adequate and even if exist, these policies are ineffective or conflicting in their standpoints. Most importantly, due to legislative and administrative

complexities appropriate policy and programmes have the difficulty in reaching all grass root levels. In certain situations, programmes are not effective due to overlapping and duplication which lead to people's ignorance. Furthermore, the lack of regular monitoring and evaluation of programmes by the authorities and weak social security systems act as other barriers. In certain places introduction of completely new technologies for flood prevention without incorporating any local indigenous practices which are built within their environment for many years mislead the community on their perception on new developments by the authorities.

3. Public Engagement

3.1 What is public engagement?

The term public engagement has been referred to as community participation, people's participation, civic engagement, etc. Participation is another term which is quite often referred to engagement. Burkey defines engagement (1993 cited Samaranayake, 1996) as a process which is an essential part of human growth, which is the development of self-confidence, pride, initiative, creativity, responsibility and co-operation. Many organisations and officials who deal with disaster management use the term public engagement as a tool of enhancing the capacity of the affected community in order to create a resilient community. However, the term engagement is described with different meanings. The term is viewed as a cosmic label to make any proposal to appear more attractive to the funding body or to describe a co-opting practice to mobilise local labour and which in turn will reduce the cost of execution. Further, the term is also used to describe an empowering process which enables the local people to do their analysis, to take command, to gain confidence and to make their own decisions (Samaranayake, 1996). Public engagement is described and promoted with three rationales: normative, instrumental and substantive (Hajer and Kesselring 1999). While explaining about engagement Petts (2006) states that it is predicated on creating the necessary conditions to support a new relationship between expert and lay understandings of an issue, one that promotes learning about different perspectives, views, and knowledge. Further, he states that public engagement is a process which can capitalise on local knowledge and lead to shared learning and understanding between experts and public. Petts refers to it as not only to be the right thing to do and a better way to achieve particular outcomes. However, Petts pointed out that this should ultimately also lead to better decisions as in many situations the interest of public is not taken up to decision making level. Although, the concept of public engagement has its different motives for different stakeholders of flood management building a relationship with the public and agreeing on the importance of public participation as a solid first step towards engagement.

3.2 Importance of public engagement

During early 1970s (Samaranayake, 1996) development interventions had two types of actors. On one side those who engage in the development activity by involving in identifying the development need, planning development activities, mobilising resources for development, implementation, monitoring the implementation process to ensure that designs, plans and disbursement of resources were taking place as planned, and evaluating the success or failure after the event. On the other side the beneficiaries for whom and for whose development all these tasks were undertaken. Earlier days although beneficiaries were marginally involved in the development process, but were called upon to operate and maintain structures such as minor irrigation reservoirs, well, etc to share the cost of development activities. In these two categories those who do are empowered and they have knowledge, authority, access to resources and decision making power. Those who are the beneficiaries or for whom things are being done are dependent, powerless, ignorant, lacking in authority, poor and therefore lacking in resources and basically voiceless in the decision making. This gap between these two actors has resulted in mutual mistrust, often leading to resentment and has serious implications on the development process. Numerous cases have been recorded on the failure of the development activity without community participation. Hence, there is a need to bridge this gap between these two actors.

Further, the local community is an important segment of the stakeholders for flood management as they are the first responders when a flood happens. Most often during small scale disasters the local community is left to deal with disaster management without any assistance from external parties. In addition, top-down disaster risk reduction programmes often fail to address specific vulnerabilities, needs and demands of at-risk communities (Haghebaert, 2007). These vulnerabilities and needs can only be identified through a process of direct consultation and dialogue with the communities concerned, because those communities understand local realities and contexts better than outsiders (Haghebaert, 2007). Generally, vulnerable communities possess skills, knowledge, resources and capacities and these are often overlooked and underutilised (Aldunce and Leon, 2007) and, in some cases, even undermined by external actors. This indicates the need for involvement of affected populations when determining their needs and in the design and management of responses. Their lack of participation can limit the impact of both emergency and long-term interventions. During the Yokohama World Conference on Natural Disaster Reduction (1994 cited Ariyabandu and Wickramasinghe, 2003), a mid-term review of the International Decade for Natural Disaster Reduction recognised the need to stimulate community involvement and the empowerment of women at all stages of disaster

management programmes as an integral part of reducing community vulnerability to natural disasters.

