



PROMOTING TRANS-BORDER FLOOD EARLY WARNING SYSTEM IN SOUTH ASIA PRACTICES, CHALLENGES AND PROSPECTS

Author

Gehendra Bahadur Gurung
Gopal Prasad Ghimire
Mizanur Rahman

Summary

Floods spread across trans-border in South Asia. There exist early warning systems within the countries at national and community levels and some practices of exchanging flood information at cross-border level. However, on trans-border scale, systematic evaluation of such community based cross-border flood EWS is lacking. Lessons from existing initiatives, though in small areas, can help scale up and scale out disaster risk management at trans-border level. At the same time, it is necessary to understand the institutional and operational challenges and constraints of EWS across borders such that it can be made further effective. This paper tries to explore opportunities and constraints for more effective flood EWS at trans-border scale and bring information to the notice of the policy makers in the region.

1.0 Context of Trans-border EWS in South Asia

South Asia faces natural disasters each year with its frequency and intensity getting higher and higher with time. In recent years, South Asian countries have endured series of catastrophic disasters including devastating flood events spreading havoc especially in the poor communities. The loss and damages caused by flood comprises about 4.75 per cent of the national GDP in Bangladesh, 2.58 per cent in Afghanistan, 1.36 per cent in Nepal, 0.98 per cent in Pakistan and 0.84 per cent in India¹. These countries account for more than 21 per cent of the world population and have

witnessed a surge in natural disasters in addition to flood². Due to vast geographic diversity and varied climatic conditions in South Asia, flood forecast and Early Warning Systems (EWS) is difficult to put in place. Recurring catastrophic floods in the trans-border river basins of the Ganga and Brahmaputra cause extensive damages to lives, livelihoods and properties of the communities living in this region. This has further exacerbated vulnerability resulting in displacement of millions of people and limiting achievement of national socioeconomic development targets. Flood travels across the

