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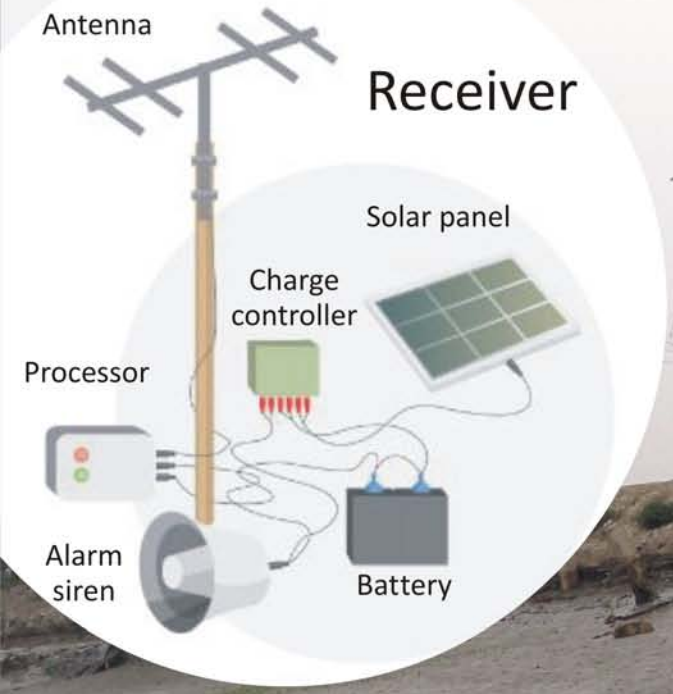
Community Based Flood Early Warning Systems



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About this issue

Flooding is perhaps the most widespread hazard in India. It has been estimated that out of the total geographical area of 329 million hectares (mha), more than 40 mha is flood prone in the country. Uttar Pradesh (UP) is India's most populous state and is no stranger to the risks of flooding. The rural areas of eastern UP in particular are highly vulnerable to riverine flooding during the monsoons every subsequent year. Hence, it is important to evolve community based flood early warning systems in such areas.

This issue of *Southasiadisasters.net* is titled "Community Based Flood Early Warning Systems" and focuses on the efforts of Poorvanchal Grameen Vikas Sangathan (PGVS) in evolving such systems in 95 villages of eastern UP. The articles contained in this issue highlight the various aspects of this initiative ranging from inception, planning, execution, results and evaluation. It also presents important lessons for the government and other humanitarian agencies to replicate CBEWS across India. Other success stories on CBEWS from and beyond have been included in this issue as well. ■

– Kshitij Gupta

INTRODUCTION

Community Based Flood Early Warning Systems

Floods are considered to be the most widespread and frequent natural hazard in India. The country already accounts for one-fifth of the total flood related deaths globally. Annual flooding in India adversely impacts housing, infrastructure, utilities, livelihoods, health, environment and cultural heritage. The United Nations has estimated the average annual loss from floods in the country to be US$ 7.4 billion.[1]

Given India's enhanced vulnerability to floods, early warning systems can play a big role in saving lives and assets. It is also important to empower communities exposed to flood risk to manage their own risk. Therefore, community based flood early warning systems need to be evolved. To evolve such systems, India needs to have a look at the following five factors:

One, the changing nature of communities exposed to flood risk. Communities are changing across time, space, economic activity, social constitution, and technology base. Smart-phones and cheap internet connectivity is radically changing the way far flung rural communities get information and interact with the world around them. Demographically, a lot of young and aspirational people have been added to these communities. Any CBFEWS needs to factor in these factors to evolve an effective system.

Two, what is early has changed. Advances in technology has enabled humans to predict weather patterns and extreme events far more accurately than ever before. Digital rain and river gauges can provide information on the level of water rise in the rivers almost instantly. All these technological advances has changed the meaning of the word early in early warning systems. There is a need to factor in such technologies in evolving effective early warning systems.

Three, floods all over India have become deadlier and costlier. As this article was being written, news broke that floods in Maharashtra and Kerala had killed more than a 130 people and caused massive economic damages in Maharashtra, Kerala and Karnataka. Assam and Bihar had already been severely affected by flooding earlier in 2019. All this loss and damage caused by flooding underscores the importance of evolving effective EWS.

Four, the dissemination of warning has also changed. Earlier, the only source of information/warning about floods used to flow down a cumbersome bureaucratic apparatus which would affect the response time. However, the advent of social media and mobile technology has drastically altered how warnings can be disseminated to a large number of people in very limited time. For instance, bulk SMSs can be used to send flood warnings to lot of people in a very short amount of time. Greater innovation can still be factored into early warning systems to improve the lead time.

Five, System has changed. The humanitarian as well as Early Warning System (EWS) has changed. ALNAP has excellent report on State of the Humanitarian System (SOHS) that shows the changes. The early warning system has become more technical, real time, out reaching, and almost accurate.

It is in the above light that this issue of Southasiadisasters.net titled 'Community Based Flood Early Warning System' is promoted. ■

– Mihir R. Bhatt

1 Global Assessment Report on Disaster Risk Reduction 2015, https://www.preventionweb.net/english/hyogo/gar/2015/en/home/data.php?iso=IND

Community Leadership in Flood Early Warning Systems

A View from Bahraich District in Uttar Pradesh

Uttar Pradesh is the most populous state in India. It is exposed to multiple hazards such as floods, earthquakes, heatwaves, fires, etc. However, riverine flooding is one of the most frequent and recurring phenomena in the state endangering lives and causing widespread economic loss and damage. It is estimated that annually 23,10,578 hectares of sown agricultural area in Uttar Pradesh is affected by floods. Eastern UP in particular is vulnerable to riverine flooding during the monsoons. Rivers like the Ghagra, Saryu, Sharda and Rapti often breach their embankments leading to flooding during the monsoons.

The rural communities living in eastern Uttar Pradesh are routinely subjected to the wrath of these floods but don't possess the capacity to deal with them. Lack of flood preparedness and poor access to government and non-government support impedes their ability to withstand floods. Most importantly, these communities within the flood prone areas are often devoid of any form of reliable information which can be used by them to prepare for floods.

Thus, floods often hit these communities without any warning. Although flood related information is shared between the authorities of Nepal (Department of Hydrology and Meteorology) and India (irrigation department), most of this information remains within the administrative setup and seldom reaches the desired recipient, especially at the grassroots levels because of bureaucratic hurdles. Therefore, it is necessary to develop a community-based early warning mechanism which can be managed locally without the use of too much of technology.

Photo: AIDMI.

The Poorvanchal Grameen Vikas Sangathan (PGVS) has established such a Community-Based Early Warning System (CBEWS) in the district of Bahraich and neighbor districts of Uttar Pradesh, which are regularly affected by Trans Boundary Rivers. The objective of this initiative is to consolidate trans-boundary CBEWS between India and Nepal. Christian aid has provided funding support to this initiative while Practical Action (Nepal) has provided technical support. This initiative is being implemented in 95 villages of the district Gonda and Bahraich in eastern Uttar Pradesh and 8 Wards from the Village development committee of Bardiya, district Nepal.

This initiative was unique because it empowered the local communities to identify and manage their own risks. First of all, massive capacity building of the at-risk village community was undertaken by PGVS. Under this initiative, four task forces on four themes were formed viz. search and rescue, first aid, temporary shelter and early warning. The most proactive and enthusiastic members of the village community participated in these task forces became underwent several trainings and planned various resilience activities in the village. This was perhaps the best way of ensuring community mobilization by empowering them to manage their own risk. Moreover, this initiative made a lot of communities self-sufficient in protecting themselves from the onslaught of floods and not be dependent upon external help.