Through public engagement in flood prevention actions authorities can provide accurate information to affected people about the assistance they can expect to receive so that people can take other necessary actions to drive their own recovery plans in the overall process. Local authorities should not underestimate local communities' coping capacities but rather they should build upon them. There are a number of pre-conditions for reducing the spread of disease and preserving the quality of the environment during and after flooding. These include a good understanding of water and sanitation conditions, disease monitoring, speedy responses to warnings of disease outbreaks and the preparedness of health agencies to act. Further, public should be given an opportunity to get involved in post flooding reconstruction activities as it will provide them the chance to develop their ability to cope for future disasters. Although, many agencies end their assistance after a period of time the local community do not cease their living instead they are the people who need to live and improve their living conditions and livelihood opportunities. Hence, local community needs to be given an opportunity to develop their knowledge and skills to maintain and develop their local conditions. Further, community's participation in these activities can provide them economic and social upliftment. Their participation can enable the aid programmes to be flexible enough to adapt to changing conditions and can facilitate the authorities to provide successful programmes to manage the emergence of new categories of people needing assistance. The highest form of participation appears to be self-organisation, self- responsibility and self-actualisation, which result in empowerment of people concerned (Samaranayake, 1996). This development allows a process whereby people learn to take charge of their own lives and find solutions to their own problems which guides towards sustainability. The following section details about the concept of empowerment of community.

3.3 Empowerment of community

Empowerment has been defined in several ways by many authors for different contexts. While explaining about community empowerment Adams (2003) refers it as a process that enables them to analyse the sources of their problems, to explore their own needs and develop their own strategies. Even though the meaning of the terms delegation and empowerment may look similar they are different to each other. Shackleton (1995) states that in delegation a leader or manager decides to pass on a task or a specific part of his or her job to another individual for a specific reason. However,

empowerment is a philosophy of management which widens the responsibility associated with the current task or role without necessarily changing the task or role itself. Handy (1993) simply explains empowerment as encouraging people to make decisions and initiate actions with less control and direction from their manager. In a study by Loretta and Polsky (1991), for management, empowerment is giving up of some control and the sharing of additional knowledge of company goals and achievements.

The origin of empowerment as a form of theory was traced back to the Brazilian humanitarian and educator, Paulo Freire (1973 cited Hur, 2006) when he proposed a plan for liberating the oppressed people through education. Although, Paulo did not use the term empowerment, his emphasis on education as a means of inspiring individual and group challenges to social inequality provided an important background for social activists who were concerned about empowering marginalised people (Parpart, et al. 2003). The concept is conceived as the idea of power since it is closely related to changing power by gaining, expending, diminishing, and losing (Page and Czuba, 1999). While explaining about the origin of the concept, Shackleton (1995) says that there is no single cause or origin of the empowerment movement, rather, it emerges from the increasing specialisation of some work, the changing shape of organisations and a shift towards placing greater value on the human being at work. While describing empowerment, Nesan and Holt (1999) state that, empowerment is more a philosophy than a set of tools or management principles to be readily applied to business organisations. Though the term empowerment has been used frequently in management literature, it is been defined in several ways by organisations and scholars. Accordingly, empowerment is a diverse concept which is open to a number of different interpretations. During the last decade the term has become a widely used word in the social sciences across many disciplines such as community psychology, management, political theory, social work, education, disaster management, women studies, and sociology (Lincoln et al. 2002).

In a study within the construction industry, Nesan and Holt (1999) collectively define empowerment as the process of giving employees the authority to take decisions, relating to their work processes and functions, and within the limits provided by management, but requiring them to assume full responsibility and risk for their actions. Further they state that, empowerment is not an act or incident that can visibly or physically happen, but it is employees' perception or realisation that they believe in, and control what happens to their work processes; and that they are capable of controlling those processes efficiently. Even though Eylon and Bamberger (2000) view empowerment from two different perspectives: a cognition (psychological approach) or social act (sociological approach), in their gender

related study, they accept that empowerment cannot be neatly conceptualised as either a cognition or social act.

3.4 The process of empowerment

Empowerment is multidimensional and occurs within sociological, psychological, economic, political and other dimensions. Earlier studies on empowerment state that empowerment can occur at individual level or collective level (Hur, 2006; Boehm and Staples, 2004). Empowerment can be illustrated as a social process since it occurs in relation to others and as an outcome that can be enhanced and evaluated against expected accomplishments (Parpart et al., 2003). According to Hur (2006), the process of empowerment can be synthesised into five progressive stages as illustrated in Figure 1: an existing social disturbance, consciousness, mobilising, maximising, and creating a new order.

According Hur (2006) and Nilsen (2007) the components of Individual Empowerment could be listed as follows:

- Meaningfulness: This is related to how the employees find the work relevant to their own values and ideas. It is also about internal commitment.
- Competence: It is a belief that one possesses the skills and abilities necessary to perform a job or task well (Gist, 1987 cited Hur, 2006).
- Self-determination: Is about autonomy in personal working tasks. It concerns having the ability and authority to try one's own solutions.
- Impact: Impact is the perception of the degree to which an individual can influence strategic, administrative or operating outcomes at work.

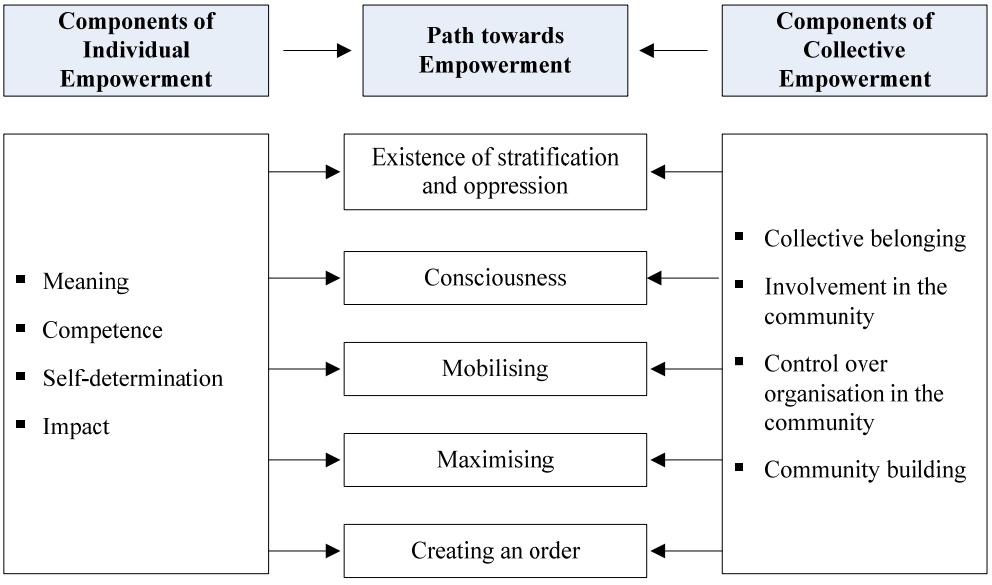

Figure 1: Path towards empowerment (Source: Hur, 2006)

Furthermore Fetterson, (2002) and Hur (2006) describe the components of Collective Empowerment as below.

- Collective belonging: Taking part in community activities or events that may lead to effecting change/affecting the power structure in communities.
- Involvement in the community: Taking part in community activities or events that may lead to effecting change in /affecting the power structure in communities.
- Control over organisation in the community: Component of gaining forces to influence representative groups, plus efficacy of those organisations like group support and advocacy.
- Community building: Creating a sense of community among residents that will increase its ability to work together, solve problem, and make group decisions for social change

As shown in Figure 1 above, empowerment has two aspects which are personal empowerment and collective empowerment. Each aspect has its own components. A set of four components including meaning, competence, self-determination and impact were found in personal empowerment. A set of four components, including collective belonging, involvement in the community, control over organisation in the community and community building, are explored in collective empowerment. The goal of individual empowerment is to achieve a state of liberation strong enough to impact one's power in life, community and society. The goal of collective empowerment is to establish community building, so that members of a given community can feel a sense of freedom, belonging, and power that can lead to constructive social change.

The concept of individual and collective empowerment well suits to flood management contexts as well. Empowerment of individual members of the community can help the authorities to reduce their amount of time and cost spent towards manageable small scale disasters. This can further provide an opportunity to those members of the community to develop their knowledge and abilities to uplift their economic status. Furthermore, empowerment of individual members can facilitate the process of collective empowerment. Although, this will initially require a facilitation process to bring mutual trust and understanding between members, later this can help the society to create disaster resilient communities. Further, this can assist the community to convey their messages to the relevant authorities to adapt suitable flood prevention programmes which suit to their local conditions.

