

Flood Management and Local Adaptation Strategies

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Abstract

The countries of the Hindu Kush-Himalayan (HKH) region are affected annually by floods of varying extent and intensity in terms of height and duration. Flood management encompasses three broad categories of measures: measures to moderate the flooding, measures to moderate the damage caused by the flooding, and measures to provide relief and succour to the people affected by the flooding and to secure their eventual rehabilitation. The ability to effectively forecast a flood with adequate lead time and to effectively disseminate the information to all concerned so that resources and people can be adequately mobilised for the tasks involved, can go a long way to mitigating the hazards of even severe floods. If a comprehensive flood management strategy is in place, the mobilisation can be implemented swiftly and in a coordinated fashion.

Local adaptation to floods consists of adjustments and responses at the local level aimed at minimising adverse consequences. People in flood affected areas have learnt to deal with certain aspects of flooding by making certain preparations – for example, by adjusting crop calendars; by keeping certain commodities in store; by arranging for the temporary migration of children, the elderly, and the sick; by arranging for supplies of safe drinking water; and by procurement of commonly needed medicines. Knowledge at the local level, acquired through centuries of experience, can be put to proper use if the local people have the capacity to do so. Whereas each individual alone may not have much capacity, a community approach can mobilise considerable resources. Furthermore, assistance from government and non-government organisations in terms of supplying information and providing certain critical inputs at the appropriate times would go a long way towards strengthening the ability of local people to respond more effectively to flood hazards. Nevertheless, when flooding affects extensive areas, is of long duration, and/or causes large-scale losses and damage, the local response, while still essential, needs to be augmented by major external assistance from the government and/or from other organisations.

Introduction

The causes of floods vary in nature and type depending on the geographical realities of a country as well as on the location of its flood-prone areas. These causes may be grouped into three broad categories. The first set are causes that are national in origin and nature – high intensity rainfall and cloudburst within the country, erosion of river banks, and rural infrastructure like roads and embankments impeding water flows. These are common causes of floods, regardless of a country's location along a river system (upper or lower riparian) or its topography (whether flat or mountainous). In mountainous areas, floods can also be caused by glacial lake outbursts, landslides, and debris dams. These floodwaters travel downwards and cause floods downstream. In coastal areas, floods are often caused by storm surges.

The second set of causes relates to the regional perspective. For example, a lower riparian country is subject to run-off from upper catchment areas after heavy rainfall

and snowmelt in upland areas, and must bear excessive silt loads in its rivers carried by upstream floodwaters.

The third set of causes relates to oceanic activities such as El-Niño, La-Niña, and sea level rise. While La-Niña causes intensification of precipitation, sea level rise prevents water from flowing into the sea so that water stays inland for longer inundating extensive areas. The 1998 Bangladesh flood, which lasted an average of 65 days, is a good example of sea level rise impeding water flows to the Bay of Bengal.

When developing flood management strategies, it is important to understand the various causes of flooding and design local, national, and regional strategies appropriate to the different causes. Thus, while national capacity building – from central to local levels – is crucial for managing any flood, regional cooperation assumes pre-eminence as far as floods with regional causes are concerned. While it may not be possible with the present state of knowledge to address issues related to oceanic activities, it may nevertheless still be possible to mitigate some of the hazards by developing strategies and measures as appropriate for addressing the consequences of any longer duration flood.

The Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report estimates a projected global warming of 1.4 - 5.8°C and concomitant sea level rise of 9 - 88 cm, by 2100. Such changes would imply an increase in flood risks in terms of both frequency and duration in temperate and tropical Asia. These areas include the Hindu Kush-Himalayan (HKH) region in general, and the Ganges-Brahmaputra-Meghna (GBM) in particular. The Eastern Himalayan countries of Bangladesh, India, Nepal, and Bhutan are likely to be particularly affected. Thus, while the HKH regional countries have periodically suffered major loss and damage due to flooding, it would appear that they may face yet more hazardous and frequent flooding than heretofore.

