Technology Fact Sheet for Adaptation

IX. Community based early warning system [i]

Introduction

An Early Warning System (EWS) consists of coordinated procedures through which information on foreseeable hazards is collected, analyzed and dissipated to warn people of the possible occurrence of a natural disaster. These systems are acquiring more importance in view of increased climate variability and susceptibility. The ability to properly implement EWS has become fundamental for improving climate change adaptation capabilities. ESWs can be decentralized, community based systems, usually operated by a network of volunteers.

Technology Characteristics

A community based EWS is implemented by employing simple equipment to monitor meteorological conditions and operate radio communication networks. Operators of decentralized community meteorological stations report the information to a local forecasting centre where the data is analyzed and then communicated back to the community network.

The following are the main implementation stages of a decentralized community system:

- Establishing an organizing committee (leaders of the community and civil society, NGOs, representatives of local authorities and the private sector)
- Creating and analyzing information: building and installing measuring instruments, carrying out forecasts
- Producing a participatory emergency and contingency plan
- Implementing a communication system: early warnings, dissemination of prevention, mitigation and adaptation measures.

Increased frequency and intensity of extreme weather events, prolonged drought and processes of desertification, longer periods of heavy rainfall and increased risk of flooding are just some of the impacts of climate change affecting the world's poorest populations (IPCC WG II, 2007). EWS technology designed as a climate change adaptation strategy must therefore be capable of forecasting a number of climatic events that correspond to different time scales:

- Three to four months of advance warning of a drought
- Two to three weeks of advance warning of freezing weather conditions and monsoons
- A few hours of advance warning of torrential rain, hail and floods.

Country specific applicability and potential

There is a need to incorporate community based EWS in Bhutan. It could prove to be a technology that has a major say in Bhutan's climate change adaptation capacity in the near future. It will prove to be an excellent tool to tackle the key climate related disasters in Bhutan.

Status of technology in country

The Glacial Lake Outburst Floods (GLOF) project in Punakha-Wangdue valley has initiated a EWS. Under this project, an automated EWS has been installed with sensors at four sites in the headwaters and siren towers at 17 sites along Punatshangchhu river. Evacuation sites have been identified in the event of GLOF and local communities have been sensitized about the EWS and evacuation procedures.

Benefits to economic / social and environmental development

- Implementing community based EWSs can help in saving a lot of cost that would have occurred due to damage from natural disasters.
- As a technology to bolster climate change, it is quite low cost and sustainable as compared to some others, and it requires minimal capital investment.
- As it is a community based approach and participatory in nature, it helps in creating a more inclusive community, with everyone playing an important role.
- It helps in establishing a robust communication infrastructure of a particular community.
- It helps in generating employment from within the community itself.
- It encourages exchange of information of a social or legal nature, in addition to climatic information, through the established communication network

Climate change adaptation benefits

In the wake of increased frequency and intensity of extreme weather events, prolonged drought and processes of desertification, longer periods of heavy rainfall and increased risk of flooding (IPCC WG II, 2007), community based EWS have come up as an important technology to bolster the adaptation of communities against climate change.

A key benefit of community based ESW towards climate change adaptation is that it provides populations with time to act and curtail the damages that are expected due to a particular climate related hazardous event. A community based EWS is able to educate the people about the particular steps that they must take to avert potential dangers when or before a natural disaster occurs.
Some of the noteworthy climate change adaptation benefits that EWS have include the following:

- Introduction of hazard-related and disaster management concepts into community-level planning processes
- Facilitation of decision-making in political organizations
- Creation and improvement of a structure that incorporates different stakeholders involved in drawing up specific action plans

Financial Requirements and Costs

The initial implementation costs of a decentralized system comprised of ten local governments in one micro-water basin are estimated at USD 52,000 and annual operating costs are estimated at USD 25,000. A breakdown of the estimated cost is provided in the table below:

Table 1: Breakdown of the estimated cost for decentralized EWS

Implementation costs

Item	Unit	Cost (USD)	Comments
Awareness-raising campaign including the involvement of authorities, institutions and the population.		10,000	Workshops, printed material and radio broadcasts
Installation of a local weather station	10	5,000	1 station/district
Installation of limnimetric scales	10	2,000	1 scale/district
Creation and analysis of information: forecasting protocols	Study	10,000	1 study for all ten districts
Participatory production of the emergency and contingency plan	Study	10,000	1 study for all ten districts, including emergency drills
Implementation of a communication system:	Overall	5,000	Design of news bulletin and radio

warning notices, mechanisms to disseminate prevention, mitigation and adaptation measures			announcement formats and models, broadcasting via local networks
Training for local EWS operators and promoters	Overall	10,000	Around 20 people per district. Includes the production of training material
Annual operating costs			
Equipment maintenance		1,000	The sum includes basic maintenance of weather stations and limnimetric scales.
Radio broadcasts		6,000	$50/month per district
Dissemination of printed material		6,000	$50/month per district
Communications		12,000	$100/month per district

Source: Damman, 2008[1]

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation – Bhutan. You can access the complete report from the TNA project website http://tech-action.org/**

[1] Damman, G. (Ed.) (2008) Sistemas de información y alerta temprana para enfrentar al cambio climático: propuesta de adaptación tecnológica en respuesta al cambio climático en Piura, Apurímac y Cajamarca, Soluciones Prácticas-ITDG, Lima, Peru. P.166, cited at http://climatetechwiki.org/content/decentralised-community-run-early-warning-systems#Advantages%20of%20the%20technology, accessed on 15 June 2012.