4. Achieving Community Engagement in Flood Mitigation

The recognition of the importance of public participation in the process of flood mitigation has led to the development of a variety of methodologies in order to achieve its objectives. Osti and his colleagues (2008) emphasise that it is essential to build a community's capacity to understand their vulnerabilities, strategies, activities and the role they could play in managing flood risks without relying on external entities. Hence, in order to accomplish effective community participation this section draws some ways of achieving effective communication between community and other agencies and encouraging the community to get involved in flood mitigation from different countries.

4.1 Formation of decentralised units and formulation of local specific plans

According to Express India (2008), forming District Disaster Management Authority in each district can help the process of disaster mitigation as it will allow the authorities to consider the prevailing local conditions. Drawing specific plans for disaster mitigation by a district authority can make the process easier for communities to prepare for disasters instead of having a universal plan for the whole country. It was stated that the District Disaster Management Authority will work in close coordination with the State Disaster Management Authority and will play an integral role in tackling different types of disasters at the district level. Further, it was decided that the funds can be divided into two sections that is, the mitigation fund and the response fund. While the mitigation fund will be for constructions and awareness programmes regarding the district specific disasters the response fund will help the authority to manage rescue operations, rehabilitation programmes, etc. in the event of disaster. This will facilitate the District Disaster Management Authority to draw a disaster management plan by considering their individual risks and vulnerabilities. Delegating the appropriate power from district units to local units to decide upon the usage of funds for specific community developments can assist the local units to manage the events accordingly. Those districts, which suffer from two or more problems can form a comprehensive disaster management plan (Express India, 2008). This

can not only encourage the community to get involved in constructing the disaster preventive measures but also provide a confidence and interest to support their community specific disaster mitigation programmes.

4.2 Better networking between stakeholders

According to a study on 1997 Roseau river flood, many rural households found that due to mandatory universal evacuation order their flood mitigation measures were breached and damaged their homes that in many cases were not repaired or been compensated for a longer period. It was found that three communities within this area had unique experiences. The order catalysed conflict in at least one community that could have resulted in serious negative consequences. Hence, the study concluded that community effectiveness in disaster management would be greatly enhanced by a relationship with government agencies that is based on equal partnership, mutual respect and open, two-way communication (Buckland and Rahman, 1999).

Flooding is a significant natural hazard in New South Wales in eastern Australia. Within this region flooding constitutes the most serious hazard faced by the community at large as it causes damages to infrastructure, property and production, and also in terms of deaths and injuries. The councils of local government in the Australian state of New South Wales were charged with making decisions about development on floodplains and applying measures to mitigate the impacts of floods. However, a volunteer agency is responsible for the coordination of community responses when flooding actually occurs (Keys, 2003). Many towns and villages in New South Wales have flood liable land, and many are built entirely on floodplains. It was estimated that the total expected damage from flooding in terms of all assets exposed in the state would amount to several tens of billions of dollars. In this place the actual flood management at the level of the flood prone community is delivered by the volunteers, who are local residents with the benefit of local community and local hazard knowledge. These residents receive considerable prior and real-time assistance from paid staff located in the organisation's regional and state headquarters. This indicates the assistance and the linkage between community and flood related authorities. There have been many improvements in terms of better networking the community's preparatory endeavours with relevant work in other organisations and in terms of training the volunteers before a disaster. In this participatory approach adequate measures are taken to ensure that volunteers are kept abreast of advances in flood management thinking and of technical studies about the nature of flooding in their own areas. Frequent

briefings are held on floods and their management and purposeful exercisers are conducted to update both community's and authorities' information. In addition, efforts are made to develop the local capacity to communicate effectively with the public, both directly and through the media.

4.3 Understanding the perceptions of community and effective dissemination of updated information

In order to accomplish effective communication and encouragement the authorities should focus on following aspects: the methods and tools used; attitudes and behaviour and process and time. Although, nations have devised their regulations and new participatory measures the lack of awareness of those among public acts as a hindrance to effective community participation. Hence, it is important to conduct awareness programmes regarding the district specific disasters and examining flood mitigation measure in addressing the specific local community's conditions. In addition, leaflets and brochures can be distributed to community to educate their knowledge on those. This will help the community to get prepared themselves for future flood events in addition to available external assistance. However, while providing information to public on flood mitigation and response the local authorities should give adequate attention to the usage of the right language and should consider the community perceptions on flood threat, resources availability, local threats, etc.

According to a study on 1995 flood in Norway it was found that the perception of flood hazard by the general public was not realistic and the flood risk messages was not communicated well (Krasovskaia et al., 2001). This gap in the perception of flood risk among public and authorities can act as barrier for effective communication. Further, the results showed that the transparency of the different decisions made during a flood situation and their effects on the degree of risk required further improvement. This indicates the need for better dissemination of information concerning flood issues and the organisation of flood mitigation activities with the decision makers and the community as the primary actors and the required transparency in the process of flood mitigation. The study recognised that the knowledge gained these participatory approaches can be used for developing a flood assessment policy based on participatory principles. When the residents view the flood risk correctly, they are likely to support the allocation of the necessary funds for flood mitigation measures and cooperate with the authorities during a flood.

During the process of encouraging the community to get involved in mitigation activities the use of visualisation tools and techniques, changes in the behavioural patterns and attitudes while focusing on the interaction and mitigation process can help the relevant institutions to promote community's participation. The shift from verbal to visual can help even non-articulate members such as under privileged, children, and women to participate. The significance of visual communication can play a major role in achieving quick and effective communication between community and authorities.

Another important step in encouraging the community to participate in these approaches is to improve the accurate prediction of estimates of the risks associated with natural disasters. This can provide better data on the probabilities and consequences of these events to insurers which in turn can help them to set their premiums and tailor their portfolio to reduce the chances of insolvency. Successively this can assist the community to take corrective actions to mitigate their future loss with more confidence in the estimates of the risks and insurance companies (Kunreuther, 2001).

4.4 Motivating the community and developing their capacities

In achieving greater community participation, the authorities can create community based organisations and provide opportunities for community members to take leadership roles. This can motivate many members of the community to get involved in the process of flood mitigation. While community can gain knowledge and attain skills on flood mitigation measures they also would prefer to manage their problems by representatives from their places rather than external bodies. In addition, authorities can create a system to accommodate the community based organisations in the network of stakeholders. This will enable community based organisations to have contacts with relevant suppliers, authorities, and other bodies who are involved in flood mitigation and response. Although, initially this will require authorities' support later it may gain its power to sustain their organisation by the community itself.

5. Summary

Although, some countries have made considerable progress in the recent past in removing obstacles for a full participation of community in their respective societies there is tremendous work to be carried out. While many international and national regulations and management structures have been introduced over time for flood mitigation, authorities around the world face many challenges such as inflexible management structure, poor coordination between stakeholders, conflict of interest between parties, etc. in carrying these activities. However, the authorities can consider formulating a flexible management of flood mitigation that can allow for formulation of plan that fits the purpose of a community than a universal one. Further, they can facilitate a better networking between stakeholders and encourage them to understand the community and motivate them for a sustainable flood mitigation programme that can be run by the community in the long run. The authorities can foster greater co-operation through exploitation of pre-existing networks which can be identified through community engagement. This can provide opportunities to community to uplift their socio economic status which ultimately can empower them to take their own strategic decisions. However, in order to achieve effective community responses towards participatory flood mitigation programmes the government and other relevant institutions should take account of the complex causes of flooding, which include human vulnerabilities, inappropriate planning, increasingly climate variability and, most importantly the social capital of the community. Further, while planning for these flood mitigation programmes the authorities should consider the community's interest in the performance of flood warning systems as it will have an effect on community's trust towards the system and, human risk perception and behaviour.

6. References

Aalst, M. and I. Burton (2002) The Last Straw: Integrating Natural Disaster Mitigation with Environmental Management. Disaster Risk Management Working Paper No. 5. The World Bank, Washington, DC.

Adams, R. (2003). *Social Work and Empowerment*. 3rd ed. New York: Palgrave Macmillan.

Aldunce, P. and Leon, A. (2007) Opportunities for improving disaster management in Chile: a case study. *Disaster prevention and Management*. 16 (1). Pp. 33-41.

Ariyabandu, M.M. and Wickramasinghe, M. (2003) *Gender dimensions in disaster management*. Colombo: ITDG South Asia Publication.

Boehm, A. and Staples, L.H. (2004) Empowerment: The point of view of consumer. *Families in Society*. 85(2). Pp. 270–280.

Buckland, J. and Rahman, M. (1999) Community-based Disaster Management during the1997 Red River Flood in Canada. *Disasters.* 23 (2). Pp. 174- 191.

Express India. (2008) *Flood lesson: disaster management authority to come up in districts* [Online]. The Indian Express Limited. 13th of September. Available from: http://www.expressindia.com/latest-news/flood-lesson-disaster-management-authority-to-come-up-in-districts/360746/ [23rd of March 2009].

Eylon, D. and Bamberger, P. (2000) Empowerment cognitions and Empowerment acts. *Group and Organisation Management*. 25(4). Pp. 354-372.

Fetterson, M.D. (|2002) Empowerment evaluation: Building communities of practice and a culture of learning. *American Journal of Psychology*. 30(1). Pp. 89–102.

Haghebaert, B. (2007) *Working with vulnerable communities to assess and reduce disaster risk. Humanitarian Exchange*. London: Overseas Development Institute. Pp. 15-18. Available from: http://www.odihpn.org/report.asp?id=2888 [accessed on 25/03/2009].

Hajer, M. and S. Kesselring. (1999) Democracy in the risk society? Learning from the new politics of mobility in Munich. *Environmental Politics.* 8(3). Pp. 1-23.

Handy, M. (1993) Freeing the vacuums. *Total Quality Management*. June 1993. 11.

Hur, M.H. (2006) Empowerment in terms of theoretical perspectives: Exploring a typology of the process and components across disciplines. *Journal of community psychology*. 34 (5). Pp 523–540.

Keys, C. (2003). Managing Floods in a Volunteer Agency: some Considerations Relating to Training, Planning and Response Activities in New South Wales, Australia. *International Disaster and Emergency Readiness (IDER) Conference. October 2003 London.*

Krasovskaia, I., Gottschalk, L., Saelthun, N.R. and Berg, H. (2001). Perception of the risk of flooding: the case of the 1995 flood in Norway. *Hydrological Sciences-Journal-des Sciences Hydrologiques.* 46(6), Pp. 855-868.

Kunreuther, H. (2001). Incentives for mitigation investment and more effective risk management: the need for public–private partnerships. *Journal of Hazardous Materials.* 86. Pp. 171–185.

Lincoln, N.D., Travers, C., Ackers, P. and Wilkinson, A. (2002) The meaning of empowerment: The interdisciplinary etymology of a new management concept. *International Journal of Management Reviews*. 4(3). Pp 271–290.

Loretta, D. and Polsky, W. (1991) Share the power. *Personnel Journal*. September 1991. 116.

Nesan, L.J. and Holt, G.D. (1999) *Empowerment in construction*. Hertfordshire: Research Studies press limited.

Nilsen, A.S. (2007) *Tools for empowerment in local risk management*. Safety science.

Osti, R., Tanaka, S. and Tokioka, T. (2008) Flood hazard mapping in developing countries: problems and prospects. Disaster Prevention and Management. 17(1). Pp. 104-113.

Page, N. and Czuba, C.E. (1999) Empowerment: What is it?. *Journal of Extension*. 37(5). Pp 24–32.

Parpart, J.L., Rai, S.M. and Staudt, K. (2003) *Rethinking empowerment: Gender and development in a global/local world*. New York: Routledge.

Petts, J. (2006). Managing Public Engagement to Optimize Learning: Reflections from Urban River Restoration. *Human Ecology Review.* 13(2). Pp. 172-180.

Pfister, N. (2002). Community response to flood warnings: The case of an evacuation from Grafton, March 2001. *Australian Journal of Emergency Management.* Autumn 2002.

Thaindian News. (2008) *Orissa flood toll 29; Uttar Pradesh, Delhi face Yamuna fury (Roundup)* [Online]. Thaindian News. 22nd September. Thaindian.com Company Limited . Available from: http://www.thaindian.com/newsportal/uncategorized/orissa-flood-toll-29-uttar-pradesh-delhi-face-yamuna-fury-roundup_10098617.html [29th of March 2009].

The Herald. (2007) Mexico City might face Katrina-scale flooding. *The Herald.* 23rd of May. Available from: http://www.eluniversal.com.mx/miami/24733.html [23rd of March 2009].

The World Bank. (2005). *Empowering the poor - The KALAHI-CIDSS Community-Driven Development Project*. Manila: The World Bank.

Tippett, J., Searle, B., Pahl-Wostl C. and Rees, Y. (2005). Social learning in public participation in river basin management - early findings from HarmoniCOP European case studies. *Environmental Science & Policy.* 8. Pp. 287–299.

Tran, P., Shaw, R., Chantry, G. and Norton, J. (2009). GIS and local knowledge in disaster management: a case study of flood risk mapping in Viet Nam. *Disasters.* 33(1). Pp. 152−169.