Flood Management Measures

Both structural and non-structural measures are necessary for flood management. Structural measures include embankments, drainage channels, and reservoirs. Non-structural measures include flood forecasting and warning, flood-plain management measures such as flood-plain zoning and flood proofing (including disaster preparedness and response planning), public health measures, during and post-flood relief measures, and flood insurance. These measures can be broadly grouped into three categories: measures to moderate floods; measures to moderate the damage caused by flooding; and measures to provide relief and succour to the people affected during a flood and for their rehabilitation afterwards.

Generally speaking, floods have local (suffering, damage, loss), national (management concerns, resource implications), and regional (geographical inter-connections, regional causes of floods) perspectives; effective flood management implies that appropriate measures are needed at each of these levels.

Strategies and Resources for Flood Management

The efforts and resources that are needed to effectively manage a flood depend on the flood's intensity, extent, and duration on the one hand, and on the capacity of the various actors (government and non-government organisations and communities) to

take the necessary actions on the other. In order for these various players to be able to mobilise resources and people effectively for the tasks, it is necessary that all concerned be given an adequate lead time by providing them with a flood forecast. If a national flood management strategy is in place, responsibilities have been properly identified, and a co-ordination mechanism has been established prior to the incident, then the mobilisation of resources and people can take place in a more effective manner.

In general, countries that are affected by floods on a regular basis have developed flood management strategies, which provide the basic framework for actions to be taken when flooding occurs. These frameworks can and should be improved as new information and analyses become available. However, ultimately, it is a country's capacity to respond that lies at the centre of most problems. Capacity building calls for trained people, necessary equipment, and financial resources. In areas where flooding is a normal occurrence, the affected people themselves can usually manage the consequences to a large extent. Unfortunately they still sustain losses and damage, which apart from causing an immediate setback, also adversely impacts their future economic prospects. When the capacity of local people to manage floods is strengthened, the immediate setback is reduced and the future economic prospects may not be so severely impacted. If strategic support is also available from relevant government and non-government organisations, so much the better.

When flooding causes major destruction to property, crops, infrastructure, and people's health (Ahmad 2000) the resources that can be mobilised locally are often insufficient. In fact, local resources are typically extremely limited, but in spite of this, governments do not make anticipatory budgetary allocations. In these situations, an effective flood forecasting system that provides a reasonable lead time for the mobilisation process to be initiated in advance, can help considerably to mitigate the consequences of devastating floods. Sufficient lead time for mobilisation beforehand can be much more effective in moderating the effects than efforts after the event. Such forecasting requires real-time data and information and the ability to plan well in advance of an approaching disaster. Given adequate lead time, governments can take steps to mobilise additional financial resources, including a budgetary re-allocation on an emergency basis, to respond to the catastrophe in a meaningful way. Adequate lead time will also enable local communities and other actors to organise the best possible collective responses.

Flood Information and Flood Management

An effective flood-forecasting model requires relevant real-time data and information from within and across regional countries. Up-to-date data and information on the various aspects of floods are needed. These include, among others, the causes of flooding, their nature and impact, the circumstances of those affected, the local resource base, the potential community responses in place, and the support institutions available and their activities. The availability of flood information and its dissemination within and across countries is thus a crucially important element in managing floods. It is important that a national flood information system be properly developed in each country. The capacity, both in human capability and technological terms, of gathering, processing, and disseminating information is the basic pre-condition for a country to have an effective flood information system.

A regional flood information system that can be used to exchange information between and among regional countries can mutually reinforce the respective national systems. For such a system to be effective, regional countries need to be able to exchange both available experiences and analytical results, and real-time information – and the mechanisms for such an exchange needs to be developed, expanded, or strengthened (as appropriate), and properly implemented.

Local Adaptation and Responses

Since floods are a regular occurrence throughout the HKH region, over time the people of these flood-prone areas have developed their own responses and their own ways of mitigating flood impacts. In some instances individuals can act alone, but in others a collective community response is needed. For example, people have learnt to prepare for higher water levels where the only means of transport is by water by keeping boats in reserve for this purpose. Another example is that they try to store adequate cattle feed to last them over the period of a flood. In spite of these and other responses that they routinely mount during a flood they nevertheless suffer losses and damage, which reduces their future economic prospects. The poorest segments of a flood-affected community usually suffer the greatest setbacks.

The responses that local people undertake can be grouped into three categories: before a flood, during a flood, and after a flood. The results of recent surveys of these activities in the flood-prone areas of Bangladesh, India, and Nepal are reported below.

Bangladesh

The Bangladesh case study was conducted in two flood-prone areas in the districts of Jamalpur and Chapai Nawabganj using participatory rapid appraisal (PRA) techniques (BUP 2003). The adaptation/coping activities undertaken by the flood affected people are summarised below. These practices are adopted generally throughout the country, but there are some local variations in areas not covered by the study.

Before a flood

- Local people try to gauge the severity of forthcoming floods based both on their previous experience of the quantity of rainfall and run-off and on any forecasts available to them. They eagerly await flood information from a flood forecasting and warning system. None of the areas included in this study had any access to nearby flood information centres from which flood information could be secured. People listen to radio and television for information about the rainfall in upper catchment areas. They also watch the behaviour of insects, domestic animals, and snakes, all of which show marked changes prior to the onset of floods. They often discuss these matters among themselves in order to try to understand the likely nature and severity of a forthcoming flood, and the ideas formulated are disseminated to community members.
- Local people try to store food as well as seeds and other agricultural inputs such as fodder for feeding cattle.
- They undertake the repair of embankments as needed; this is usually a joint undertaking by the people concerned and at times can include the support of appropriate government agencies.
- They procure or repair country-boats for possible use.

- Some people build platforms inside their houses on which to sleep and store belongings temporarily as long as floodwaters are moderate.
- Those who have the financial resources procure essential medical supplies to deal with water and vector-borne diseases – these include fuel for boiling and chlorine tablets for purifying water.

During a flood

- During a flood, the affected people move to higher ground and to safer places such as embankments, roadsides, and school buildings, or to unaffected areas to live temporarily with relatives. When they have to move they take their food stocks and other valuables with them, as far as possible.
- People help one another by providing shelter or lending money and/or food to those who are particularly affected.
- The community undertakes the repair of embankments and the clearing of congested channels to allow floodwaters to flow faster.
- Concerned government agencies, non-government organisations (NGOs), and community-based organisations (CBOs), provide some assistance, especially to those most affected.

After a flood

- After a flood, the affected people need money to buy food and agricultural supplies such as seeds, fertiliser, and pesticides, especially if their crops have been destroyed or are severely damaged and if they do not have previously saved supplies. They also need money and materials for repairing their damaged buildings.
- People often need to borrow money and are at the mercy of local moneylenders who charge high interest rates. They may also need to pre-sell their crops at low prices to people who can afford to buy them and/or sell their cattle or ornaments to buy food and agricultural inputs. Those who are forced to take such steps are at a distinct disadvantage both economically and socially compared to those who manage to secure access to credit and inputs on softer terms.
- The local people sometimes also help each other by lending supplies of seeds, fertiliser, and/or pesticides.
- When people suffer losses too large for them to be able to recover, they are often left with no choice but to migrate to urban centres where they often become squatters, itinerant vendors, or rickshaw pullers.
- It has been suggested that banks can help by giving credit, that government and non-government organisations can help in the distribution of inputs, and that both can play important roles in helping people to recover more quickly from flood damage. A main obstacle remains that rural people, particularly the poor, cannot easily access bank loans.

India

In India, case studies were conducted in six villages in the states of Bihar, Assam, and West Bengal using participatory research appraisal techniques (IRMED 2003). The results are summarised below. Care should be taken in generalising these results since it is not clear whether or to what extent they apply to flood prone areas elsewhere in India.

Before a flood

- People use previously gathered knowledge and information about precipitation patterns and run-off to generate their own forecast of the possibility of a flood and its likely severity. They also listen to radio announcements and bulletins. In Bihar, there are flood forecasting/warning centres that provide relevant information to the population. In Assam, people do not have access to so much information. In West Bengal, the population is more concerned about the possibility of cyclone storms, for which warning is usually provided in advance.
- People from the vulnerable locations harvest crops as early as possible and store them in waterproof bags or containers on raised platforms. They store dry fuel for cooking during the flood, and cattle fodder for feeding cattle, which are commonly moved to sheds on higher ground.
- Some people set aside money and other necessary items (including certain medicines) before a flood sets in.
- With a view to saving assets and avoiding re-location, some people construct raised bamboo platforms inside their homesteads where they store goods, sleep, and cook once floodwaters are at floor level. Others construct houses on high ground to ensure staying above normal flood levels.
- In West Bengal, the coping strategies mainly centre around cyclone preparedness. Here the availability of advance cyclone warnings allows people to store food and other supplies well in advance before they move out to safer and higher ground.

During a flood

- During a flood, communities stand together helping one another, putting aside intra-community differences and disputes. It is not uncommon for higher income families to offer food and cooking fuel to lower income and distressed families in the area.
- Cattle are moved to uplands and roadsides.
- The Water Board supplies chlorine for treating drinking water.
- NGOs and local Panchayats work together to help the people, providing food and clothing during flood/cyclone emergencies. NGOs also make boats available to transport people and materials.
- In the absence of boats, some people use bamboo and banana stems as makeshift rafts for transportation.

After a flood

- Rehabilitation needs after a flood depend on the losses and damage suffered. Renovation of damaged embankments and other infrastructure is the responsibility of the relevant government departments. However, the people surveyed expressed an interest in being involved in the process of planning for construction and rehabilitation of embankments and other infrastructure.
- People themselves mobilise resources to repair their homes and other assets. NGOs, community-based organisations (CBOs), and government organisations usually provide some assistance. However the assistance received is typically less than what is minimally needed to restore the properties to their pre-flood condition.

Nepal

The case study conducted in Nepal used participatory rapid appraisal techniques in flood-prone areas in Rautahat and Saptari districts (JVS 2003). The findings are summarised below.

Before a flood

- Measures taken by people before a flood generally include the storing of plastic sheets, tents, rubber tubes, and empty drums.
- Some people move their food stocks to higher ground, while others prefer to adopt a 'wait and see' strategy.

During a flood

- During a flood, those affected commonly move temporarily to higher ground and safer locations such as uplands, public buildings, and school compounds. Sometimes they take shelter with neighbours and they usually move their cattle to higher ground.
- They use the plastic sheets and tents if these have been procured beforehand and are available. If not, they depend on assistance from others, particularly government and non-government relief providers.
- Sometimes, when the lower part of a house is submerged, the household members continue to live in the upper part.

After a flood

- As a flood subsides, rehabilitation needs become crucial. The affected people, particularly the poorer ones, are usually unable to rehabilitate themselves in a meaningful way.
- Severely flood affected poor people sometimes receive support from the richer members of the community, in addition to any rehabilitation assistance from government and non-government agencies. As flood-displaced people return to their homes they need both food and clothing for their immediate needs as well as money and materials for house repairs. As floodwaters recede, water- and vector-borne diseases commonly break out and some assistance to combat this is provided by relevant public and non-government organisations.

Conclusions

On the whole, the immediate setback for a household depends on the severity of the flood and the ability of the particular household to respond. Poorer people obviously suffer the most. The future prospects of all flood-affected people are hampered – the extent to which they are affected varies, however, depending on the loss/damage sustained and their capacity to respond.

In the case of a deluge, the severely affected people become suddenly destitute. They can do very little by themselves for their survival during the flood or rehabilitation afterwards. Assistance from the government and other organisations becomes absolutely crucial although individual and community responses, to the extent possible, remain important. When rehabilitation in the locality is found to be impossible, people migrate to other areas or urban centres where they face harsh living conditions and uncertain futures.

Improving peoples' access to knowledge, information, resources, and employment opportunities can help them to mount a better response to flooding. Such access would not only help to limit their immediate setbacks but also to minimise the impact on their future prospects.

A system that can provide relief and rehabilitation assistance in an organised manner can go a long way to help reduce the suffering of flood affected victims. Unfortunately, however, coordination among the various agencies involved is usually rather weak. It is therefore necessary to improve coordination and to ensure clearly defined mandates for the various agencies so that effective relief and rehabilitation assistance can be provided as and when needed most.

It would be immensely helpful for local capacity building if people from different flood-prone locations (within a country and between different countries) could be encouraged to exchange experiences and share their coping strategies.

It is also crucial that flood forecast information is available, and disseminated to the local people and others concerned with adequate lead time so that the process of mobilisation and programming of actions can be initiated in advance and implemented properly.

References

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