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Project Level

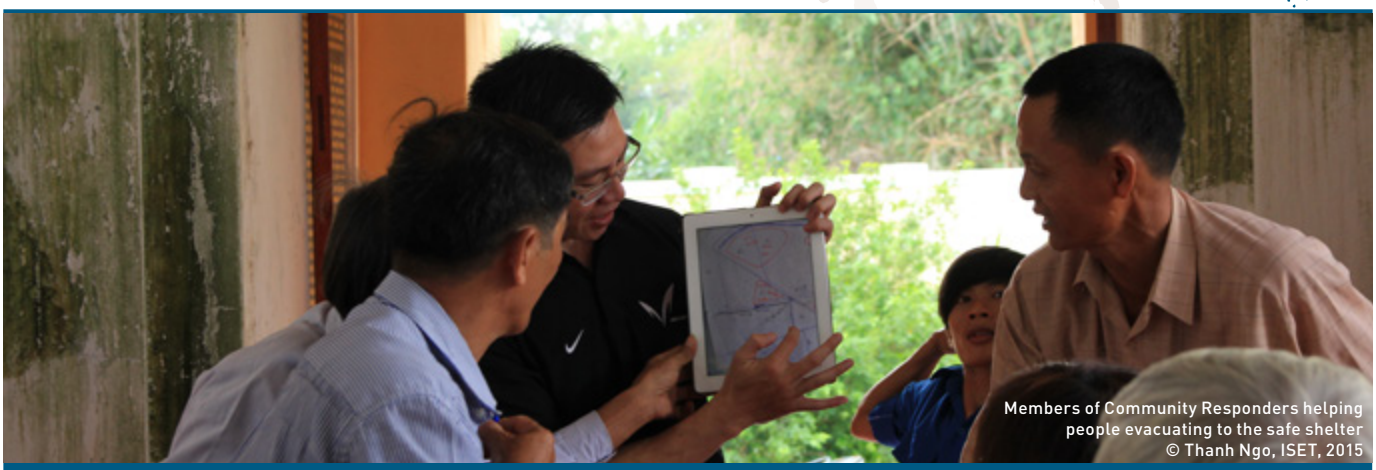
INSTITUTE FOR SOCIAL AND ENVIRONMENTAL TRANSITION-INTERNATIONAL

CLIMATE RESILIENCE CASE STUDY

Quy Nhon, Vietnam

COMMUNITY ENGAGEMENT IN FLOOD EARLY WARNING AND RISK REDUCTION

2013–2016 | Implementing Partner: Binh Dinh Climate Change Coordination Office (CCCO Binh Dinh)



Members of Community Responders helping people evacuating to the safe shelter
© Thanh Ngo, ISET, 2015

THE CONTEXT

Quy Nhon is a city of about 300,000 people on the coast of Binh Dinh province in central Vietnam. City boundaries are expanding and urban development is increasing in peripheral areas outside the urban core. Like most areas on the central coast of Vietnam, Quy Nhon city is prone to flash floods because of its steep and short river systems. Rainy season floods are normal and are expected to bring disruption but also benefits to farmers' crops as their sediments spread across paddy fields, fishponds and marshes in the productive lower floodplain. However, increasing urbanization in floodplain areas of the lower Ha Thanh and Kon Rivers has blocked natural floodways and impeded overland flow in low-lying areas, creating impoundments and worsening the seasonal flood problems.

For more information about our project and publications, please visit: i-s-e-t.org/projects/quy-nhon.html

The problem

Floods have become more severe and flood depths unpredictable in recent years, as the development of Quy Nhon city expands into floodplain areas in Nhon Binh and Nhon Phu wards. Climate change is making extreme rainfall events more likely and this trend will continue. Embankments for new roads and bridges, and landfill to build new structures, all create barriers to the historical pattern of flood flow, resulting in deeper and faster-moving floodwaters in areas that were previously not seriously affected by floods. A previous study[1] recommended that, because of these increased flood risks, an early warning system and community flood risk reduction measures should be implemented. This project worked with vulnerable communities to improve their capacity for flood risk reduction, and developed an early warning system to effectively communicate flood warnings to vulnerable communities.