Samaranayake, M. (1996) Significance of participatory approaches in empowering people for sustainable development. *In:* Bastian, S. and Bastian, N. Assessing *Participation*. Colombo: Konark Publishers private limited. Pp. 46-66.

Shackleton, V. (1995) *Business Leadership*. London: Routledge.

Appendix

This section describes three case studies detailing the public engagement that took place in the flood mitigation within Vietnam, Philippines and Canada.

7.1 In Vietnam

After the severe flood (1999) in Thua Thien Hue, a project was initiated in 2004 that focused on integrating GIS tools with local knowledge to develop flood risk maps in two communities.

The communities' involvement in developing risk maps assisted them in establishing trust, respect and an exchange of information among local communities and, local authorities and planners. In addition, this facilitated them in developing a better community action plans which was appropriate to the local conditions than top-down disaster management plans. During this approach dialogues were held to encourage exchange of opinions, needs and wishes which helped to overcome the communication gap between stakeholders. The community meetings on flood management and the analysis of potential risks provided an opportunity to communities to empower them.

[Source: Tran et al., 2009]

Thua Thien Hue province is located in central Vietnam surrendered by the South China Sea on east and the Lao People's Democratic Republic on west. In November 1999 a severe flood occurred in Thua Thien Hue which affected 90% of the lowlands. This event reflected the need to identify risk areas, to communicate warnings to communities about the actions that they need to take in preparing for flooding. A pilot project was initiated in 2004 that combined GIS tools with local knowledge to develop flood risk maps in two communities as mapping the hazard prone areas is an important tool in identifying risk areas. Although, local people have better understanding on their vulnerabilities and risks and, the prevailing disaster coping mechanisms at village level this local knowledge has hardly ever been recorded.

During the process of developing risk maps it encouraged community participation and succeeded in establishing trust, respect and an exchange of information among local communities and, local authorities and planners. This engagement helped the planners tremendously in the development of a

safer community plan. When local people were actively involved in the decision making process and recommended solutions for risk reduction the suitability of risk maps and recommended actions are more appropriate to the local conditions rather than top-down disaster management plans.

This community engagement approach ensures the commitment from local communities since it suits the communities' interests and due to improved relationship between local communities and other stakeholders. During this approach dialogues are held to encourage exchange of opinions, needs and wishes in order to achieve a mutual understanding of the prevailing situation which can help to overcome the communication gap between stakeholders. Furthermore, the community meetings which analyses about the potential risks can provide an opportunity to local communities to attain the required skills which can empower themselves to create disaster resilient community.

Since the community contributed during the planning and implementation stages the residents felt their responsibility towards the programmes. This can reduce the costs of external monitoring and ensures the long-term sustainability of the approach. However, it was emphasised that a good disaster risk reduction plan can only be effective if communities themselves are motivated to keep the issue alive during village meetings and on other occasions. Further, the success and continuation of these initiatives strongly depend on the community's passion towards a sustainable disaster resilient community and their sense of ownership on these among the whole village people.

7.2 In Philippines

[Source: The World Bank, 2005]

During December 2004, four severe storms hit the Philippines. In the province of Quezon, more than 1,000 people died and buried in mud and more than 40,000 people had to evacuate their homes. However, within one part of Quezon, the activities carried out through KALAHI-CIDSS (Kapit-Bisig Laban sa Kahirapan - Comprehensive and Integrated Delivery of Social Services) community driven development project was proved to be effective during this catastrophe. This project carried out the flood control dam to hold up against the rush of water through community engagement. The community built a truly solid wall since the deluges were seasonal and devastating. The village was right at the foot of Mount Banahaw. Therefore, water would roar down the slopes during storms and flood their area. Several creeks converged there and led to overflowing into each other. This uprooted the trees, drowned farm animals, and swept away small houses. During heavy rainy periods residents packed their things in plastic and moved out to reserved shelters.

Four severe storms hit the Philippines during December 2004. However, before this catastrophe a project was carried out on flood control dam to hold up against the rush of water through community engagement.

The community built a truly solid wall since the deluges were seasonal and devastating. When deciding on the construction of this installing a water system, communities had to decide between the importance of their access to water and its effect on flooding on them. Since the community decided that human lives are more critical than their access to water they prioritised their need towards flood control wall. Hence, community built their own 2.4 kilometres long wall which separates their village from the mountain. The project was very transparent where everything was recorded which encouraged the community to get involved in the activities and that didn't create any conflicts between people.