A detailed review of PGVS's incredible community based flood

early warning system has yielded the following findings:

- **Balance development of the four community EWS components:** The PGVS CBEWS is a well-balanced system that functions as a whole. All the four components of an effective community-based EWS; a) Risk knowledge, b) monitoring and early warning, c) dissemination and d) communication and response capability and resilience seems to be equally emphasized and developed.

- **Application of technology:** For this project, PGVS has adequately leveraged the use and dissemination of technology. Some instances of leveraging technology include training VDMC members to monitor rainfall and river level status to leveraging bulk SMS technology for informing all stakeholders in districts such as Bahraich, Gonda, Sravasti, Barabanki and Basti. However, a more advanced use of technology such as specifically developed mobile applications can be introduced, tested/ embedded in the system.

- **Scale of coverage:** Being a local and community led system, the CBEWS has limited capacity in terms of reaching out to all "at-risk" areas. Currently, the system is operational in parts of two districts in Uttar Pradesh. However, the system has capacity to expand and replicate the CBEWS in neighboring districts of Uttar Pradesh with additional funding and support from the administration. PGVS has established central level Early Warning Centre in Lucknow, Uttar Pradesh. The organization is activating it from 15 June every year. The rainfall, river water level related information is collected and disseminated by bulk message technology to relevant stakeholders when the monsoons are activated.

- **Well-defined roles and responsibilities:** The PGVS CBEWS have well-defined roles and responsibilities for all stakeholders involved. Each component has multiple but specific stakeholder group attached to discharge specific functions.

- **Effectiveness of warning messages to "at risk" communities:** While warning messages are disseminated in a simple sign language, which are followed up by local task force team members in terms of appropriate action to be taken. This enhances overall efficiency of the entire EWS. A communication plan has been developed for effective communication and dissemination between community to community, Government to Government and Media to Media from upstream to downstream for accessibility the Alerts/ early warning to last milestones/ most vulnerable peoples.

- **Community education:** Several activities for educating the community on various aspects of CBEWS have been undertaken by PGVS. Community members are involved in training, mock drills and development of emergency plans. For example, as a part of strengthening the CBEWS, PGVS prepared Participatory Vulnerability and Capacity Analysis and Planning, Emergency Preparedness Plans and a multi hazards district disaster management plans with active participation of "at risk" communities.

- **Impact:** There is no loss of life during flooding last two years in project operational areas because the communities were linked to this early warning information. Communities were prepared at house hold level for flood response. In 2015, "almost 70% of the losses from floods could be avoided due to issuance of last mile early warning, especially in the areas, where PGVS CBEWS was operational.

- **Sustainability:** PGVS has established Early Warning Network between India and Nepal for proper information sharing related to before disaster preparedness, river water level and rainfall status sharing. Nepal Red Cross society is facilitating it in Nepal Side and PGVS in India side. From the very beginning project will ensure that community is involved at every stage of project implementation. PGVS has formed community task forces, which will be key to ensuing institutional sustainability of the TBEWS.

- **System of review and learning:** After each flood event, PGVS reviews and document lessons learned. These lessons are communicated to relevant stakeholders through meetings, training and publications such as annual report. Moreover, efforts are made to improve coordination with government on a continuous basis. Both, formal and informal emergency plans are refined and improved after each flood event. Various consultation and convergence meetings are conducted with Officers of Government departments at district level, Tehsil level, Block level for institutionalization of CBEWS and establishment of formal and informal communication systems. ■

– AIDMI Team

Assessing the Effectiveness of Community Based Flood Early Warning Systems

Empowered communities that are aware of their risk exposure and can manage it lie at the heart of effective disaster risk reduction. Disaster affected communities are in fact the first responders to any disaster, before any government or humanitarian agency. It is therefore important to empower hazard-prone communities with the ability to monitor the factors that turn a hazard (the actual event) into a disaster (the worst-case result of the event) to help save lives and livelihoods of populations that are at risk. Community based early warning systems (CBEWS) is a potent tool to achieve this.

A Community-Based Early Warning Systems (CBEWS) is a system developed, managed and maintained by the community itself, that empowers individuals and communities threatened by hazards to act in sufficient time and in an appropriate manner in a bid to reduce the possibility of personal injury, loss of life, damage to property, environment and loss of livelihood. CBEWS seek ways to help communities use local resources and capacities effectively to better prepare for and respond to disasters and adopt measures to reduce their vulnerability.

Uttar Pradesh is the most populous state in India with very poor development indices. In particular, Eastern UP is one of the most economically backward areas of the state with low development indices as well. The area is also affected by recurring floods annually. Rivers like Ghaghra, Saryu, Rapti and Sharda often cause riverine flooding in the area during the monsoons. The rural communities living close to these rivers are often ill-prepared to face them. Consequently, every time a flood hits them it does maximum damage. Despite information sharing between Nepal and India on the level of water in these trans-boundary rivers, the communities still don't receive this vital information on time to effectively respond to the threat.

The Poorvanchal Grameen Vikas Sansthan (PGVS) decided to initiate a project community based flood early warning system among the rural communities of Bahraich and Gonda districts in Uttar Pradesh. Funded by Christian Aid India and supported by Practical Action (Nepal), this project was implemented in 95 villages of the region to strengthen trans-boundary CBEWS between India and Nepal. In 2019, the All India Disaster Mitigation Institute (AIDMI) reviewed the CBEWS set up by PGVS in Bahraich district. The findings of this assessment are presented below in the form of challenges and opportunities:

A. Challenges

a. Power Outages affect the dissemination of bulk SMSs

Whenever the floodwaters enter into villages and habitations, the administration has to shut down electricity to avoid any instance of electrocution deaths. Sometimes, power outages can last for several days on end. Absence of electricity for extended periods of time also does not allow mobiles to be charged up. This in effect defeats the purpose of the bulk SMS scheme for early warning as SMSs can't be transferred through switched off mobile phones lacking charge. This is a big challenge for the early warning system set up in the 95 villages of the area.

b. Maintenance of Community River Gauges

One of the most innovative approaches to EWS taken by PGVS in this project was the installation of community river gauges on specific sites on the rivers. However, after the project came to a close in 2016, the maintenance of these river gauges is proving to be a challenge. All the villages covered under this assessment had unanimously voiced that after the completion of the project the river gauges are not being properly maintained. If this situation is not addressed quickly, then it will lead to a complete breakdown of these river gauges undoing all the progress in CBEWS achieved through this initiative.

c. Shortage of Staff at DDMA

In order to make CBEWS a sustainable proposition in the region, the government and the administration need to play a key role. However, the district disaster management authority (DDMA) in Bahraich is terribly short staffed to manage the task at hand. Currently, only an *Aapda Babu* and a disaster expert are on the roster of the DDMA. Both these DDMA staff members voiced their concern about the lack of institutional funding in the DDMA along with the shortage of staff. They also highlighted how the CBEWS project has circumvented the unwieldy way in which early warning from the administration flows to the at-risk villages. Therefore, such an initiative needs

Photo: AIDMI.

Focus Group Discussion (FGD) at Dallipurwa Village, Mihinpurwa Block, Bahraich District, Uttar Pradesh.

to be taken up by the government and administration. However, the shortage of staff at the DDMA would prove to a massive challenge in this respect.

d. Communication channel is only active in one season

The CBEWS initiative is primarily hinged on the using mobile telephony (bulk SMSs) to relay flood warnings to the at-risk communities. However, due to a lot of migration taking place in the project villages, along with a lot of people shifting to new numbers and mobile service providers, the effectiveness of the bulk SMS system is being seriously compromised. The information registers containing the mobile numbers of the early warning volunteers in the villages are not updated properly when these volunteers either migrate to other areas for work or change to another mobile service provider.

e. The absence of village level resource centres

One of the greatest challenges for effective risk reduction in the flood prone villages was the absence of village level resource centres. These centres can be used to stock essential rations, medicines and other necessary items during times of crisis. Moreover, all the villages covered in this assessment reported not having a boat in their village that could ferry flood victims to safety when the village gets submerged. If these village level resource centres are started then community based EWS can be made more effective by undertaking greater mitigation efforts.

B. Opportunities

a. Pilot Project on *Aapda Rahat Mitra*

The multiple trainings on risk reduction given to the members of the at-risk communities under this project has created a wide base of people with risk reduction skills. After the project cycle, it is important to leverage the pool of skilled people. Perhaps one person from each Gram Panchayat can be appointed as an *Aapda Mitra* to mainstream the disaster risk reduction in all the development works and activities in the village. These *Aapda Mitras* can also mainstream DRR in the Gram Panchayat Development Plan (GPDP) with special focus on institutionalizing community based EWS.

b. Leveraging Solar Technology to provide power in villages

Some of the villages that were covered under this assessment reported not being able to access electricity while others reported that they had been electrified only a few months ago. In such a case, where electricity is sparsely distributed to flood prone villages, the use of solar power can be a big opportunity to address the power and early warning needs of the villagers. There is precedent for this, as some humanitarian agencies have distributed solar lights to flood affected communities before. Perhaps if batteries that can help in the charging of mobile phones can also be distributed among such villages, then prolonged power outages would cease to adversely affect the effectiveness of the bulk SMSs for early warning.

c. Guidelines for government departments to mainstream DRR

Most of the government departments like irrigation, animal husbandry, horticulture, etc. do not practice risk sensitive planning. This results in avoidable loss and damage due to recurring floods or other disasters. Therefore, relevant guidelines should be issued to each government

department to mainstream risk reduction activities in their plans and actions. This is an opportunity that can also help in expediting the flow of information on early warning from government to the at-risk communities.

d. Leveraging Gram Panchayat Development Plan

The 73rd amendment to the Indian Constitution has given immense powers to the Gram Panchayats to carry out development work in their areas. The Gram Panchayat Development Plan (GPDP) encapsulates the vision and actions of the of the panchayat leadership to bring about the desired change. An opportunity to institutionalize and mainstream risk reduction at the local level can be leveraged through a risk sensitive Gram Panchayat Development Plan (GPDP). For this to happen, the first step would be to educate and sensitize the members of the Panchayat bodies on risk and resilience.

e. Impact of CBEWS Project in the area

This assessment made it abundantly clear that community based EWS in Bahraich and Gonda districts of Uttar Pradesh have had the desired impact of empowering the at-risk communities with the knowledge and capacity to understand their exposure to floods and manage that risk. The information collected through community focused group discussions (FGDs) and key informant interviews (KIIs) reveal that the targeted community's knowledge and skills on early warning systems on flood exposure has improved considerably. Despite several challenges, all the community members unanimously agreed that this project has at least empowered them to evacuate their villages during a potential flood situation thereby avoiding any loss of life or critical household items and documents. Even in 2015, almost 70% of the losses from floods could be avoided due to issuance of last mile early warning, especially in the areas, where PGVS CBEWS was operational.

f. Scalability of the project

There is a great potential to scale up the CBEWS work that was carried out for this project. This project has given rise to many good practices and lessons that can be scaled-up by the government or other humanitarian agencies to cover a wider area and population. For instance, one of the greatest lessons from this project was the leveraging of local resources for risk reduction activities. Instances of life jackets made from empty bottles, a charpoi boat, etc. were great examples of how even through limited resources risk reduction work can be effectively done. There is great potential for scaling up of this process by the government and other humanitarian agencies in these areas.

g. Potential for replication

The potential for replication of such a community based EWS is massive in the state of Uttar Pradesh. It is well-known that many rural communities in the state are exposed to riverine floods either annually or every subsequent year. Consequently, this project was based on a threshold analysis of the Ghagra and Rapti rivers. Perhaps a similar threshold analysis of all the rivers can be done in the state to identify the level of threat that they pose to the various communities living near them. Based to the threat levels identified by this threshold analysis a community based EWS can then be initiated in all the areas of the state drawing lessons from PGVs's good work.

C. Conclusion

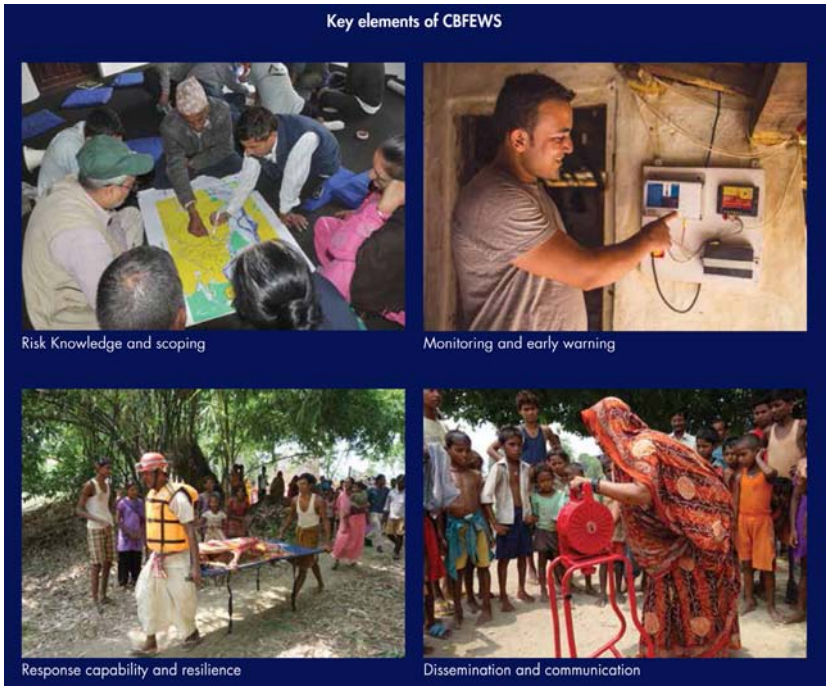
As climate change makes the monsoons more erratic and severe, the flood exposure of Uttar Pradesh is bound to increase over the coming years. Several factors like the widespread poverty, low nutrition, health and education outcomes act as drivers of risk that quickly exacerbate a hazard event (flood) into a full-fledged disaster in these areas. Therefore, empowering communities to manage and mitigate their risks through community based EWS is a novel and praiseworthy approach. PGVS's CBEWS project has taken a commendable first step to evolve an effective, equitable and efficient community based EWS. However, greater efforts from the government and other civil society organizations would be needed to make a lasting impact. ■ **– Kshitij Gupta,** AIDMI

Photo: AIDMI.

"Our village is more resilient due to the Early Warning Initiative of PGVS. We can now access the information about the levels of the Ghaghra river and relay it to all the community members. This has helped our village to protect itself against the risk of flooding." – Chhatrapal Nishad, Head, EWS Centre in Dallipurwa Village, Mihinpurwa Block, Bahraich District, Uttar Pradesh.

Putting Communities at the Centre of Early Warning

Floods are different from other hazards like earthquakes, cyclones and droughts because they are much more frequent, widespread and localised. In the areas that are prone to such hazards, an earthquake may strike once in several decades, cyclones once in a decade and drought once in half a decade, but floods would usually recur in some form every year. The riverine floods would inundate large rural and urban settlements in river valleys; coastal floods would submerge coastal lands and habitations; flash floods would affect communities living in the hills; and glacial lake outburst floods threaten communities living even in high altitudes.



A flood is also much more localised. The manner in which runoff from the rains or discharge from rivers or reservoirs affects communities depends on a number of local factors like topography, land use, vegetation, settlement pattern, state of maintenance of drainage systems etc. These make early warning of flood essentially local in nature.

Weather forecasts of rains in the catchment would not translate into sound early warning of floods unless these local parameters are factored in the flood warning system. Such modelling is very rare even in most of the large metropolitan cities and therefore 'rain warning' continues to remain a poor substitute for 'flood warning', probably this would remain so for many more years to come.

This places communities at the centre stage of any sound and effective flood warning system. Communities have intimate knowledge of local topography, settlement, vegetation and land use. They have lived with floods for generations and as such have accumulated experiences of ages to know the areas that would get submerged with different intensities of downpour. Communities have also their informal network of communications and messaging which are strong and effective, as has been demonstrated through many community based early warning systems.[1]

Communities have also their inherent shortcomings and limitations. Communities can neither predict rainfall nor anticipate discharges from rivers, reservoirs or lakes. Communities are also helpless with the growing phenomenon of short-duration high-intensity rains seen in the era of changing climates.

Communities should therefore be empowered with easily actionable scientific information on impending hazards of flood, which can supplement latent capacity of the communities to assess and act on local level risks. Simple easy-to-operate systems can be created, tailored according to local situations, to access scientific information on precipitation and discharge, overlay such information on local knowledge of topography-land-use-vegetation-settlement, generate locally relevant flood warning, and disseminate such warning to vulnerable people to save lives and reduce loss of livelihoods and assets.

45 vulnerable communities in Himalayan region have created

1 International Federation of Red Cross (2012), Community Early Warning Systems, Geneva

Community-Based Flood Early-Warning System

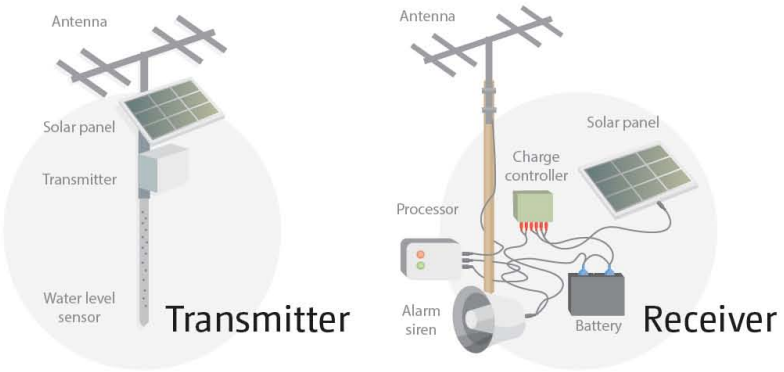
To enhance the resilience of 45 vulnerable communities to flood hazards, ICIMOD, together with its partners Aaranyak (India) and SEE (Nepal), established the Community-Based Flood Early-Warning System project. The ICT-enabled system uses a flood sensor attached to a transmitter to detect rising water levels. When the water reaches a critical level, a signal is wirelessly transmitted to the receiver. The flood warning is then disseminated via mobile phone to concerned agencies and vulnerable communities downstream. Critical flood levels are set with the help of the local community.

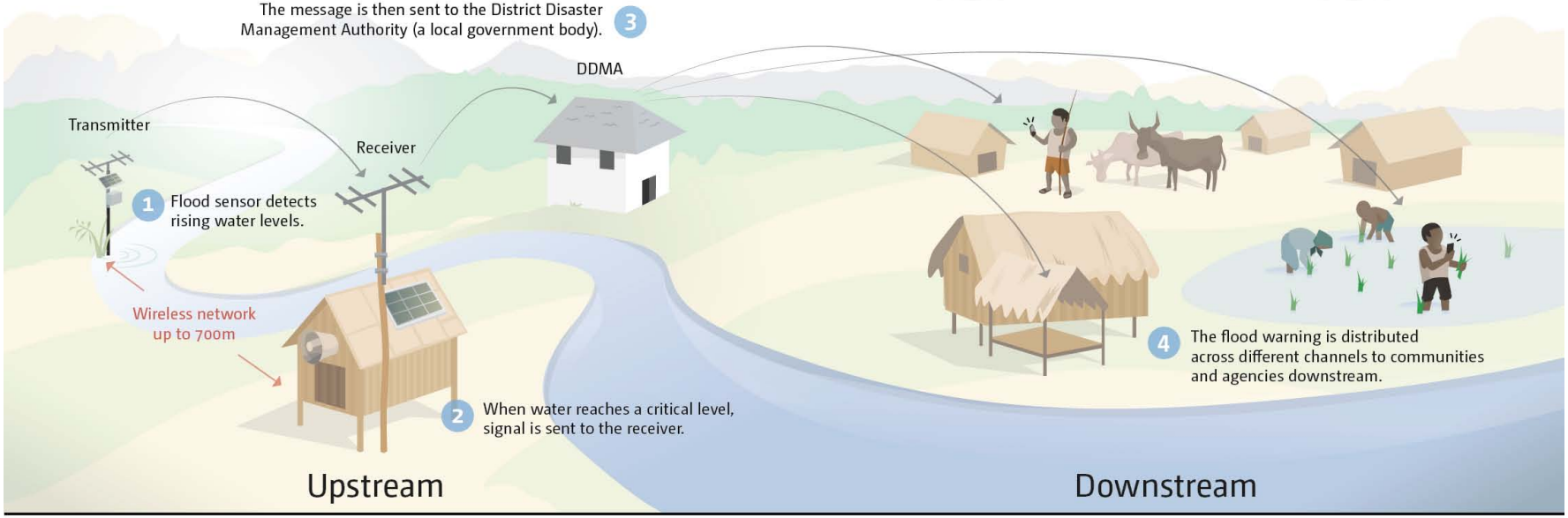
How it Works

The ICT-enabled system installed upstream sends warning signals to flood-vulnerable villages downstream when water reaches a critical level. This gives people time to move out of harm's way, saving lives and property.

Early-Warning System

The warning system consists of sensors that wirelessly transmit information about river water levels to a receiver.





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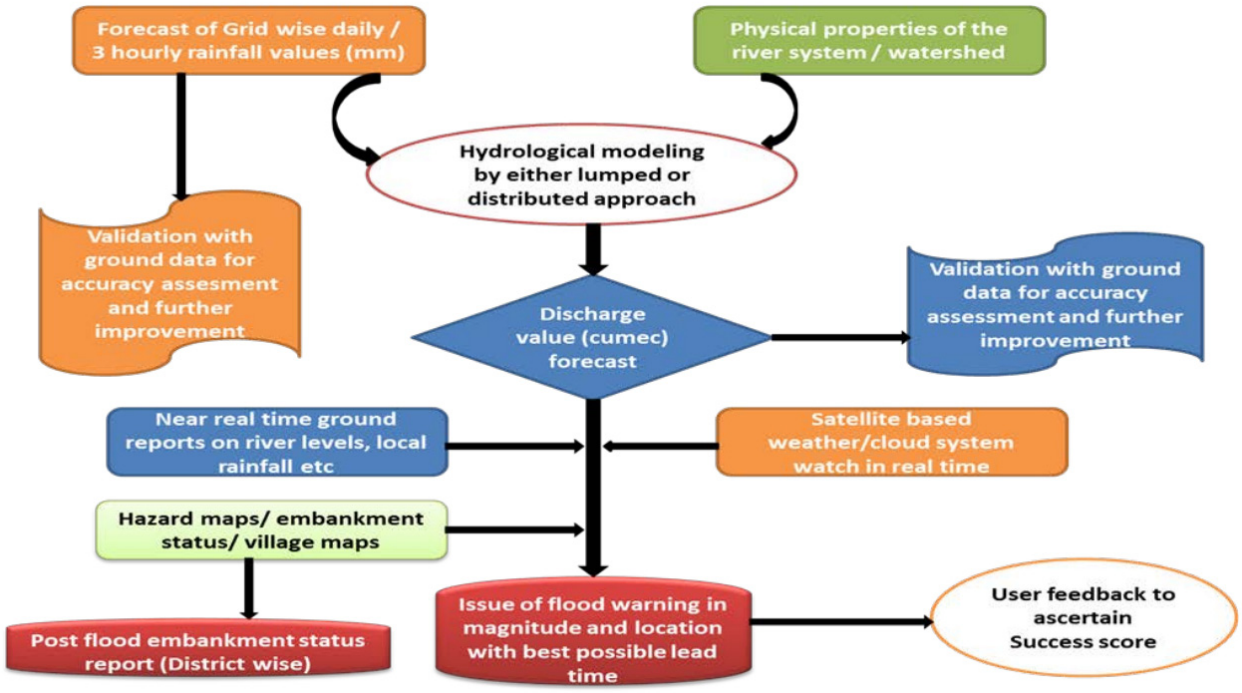
MOMENTUM FOR CHANGE

Flow Chart of overall methodology of FLEWS



Community Based Flood Early Warning System (CBFEWS) using a flood sensor attached to the transmitter to detect rising water levels. When the water reaches a critical level, a signal is wirelessly transmitted to the receiver. The flood warning is then disseminated via mobile phones to appropriate agencies and vulnerable communities downstream. Critical flood levels are set with the help of local communities.[2] Valuable lessons learnt through the system have been put together as a resource manual for replication in larger areas.[3]

A more sophisticated system has been developed in Assam. The Assam State Disaster Management Authority (ASDMA) brought together India Meteorological Department (IMD), Central Water Commission (CWC), Assam Water Resources Department (AWRD), North East Electrical Power Corporation (NEEPCO), and North East Space Application Centre (NESAC) – to develop the Flood Early Warning System (FLEWS).

FLEWS has three components – meteorological, hydrological and embankment monitoring. Real time data on rainfall at various locations and discharge from rivers at up-middle-down-stream locations; satellite imageries on topography, land-use-land-cover, human settlement and breach of embankments, if any; and ground level inputs on various other parameters are integrated and modelled to generate early warnings of flood in magnitude (intensity), location (state, district and circles) and time (7-24 hour range).

A robust mechanism has been developed for dissemination of early warnings to the local administration down to villages. The warnings have been ground tested and margin of error has been reduced to 4.14%. Encouraged by the success of the system the coverage of FLEWS has been progressively expanded to all flood prone districts of Assam.[4]

Various states of India have shown their interest in replicating FLEWS. Department of Administrative Reforms & Public Grievances has selected FLEWS as a best practice of innovative disaster preparedness. Such best practices should be adopted and adapted according to local needs, requirements and capacities. ■

– Dr. Prabodh Dhar Chakrabarti,
Lead Consultant of UNDP in India and Myanmar, and Formerly Secretary NDMA and Executive Director NIDM

2 UNFCCC, https://unfccc.int/climate-action/momentum-for-change/activity-database/community-based-flood-early-warning-system-india
3 ICIMOD (2016), Community Based Flood Warning System in Hindukush Himalayas, Kathmandu
4 Assam State Disaster Management Authority (2013), Flood Early Warning System, Guwahati

UNDP Role in Strengthening Community Based Early Warning System in India

Over the last few decades, UNDP has supported the efforts of the Government of India (GoI) and State governments to formulate disaster reduction policies, set up institutions, and include risk reduction aspects in social and economic development plans to promote effective disaster preparedness and risk reduction measures, as well as to improve response capacities. Effective Early Warning Systems (EWS) are an essential component of Disaster Risk Reduction and can be best delivered through operational partnerships between disaster management agencies, local governments and technical agencies. UNDP has played a contributory role towards strengthening the concept of Early Warning Systems (EWS) and making them integral to Disaster Management Systems.

Through the GoI-UNDP DRM programme (2002-2009), Early Warning Task Forces were constituted under Village Disaster Management Plans and trainings were provided on various components of EWS. States like Uttarakhand and Mizoram created innovative approaches in the EWS such as reliance on community radios, use of Coloured Flags, Morse Code Communication, and Torch-Mirror systems.

After the 2004 Tsunami, UNDP supported a last mile VHF based Wireless Communication Network in Kerala and Tamil Nadu. These initiatives were further scaled up by the Government in Tamil Nadu through the Tsunami Emergency Assistance Programme to cover other villages that are prone to Floods and Landslides.

With UNDP's support, the state of Assam in 2015 set an example by setting up a Flood Early Warning System, which ensured that local communities are informed well in advance of ensuing flood situations so that they are empowered to deal with disasters. This was among the first such system established for flood management. The partnership between the State Government and North Eastern Space Application Centre (NESAC) paved the way for multi-stakeholder partnerships with many central and state government organizations coming together such as: Brahmaputra Board, Central Water Commission (CWC), North Eastern Electric Power Corporation (NEEPCO), Assam Water Resources Department (AWRD) and Indian Meteorological Department (IMD). The successful demonstration of the pilot Flood Early Warning System in one of the worst affected districts of Assam (Lakhimpur) in the year 2009 has resulted in extension of the system to 14 districts in the states in a span of three years. With the success of FLEWS technology in Assam, the Government of West Bengal and Bihar also joined hands with NESAC for technical collaboration for pilot implementation of Flood Early Warning System in their respective states.

Considering the rapid urbanization in India, it was realized that the urban EWS in India also needed strengthening. UNDP with support from USAID under its Urban Resilience project undertook assessment of EWS systems in 10 partner cities. Bhubaneswar, Vijayawada and Visakhapatnam developed a Heat wave Action Plan. Visakhapatnam and Navi Mumbai advanced efforts with portal-based information dissemination as well as SMS based warning systems for citizens. In Vishakhapatnam, more than four thousand volunteers' mobile numbers were included in this system and utilized during the Cyclone and in mock exercises. The cities are also strengthening city level EOC and establishing linkages with the district level EOC.

In the aftermath of the 2018 Floods in Kerala, UNDP has extended support to the Government of Kerala in developing and implementing a Recovery programme. Under this ongoing collaboration, Community Based DRM has been a major thrust area to ensure that communities are well informed and prepared for sudden hazard events.

With increased intensity and frequency of disasters due to climate variability, Early Warning Systems are a component that needs to be supported as improved communications and weather forecasts would make climate change information available to communities in specific sectors. This would help not only farmers in drought, cyclone or flood prone areas but also support coastal communities engaged in tourism and sustaining other rural livelihoods through improved quality of life. UNDP is committed to meeting the Sustainable Development Goals and leaving no one behind. This requires facilitating and establishing partnership for systems that can collect, analyse, forecast, inform and support resilience building of communities to withstand the threats and impacts of natural events. ■

– Abha Mishra, Head of office-UNDP, Odisha

CASE STUDY

Role of KSSF in Early Warning System for Disaster Risk Reduction in India

The sheer magnitude and intensity of 2018 Kerala floods wreaked widespread havoc and traumatized a lot of people in the state. This unprecedented flood brought death, destruction and distress in its wake.

During these exigent times, the Kerala Social Service Forum (KSSF) being the State level nodal agency of the 32 Catholic Diocesan Social Service Societies (DSSS) operating in Kerala, could take up a lead role in Early Warning System for DRR. KSSF participated actively in the Rescue and Relief phase of the recent Floods by coordinating to deliver services and relief materials through our network to different parts of Kerala. Through its partner DSSSs, KSSF has the capacity to communicate directly to an estimated 8,50,000 people who are members of the diverse Community Based Organizations (CBOs) fostered by the DSSSs.

Role of KSSF in Early Warning System for Disaster Risk Reduction in India:

- KSSF and its partner DSSSs especially those in the coastal areas have been involved in Disaster Risk Reduction and Mitigation measures way from 2004 after Tsunami. As part of the Community Based Disaster Preparedness and Community Managed Disaster Risk Reduction projects implemented through 10 DSSSs in the coastal villages, DMT Teams were formed with Committees for Early Warning, Search and Rescue, Medical and First-aid, Damage Assessment, Shelter Management, Water and Sanitation. These Committee members performed extremely well to address the Ockhi cyclone and Kerala Floods 2018.
- Coastal areas have kept registers to track the departure and arrival of fishermen. The people in these areas are also trained to ring the church bells and thus communicate early warning messages in the event of an upcoming disaster.
- KSSF has partnered with DSSSs operating in Wayanad, Alappuzha, Changanacherry, Tiruvalla and Trivandrum with Community Radio Stations and these DSSSs received several accolades for their services in Early Warning and Rescue operations.
- KSSF maintains good coordination with the State and District Disaster Departments and could get updated information and Early Warning
- Early Communication to the Dioceses and DSSSs to reach out and gear up to confront any foreseen or unforeseen disaster.
  - o E.g.: deploying of fishermen and fishing boats for rescue
  - o Voluntary Task force for rescue and relief
- Finally, KSSF is documenting the Best Practices and Interventions of its Partner DSSSs in the Rescue, Relief and Rehabilitation phases to ensure the preservation of lessons learnt while addressing disasters.

In India, KSSF also has an identity as the Regional Forum of Caritas India in the state of Kerala. Post Recovery and Rebuilding, the partner DSSSs have already embarked onto a DRR phase and aims to build a Volunteers team for Disaster Preparedness and includes exercises for formulation of Village level Disaster Management Plans in around selectively identified 300 villages in Kerala.

It is with a deep sense of esteem and happiness that KSSF looks upon the globally cherished and talked-about resilience of the Kerala community, as the DSSSs have had a significant role in moulding the attitude of the people towards one of communal harmony. ■

– Fr. George Vettikattil, Executive Director, KSSF, Kottayam, Kerala

Community Based Early Warning System: Agenda for Action

Since the 1950s, Nigeria has always borne the brunt of intermittent fluvial and coastal flooding without making headlines. However, in 2012 citizens and authorities alike received the shock of the century with the great floods that submerged 30 of the 36 states, displaced 2.1 million and killed more than 300 persons. In 2018 more than 100 persons died on account of flooding in various parts of the country. The importance of early warning mechanisms, of a system of competences put in place to generate and relay warnings/information to enable those threatened to act in order to reduce/forestall impending devastation can never be over emphasized.

The UN Office for Disaster Risk Reduction defines early warning as ''an integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events.'' When these set of actions are community led and driven, local ownership is established, more lives are saved, sustainability and overall effectiveness improved.

Community based model of early warning in the country may be described as evolving. It is hard to identify community driven efforts against floods either enabled by development actors or the government itself. What exists are designed at the national level, often drawing from global parameters or standards, and dissipated downwards to the lower authorities and sometimes communities. We see this reflected clearly in the Nigerian Metrological Agency, which issues annual and quarterly drought and flooding forecasts sometimes with in partnership with the Federal Ministry of Environment, National Emergency Management Agency (NEMA), National Orientation Agency or similar federal authorities. In order to mitigate the incidents of flooding and improve resilience of communities, certain actions must be undertaken.

A critical agenda for action must be co-opting the public into buying in and eventually accepting the reality of the results of some actions that lead to, or exacerbate flooding. The implications of flagrant disregard for the environment, flood warnings and alerts environmental management laws and regulations particularly in urban cities are a sore point for advocacy and enlightenment campaigns.

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It is important that the federal authorities re-consider the model of early warning concerning flood in Nigeria today. A bottom-up rather than an up-bottom approach should be considered and greatly encouraged. A step further would be to establish a community driven early warning system in states that are highly prone to flooding. Priority should be given to communities that lie by the banks of major rivers such as rivers Niger and Benue, creeks (Niger Delta) and coastal cities like Lagos. In conclusion, I would like to emphasize preparedness as a vital aspect of any early warning effort. Government needs to display clear leadership, coherence and clarity in its policies and approach; allocate resources for this and clearly designate a lead agency among existing institutions. Capacity of staff must be strengthened, communities identified and volunteers sourced. The relative coverage of tele-communications networks should be leveraged to establish community led early warning initiatives. There is much to be done, to prevent the losses from recurrent flooding. Nigeria needs a paradigm shift. Let us try an autochthonous, community driven early warning mechanism supported by the central authorities. The time for action is now. ■ **– Uche Hilary-Ogbonna,** Abuja Based Human Rights Lawyer, Nigeria

Flood Warning Systems as Social Processes for Cities and Towns

Warning systems for floods—whether from rain, storm surge, tidal bores, tsunamis, or other sources—must be a continual part of our lives. The systems should not be run by others, just waiting for the water to approach and then being activated. Instead, warning systems involve everyday activities, so that we are all prepared and not surprised when a flood strikes.

It can be as simple as cleaning up rubbish and other debris from the streets. Many cities and towns have drainage networks, such as gutters or sewers, which are not properly maintained, because of which they become clogged with litter or plant material including leaves. When it rains, the water is trapped behind this debris, flooding nearby streets and properties.

Releasing a warning as the weather or wave approaches, telling us to clean up the streets then, is too late. We might be on holiday or at work. We might not have trained, so we do not know where equipment is stored, where to put the garbage, or how to coordinate to ensure that all channels and sewers are cleared. Or we might clear the streets, but trash and leaves are washed from gardens and car parks, blocking the channels again.

Instead, clean cities and towns should be our daily and weekly activity. The warning system, as a real system rather than as a mere mechanism, means that we know not to litter, we keep our gardens and streets clear of debris all the time, and we accept that one-off actions while the weather or water approaches are too late. Warning actions are integrated into our routines, ensuring that a lot of water never leads to a flood disaster. While individuals can be responsible for our yards and garbage, we need collective action for urban design which directs water away from properties, which plans for excesses, and which engrains a culture of not entering any floodwater, as a pedestrian or with any vehicle.

This real warning system—day-to-day actions keeping people and properties safe from floods—is called the "first mile". It asks us about our needs, our interests, our knowledge, and our resources related with water, floods, flood vulnerabilities, flood risks, and flood disasters, in order to tailor needed actions to each of our circumstances. It involves keeping locations clean as well as understanding why we might try to cross floodwater, such as to reach kids at school or because we are afraid of being fired from work. Then, we can plan and act now to stop this happening long before the water arrives.

"The last mile"–connecting an external warning system to the people affected as the final step--is too late. A real warning system starts with those affected and links internal and external monitoring, analysis, and information according to what works best for them.

This first mile accepts that no community is homogenous. Everyone is important, including people with disabilities; ethnic, religious, and linguistic minorities; prisoners; homeless people, and those living in informal settlements. Visitors must be considered along with locals. Different groups have varying approaches and needs, so the first mile begins in multiple places. The warning system can better connect people all the time, to reduce marginalisation and to use everyone's capabilities.

This makes the warning system a continual social process, combining technical and social components. Implementing only technology rarely succeeds. Flood warning systems for cities and towns are fundamentally about people. ■

– Dr. Ilan Kelman, University College London, UK and University of Agder, Norway

Photo: Ilan Kelman.

After a bit of rain, a street floods in Malé, Maldives.

Further reading:

1. https://doi.org/10.1108/09653560610654329
2. https://doi.org/10.1108/DPM-12-2017-0318
3. https://doi.org/10.1007/978-94-017-8598-3_5

Early Warning System for Flood: A View

Source: NDRF, GOI.

Rescue during Kerala Flood 2018.

Early warning systems (EWS) for flood comprise an end to end approach that looks beyond generation of an accurate warning or strengthening the last mile connectivity alone. Instead it begins with flood risk assessment for a given geographical location, installation of robust warning infrastructure and apparatuses, development of appropriate guidelines and procedures, communication and dissemination of warning information to the last vulnerable person and finally enabling user's ability to take necessary measures for their safety.

The last EWS component or community capability to act upon warning has received due recognition in recent times and is pivotal to community based management approach. In its conception, flood EWS seeks to bring together multiple domains of expertise; from risk analysts, hydrologists, meteorologists to communication, GIS specialists, and community preparedness experts. However often in practice, instead of a holistic approach, EWS gets oriented in one or other of the above dimensions, thereby overlooking the importance of interconnectedness among different components.

Flood warning poses additional challenges because of the varying nature of the hazard-risk, in part due to rapid rate of urbanization and concomitant encroachment of flood plains and alteration in percolation/ drainage capacities, and variation in climate manifested through intensified rainfall over shorter duration. Recent flooding of Indian states like Tamil Nadu 2015 and Rajasthan etc. point to possibilities of more such parched areas traditionally not known for being vulnerable to flood facing an increased flood risk. Flash flooding, particularly in urban context, brings its own set of challenges; for example very little warning lead time and exposure of large population, in addition to huge economic cost. In spite of considerable progress in recent times in flood warning system, the following three aspects require further attention.

First is in the conception of 'warning' or more specifically the need for incorporation of inundation height as an important element within warning content. It makes much difference from the public response point of view to know a) an area will be flooded and b) it will be flooded by three or four feet of water. The latter with definite input on nature of hazard risk is bound to elicit a much better response than the former. Providing accurate inundation scenarios however requires far greater collaborative works across disciplines and significant refinement of modeling capacities. This becomes even more challenging in the face of extensive application of 'now-casting' tools or live forecasts of heavy rainfall.

Second concerns two related problems, one of communicating to every vulnerable individual in a very short period of time and the other how to prevent distortion of warning information with wide use

of social media. In case of first, usual last mile connectivity problems persists which include reliability and sustainability of communication hardware, long term maintenances etc. Social media provides useful means to distribute warnings and enables faster response as was seen for example, in Kerala flood 2018 and yet it can also potentially modify/distort warning messages which at times can cause panic and at other times, trivialize authentic information. Finally, public response to flood warning is shaped by host of considerations in which specific input is contextualized. For example, where to take shelter during a flood warning, whom to trust, when and how to evacuate, what to carry etc. are often rooted in a given social context and are not easy to anticipate. Take the example of Mumbai Floods in 2005 when a number of people died because they took shelter in their own vehicle, locks of which malfunctioned under rising water level. Similarly a number of pets were washed away during Chennai floods of 2015 lacking a plan for their evacuation. There are evidences which suggest affected people during Kerala Flood 2018 failed to evacuate mainly due to a lack of warning from local administration (Ajay, 2019). ■

– Biswanath Dash, PhD, Assistant Professor, Department of Humanities and Social Science, BITS Pilani Hyderabad Campus, Hydrabad

Reference: Ajay, A. 2019. "Role of Technology in responding to disasters: insights from great deluge in Kerala" *Current Science*, Vol. 116(6): 915.

CASE STUDY

Early Warning Systems for Floods: Structural Initiatives and People's Perception

A View of Flood Victims of Jamalpur District of Bangladesh

In spite of many remarkable achievements, Bangladesh still faces many hurdles in ensuring sustainable socio economic development for its vast population. Climate change has become an emerging problem in Bangladesh that is largely affecting agricultural productivity, food security, and human mobility. The frequency and severity of various hazards increased over the last few decades because of the changes in climate. The main reason for flooding in Bangladesh is not only the heavy rainfall within the country, but also other issues, including snow-melting from the upstream countries, deforestation, shrinking of the rivers' capacity, building of dams in the upstream for irrigation and many more. One of the World Bank's studies shows that among various types of hazards, the damage caused by flood is 23 percent while it is 19% by cyclone and 15% by landslides.

Photo credit: Ashraful Islam.

Data collection from char dwellers.

In Bangladesh, early warning is more prompt and precise for cyclone, but not strong enough for floods. The Disaster Management Act 2015 agrees that we should ensure the warning through accessible language for dissemination and should coordinate with neighboring countries. Bangladesh Climate Change Strategy and Action Plan pointed "forecasts are released through emails and website, there is scope for improvement".

Within the last two decades for reducing the flood hazard a series of structural initiatives were taken by the Government and development agencies. These initiatives included activating a Union disaster management committee, mobile-based early warning system, trained religious leaders and community volunteers to alert people about the imminent floods, produced customized early

warning voice message taken from the Flood Forecasting and Warning Centre (FFWC) and sent those messages to enlisted persons and Union Digital Centers, using FM radio, community radio, Television and using local level institutions. The concerned authorities claim that these initiatives coupled with other community based solutions have worked quite well for evolving effective flood early warning systems.

Considering the above findings, a study has been done in the highly flood prone Islampur and Dewangonj upazilla of Jamalpur district. For this study, data were collected through: intensive interviews and focus group discussions (FGDs) with flood victims. The selection of respondents was done through a systematic criteria which ensured that the most vulnerable and at-risk persons were selected for the study. For instance, some of the factors that were taken into account while selecting the respondents for this study were: age (elderly or above 50 given preference); place of dwelling (lived in Char); male-female ratio; repeated annual exposure to floods; livelihoods, etc. It has been observed that there is a contradiction in between, the field findings and the different study reports.

Major Findings

Through the study, it has proven that Television based weather forecasting system has mostly helped the flood victims. According to the respondents' opinion, community based flood early warning systems till now have played a less significant role. It has also been observed that, people also used some indigenous methods for flood early warning including observation of water level, wind, cloudy sky, the behavior of animals etc. Some of the early-warning system are working in less remote areas but in most remote areas it is still now a big challenge.

Recommendations

i) Greater coordination and collaboration in between relevant actors,
ii) Continuous & effective follow-up,
iii) Greater attention to activating Union disaster Management Committee,
iv) Formation and activation of Village Level committees,
v) Activation of Community Volunteers,
vi) Utilizing digital technology through appropriate database,
vii) Expanding Mobile based early warning system,
viii) Activating school & college based volunteers including involving scouts, girls guide BNCC. etc.,
ix) Expand subsidized solar based solutions for operating television, x) Regular reporting system and consolidation by Local Level Administration for next course of action. ■

– Dr. Md. Shahid Uz Zaman,
Executive Director, Eco-Social Development Organization (ESDO), Collegepara (Gobindanagar), Bangladesh

HUMANITARIAN STANDARDS IN EWS

Early Warning System(s) for Crisis and Sphere Standards: A View for Action

A growing number of crises are protracted, and crises often re-occur. In this context, the traditional view of punctual humanitarian action is not sufficient. While the Sphere standards explicitly address the humanitarian emergency stage and focus on survival and recovery with dignity, it is vital that they are situated in a broader frame of time and preparedness activities. Learning from what was before and anticipating what will come later is crucial if we want to make the best use of scarce resources, and if we want to ensure that people can meaningfully recover and protect themselves in the longer term.

This longer-term thinking is nothing new, and we can learn a lot by taking a longer term look at human activities. I recently visited the Citadel in Amman, a really ancient place in this ancient city. I learned that, because there were no natural water sources in the citadel, its residents captured rain and waste water which was rationed and recycled, so as to make the most of what little they had. They anticipated dry spells, knowing these would come back for sure. This is how they survived in a situation of chronic scarcity.

This small, simple example is of great relevance today for many regions of the world because it exemplifies the consciousness of limited resources and the need to anticipate and care for what we have.

Today's technology and knowledge allow for more precise anticipation. The combination of Sphere standards and their indicators and existing early warning systems allows for customized plans of action for any menacing crisis situation. *Using forecasts and early warning systems for contingency planning before a crisis will help communities, authorities and agencies respond quickly when needed. This will also allow affected people to protect their assets before their lives*

and livelihoods are at risk (See CHS Commitment 2 on effective and timely response).

Famine early warning systems (FEWS) are particularly important in the context of food security and nutrition. Undernutrition often has structural, long-term causes. Any nutrition response will need to be based on understanding these aspects. Therefore, as much as possible, early warning information must be used in food security and nutrition assessments, planning and programming. Importantly, Sphere specifies that, where possible, information from early warning systems should be accessible to affected people as well (Food security chapter, standard 7.2, GN 5).

The Sphere Health chapter addresses communicable diseases in densely populated areas such as cities. The chapter introduction states: *Rumours and misinformation spread quickly in cities. Use technology to immediately supply accurate information on healthcare and services. Secondary and tertiary healthcare providers are often more active in cities, so increase these providers' capacity to deliver primary healthcare. Engage them in early warning and response systems for communicable diseases and increase their capacity to deliver their usual specialised service* (Health Chapter, Essential concepts).

The Sphere Handbook[1] and the Health chapter in particular repeat consistently how important it is that various response actors work together, and that it is usually better that local or national authorities have the lead (Health Systems Standard 1.5: Health information; and Communicable Diseases Standard 2.1.2).

One of Sphere's companion standards, the Livestock Emergency Guidelines and Standards (LEGS), discuss early warning in detail, including standards on emergency feed and on de-stocking Livestock early warning (providing emergency fodder and guidance on emergency de-stocking)

So we know how to prepare and carry out a response based on early warning systems. And we also know that the earlier we react to early warning signs, the more effective the response is likely to be. Yet, sometimes the response comes too late or in an inadequate manner. The challenge remains that, whenever possible, we should have the courage to act upon strong suspicion of crisis and not wait until the crisis hits. Let's re-connect with the age-old wisdom of managing scarce resources, linked to modern technology and collectively agreed best humanitarian practice codified in humanitarian standards such as Sphere. These are the three ingredients to success. ■

– Aninia Nadig, Policy and Practice Manager, Sphere, Geneva, Switzerland

1 Humanitarian Charter and Minimum Standards in Humanitarian Response, https://spherestandards.org/wp-content/uploads/Sphere-Handbook-2018-EN.pdf

Aninia with the Sphere Handbook.

Photo Credit: A. Petrenko / Sphere.

Post Disaster Assessment And Recovery: ILO Agenda

Photo Credit: ILO.

Consultative Meeting on Post Disaster Recovery and Reconstruction Plan for "Employment" in Kerala organized by ILO in January, 2019.

The term "disaster" means a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts (as in Recommendation 205 and based upon internationally agreed terminology). Disasters hamper socio-economic development and undermine the employment and livelihoods of households and communities. Damaged workplaces, lost jobs/ wages and diminished incomes are the typical consequences of disasters and disproportionally affect the poor and the most vulnerable, depriving them of their jobs, reducing their ability to raise income, and thus diminishing (permanently or temporarily) their capacity to make a living.

In the recent one year, India has been adversely affected by two major disasters: Floods & Landslides in Kerala- August, 2018 and Cyclone FANI in Odisha- May, 2019. In the aftermath of both disasters, a systematic assessment of damage and loss and recovery needs was done in the form of "Post Disaster Needs Assessment (PDNA)". The PDNA, a joint initiative by three international development partners- UN system, European Union and World Bank- represents a standard tool and methodology, applied across different countries. This comes as part of signing a Joint Declaration on Post-Crisis Assessments and Recovery Planning by the United Nations Development Group (UNDG), the World Bank (WB) and the European Union in 2008, to harmonize and coordinate "post-crisis response frameworks to enhance country resilience to crises". The joint declaration brought together the capacities and resources of the three institutions to assist national governments to prevent, respond, and recover from crises and enhance countries' resilience to such catastrophic events.

The PDNA is led by the State government and estimates post-disaster damages and losses for all sectors of the economy as well as the recovery, relief, reconstruction, and risk management needs. In the event of a disaster, the analysis of its effects and the formulation of the needs for recovery and reconstruction following a multi-sectoral process is very important. The PDNA provides guidance to the government and the international donor community on a country's short, medium, and long term recovery priorities. Where possible, it also considers how the response to the current situation can improve the natural and built environment for citizens, and how the impact of future disasters can be minimized.

Being a part of the UN system, the ILO contributes to the PDNA by supporting governments in assessing the disaster impact on the

"Employment, Livelihoods and Social Protection (ELSP)" sector, in line with the PDNA Guidelines Volume B. The ELSP sector assessment complements earlier humanitarian livelihoods assessments and other sectoral assessments to link the disaster recovery with national development objectives.

Since 2008, the ILO has been supporting PDNAs in tens of countries in Asia, Africa and the Americas. For India, Kerala is the first example where a formal PDNA was done after the disaster and thereby sets a precedence for others. The ELSP sector assessment and the further recovery process followed a human-centred approach, in consultation with the relevant stakeholders. ELSP is a cross cutting sector and therefore has linkages with other PDNA sectors including Social, Productive and Infrastructure. Pulling together information on the socio-economic aspects of damages, effects (economic losses, disaster caused changes in service delivery, governance and risk), impacts and needs, it highlights recovery priorities from a human recovery perspective. While doing the ELSP sector assessment, special attention is paid to the specific needs of population groups and individuals who are made particularly vulnerable by the crisis, such as children, young persons, persons belonging to minorities, indigenous and tribal peoples, persons with disabilities, internally displaced persons, migrants, refugees and other persons forcibly displaced across borders. The cumulative result is a consolidated report that includes a strategy for resilient recovery, including the estimation of financial resources required. The ILO's assistance in this process aims to mainstream employment and decent work elements into the response and recovery strategy. This approach has been followed while supporting Kerala in its recovery process as well.

Overall, the lessons and learnings from the assessments and recovery processes are definitely going to benefit the country, States and in the longer timeframe, our collective preparedness and response capacity to these kind of situations. ■

– Ruchira Chandra, Programme Officer, International Labour Organisation (ILO), New Delhi

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