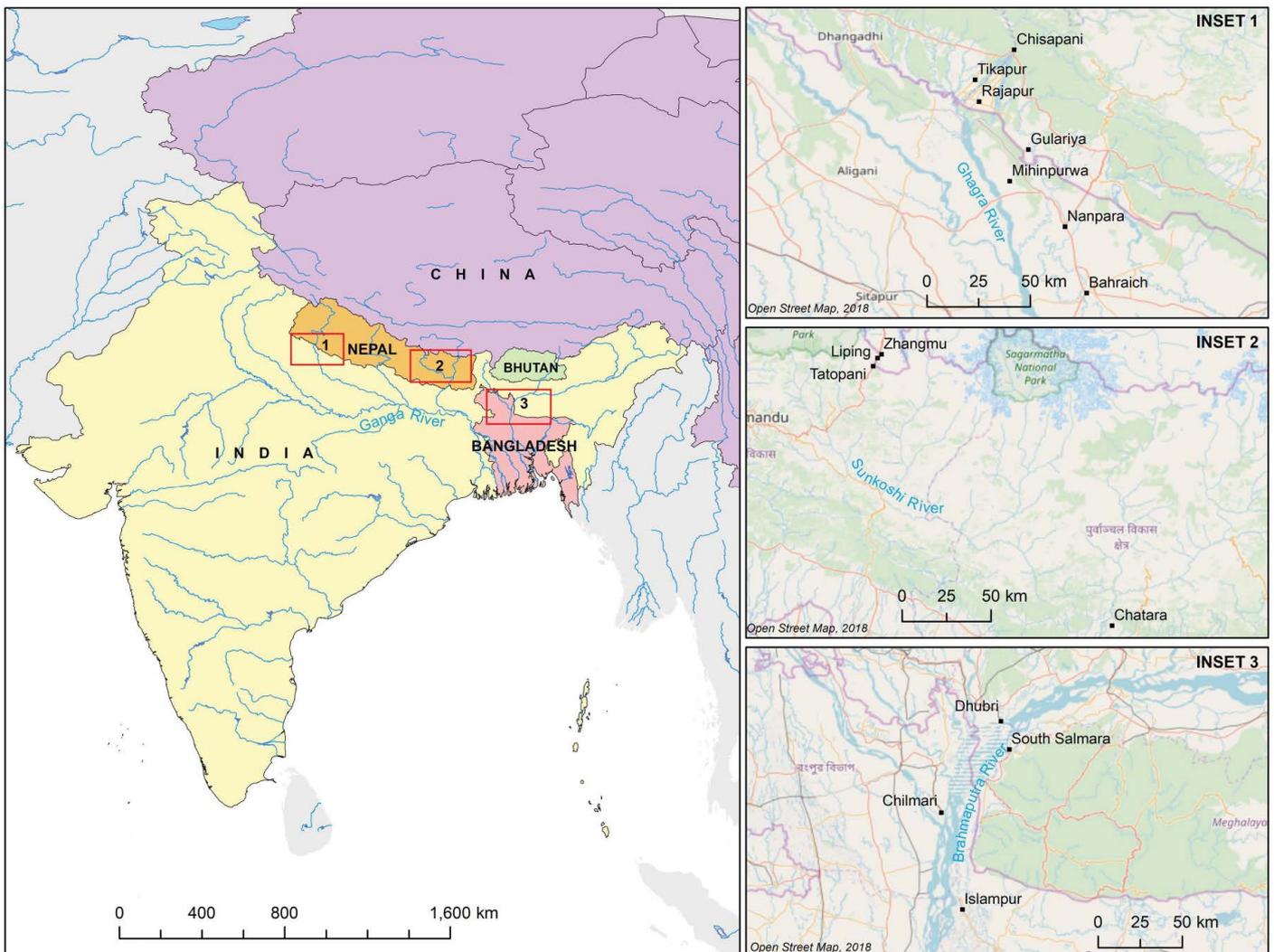
1. Luo, T., Maddocks, A., Iceland, C., Ward, P., and Winsemius, H, (2015), World's 15 Countries with the Most People Exposed to River Floods, Water Resources Institute, Washington DC
2. Memon, N, (2012), Disasters in South Asia – A Regional Perspective, ISBN 978-969-9153-12-9, First published by Pakistan Institute of Labour Education and Research, PILER Centre, May 2012



borders from China to Nepal and India, Nepal to India, and India to Bangladesh. The trans-border EWS that functions at various levels could play vital role in reducing the loss and damage of lives, properties and livelihoods across this region. However, existing risk knowledge and its communication, water treaties and data sharing agreements on rivers at trans-border level between and among the countries are not sufficient to avert flood catastrophes at scale. This paper discusses the opportunities and constraints for more effective flood EWS at trans-border scale and tries to bring information to the notice of the policy makers in the region.

The study was carried out in three cross border rivers – Karnali, Koshi and Brahmaputra (Map 1). One of the major tributaries of Karnali which is known as Humla Karnali in Nepal originates from Mapchachungo Glacier near Manasorover Lake in Tibet, China. This river is called Mambo Tsangpo (Peacock River) in China, Karnali in Nepal and Ghaghara/Ganga in India. Similarly, one of the

major tributaries of Koshi which is known as Poiqu in Tibet, China, Bhotekoshi/Sunkoshi in Nepal and Koshi in India was selected for this study. Brahmaputra River originates from Tibet and drains to India and Bangladesh. It is known as Tsangpo or Yarlung Zangbo in China and Brahmaputra in India and Bangladesh. Karnali River was taken as a case of Nepal and India, Koshi as a case of China and Nepal and Brahmaputra as a case of India and Bangladesh. Both the secondary and primary sources of information have been used in analysing the opportunities and constraints for more effective flood EWS for trans-border rivers. The literatures so far available were extensively reviewed. The primary information was collected through Focus Group Discussions (FGD), Key Informants Interview (KII), consultative meetings and workshops at local, district and national level. At least two sites were selected for case studies in each of the three trans-border rivers. Tikapur, Rajapur, Chisapani and Gulariya were selected in Karnali of Nepal and Dillipurva,