While deciding the importance of the access to water and its effect on flooding the community decided to consider installing a water system under the project. Since the community decided that human lives are more critical than their access to water they prioritised the flood control wall. Hence, community built their own 2.4 kilometres long wall which separates their village from the mountain. The project committee decided to deviate from the original design and made the wall thicker than planned wall since they felt that it would take only one breach to make the entire dam useless. Further, they installed pipes and

used a barrier mix of boulders, stones, and cement. While 60 percent of the cost came from materials bought at the hardware store, the rest came from the community. However, the community's labour was 100 percent free. Everyone from the community helped, including the children who collected stones. A maintenance committee was set up. The members were tasked with cleaning up areas clogged with vegetation and cutting roots to prevent cracks. A fund for maintenance cost was set aside.

Since the community got involved in the project and have the confidence on the success of their project they now live with peace of mind while carrying out the required activities even during rainy season. The project was very transparent where everything was recorded. This encouraged the community to get involved in the activities and didn't create any conflicts between people as it also involved investing from people's own resources. Further, since the community had an experience during the first cycle of this construction there was an improvement in the efficiency of the other cycles of construction. Some community members mentioned that their perception on their role towards a valuable contribution to the community created a confidence on them and gave courage about their talents and the role that they can play towards a great project.

7.3 In Canada

[Source: Buckland and Rahman, (1999)]

The 1997 Red river flood was one of the worse flood faced by Canadians. A study investigating on the preparation and response to the 1997 Red river flood focused on the issue through three rural communities in Manitoba, Canada. The communities were selected because of their different ethnic mix, its associated level and pattern of community development. The Red River flood plain that was affected by the 1997 flood sits between Manitoba's capital city, Winnipeg, and the US border to the south. Within the flood plain region there are several towns and one First Nation community that were affected by the flood, including Rosenort, St Jean Baptiste and Roseau River Anishinabe First Nation. The administrative structure of each rural municipality consists of a body of elected councillors and one reeve. Each municipality has a chief executive officer who in some cases was appointed the emergency co-ordinator during the 1997 flood. Municipalities established emergency committees based in towns within the flood affected areas. These emergency committees, made up largely of municipal leaders, orchestrated community preparedness and response, and acted as an intermediary for provincial government action. Many of the Rosenort organisations that involved in the flood mitigation were identified as churches or church related groups.

The Red river flood (1997) was one of the worse floods that devastated many villages in Canada.

However, due to previous experiences with flooding and introduction of government initiatives communities have prepared themselves through the construction of permanent dikes, flood pads and the establishment of systems to construct sandbag dikes in the event of emergency. Some communities even had water pumping system in their basements. Due to the nature and the prevailing political system one of the communities (First Nation) received governmental assistance for disaster response through an intermediary agency called Manitoba Association of Native Fire Fighters. This agency provided direct assistance to First Nations during disasters and acted as a liaison between government's central disaster planning agency and the community. It also provided the community regarding flood forecasts and reported to the government's central disaster planning agency about community needs as well.

Households and communities have expanded and refined their preparedness through the construction of permanent dikes, flood pads and the establishment of systems to construct sandbag dikes in the event of emergency. Their previous experiences with flooding and introduction of government initiatives for those have enhanced their preparation and response. Although, during this event the issue of mandatory universal evacuation created problems within certain communities a survey (Buckland and Rahman, 1999) found that many respondents said it as 'some what useful'. Community's flood mitigation measures had evolved from the 1950s, and particularly since the 1966 flood, after which the government initiated cost-sharing programmes for residential property flood mitigation. These mitigation techniques involve labour-intensive monitoring.

Unlike other communities in Manitoba that fall under provincial jurisdiction, First Nation communities fall under federal jurisdiction, through the Department of Indian Affairs and Northern Development. This complicates the First Nation communities' relationship with the provincial government's central disaster planning agency. In this context, First Nation communities receive governmental assistance for disaster response through an intermediary agency, the Manitoba Association of Native Fire Fighters (MANFF). MANFF provides direct assistance to First Nations during disasters and acts as a liaison between government's central disaster planning agency and the community, providing the community with such things as flood forecasts, and reporting to the government's central disaster planning agency about community needs. However, the authorities should take adequate care in order to avoid inter community conflict while providing assistance to flood mitigation.