1 DiGregorio and Huynh, 2012. Living with Floods: a grassroots analysis of the causes and impacts of Typhoon Mirinae. ISET, Hanoi.

Finding Solutions

The project has four closely linked components led by the provincial government, all tied to engagement with vulnerable communities in Nhon Binh and Nhon Phu wards of Quy Nhon city. Community flood risk management training and capacity development was undertaken in several of the most vulnerable areas of these wards. This training included awareness about changing flood risks due to climate change and urban development, and consultations on local flood assessment and mapping. The communities developed their own response plans including identification of vulnerable individuals (e.g. older people, people with disabilities) and evacuation routes. They installed flood level markers at high risk locations. In each community, emergency response volunteers were trained and equipped with life jackets, high-visibility rain gear, first aid kits, flashlights and small boats for emergency use. More than 20 road markers, signboards and flood measuring posts have been installed, with the support of local government authorities.

In precinct 3 of Nhon Phu, one of the most vulnerable communities, where flooding is rapid and deep and there are few

FIGURE 1

MULTI-PURPOSE FLOOD SHELTER

safe evacuation routes, a *multi-purpose flood shelter* was designed with community input. It has been built to accommodate up to 200 people in an emergency at an easily accessible site (see figure 1 above).

Thirty-four households in two small and impoverished communities were found to be vulnerable to disruption of their water supply during floods. A more robust connection to city water mains was installed, *providing clean water* at all times. In other areas, one hundred new 500-liter water tanks were provided to buffer water supply disruptions.

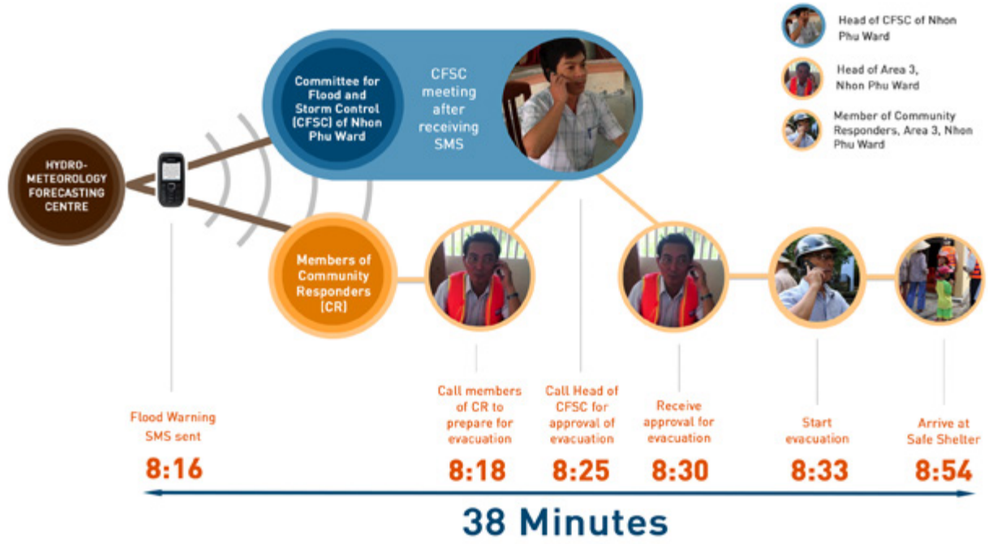
The centerpiece of the project is an *innovative real-time upstream river level and rainfall monitoring system* installed as part of a flood early warning system. The system includes automatic precipitation and water level sensors and data transmission links. The sensors are located at four sites on the Ha Thanh and Kon Rivers upstream from the city of Quy Nhon. They are located at existing hydrological monitoring stations so as to better enable technical support and data calibration. A central station at the Department of Hydrometeorology tracks incoming data and applies it to existing hydrological models to generate downstream water level projections. Once pre-determined downstream water level thresholds are reached, the system operators send pre-determined SMS warning messages to a subscriber list that includes all provincial, district and ward level emergency management officials, as well as local emergency responders, administrators and community leaders (see figure 2).

FIGURE 2

OPERATION OF FLOOD WARNING SYSTEM

FIGURE 3

FLOOD EARLY WARNING SYSTEM DRILL IN NHON PHU WARD, QUY NHON CITY



Outcomes

The early warning system ensures that community leaders, emergency responders and local emergency organizations can stand ready and notify residents so that they have enough time to respond to increasing threats. When a flood actually happens, the flood map, warning signs and training inform people what they should do, where they should go for shelter, and by which route. The population of Nhon Phu is over 20,000 and of Nhon Binh it is approximately 22,000. Most of these people would be threatened by a severe flood. With these early warning and risk reduction measures, they are much less vulnerable.

An unscheduled drill was held on October 31, 2015, and monitored by local observers. A flood warning message was sent from the Hydro-meteorological Centre using the SMS network. Within 15 minutes of receiving the text warning, the ward Flood and Storm Committee leaders were able to meet and assign responsibilities. In precinct 3, the head of the precinct and neighbourhood responders arrived at the flood shelter within 10 minutes of receiving the warning message to prepare. Within 38 minutes of the SMS message being sent, all the vulnerable residents of precinct 3, including the elderly and infirm, had been evacuated to the flood shelter using safe routes. (See figure 3).

> *"All people will take action at the same time, there's no need to gather people and assign tasks. The annual work plan clearly states who does what, from alarm ringing to telephone making, to evacuation and assistance to residents..."*
>
> *– Mr. Vo Van Tinh, member of Community Responders –*

Summary of Resilience Measures by Type

INFRASTRUCTURE	ECOSYSTEMS	CAPACITY	INSTITUTIONS
• Real-time precipitation and water level reporting system; • Flood prediction model; • Communications network.		• Train community volunteer emergency responders to interpret warning messages and respond. • Provide simple emergency equipment to support flood response.	Create SMS message protocol to alert local responders and community leaders about potential flood risk.
• Community multi-purpose flood shelter; • Improved water supply infrastructure for vulnerable areas.		Increase public awareness of flood risk and response measures including evacuation.	Provide flood maps, evacuation routes, flood level markers for better public information on flood risk and response.

LESSONS FOR POLICY AND PRACTICE

A crucial part of the warning system is agreement on the content of the short SMS warning messages and training for all the emergency response officials to understand the messages and know how to respond to the different warning levels. After considerable debate, the team in Quy Nhon devised a simple and short warning message. In practice, during a flood event, a series of escalating warning messages would be sent as water levels rose.

The drill was essential to reveal the state of preparation and to identify any challenges in procedures. An additional flood water level marker was installed after residents realized one of the routes to the flood shelter would be at risk in a real flood event. Organizers also identified some confusion in the mobilization of emergency equipment during the drill. This deficiency can be addressed easily now that it has been recognized.

The early engagement of local government authorities in several different departments and agencies helped local officials to see that the project would help them to better serve and protect vulnerable local residents. For example, community assessment of vulnerability at the precinct level is now used to update the ward's official Flood and Storm Control action plan. And community suggestions for design and location of flood markers were reviewed and approved by ward and provincial government agencies. The responsibility for the markers installed by the project has been transferred to the provincial Deptartment of Agriculture and Rural Development, and they will be managed and maintained by the ward.

The community's role in guiding vulnerability assessment, planning and risk reduction measures has ensured that communication links are effective, risk reduction measures address local vulnerabilities, and residents are better aware of risk and response measures. The effectiveness of the early warning system relies not only on the reliability and accuracy of the monitoring equipment but also on the communications network and the training provided to the community. All these factors increase resilience for vulnerable populations in Nhon Binh and Nhon Phu wards.

Local partners

- Binh Dinh Climate Change Coordination Office;
- provincial Department of Hydrometeorology;
- Committee for Flood and Storm Control at provincial, district and ward levels;
- the Centre for Technology and Informatics in the Department of Natural Resources and Environment;
- the Southern Institute for Water Resources Research (SIWRR);
- Nhon Binh and Nhon Phu ward People's Committees; and
- Viettel (a telecom company).

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