



CLIMATE CHANGE Policy Brief

No. 2011-CCPB1

Keeping One Step Ahead of Climate Change - **Early Warning Systems in Southeast Asia**

An early warning system (EWS) is widely recognized as an essential element in enhancing the adaptive capacity of local institutions and communities to respond to extreme climate events.

A cross-country project on adaptation behavior in response to extreme climate events in Southeast Asia and China by the Economy and Environment Program for Southeast Asia (EEPSEA) in 2009 examined, among other things, the effectiveness of EWSs in relation to typhoons and floods in six study sites in China, Indonesia, the Philippines, Thailand, and north and central Viet Nam.

For China, Indonesia and Thailand, localized EWSs which comprise monitoring, forecasting and sending out warnings of impending disasters are undertaken by local-level government agencies. In China, typhoon monitoring and forecasting are done by provincial weather stations and warnings are disseminated to the households at risk. In Jakarta, there is an early warning system to predict floods caused by tidal waves. In the case of Thailand, the Hydrology and Water Management Center for the Upper Northern Region is responsible for flood monitoring and early warning dissemination in Chiang Mai City and neighboring provinces.



Heavy flooding causes damages to properties.

This study was part of the EEPSEA Cross-Country Project on Adaptation Behavior in Response to Extreme Climate Events in Southeast Asia and China which was conducted over five countries: Vietnam, Indonesia, the Philippines, Thailand and China in 2009-2010.

For the individual country reports, please visit: www.eepsea.org

Meanwhile, in the Philippines and Viet Nam, the monitoring of approaching disasters is done by central or national agencies. In the Philippines, the warnings are issued by the national weather agency using its typhoon warning system. For Viet Nam, early warnings originate from the National Center for Hydro-Meteorological Forecasting and are delivered in two ways to households at risk; through various media channels and down the bureaucratic hierarchy from the Storm and Flood Prevention and Control Committee.

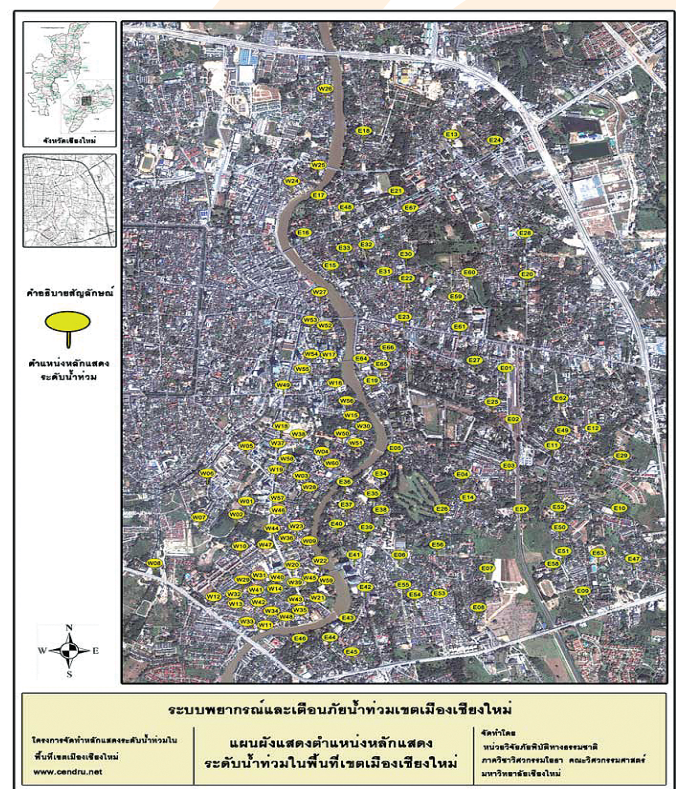
Are Existing Early Warning Systems Effective?

According to the framework of the International Strategy for Disaster Reduction (ISDR), there are four elements that determine the effectiveness of an EWS. The first is knowledge of risks by the communities. This factor considers if the risks of the impending disaster and the vulnerability of the households are known by the respective agencies and communities. The second element is monitoring and warning services and looks at the monitored parameters, accuracy in forecasting, and the issuance of timely warnings. The third element focuses on the dissemination and communication of risk information which is measured by the extent of the warning in terms of reaching the people at risk and how well the recipients of the warning understood it. The last element is response capability which relates to the reaction of the recipients to the warning.



Knowledge of Risks

The studies measured knowledge of risks by looking at the availability of disaster risk maps. The study sites in China, Indonesia and Thailand had risk maps that indicated zones at high or low risk from specific disasters. China's hazard maps showed the origins, paths and affected ranges of tropical cyclones while Jakarta's hazard map highlighted the flood prone areas in the city. The flood risk map of Chiang Mai Province also illustrated the high flood risk areas but in color, corresponding to water levels measured by hydrological monitoring stations located along the main river in Chiang Mai City.



Distribution of flood poles for flood forecasting system in Chiangmai.
Source: http://202.28.24.131/flooding/?name=chapter3/cp3_7/artical7

Monitoring and Warning Services

Most of the EWSs in the study sites were found to be monitoring the right parameters for their respective climate events. For typhoon and storm warnings in China and Central Viet Nam, the basic set of information about the origins and paths of the typhoons and potentially affected areas were monitored and included in the early warning messages. However, there was an absence of key parameters being monitored in the study sites in the Philippines. Only storm warnings are sent out and there is no science-based flood warning system which is needed there as most damage is caused by flooding. Regarding the accuracy of disaster forecasting, only the EWSs in China and Thailand seem to have a high enough level of accuracy to convince communities at risk to take heed of early warnings. In other cases, there is still a lack of accuracy that makes people doubt or disbelieve the warnings.