Map 1 Location of study area

Maikapurva, Lucknow, Bahraich and Nanpara in India. Similarly Liping, Tatopani, Janbhu and Chautara were selected for field study in Koshi River. It was not possible to carry out field study in headwater area in China because of long processes required to take research permit. So, only the secondary source of information was used for this area. In Brahmaputra, the field study was carried out in Dhubri and South Salmar in India and Chilmari and Islampur in Bangladesh. A total of eight FGDs were carried out 18 KIIs were taken place, 4 consultative meetings and 2 workshops were organised in order to generate primary information. The participants included the chief of the offices which are involved in disaster risk management at local, district and national levels.

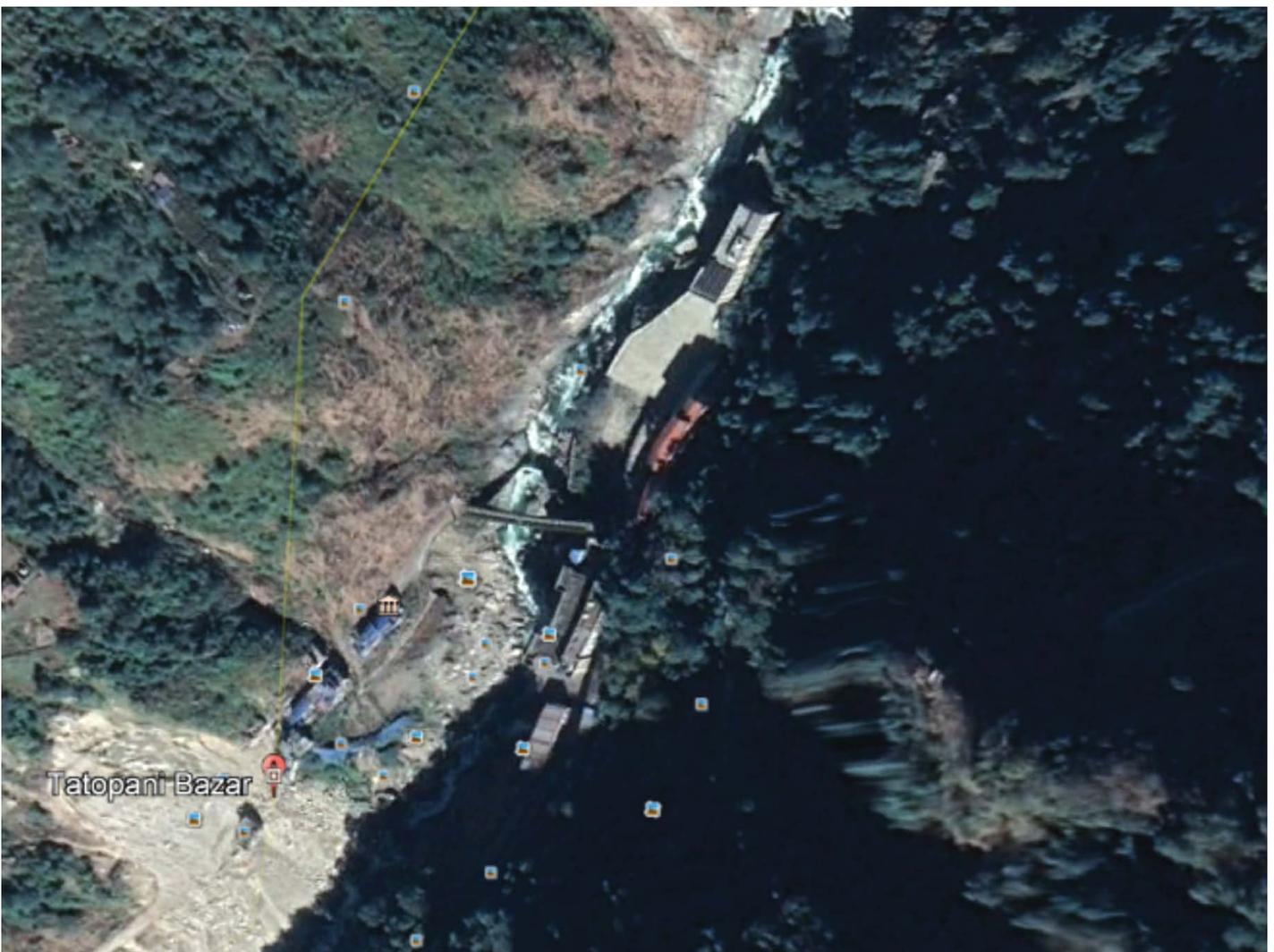
2.0 Existing trans-border flood EWS in South Asia

One of the seven targets of Sendai Framework for Disaster Risk Reduction (SFDRR) is to substantially increase the availability of and access to multi-hazard EWS and

disaster risk information and assessments to people by 2030. The Asian Ministerial Conference on DRR (AMCDRR) held in November 2016 in New Delhi, India has also recognized multi-hazard EWS as an area where investment, collaboration and global partnerships are needed. For an effective multi-hazard EWS, there is a need for effective sharing of cross border risk knowledge and information, between and among the stakeholder countries. The key highlights of the existing flood information sharing practices and recommendations for an effective trans-border EWS between the countries and at the regional level are provided below based the learning from the study.

2.1. Poiqu/Bhote Koshi/Sunkoshi in Koshi River (China - Nepal)

Poiqu/Bhotekoshi is one of the cross-border rivers between China and Nepal that has repeatedly been affected by flash floods claiming lives and damaging properties and



Map 2 Extent of damages due to glacial lake outburst in 2016

infrastructures. Flood in Bhoté Koshi River is mainly attributed to intensive rainfall in windward side of the Himalaya, mostly towards Nepal and the Glacial Lake Outburst Flood (GLOF), which is mainly from Tibet (China). Two devastating glacial lake outburst floods one in 1981 and another in 2016 originating in upstream in Tibet, China and resulting massive damages of infrastructure and other properties in downstream in Nepal have been reported in this river (Map 2). Due to steep slopes and fragile geology, the rainfall causes landslides resulting in occasional damming of Bhoté Koshi River.

The inundation due to damming of river and outburst of landslide resulted in damages of infrastructure and other properties. For example, in 2014, Jure landslide dam inundated and damaged the power house of Sanima Hydropower Project, road and many houses (Map 2). The study revealed followings issues in EWS for this trans-border river:

- Though a few attempts for flood risk assessment have been made at academic level, no efforts have been made to incorporate its findings in preparedness and planning. There is a need for systematic trans-border as well as individual country level flood risk assessment.
- Upper Bhotekosi Hydroelectricity Project in Nepal side had installed an early warning system with five sensors near the Nepal-China Friendship Bridge with automatic siren at four locations while people living in the project area were trained and signboards about siren system were placed. But the lead time between the monitoring site (near international border) and the location of major infrastructure (dam) is very short (around 6 minutes). There is a need to increase lead time by placing monitoring station upstream in China side.
- No practice of upstream flood monitoring system exists for this river in Chinese side that constraints communicating flood information to downstream communities across the border in Nepal.
- No systematic communication of flood information exists between the two countries at local and national levels.
- Informal communication exists between the local security forces of the two countries if there is a massive flood arriving from China to Nepal. But this is on an ad-hoc basis and since this is not primary responsibility of security forces, communication is not always effective. In addition to that, security forces have limited understanding and capacity on flood early warning.
- Individual level communication exists primarily between family members and their relatives residing nearby border areas. There are social ties between the communities residing nearby the international border across the country. People residing nearby border area also move from one country to another for economic and business purposes. So whenever a family member from Nepalese side happens to be in other side of the border in Tibet (China) at time of flood, they communicate flood information to their family back home.
- The public means of communication is through telephone using Chinese sim cards. The connectivity of the mobile telephone system in Nepalese side is not reliable in area. Whereas, the international calls is very costly.
- Capacity of community as well as stakeholders regarding awareness of EWS, its functioning and operations is lacking. In the absence of trained Local Disaster Management Committees (LDMCs) and task forces, tools, equipment and appropriate skills, community are unable to understand the concept of EWS and respond to it even if they receive warning information.
- Bhoté Koshi River in Nepalese side is located in Sindhupalchok District which has Disaster Management Plan (DMP) and Disaster Preparedness Plan (DPD) in place. However, EWS especially the trans-border EWS has not yet been adequately addressed in the plans. The district has District Emergency Operation Centre (DEOC) for disaster communication. But, the DEOC does not receive trans-border flood information from Tibet (China).
- Joint institutional mechanism between the Government of Nepal (GoN) and China does not exist to share river information that travels across the border.

2.2. Karnali River (Nepal - India)

The main cause of flood in this river is rainfall that occurs in the mountains and hills of Nepal. Following are the current situation of trans-border EWS for this river between Nepal and India:

- There is no systematic trans-border risk assessment of flood between Nepal and India for this river. In Nepal,

risk assessment exists but it does not extend beyond the border.

- There are monitoring stations inside Nepal along this river. The information coming from these stations are shared with the Indian government at provincial and central level through a bilateral agreement. The Nepal government provides daily flood information to India during the high flood season while the communication frequency is relatively low during non-flood season. However, the information are basically shared for water management, not necessarily for flood early warning purposes.
- A joint water commission exists between Nepal and India which discusses the issues (if any) on water resources and makes recommendations for solutions of the problems to the governments. The commission meets at least once a year; if needed, they meet more frequently. Water management is usually the agenda of these meetings; early warning has not yet been a priority agenda.
- Information from the stations inside Nepal is available on <http://hydrology.gov.np>. The government and the communities of India can access these information and use for early warning for the Indian communities.
- The communities from India can also communicate directly to the gauge reader at Chisapani gauge station in Nepal. So, when there is high flood in Nepal, the Indian communities can get early information about flood through website and also from the Nepali gauge readers and the communities in Nepal. The flood takes more than seven hours from Chisapani gauge station in Nepal to reach the nearest Indian communities living across the border.
- At the community level, there is a community-to-community early warning communication practice. The Nepalese communities provide flood information to Indian communities and when needed the Indian communities also enquire flood information to the Nepalese communities. There are identified focal persons in the communities for communication across the border for flood. The communities have prepared communication channel with focal communication points along with contact telephone numbers.
- Communication between the communities is through mobile telephone is costly like between China and

Nepal using international call for communicating information about flood. In addition, because of frequent change in policies of the telecommunication operators especially in India, people keep changing their sim cards. Such changes in contact number are not timely updated to members of committees and their counterparts in Nepal. So when there is real need for communication, the telephone numbers often tend to have changed evoking problem to the entire communication of flood information. Use of social media is yet to be explored for flood early warning.

- In Nepal, there is a well-functioning flood EWS along Karnali River where the government, non-government and community based organisations play their roles in monitoring the flood, communicating flood information and responding to flood information once the flood reaches pre-identified critical level at the gauge station.
- In India, there are some gaps in monitoring the river from flood early warning point of view in this river which affects the timely communication of flood information to the communities and their response. The government issues flood bulletins and action points but these information do not necessarily reach to the communities in time, and the communities do not have adequate and timely access to these information. There is also need to further capacitate the communities and local stakeholders in responding to flood information in case the communities and stakeholders receive flood information.
- Informal communication between local government in Nepal and India across the border does exist when flood in Nepal reaches high level. The border security authorities at local level meet informally and visit each other during the time. But there is no formal channel yet established to communicate flood information through local government for early warning.

2.3. Brahmaputra River (India - Bangladesh)

Floods in Brahmaputra River affecting India and Bangladesh are mainly due to rainfall in the southern slope of the Himalaya. In addition, one event of devastating landslide dam outburst flood originating in Tibet, China affecting parts of India and Bangladesh has also been reported.

Followings are the status of trans-border EWS in the Brahmaputra River:

- Like between China and Nepal, India and Bangladesh lacks systematic and scientific trans-border flood risk assessment. An in-country risk assessment exists for Brahmaputra River in both the countries but it does not extend over the border.
- Under the existing bilateral Memorandums of Understanding (MoU), China provides hydrological information of the Brahmaputra and Sutlej River to India during the flood season between May 15 and October 15 every year. The Bangladesh Flood Forecasting and Warning Centre also receive river discharge data from China for the Brahmaputra River.
- There is no real time trans-border information exchange at community level leaving flood forecast in Bangladesh at a limbo. Similar is the case between the local governments; information exchange at border even including flood information is considered sensitive from security point of view.
- From central to local government levels, both countries have relatively better EWS framework within their own boundaries. But community level institutions for EWS at the bordering communities do not exist. Security forces of both the countries involve in relief, rescue and humanitarian activities in the affected bordering communities during flood. The bordering communities however do not have mechanism and institutions to engage in such activities.
- The bordering communities are linked socially as they practice similar culture and even have family ties beyond the border. But any communication including flood information over telephone has to incur international charge which is expensive for the poor and vulnerable communities.
- There is a strong real-time and forecast based flood EWS in Bangladesh. The government has its rainfall and flood gauges in the field from which real-time meteorological and hydrological information are received. Satellite imageries are also used for forecasting weather and flood.
- The Assam Government in India provides two days flood forecast which is available at the website. This information is used by the Flood Forecasting Division

(FFD) of Bangladesh which gives five days forecast for the communities in Bangladesh to prepare for flood.

- The Indian Meteorological Department (IMD) forecasts weather all over India and provides the information at its website. It also communicates information to the district level authorities but in general this information fails to reach to the communities in time who are at real risk.
- The communities in India lack access to flood information. They do not systematically receive information from the government and the information being posted on websites are not accessible by the communities for obvious reasons like inaccessibility to regular internet, lack of knowledge on modern technologies, among others. On top of that, there is no mandatory practice of the district level government to send flood and weather information to communities. A lack of institutional mechanism and their capacity remains a major hurdle in India for a better EWS. Though some non-government organizations are implementing flood EWS collaborating with the communities, the initiations are not sustainable unless the government takes the ownership.

3.0 Need for establishing and promoting trans-border flood EWS in South Asia

There is a significant loss of lives and properties and impact on livelihoods across the border due to floods in rivers spreading across trans-border territories. This phenomenon is recurrent which governments and communities are well aware of. One of the main reasons for such effect of flood in communities across the border is lack of systematic flood information exchange between the communities and the governments, and reaching the information to the most vulnerable ones in time. In spite of the need for having a trans-border EWS, it has not received importance in the agenda of relevant governments. Communication of flood information from one country to another at local level is taken as potential security threat; it becomes a subject to scrutiny from security point of view.

Any formal communication between two countries is considered as inter-governmental communication which should be facilitated by designated central government or an authorised government organisation at local level. The local governments or the local government institutions are primarily authorised for local security. The security of

communities other side of the border is obviously not a priority or even an interest of local government or the security forces. Flood information exchange has not yet been considered as responsibility of local government and security forces.

The communication takes place informally between the communities and sometimes between the local authorities when there is significant flood havoc. However, to save lives and properties on other side of the border, formal exchange of flood information between the authorities and communities at local level should be in place with due recognition.

The concerned authorities and communities need to understand the flood information and should be capacitated on flood information communication regardless of political borders. There are large number of gaps which need improvement for trans-border flood EWS. Following are some highlights to address some of the gaps and the needs:

- The preliminary requirement in EWS is to understand the risk of a particular hazard. Currently, there is no information regarding potential effect of flood in upstream country/communities and downstream country/communities. Though a few cases of flood risk assessment within individual country exist but its findings are not well considered and used in developing local level preparedness plans. There is no trans-border flood risk assessment, in order to establish a trans-border flood EWS, the trans-border flood risk assessment should be carried out through joint engagement of the authorities and scientists from the adjoining countries.
- Individual countries have developed effective flood EWS which are effective within the country itself. A connection between these individual systems will significantly enhance the trans-border flood EWS. In the individual system, there are practices of sharing now-cast and forecast flood information by posting them on the respective websites. It was found that the information from upstream country were already in use by authorities and communities in downstream country. For example, FFD of Bangladesh uses flood information of Brahmaputra River from the website of Central Water Commission (CWC) and Assam State Government of India which are publicly available. Similarly, the communities in Bagraich District of India living along the Karnali (Ghagra) River use the flood information of Karnali River through web posts by the Government of Nepal. In the case of Bhot Koshi River, the upstream information from Tibet (China) is currently not available. Therefore, sharing of already available information effectively, helping each other to interpret the information and linking the existing individual system will significantly enhance the trans-border flood EWS. Moreover, it is also necessary to generate flood information by establishing monitoring as in the case of Poique/Bhotekoshi/Sunkoshi (China-Nepal) in upstream area and provide flood information to downstream area for better preparedness and deal with the flood risk.
- The trans-border information should ultimately reach to the most vulnerable communities, households and the individuals. In some cases like in Bagraich District of India, downstream of Karnali (Ghagra), the community expressed that they were not getting flood information from the relevant government authorities in time. The study shows that the authority of India, especially the IMD and the CWC have excellent information on flood and weather at their websites. But somehow the information do not reach in time to needy people. Effective mechanisms are needed within the country for better access to the flood and weather information by the communities, the ultimate beneficiary of the EWS.
- The flood and weather information posted on the websites are too technical to be understood by the users especially by the communities. So there is a need to contextualise the information and make them understandable by the users including the communities who are illiterate.
- Upstream country should monitor the flood for downstream countries as well, besides monitoring for its own downstream communities.
- In the Karnali River between Nepal and India, community to community trans-border flood communication already exists. Such communication should be recognised and formalised by the governments and should be supported through institutional development and strengthening of community based committees.
- The community-to-community flood information sharing across the border is by using very expensive international telephone calls. The governments should devise mechanism to subsidize the international telephone cost for such welfare calls that protects lives

and properties on the other side of the international border.

- Capacity of the communities and the authorities at local level to respond to flood information needs to be enhanced. They should be able to understand the flood information and have adequate skills, equipment and resources to respond to it.
- Systematic communication between upstream and downstream authorities should be designed and agreed upon by the concerned governments. Flood information should come to the designated authority at local level while at the same time it should also reach to the communities with no delay. Local authorities should be authorized and held responsible for trans-border flood information and communication.
- The flood EWS should be one of the main agendas for any relevant bilateral meeting between the two countries, especially when the countries discuss on water resources at bilateral level or at regional level in South Asia.
- The mechanism for flood trans-border EWS can also be used for other hazards like cyclone, which travels from sea to land reaching to the mountain communities.
- GLOF, inundation from landslide dam and landslide dam outburst flood are also the major form of floods particularly in mountainous areas in headwater affecting downstream. So, frequent monitoring of glacial lakes and landslides and communicating the risk information are also necessary in order to better preparedness.
- SAARC, as the regional coordinating body, should take the responsibility for trans-border flood and multi-hazards EWS as part of effective implementation of SFDRR at regional level.



www.practicalaction.org – Summary Report

About Practical Action

Practical Action is an international charity working to reduce poverty through the wider use of appropriate technologies in the developing world. With its head office in the UK, Practical Action works in more than 45 countries, through its country and regional offices in Bangladesh, India, Nepal, Peru, Bolivia, Kenya, Malawi, Senegal, Sudan and Zimbabwe. We are focused on leveraging large scale change to contribute to poverty reduction, technology justice and sustainable wellbeing for all through working in the four expertise areas: energy; agriculture and markets; water and sanitation; and disaster risk reduction.

Partner



Practical Action South Asia Regional Office

House No. 1114
Pani Pokhari, Lazimpat
PO Box 15135, Kathmandu, Nepal

T: + 977-1-4423639, 4423640, 4413452
E: info@practicalaction.org.np
W: www.practicalaction.org/nepal