In terms of the timeliness of early warnings, the selected sites in the Philippines and the urban study site in Thailand had the shortest periods, i.e., 14 and 16 hours, respectively. Households in the urban study site of Thailand claimed that they did not have enough time to protect their property while those at work did not have a chance to do anything in advance. The time periods in the other study sites ranged from one day to 2.5 days (for China).

Dissemination and Communication of Risk Information

Most of the EWSs used a variety of channels like television, community radio, newspapers, and social networks. As to the extent of the outreach of the EWS, almost all the households in the study sites in China, the Philippines, Central Viet Nam, and the rural area in Chiang Mai had received early warnings of the respective climate events. In the study sites in North Viet Nam and urban Thailand, a significant number of households did not receive any warning. The reason for this in Thailand was because many household members were at work. In terms of the degree of comprehension of the warning messages, the household surveys revealed a high level of understanding across all the five countries.

Response Capability

The last element to measure the effectiveness of an EWS is how people react to the early warning. The data shows that more than 90% of all the surveyed households, except in Thailand and North Viet Nam, had done something to prepare for the impending disasters. Among the households that did not react to the warning in the urban study site of Thailand (35%), the major reason was that they had underestimated the severity of the flood, thinking that it would not affect their property. Others did not expect the flood to come so fast and panicked when it did. This was mainly due to the fact that households in this area had rarely experienced floods before. About 10% of the rural Thai households that did not react also said that they did not believe the warning.

In the case of North Viet Nam, one of the factors that could explain the low response capability is the accuracy of the forecasting service. Apparently, people did not act upon the warnings, even though they understood them perfectly, because they doubted the accuracy of such messages. Moreover, as floods had not occurred for quite some time in the area in question, the households had underestimated their severity and hence did not take action after receiving the warnings.

FLOODS OF CHIANGMAI CITY

WHEN and WHERE?

Generally, floods of Ping River incline to occur in the rainy season especially from August to September of each year. The main factors are the invading tropical cyclonic storms and the low pressure troughs that lie across the northern part of Thailand during that time resulting the long duration heavy rain upon the upstream catchment and cause the floods on some lower areas.

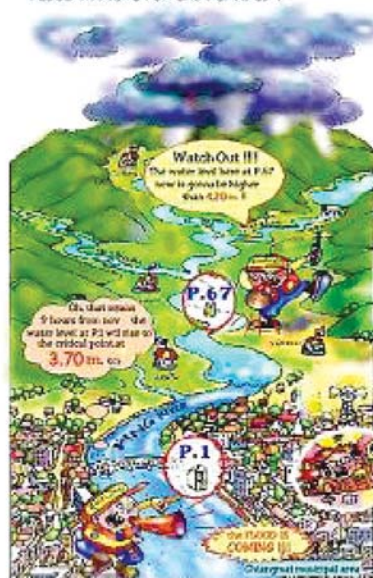
In such period of flood hazard, the people who live in the lower areas along the river banks should to be vigilant and closely follow up the information of weather and river situation and prepare themselves for prevention in advance.



HYDROLOGY AND WATER MANAGEMENT CENTER FOR UPPER NORTHERN REGION
OFFICE OF HYDROLOGY AND RIVER MANAGEMENT
ROYAL IRRIGATION DEPARTMENT

Watch Out !!

FLOOD WARNING FOR CHIANGMAI CITY



STATION P.67 BAN MAE SAKAI DISTRICT
STATION P.1 NAMPAN BRIDGE HUANG CHAIKHA
(32 KM BY WATER WAY DISTANCE)

FLOOD WARNING !!

FOR CHIANGMAI CITY



ROYAL IRRIGATION DEPARTMENT
THAILAND

Policy Implications in Enhancing Early Warning Systems

This paper has assessed the key elements of an effective EWS for six disaster-prone areas in five Southeast Asian countries. It is important for policy-makers and responsible agencies to note the importance of linkage between all the elements. A failure in one element can adversely affect the efficacy of the other elements and ultimately lead to an ineffective EWS. This assessment has revealed some strengths and weaknesses of the EWSs in place in the surveyed countries which are discussed below. They should be considered in any plans to enhance the current systems.

- Localized EWSs are increasingly needed in disaster-prone areas. The flood EWS in the northern region of Thailand provides a good example of this, having a comprehensive risk map and providing highly accurate forecasts. Localized EWSs would also help local communities be more prepared for disasters. As mentioned in the case of the Philippines study sites, the existing EWS is only for impending typhoons in spite of the fact that floods are also a major occurrence. However, no flood warning system has yet been set up to cater for this which is a dangerous omission.
- Media channels for the dissemination of early warnings should be more diversified in order to widen the outreach. Options like sending short messages via mobile phones as cited in the China study should be widely adopted especially in urban areas. A good case to bear in mind here is that of Thailand where many people did not receive the early warnings because they were not at home but at work at the time the warnings were sent out.
- The studies have highlighted the importance of accuracy in forecasting in getting people to believe and act upon early warnings. The case of North Viet Nam shows that when people lose faith in the accuracy of early warnings, they will not take action to protect themselves even if they understand the warnings.
- Communication of the risks involved is another important element that policy-makers should take serious action on. Evidence from Indonesia, North Viet Nam, and the urban study area in Thailand shows how people tend to underestimate the severity of disasters when they do not occur regularly. The key is being able to make people cognizant of the real risks of extreme climate events, including those that occur only from time to time or unexpectedly.

EEPSEA is administered by Canada's International Development Research Centre (IDRC) on behalf of EEPSEA's sponsors: