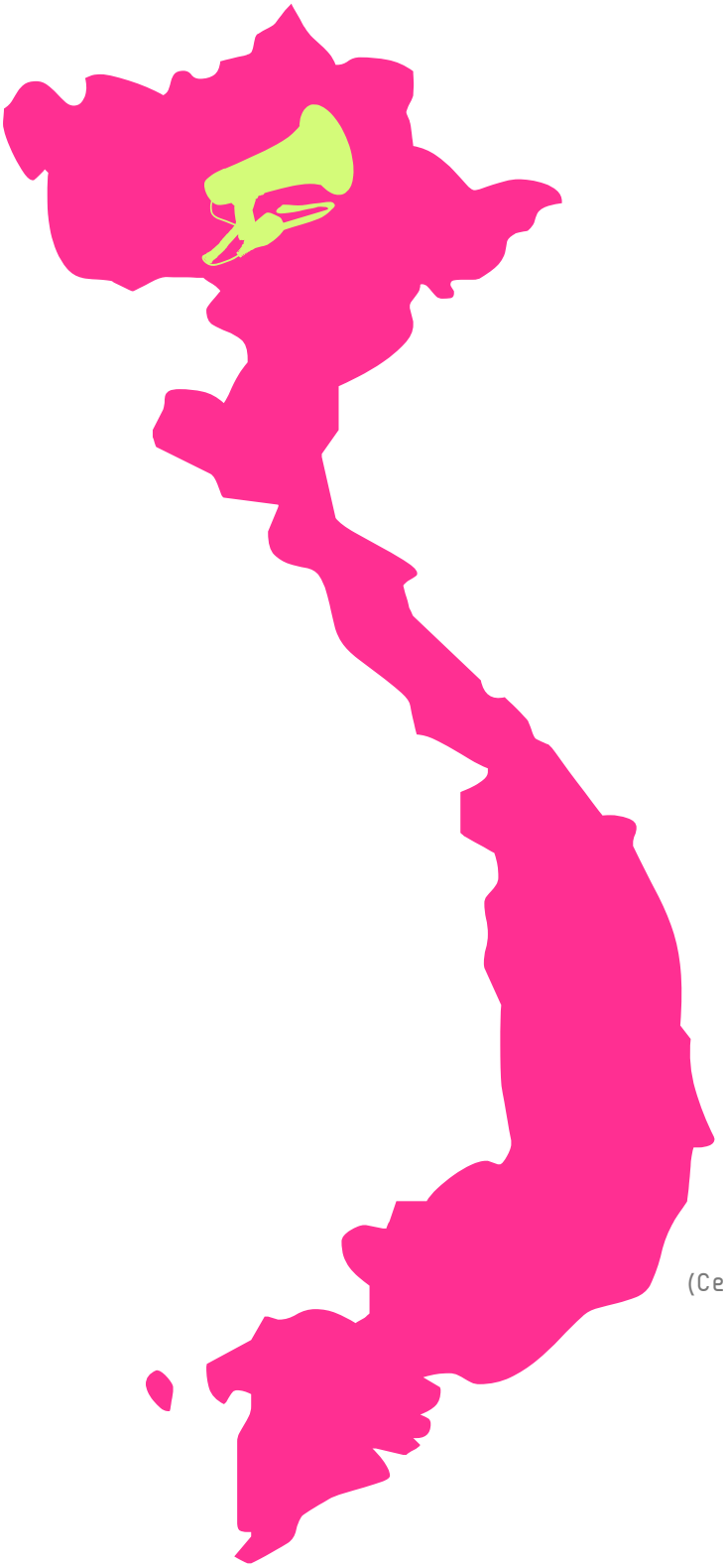
COMMUNITY-BASED EARLY WARNING SYSTEMS



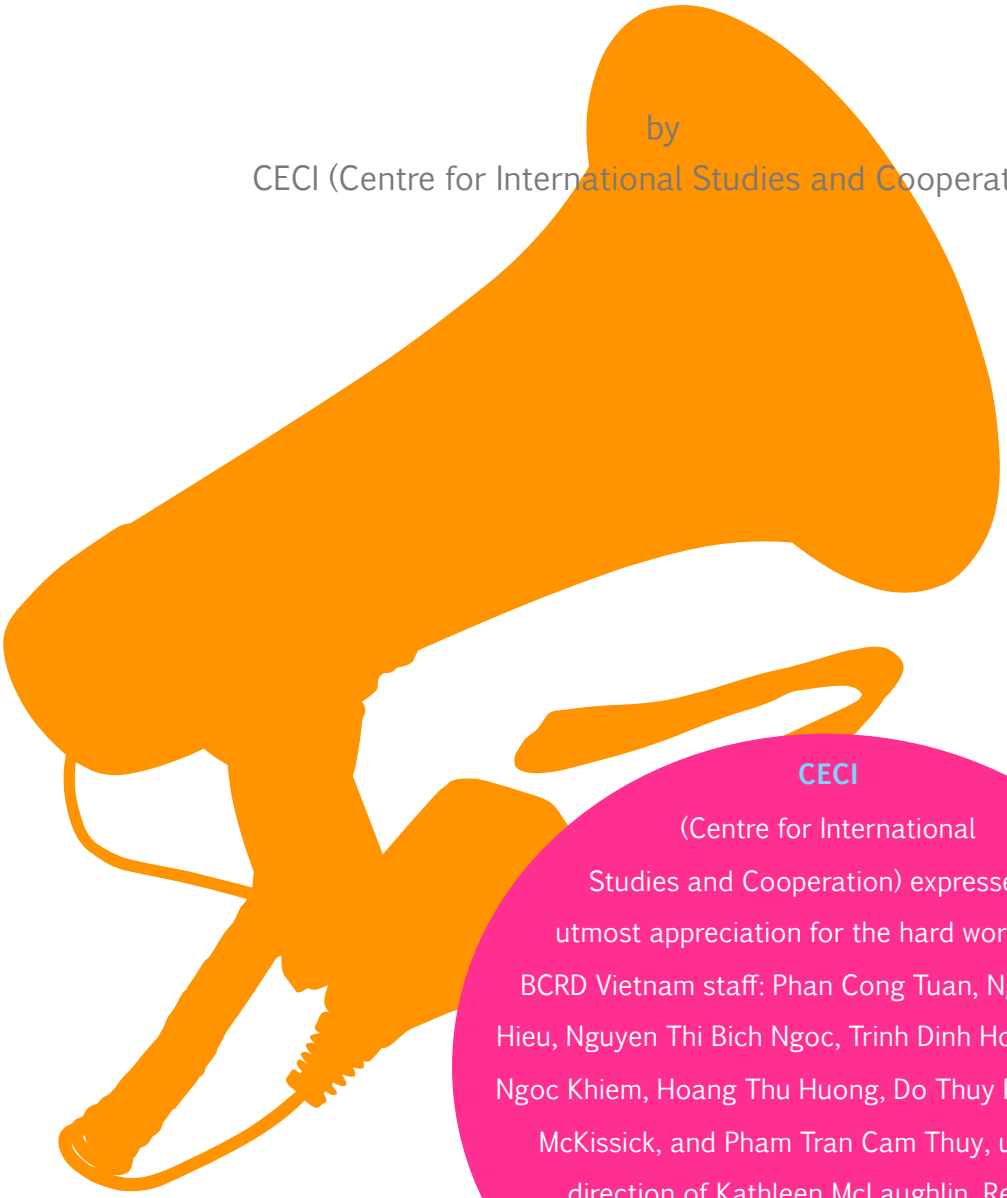
A Best Practice Guide
For Uplands Areas of Vietnam

CECI
(Centre for International Studies and Cooperation)

Community-Based EWS (Early warning Systems): A Best Practice Guide

by

CECI (Centre for International Studies and Cooperation)



CECI (Centre for International Studies and Cooperation) expresses its utmost appreciation for the hard work of the BCRD Vietnam staff: Phan Cong Tuan, Nguyen Huu Hieu, Nguyen Thi Bich Ngoc, Trinh Dinh Hoang, Truong Ngoc Khiem, Hoang Thu Huong, Do Thuy Hanh, Louise McKissick, and Pham Tran Cam Thuy, under the direction of Kathleen McLaughlin, Regional Director. We gratefully acknowledge the financial support of **ACTED**, **CIDA** & **DIPECHO**.

INTRODUCTION

Summary
Overview
Relationship with CBDRM

PART 1: Introduction to EWS

This document presents lessons learnt and best practices concerning Early Warning Systems (EWS) from the implementation of Building Community Resilience to Disasters (BCRD) in Upland Areas of Viet Nam, a Community Based Disaster Risk Management (CBDRM) project working with ethnic minority communities in the upland areas in Viet Nam.

The purpose of this document is to record and disseminate experiences, results, and best practices derived from the project activities. This document is written for government, NGOs, and other development practitioners who are specifically interested in Disaster Risk Reduction (DRR) within upland areas and with ethnic minorities.

Summary

The first section of this report is a survey of EWS, covering the what, where, and why of EWS, including an informative, step by step how to guide concerning implementation of EWS in uplands areas. BCRD supportive activities and their relationship to EWS is also addressed in this component. The second section addresses specific needs and includes recommendations, in light of lessons learnt by CECI, to overcome obstacles that hinder EWS implementation in uplands areas. Part three is concerned with detailing the unique environmental conditions of the upland areas of Vietnam (geographic, cultural, and socioeconomic) and their impact on EWS implementation. Of special concern to EWS initiatives are factors such as microclimates, site-specific hazards such as landslides, intensive human use of flood plain areas, and traditional farming practices that exacerbate the potential for natural disaster. Lessons learnt include specific evacuation techniques and practices in uplands areas for both humans and livestock, and recommends the integration of traditional cultural practices with an evidence-based approach utilizing repeated evacuation simulation drills.

The final section details best practices in uplands areas, with special emphasis placed on cultural competency. An empowerment approach is recommended, employing extensive use of visual communication tools, a learning by doing approach, and reiteration of key EWS concepts through training and mentoring activities. The inclusion of women and other vulnerable community members, and the promotion of project sustainability and durability through long-term relationship building facilitates the coordination of all key stakeholders (INGO, government and community members) in EWS. Most importantly, the burden of successful project outcomes are shared by all stakeholders. This is made possible through the establishment of easy to use, low tech monitoring devices and notification protocol. Finally, the financial and structural needs of EWS are addressed in order to promote sustainability and create a viable EWS that will endure after the end of INGO involvement.

Disaster Simulation Drill Kon Tum Province
Simulation drills give communities the opportunity to fine tune and text their EWS capabilities.

Overview

Why is EWS important to CBDRM?

Early warning systems (EWS) are an essential component to BCDRM (Community-Based Disaster Risk Management). Early warning systems provide communities with relevant, topical information on environmental conditions so that communities can assess levels of risk and make informed decisions to protect their safety. Furthermore most, if not all, of these EWS are self-monitored by the

villagers themselves, which empowers communities and insures that the community itself is a key stakeholder in the EWS initiative.

EWS are most effective when there are multiple monitoring systems in place. Weather is a complex phenomenon; this monitoring overlap guarantees that the myriad mitigating environmental factors present are all accurately assessed for potential risk and danger. Data collected by, for example, a rain gauge, is very different from the information one can obtain by looking at a river gauge. In uplands areas, rainfall is not necessarily correlated to dangerously high river water levels – sometimes flash flooding, for example, occurs because the water basins in neighbouring Laos overfill, and the spillage runs downside into low-lying Vietnam. This type of flooding can occur without any higher than average rainfall.

River Gauge, Chau Dinh Commune, Nghe An after Typhoon Haima, 2011.

The commune was severely hit by the typhoon, requiring a partial evacuation due to a rapid river water level rise of almost 3m. Reports indicate that the evacuation was orderly, timely, and well organized. It was observed by field staff that the river gauge EWS, along with past evacuation drills, helped the Chau Dinh community lessen the impact of this disaster.

"This is the worst flooding since the Nam Mo River in 2005. This time, the flood peaked at nearly 3m. It was as if a giant pool of water was suddenly poured on top of the forest."

Ky Son District Chairman Tram Bui, during Typhoon Haima, 2011

What are Early Warning Systems? River Gauges

A river gauge is essentially a large measuring stick that is used to determine water level. CECI's river gauges are cement pillars with markings every 20 cm. (photo, above). They are installed with a cement foundation in order to prevent erosion from uprooting the gauge. An instructional sign is located nearby to assist villagers in the reading of the gauge – for example in Kon Tum province, the river gauge's levels are placed within low, medium or high risk category levels.

Rain Gauges

A rain gauge is a simple, low-tech device used to measure rainfall levels. A container with markings on it indicating volume is installed on top of a pole in an easily accessible public place. During heavy rainfall, water levels and times are recorded in a logbook in order to assess for risk.

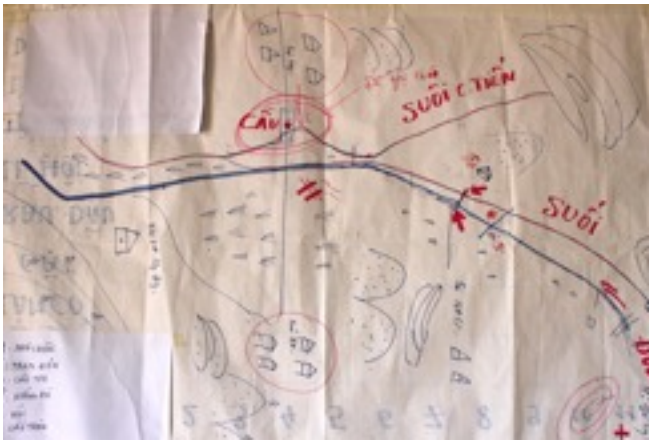
Rain Gauge, Hydrometeorology Dept., Kon Tum
Example of a more sophisticated rain gauge located at the Dept. office, Kon Tum. Dept. officials monitor these devices and receive readings via SMS obtained from other rain gauges distributed in the rural areas that are monitored by the villagers themselves, including those installed by CECI. Officials interpret the data sent in by the village monitors and alert village and commune officials of potentially hazardous weather conditions.

Simple Rain Gauge, Kon Tum Province
This simple rain gauge (photo, above) is a perfect example of CECI's EWS. philosophy: low-tech, inexpensive, practical, durable and easy for villagers to monitor.

The rain gauge monitor keeps detailed records in a log book during the rainy season, and transmits the data via SMS to the Department of Hydrometerology (photo, right).

Hazard Map, Nghe An Province

Example of a hand drawn hazard map drawn by community members during the VCA (Vulnerability and Capacity Assessment) process (photo, below). Note that the map includes the location of homes and other buildings, roads, paths and other thoroughfares. Also located on the map are rivers, bridges, rice paddies, and livestock pens in addition to hazardous areas such as locations prone to landslides and known floodplain areas. The completed maps are laminated and posted in the village commune office.



Hazard Mapping

Hazard maps are maps of the village and its immediate environs with hazardous areas prominently delineated. The maps can be self-created by the community, or generated using sophisticated digital mapping technology. In the uplands areas of Vietnam, hazards that are located on these maps include areas prone to landslides, flood plains, and flash flood areas. Hazard maps are handmade by the community with some outside facilitation during the VCA (Vulnerability and Capacity Assessment) process, which was undertaken at the beginning of the BCRD project.

Signboards

Hazard maps are generally posted in the commune office, and not mass printed to be carried about by villagers. Therefore, erecting site-specific signs have been extremely helpful in transmitting the information found on the hazard maps to villagers in the field. These metal signs are colorful, with all information communicated in a visual format so that those without literacy skills can also comprehend the warning. Signs are posted in Vietnamese and, if applicable, also in the local language. CECI has erected these signs in areas prone to landslides and to flash floods within the CECI project sites.

Hazard Signboard, Kon Tum Province

Colour-coded signboard explaining risk indicators and the resultant actions needed. for medium, high and extreme risk categories. Emergency contact information is also included (photo, above).

Interactive Signboards (Needle Gauge)

Similar in design and format to the hazard signboards, the interactive (needle gauge) signboards are placed in high traffic areas such as major thoroughfares, or near commune headquarters. These signs feature an interactive needle gauge that can be moved according to risk level (i.e. low, medium, high risk). RIsk levels are colour-coded (i.e. green is low risk, whereas red is high alert).

Interactive Signboard, Nghe An Province

This signboard communicates flood level risk to villagers; current risk is indicated to be in the medium range (photo, below). The sign located to the left is an instructional sign telling villagers how to interpret the current risk level, and what actions are required to guarantee their safety. Next to the sign is the signboard's monitor, who is responsible for updating the sign as conditions change. He lives nearby, and passes by the sign frequently during his daily activities; keeping the sign up to date has been a relatively easy task for him.

Communication Systems
Bell and/or Drums

Bells and/or drums are an effective, low-tech means of sounding an alarm to the community. Many uplands area communities already have drums, which they use on a daily basis as a signal. For example, in Nghe An province, drumbeats announce the end of each class session in the elementary schools. Bells are inexpensive and easy to install; as they do not rely on electricity or batteries for operation; they are resistant to damage due to flooding; and there is no upkeep or maintenance cost. CECI has installed over 40 bells in various villages in the Kon Tum province project site alone.

Signal Drum, Nghe An Province

One of the benefits of using a drum to provide the warning signal is its portability; drums are fairly lightweight and can be carried to different locations during an emergency (photo, below).

Warning Bells, Kon Tum Province

Made from repurposed scrap metal (a steel truck wheel), these warning bells are installed in central locations in the village, most often at the village communal house (photo, below). They can also be hung from a simple structure created from poles (photo, above). A stick or even a stone can be used to sound the warning signal.

During the EWS planning phase, the community is asked to come up with a set of signals - a rhythm to communicate a particular response or action. This is akin to the concept of cellphone ringtones, which communicate different messages to the user. When creating the signals, it is important that they be clear, easy to replicate, and also that each signal be significantly different from the next so that the listener does not get the messages mixed up. The creation of effective signals and the dissemination of their meaning to all community members is of the utmost importance; the creation and dissemination best occurs through community-wide workshops and training session.

Loudspeaker

Loudspeakers are very effective at transmitting relevant information to a local audience via announcements. There are two types of loudspeakers in use at the CECI project sites; the handheld, portable battery-operated loudspeaker, and the hardwired system, whereby loudspeakers are posted in various areas throughout the community. The wired system has a larger reach due to the multiple speaker set up, and therefore has the ability to transmit information to the entire village at once, thereby saving time, which, in some emergency situations, is crucial. The drawback to the wired system is its propensity for breakdown due to technical issues, as well as its ability to be damaged in the event of a disaster. Electrical systems are particularly fragile and susceptible to water damage; a tornado can easily disrupt wiring and topple speakers. Additionally, some communities in which loudspeaker systems have been installed have had difficulty maintaining and repairing them, mainly due to budgetary issues.

The handheld system is very effective in a crisis situation, as it is transportable and can be hand carried by the announcer during an evacuation. As it is battery-operated, it can be used during blackouts, which, in the event of a severe storm, can be prolonged, lasting for several days. However, some drawbacks of the handheld loudspeaker include its limited broadcasting range and its reliance on batteries, which can be quite expensive for communities to stockpile and replenish, especially as many rural communities do not have a regular budget for EWS supplies.

SMS

SMS has proven to be one of the most reliable and inexpensive means of mass communication in uplands Vietnam EWS implementation. Transmission of information from one village to the next, from the village to the commune office, or the village to the Hydrometeorology dept., or vice versa, is generally done via SMS. Cell phones are widely available in Vietnam, even in rural areas; most adults have a simple cell phone or have a family member with one. Mobile towers throughout Vietnam have backup generators in the event of power loss; generally service, even in the uplands areas, is steady, although some isolated mountainous regions contain areas where reception is spotty or minimal.

Despite their usefulness, there are some drawbacks: phones must be continually re-credited through the purchase of a phone card, and as most communities do not have a communications budget for EWS, which means the cost of sending text messages is borne by the community member appointed to monitor the EWS. Promisingly, however, in Kon Tum province, the Hydrometeorology Dept. will be implementing limited financial support in the near future for the village monitors.

Phones must also be kept charged, and in the event of a prolonged power outage, communication ability might be disrupted if the mobile phone's battery runs out and no backup power generator can be found. Lastly, even though mobile communication towers have backup generators, in the event of a serious disaster, these systems might also fail, resulting in a prolonged telecommunications outage.

Walkie talkie

Walkie Talkies are excellent EWS devices, and have proven especially effective in evacuation situations. They have been used at the Kon Tum project site to create a communication chain in order to relay information from one village to the next. This is necessary in communes which occupy a large geographic territory, as some villages are too far away from the commune office to communicate directly with the authorities via walkie talkie. Another benefit is that Walkie talkies are not dependent on the grid for power, as they are battery-operated or rechargeable; this makes them suitable for use during serious disasters where the infrastructure might be wiped out.

The downside of walkie talkies as an EWS communications device are, similar to other battery-operated and/or rechargeable devices, that they must be maintained – either recharged on a regular basis, or a stockpile of fresh, high quality batteries must be kept on hand for use during emergency situations.

Email and internet

In communities sufficiently developed whereby a large percentage of individuals have email and web access, communication via email is extremely effective; especially as more advanced cell phones (i.e. the iPhone, Blackberry and those running the Google Android operating system) also have 3G/ 3GS or 4G capability, meaning that users can check their email accounts and surf the web anywhere there is cell phone access. Websites are quickly and easily updated, and emails can be mass disseminated to huge numbers of users simultaneously via the appropriate email software program.

However, despite the positive aspects of using the internet for knowledge dissemination, in rural Vietnam, email and website communications methods have very limited applicability. Although 3G access is fairly widespread and consistent, most rural residents do not possess sophisticated phones able to access email or with internet browsing capability, as these mobiles are prohibitively expensive. Computers are not common; in some communities, they are hard to locate even in the

commune offices; many administrative tasks are still paper-based in these areas.

Nonetheless, for communications between government officials and NGO entities that have the capacity. email is very effective. In Kon Tum province, the department of Hydrometeorology sends out a monthly weather report, mass distributed by email. The national department also provides up to date weather forecasting on the internet (http://www.nchmf.gov.vn/web/en-US/43/Default.aspx).

Rural Vietnam, particularly in the uplands areas, seriously lacks digital equity, so email and web-based forms of knowledge communication cannot be recommended as an effective early warning tool in CDBRM initiatives. While it is an effective means of performing administrative tasks and can be used by CBDRM implementors to organize and support the development of EWS, it cannot be relied upon for direct communications of warnings or evacuations.

Government (Hydrometeorology)

In Vietnam, the government is actively involved and committed to providing and maintaining effective early warning systems. The Department of Hydrometeorology in Kon Tum province, for example, has a main monitoring centre in Kon Tum and three additional stations located out in the district, although not in the CECI project sites.

Despite the best efforts of the department to closely monitor regional weather, the special environmental conditions in uplands areas, specifically the prevalence of microclimates, requires the close monitoring of environmental conditions in a localized fashion. Heavy rains in one village hamlet might lead to flooding, whilst a neighbouring village may not see any rain at all.

Therefore, it is crucial that community-based EWS be implemented in a widespread basis throughout mountainous regions in order to supplement and support the activities of the Dept. of Hydrometeorology. These community-based, low-tech monitoring systems can provide the Dept. with essential site-specific information leading to more timely and accurate alerts.

Outside information sources

TV

Television and other forms of broadcast communications are a good source of general news and weather information. But in highlands areas, not every home has a television set, although there

is often a local restaurant, café, bia hoi or other public gathering place with a TV. Additionally, national TV weather broadcasts are general in nature and not localized; this information is usually provided by the local news station; therefore, the information may be out of date or irrelevant to the region in which the viewer resides.

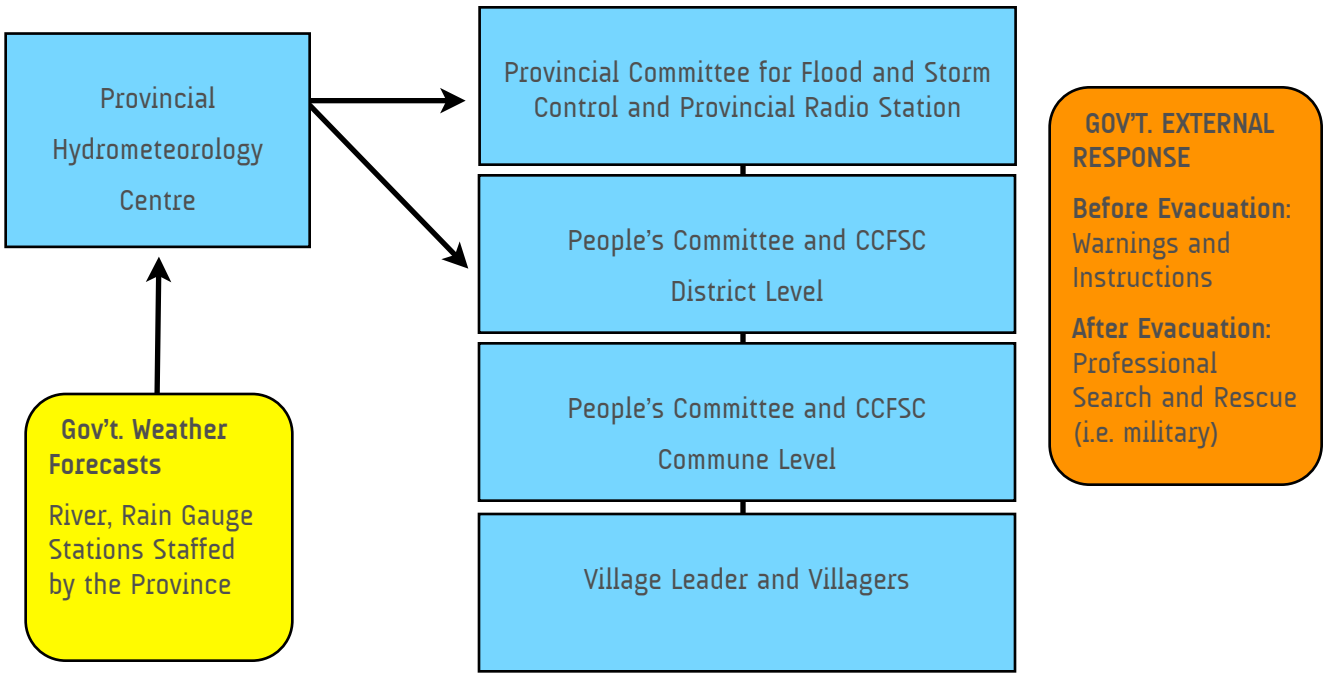
Of the two CECI BCRD project sites, Kon Tum province does not have a local TV station. Therefore, Kon Tum residents only have access to very basic, generalized weather information about their region, which can potentially be inaccurate and/or outdated, given the wide variances throughout the region caused by the influence of microclimates.

The project sites in Nghe An province, however, fare much better, as they are in close proximity to the town of Quy Hop, which benefits from the Vinh City local station, only 116 km away, a short journey via mostly good quality roads and the highway. This results in more attention being paid to monitoring and disseminating uplands weather conditions.

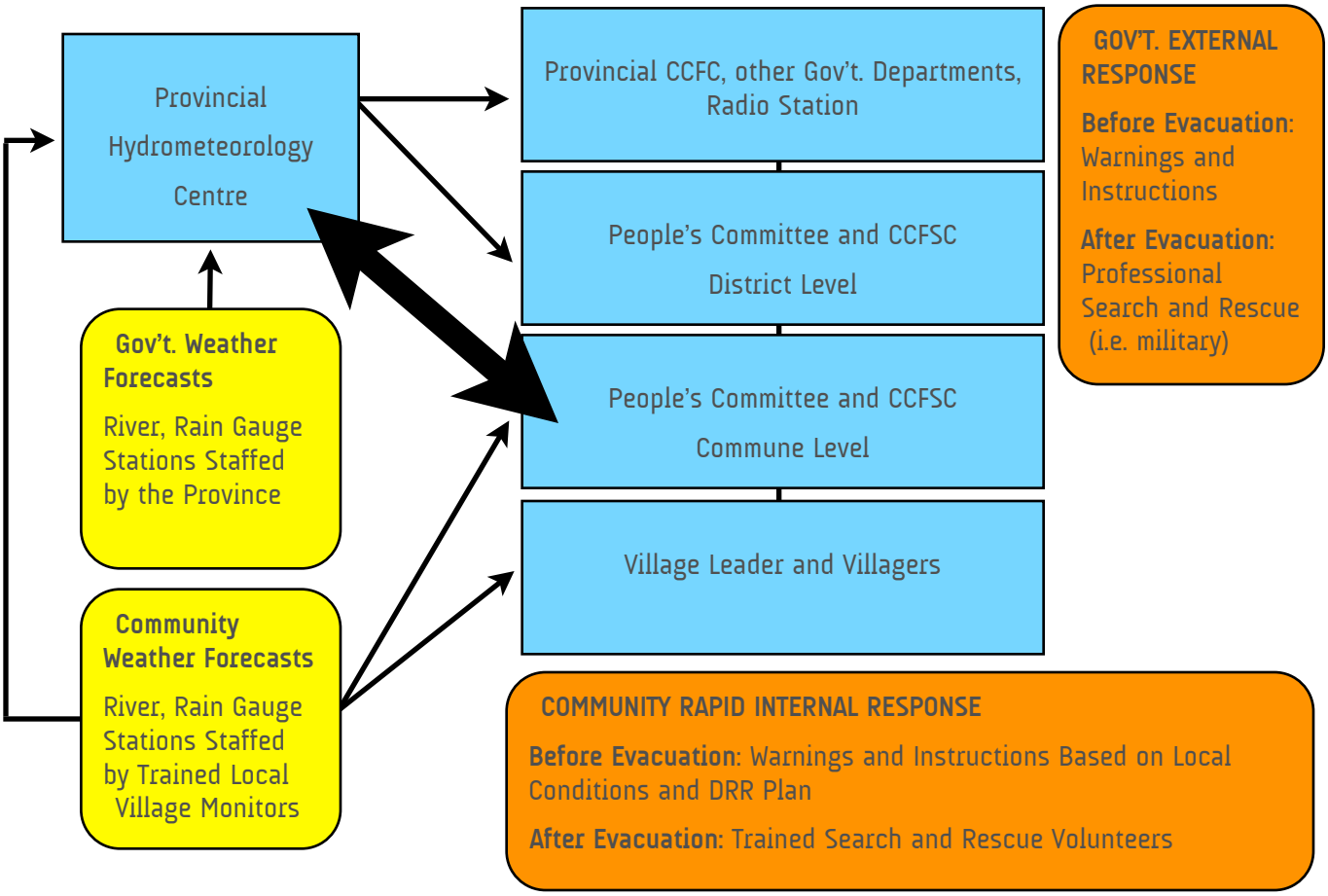
Radio

Both the Kon Tum and Quy Hop districts have local radio stations that broadcast up to date weather forecasts on local weather conditions. Age plays a factor in the listener demographic; older members of the community tuning in to radio, whilst the younger generation tend to rely on television and/or SMS messaging for topical information.

Communications Protocol Before BCRD Project



Communications Protocol After BCRD Project



What purpose do EWS serve?

Early warning systems perform multiple roles which can be divided into two broad categories: **Monitoring Devices**, such as river gauges and rain gauges, are simple devices that can be used to scientifically measure and obtain relevant information to be analyzed by the authorities on environmental conditions. A **Communications Protocol** is then brought into play, and the data obtained from the monitoring devices is disseminated throughout the community using a variety of communication devices. In addition to providing climate conditions, the analyzed data is placed within a category (i.e. low, medium, high, or extreme high risk). Required alerts or actions, if any, advised by government and hydrometeorological experts, are also relayed to the public. Therefore, EWS perform two important functions: the first allows the procurement of data about environmental conditions so risks can be assessed by climate experts; the second communicates that data and the resultant risk assessment to the public, along with any required action (i.e. an evacuation due to imminent disaster).

BCDRM supportive activities and their relationship to EWS

Early warning systems operate in concert with other BCDRM activities. For the BCRD (Building Community Resilience to Disasters) in Uplands Vietnam project, the foundation of the EWS is the VCA (Vulnerability and Capacity Assessment) process., which is the first CECI BCRD project component.

VCA Meeting, Kon Tum Province
All members of this Xe Dang village participate in the Vulnerability and Capacity Assessment process via open meetings in the community longhouse.

VCA process

The VCA process is a tool in which local communities and their government representatives collect and analyze data in order to identify the risks and hazards that threaten their community. Developed by the Red Cross, this process is usually initiated or facilitated by external actors disseminating community-based DRR (disaster risk reduction) techniques at the local level. Vulnerability and capacity are, undoubtedly, two sides of the same coin – communities are asked to map out and delineate their weaknesses alongside their coping strategies and strengths in order to create a responsive action plan, identify community priorities and strategize ways to reduce vulnerability whilst increasing capacity to mitigate the effects of natural disaster.

The VCA is an important process that generates awareness-raising and self-empowerment within the communities it serves. The VCA process begins with intensive training of key local persons from the community who then facilitate the process with the entire community, paying special attention to vulnerable community members in order to ensure their voices are heard. This ToT (training of the trainers) approach is integral to the grassroots model and insures the sustainability of the project. Local village facilitators undertake a community-wide assessment that includes gathering statistical data on the community, performing a transect walk (which is a survey of the village topography), the drawing of detailed hazard maps, and the creation of a historical timeline in order to create an accurate projection of future disasters. Assets are identified, and risks are assessed. An action plan created by consensus is created in order to strengthen disaster risk mitigation. The desired outcome of the VCA assessment process is an action plan is referred to as the DRR (Disaster Risk Reduction) plan, which is posted in a public place within the community, usually at the local commune office. The DRR plan is a shared responsibility between government authorities and the residents themselves. This cooperative approach results in improved capacity towards disaster prevention and preparedness as reflected in the DRR (disaster risk reduction) plan.

DRR (disaster risk reduction)

In the BCRD project, the results of the VCA process are compiled into a DRR plan at both the village and commune level, laminated and hung in a prominent public location such as the village meeting place or the commune office's meeting room. In some instances, for example in Kon Tum province, only those villages selected for the VCA had their own DRR Plan; other villages in the commune simply relied on the commune DRR plan. The district and provincial levels of government have Disaster Preparedness Plans, which are sent to the local communes. It is important to stipulate that these plans are not based on the CBDRM process, but in undertaking the VCA and community-level planning, every effort was made to ensure synergy between the commune and village DRR plans and the standard government DP (Disaster Preparedness) plan mandated from the province level.

DRR Plan, Nghe An Province

Example of a completed DRR plan. The document on the right is the action plan of the commune, while the one on the right is a list of hazards and risk mitigation activities ranked according to the level of severity.

The DRR plan of all the BCRD project sites listed disasters in order of occurrence, accompanied by the resultant vulnerability, and the proposed solutions, and those responsible for carrying out the plan. The plans are very similar, with slight variations according to

each commune's needs; for example, in Lien Hop commune, it was revealed that that the entire Quan village needed to be relocated due to chronic flooding and a poisoned water supply caused by illegal mining activity.

Ultimately, the DRR plan functions as a simple, clear guide not only informing communities what they need to do in case of a disaster, but also contains the concrete steps that can be taken on a day-to-day basis to lessen the effects of future disasters. Perhaps the greatest indicator of the success of the BCRD project is to be found on the DRR plan for Lien Hop, which revealed a passive, laissez-faire attitudes towards natural disasters. The antidote? Awareness-raising of the importance of timely evacuation and preparation. The planned awareness-raising campaigns included activities to influence attitudes and perceptions and, promote the message that community empowerment through knowledge and capacity building is an essential part of disaster risk reduction.

Awareness and education

Awareness raising activities are crucial to the successful implementation of EWS. The entire community is targeted, so educational interventions are developed with two main audiences in mind: Adults and children. Adults receive training workshops, and learn how to, for example, create an effective EWS maintenance and monitoring schedule for their community (see example below). Adults also receive first aid training, and participate in evacuation simulation drills along with children and youth. Adults are also the primary target for

Material	Where	Who	When	How	Note
Loudspeaker	In village meeting room or living areas	Village leader or vice head - Frequently check and update recent status of materials - To check if it is out of battery	In the event of forest fire, flood or landslide	To warn villagers for good preparedness	
Radio	Village meeting room	Village leader	+ 5 – 6am + 5 – 6pm + In the event of natural disaster	To announce villagers by the radio	Can use a variety of communication tools to announce villagers such as drums, bells, etc for good preparedness
Drum	Village meeting room	Village leader/ Project staff	In the event of: - Storm - Flash flood - Forest fire - Landslide - Whirlwind - Flood	- 3 beats to announce villagers - To evacuate villagers to safe places - 7 beats to announce about possible disasters - 9 beats to announce about evacuation	

DISASTER PREVENTION COMMUNIQUÉ FOR JULY

(The middle of rainy season)

GENERAL WEATHER CONDITIONS AND HYDROGRAPHY OF JULY:

July is the height of rainy season, so weather conditions are typically overcast and wet, with continuous showers. Heavy rainfall occurs during the day, sometimes resulting in flooding and strong winds. Temperature ranges from highs of 28-30°C to lows of 18-20°C. Rainfall levels range from 350-450mm; relative humidity is 85-91%. Water levels on all rivers and streams are unstable. This situation creates potentially serious flood and flash flood conditions. Landslides are likely to occur in mountainous areas and in areas close to streams.

TYPES OF DISASTERS AND DISEASES IN JULY:

In July, be on the lookout for the following:

- Continuous, prolonged rainfall, heavy rainfall possibly causing flooding, flash floods in rivers and streams, landslides in vulnerable uplands areas.
- Malaria, scarlet fever, diarrhea; livestock epidemics.

PREPARATIONS TO MINIMIZE THE LOSSES AND DAMAGES CAUSED BY NATURAL DISASTERS AND DISEASES/ EPIDEMICS:

- In the event of a disaster, evacuate elders, children and livestock to the designated safe place.
- Plant trees in deforested areas; refrain from deforesting activities.
- Do not build houses near rivers, streams or under mountains or slopes; avoid riverbanks, streams or areas prone to landslides in the event of heavy rain or strong wind.
- In the event of a storm, stay inside; this especially applies to vulnerable individuals such as elders and children; do not seek refuge under large trees or hydro poles.
- In the event of a flood, put on a lifejacket (if available) or hang it up high in a secure place. Also, locate floating objects (inner tubes, banana trees, plastic jugs, etc.); collect them and place them in a high and dry place.
- Do not cross streams with strong currents creating whirlpool conditions, or where the water has turned muddy due to a strong current.
- Shut off power in order to avoid electric shock or electrical fires. Quickly evacuate to a high and dry safe place previously chosen by family members.
- Beware of snake and insect bites
- Do not repair or touch electricity in the event of storm and heavy rain.
- Use boiled water; do not eat spoiled or out-of-date food. If you have to, boil the food before eating.

In the event of a storm, flash flood, landslide or tornado, you should:

- -Take all victims to the nearest health care centre or hospital without delay, and locate all missing persons.
- -Place mosquito netting over the bed.
- Clean up living areas; perform any necessary household repairs.
- Immediately bury any dead animals.
- Work towards the recovery of agricultural production in order to ensure the sustainability of life.

Thank you so much for listening.

DRREIS Workshop, Kon Tum Province
An example of the ToT approach applied in the school system. Selected students disseminate DRR information to their peers using flip charts created by CECI.

Simulation Drill, Kon Tum Province
Adults and children all actively participate in the community disaster simulation drill.s In this particular scenario, two children were rescued while crossing a river. The teachers and children stranded on the other side of the river rehearsed river crossings in flooded conditions using a rope. First aid techniques were also practiced.

educational IEC (Information, Education and Communications) materials such as brochures, pamphlets and posters. as well as the educational monthly loudspeaker broadcasts (see example on the following page).

One of the most important outcomes of CBDRM, however, is long-term, sustainable changes to perceptions and behaviours related to natural disasters. Focusing education and awareness raising initiatives on the younger generation is key to reaching this development goal. For children, the BCRD project created the DRREIS (Disaster Risk Reduction Educational Initiative in the Schools) program, which utilized three key approaches: Relevancy, Participation and Reiteration to deliver DRR knowledge within the schools' extracurricular activities. DRR materials were carefully tailored to the child's comprehension level and contained information vital to their environment and daily activities. Participation is conceptualized through the ToT approach, empowers the children directly, as key student trainers are selected who disseminate the knowledge to their peers. Additionally, the ToT approach allows for rapid dissemination of DRR knowledge, as the burden of dissemination is delegated, as well as reiteration of key DRR concepts through multiple delivery in order to encourage maximum knowledge retention and comprehension.

DRREIS components
DRR general knowledge transfer

First, classroom activities aim to raise awareness of disaster risk reduction and climate change through education for local at risk youth. These activities include playing the Riskland game, which is modeled on snakes and ladders, using flip charts with DRR information conveyed by illustrations, and drama skits and quiz competitions (See the CECI BCRD IEC Toolkit Guide for more information).

Evacuation and rescue protocol

Secondly, the DRREIS assists in the transmission of evacuation and rescue protocol to children through simulation drills and other experiential learning activities, such as rescue scenarios and first aid training (photos, above and previous page).

Support Community VCA Activities

Thirdly, the DRREIS helps to inform and supplement VCA activities within the community at large. Through the DRREIS, children are better able to raise their voices and participate in the VCA process in meaningful ways. The most important goal of the DRREIS is, of course, creating lasting, sustainable change in behavior towards natural disasters. In many cases, uplands communities have historically adopted a passive attitude towards natural disasters, in part due to perceptions that disaster mitigation and prevention was beyond their control. The DRREIS project empowers youth to take a proactive stance towards natural disaster; as the next generation, they hold the future in their hands and are key to the successful, long-range reduction of risks caused by natural disaster. Special events and activities such as feasts and celebrations also

occur for both adults and children, and allow the entire community to come together and celebrate their milestones whilst learning more about DRR.

Additional activities

First aid training, offered in coordination with the Viet Nam Red Cross, is also offered to the community for both adults and children. Feedback from the communities has been positive, as both demographic groups find these skills empowering and potentially lifesaving in the event of a disaster. This training is rehearsed during simulation drills, which also allow an opportunity for communities to fine tune their communications protocol during evacuation and search and rescue techniques.

HOW TO GUIDE

PART 2: How do EWS systems function? A how to guide

The Early Warning Systems that CECI has implemented in uplands areas have been carefully selected to best serve the unique challenges and needs of rural communities in difficult uplands geographic terrain. The following section chronicles the types of EWS selected, why they were chosen, and finally how they function in the region. It is hoped that this information will be of use to other NGOs and governmental bodies seeking to undertake similar projects in similar regions.

River gauge: technical specifications and reporting

River gauges have proven to be very informative and beneficial to the BCRD project sites. The river gauges installed by CECI are simple structures. Constructed out of concrete, the gauge is a rectangular pillar anchored in a concrete base. The river gauge is essentially a large measuring stick with markings to identify raised water levels. The gauges are installed near river crossings in in order to ensure that they are well monitored and highly visible. The BCRD river gauges are accompanied by signboards featuring instructions on how to interpret the water levels, ranging from low to medium to high risk categories. The signboard is in Vietnamese and, if applicable, also features the local language. A designated community member, usually a person who resides or works near the river gauge (often a village elder or leader, or a gov't. official) is entrusted with regular monitoring of the gauge, reporting unusually high water levels to the commune authorities. However, due to the river gauge's prominent location, other community members also monitor flooding conditions as they go about their daily business, thus improving knowledge dissemination to all community members.

Rain gauge: technical specifications and reporting

The BCRD rain gauges are simple devices used to monitor the amount of rainfall over a period of time. These are especially

Rain Gauge Case Study: Success in Action, Kon Tum Province

In Dak Koy commune, Kon Ray district during the month of May in 2011, an example of effective EWS process, from monitoring to broadcast alerts, occurred using a simple rain gauge. Installed near the monitor's home, the monitor noticed unusually heavy rainfall during the night commencing at 1 am. He monitored the gauge at 1 am and checked it again at 4am, and sent the data via SMS to the Kon Tum Department of Hydrometeorology to inform them that it was filling up fast. The hydrometeorology official sent an SMS message back telling the monitor what level to check for, and the monitor sent an SMS message back to the office at 6am that the level had been reached. The provincial Hydrometerology official then sent out a weather warning notice to neighbouring communes in the district, some of which were not CECI sites and therefore did not have the monitoring equipment found in Dak Koy commune.

This example illustrates how cooperation between villagers and commune authorities is key to effective EWS monitoring and broadcasting. Following the communications protocol chart is helpful and insures that there is enough overlap and assistance available to ensure that hazards are quickly detected and nothing is lost in the process.

important in uplands areas during the monsoon season, when rapid heavy rainfall can occur, exacerbating wet weather conditions and increasing the chances of floods flash floods and landslides.

The rain gauge is essentially a metal cup with marked gradations in ml to measure the volume of rainfall over a period of time. Located on top of a pole in front of the commune office, the rain gauge is monitored by an individual who ideally resides nearby, thus allowing monitoring during evening hours and late into the night, should heavy rains demand it. A record of the data is kept in a logbook by the rain gauge monitor.

During adverse conditions, the monitor will transmit the data via SMS to the district department of Hydrometeorology for analysis. A weather expert from the department will provide guidance and instructions via SMS to the monitor, and will also notify the proper authorities if any action is needed.

Hazard Mapping

Hazard mapping, an outcome of the VCA process, is another key component of the EWS. CECI's BCRD project views hazard mapping as the first step to the establishment of an EWS system, as hazard mapping identifies vulnerable geographic areas in the community and the types of natural disasters common to the region. The maps provide invaluable historical information to community members and implementors alike, depicting where disasters have occurred multiple times in the past, and are likely to occur again in the future. Therefore, hazard maps shape the structure and content of the resultant responsive EWS system.

Hazard maps are specific to each village or commune area and depict the terrain, both geographic and residential, along with all possible hazardous areas and the types of hazards likely to occur. In uplands areas, these maps typically include flood plains along rivers and streams and other areas; low-lying terrain prone to flash floods, and steep mountain slopes vulnerable to landslides during seasonal wet conditions. It is important to note that large scale meteorological phenomena, such as typhoons and tornadoes are likely to impact multiple hazard areas in a given geographic location, whilst flooding and landslides due to monsoon conditions tend to be more localized.

The CECI BCRD in Uplands Areas initiative utilized two kinds of mapping during the final project phase. The paper-based maps, created by the villagers themselves during the VCA process, are simple, hand drawn maps with known hazards indicated. These maps have proven most useful and meaningful to the community, as they are self-created and easy to understand, providing villagers with the data needed to develop a VCA village action plan. The maps also assist the community in identifying which EWS are most needed and where to locate them within their environs.

Digital hazard mapping relies on more sophisticated computer technology to create scientifically accurate hazard maps of the area. This technology ranges from the internet-based Google Earth application to consumer grade handheld GPS devices; professional digital hazard

Evacuation Simulation Drill, Kon Tum Province
Hazard maps are integral to a proper community evacuation plan; escape routes are plotted after the maps are drawn up in order to minimize exposure of the evacuees to risk. Knowing in advance what areas are hazardous allows for the authorities to make the proper preparations to ensure a safe evacuation.

mapping utilizes more sophisticated proprietary software. Because of CECI's community-based perspective, the BCRD project used the hand drawn hazard maps created during the VCA process to assist with the creation of more scientifically accurate digital hazard maps created by outside consultants from the Central Government's Ministry of Meteorological Resources and Environment.

After meetings with the community members and local government authorities, the outside experts conducted an analysis of the community's own hazard maps, and undertook a land survey accompanied by local residents. Data obtained by the GPS survey data was then input into a third-party proprietary software. The likelihood of particular hazards and risks were statistically estimated using a mathematical formula, and the digital maps were generated and printed.

It is important to stress the collaborative nature of this endeavour; the outside experts relied heavily on information provided by the local residents through the hand drawn hazard maps, as well as through extensive interviews to collect historical anecdotes concerning past disasters. The land survey gave residents the opportunity to point out area prone to hazards such as flooding and landslides to the consultants, who were able to incorporate their indigenous knowledge in the final product.

Lastly, outside experts from the ministry provided training to the local authorities in order to transfer their knowledge and expertise. Digital hazard maps, similar to all EWS systems, need to be re-evaluated and updated on an annual basis. The third-party software package used to generate the maps was installed into the local commune office's computer, and key personnel were trained in updating and maintaining the digital hazard mapping system.

PART 3: Early Warning Systems in Uplands Areas Lessons Learnt

The following section chronicles the lessons learnt by CECI during its BCRD project, with particular attention paid to the hurdles and challenges to relevant and sustainable EWS implementation. The uplands areas of Vietnam present unique challenges due to cultural, socioeconomic, geographic and climactic conditions that drastically depart from those found in the rest of Vietnam. A successful EWS initiative in the region must prioritize the incorporation of these elements into its planning and implementation processes.

Honour and work with traditional culture

Effective EWS must gather information on indigenous knowledge and incorporate it into the intervention. All societies and cultures throughout all time periods have attempted to forecast the weather with the intent of reducing the impact of natural disaster. Traditional societies have thousands of years of observational experience in recognizing the early warning signs that may lead to disaster. Farmers in particular are aware of weather, given the importance of climate to their livelihood. The challenge is in determining which indigenous forms of knowledge are empirically valid, and then linking these practices to current scientific discourses such as climate change (JANI: 2009 Survey on Indigenous Knowledge, p.2). The best EWS plans will integrate harmoniously with the cultural beliefs and practices of its community, as this will heighten the likelihood of community adoption. Behavioural patterns are especially important to factor in, as EWS systems must be monitored regularly in order to be effective. Linking monitoring to daily activities and rituals is helpful and increases the likelihood of project compliance.

Enjoying Rice Wine, Nghe An Province
After community-wide DRR and EWS events, a celebration often takes place that the entire community partakes in.

Xe Dang Women Socializing Near the Hearth, Kon Tum Province
Traditional cultures often have sharply defined gender roles which proscribe the activities and even the physical spaces each sex can occupy. For example, Xe Dang women are often found in the cooking area near the hearth, and not in the communal room inside the home where meetings often take place. Effective EWS interventions must be factor in the impact of such subtleties in order to be inclusive of women and other vulnerable community members.

The Xe Dang people in Kon Tum province determine their safe place for evacuation through divination. The village leader will perform a complex hand clapping sequence in order to select the correct location with the help of the spirits. Once the

appropriate site is selected by divination, appropriate animal sacrifices and rituals are performed to sacralize the selected location. Understandably, the Xe Dang are reluctant to change their evacuation site after such care has been taken in its selection. It can be difficult for outsiders, who might conclude logically that another site is more appropriate, to understand and accept the validity of this process. It is important that outside agencies work hard at finding ways to appreciate, understand and value these practices, and incorporate them whenever possible into the EWS implementation plan.

Language and literacy

In many upland communities, traditional ethnic minority languages, such as Xe Dang in Kon Tum and Thai in the Nghe An project site, are the predominant means of communication between community members. Estimates of literacy rates in Vietnam place the total adult literacy rate (2005-2008) at 93% (UNICEF Info By Country http://www.unicef.org/infobycountry/vietnam_statistics.html retrieved on October 31, 2011). However, in rural communities, this figure is considered very high, and therefore inaccurate. Research conducted by AusAID in Lao Cai province, for example (Lao Cai being a previous BCDRM CECI project site) discovered that none of the adult women were literate in two of the most remote villages in the district (Australian Agency for International Development by the Centre for International Economics: Vietnam Poverty Analysis. Canberra and Sydney: AUSAID 2002).

It is important to note that true bilingualism is concentrated mostly in the younger generations as school children have been educated exclusively in Vietnamese over the past ten to fifteen years. The majority of men understand Vietnamese and many also read and write Vietnamese, but many women, in particular older women, know only their own language. Whenever possible, EWS systems must function at a pre-literate level. For example, river gauges must be effective visual tools even if the villager surveying it cannot read the markings. Additionally, literacy levels must be assessed when selecting an EWS monitor for the rain gauge, as the monitor will be required to record and SMS data to the Department of Hydrometerology, and follow instructions received accordingly.

Traveling to Lien Hop Commune, Kon Tum Province

Poor road conditions and unstable slopes due to mining and deforestation lead to dangerous travel conditions, as landslides are a regular occurrence during the rainy season.

Socioeconomic conditions effecting EWS

Isolation (cultural, linguistic and geographic)

Although all of CECI's project sites are within a 30 km radius of a city, they are classified as isolated due to extremely poor road conditions. In many cases, roads are damaged by the heavy equipment operated by the quarries and mining companies that exploit the region's natural resources. These companies make minimal, if any, repairs and forego maintenance. In some cases, the community's only access road is a private road built by the mining companies and not maintained or managed by government. River crossings are makeshift and, during the rainy season, are often inundated by flooding. In summary, it is difficult for outsiders to grasp the giant hurdles that poor transportation options create for the individuals who reside in these remote villages.

Socioeconomic

Geographical isolation, coupled with an ethnic minority background, tends to be correlated with a lower socioeconomic status:

> "Ethnic minority people are amongst the poorest in Vietnam. Ethnic minorities make up 14 per cent of the population but account for 29 per cent of poor people in Vietnam."

(Vietnam poverty Analysis Report prepared for the Australian Agency for International Development by the Centre for International Economics, Canberra and Sydney, 9 May 2002).

"In the rainy season, water level may reach approximately 1.4 meters; people living near the river must carry their kids piggyback through this [to school]. Those living far must also take a bicycle with them; as a result, the parent must cross the river 3 times per class session. Those who cannot send their children to boarding school may cross the river up to 9 times per session. Nevertheless, people are making an effort to help their kids attend classes.

We met Ms. Vi Thi Lien, Thai minority, Ban Thinh village, as she was on the way to the Chau Dinh elementary school. She told us that she must carry a bike as well as carry her kids piggyback up to 18 times a day to go across the Nam Chong river. In July and August, because of difficult living conditions, school authorities frequently allow kids stay at school during lunchtime."

The Community – Key Role in Disaster Prevention - news item by Hoàng Thị Hoa, TTXVN/ Vietnam+, 28/09/2011).

In Dak Koi commune (Kon Ray district, Kon Tum province), 44% of the population is classified poor; 23% of the villagers in Dak To Lung are classified poor. In the Tu Mo Rong district (also Kon Tum province), Dak To Kan commune, 56.6% of the population lived in poverty: in Dan Ro Ong, the percentage is 73.5% while in Van Xuoi the total is 48%, or nearly half the population (CECI VCA Summary Reports). Statistics are similar in Nghe An province, pointing to a much lower standard of living in these rural areas when compared to Vietnamese society as a whole. As a result, communities have reduced resources to cope with disaster, and less ability to monitor and maintain EWS in order to mitigate the effects of natural disaster.

Impact on Communication

Perhaps the most salient issue in uplands regions is the impact of isolation upon communications protocol. Special care must be taken when designing effective communications systems for uplands areas. For example, data from the rain and river gauges must be transmitted to the Department of Hydrometeorology in a cost effective and rapid manner. SMS is the method of choice, as most villagers have cell phones, and the cost of sending SMS messages are minimal. Other forms of digital communication, such as email, are not dependable as many do not have access to the internet or to computers in general. Additionally, knowledge dissemination is often best undertaken at the village level via loudspeaker broadcast; these broadcasts are heard by all and are not reliant upon a household possessing a television or radio set.

Thought must also be put into the development of an alternate communications system should a prolonged blackout occur, which would eliminate the use of television and in some cases, radio as well, save for those lucky enough to have power generators or battery-operated systems. During disasters, it is commonplace for communities to lose power; therefore, batteries must be on hand and be fresh; and generators powering loudspeaker systems must have sufficient fuel to operate.

Walkie talkies are an effective means of knowledge dissemination, during such conditions as they are not reliant on electricity and are able to be used in the event that cellular telecommunication towers are out of commission. Handheld loudspeakers are effective broadcasting devices during an evacuation; care must be taken to ensure that batteries are on hand and/or that the loudspeaker is kept fully recharged at all times should disaster strike. It is important to note that low-tech early warning signal systems such as drums and bells are the most reliable and durable as they do not require any power source at all.

Environmental Conditions Microclimates

Climates in uplands areas can vary greatly from one village or hamlet to the next. For example, a village in a low-lying valley may be completely flooded during a typhoon, whilst a neighbouring village in the same commune might

Agricultural Area, Kon Tum Province
Note the lack of tree cover in the background of this image leading to multiple landslides. Steps are being taken to encourage reforestation at a policy level by the Vietnamese government; programs are under way that will compensate the villagers for conservation efforts in order to create more forest cover in vulnerable uplands regions.

escape completely unscathed. Similarly, heavy precipitation can occur in one village area, while others nearby experience little or no rainfall. In light of this, the information on hazards and weather conditions gathered by EWS must be collected at the micro level, and take very localized hydrometeorological conditions. into consideration. For example, the EWS developed by CECI in Kon Tum province (i.e. rain and river gauges) places the burden of weather monitoring and notification on multiple stakeholders, including the villagers themselves. While the Department of Hydrometeorology in the provincial capital monitors weather conditions at all times, the large fluctuations in climate conditions from one hamlet to the next makes it imperative that the villagers themselves share the burden of responsibility with governmental authorities.

Site-specific Hazards (Landslides)

Effective EWS regarding landslides have been identified as very important to uplands areas. Hazard mapping completed during the VCA process indicated a high risk of loss of life and property due to the prevalence of landslides and mudslides. The CECI BCRD approach has been to erect warning signboards in areas prone to landslides and mudslides. This approach has been successful because although these areas are marked on the hazard map, some community members have difficult reading the maps. Secondly, the hazard maps are generally located for reference in the commune office, and villagers are not in the habit of carrying maps with them while going about their daily activities. Thirdly, for illiterate or minimally literate villagers, such visual tools are concrete and therefore more effective at transmitting the necessary warning information than the written word.

Construction on Flood Plains

Hazard mapping, in concert with the creation of a historical timeline chart (part of the VCA process) also leads to the identification of flood plains and other low lying areas prone to frequent flooding. In many cases, homes or other structures have been constructed in these locations (or example, too close to a river, or in another low-lying area). Most paddy fields are located in natural floodplains;

therefore farmers are at heightened risk while at work.

Although many of the commune DRR plans contain plans to relocate residences and other buildings away from these hazardous areas, it is expensive to rebuild and many do not have a budget for such an ambitious undertaking. Therefore, it is necessary that all EWS prioritize knowledge dissemination so those who are most at risk (i.e. who reside on a flood plain) are the first informed. Village-wide broadcasts over the loudspeaker, as well as targeting these areas for knowledge dissemination first by handheld loudspeaker, is an effective way of mitigating loss of life and property in the event of a disaster.

Impact of Agricultural Techniques

In uplands areas, the impact of landslides and flooding have been heightened due to unsustainable farming and forestry practices that have resulted in a worrisome lack of forest cover. This unsustainable situation exists for a variety of reasons: traditional slash and burn farming practices remove tree cover in favour of a more profitable cash crop; the large population and lack of land for cultivation results in every available hectare used, including mountain slopes; and lastly, impoverished villages will forage and cut down the remaining trees in order to provide their households with a cheap source of fuel.

Large tracts of forestland set aside for conservation purposes are still uncommon in Vietnam, although more effort is being put into land conservation due to a combination of factors, including raised community awareness (often stemming from the BCDRM process) and broader government policy initiatives. Effective EWS must address the root causes of natural disaster, such as deforestation, so that steps can be taken to reduce their impact. For the CECI project sites, integrating conservation messages into the monthly weather communiqués that were broadcast to community became an effective platform to not only provide early warnings on the likelihood of natural disasters occurring in a given month, but it also granted CECI with a platform to inform and educate the population about the importance of forest preservation and reforestation efforts, along with other conservation practices, such as those concerning water during the dry months.

Evacuation

Cultural practices and beliefs

During a recent evacuation and medical emergency simulation drill that occurred at the Dak Ta commune in Kon Tum province, cultural practices and belief systems not seen on the surface became apparent. A young boy participated in the drill, portraying a victim injured during a landslide incident and in need of medical attention. Although his mother agreed beforehand to his participation, after the drill, she suffered intense fears that such activity might tempt fate and attract future bad luck. Therefore, she requested an animal sacrifice to propitiate the spirits. Her request was honoured; a pig was sacrificed, paid for by the local commune office with additional support provided by CECI. The BCRDM process, of which EWS is a

component, stresses the importance of integrating local cultural traditions into the intervention. Cultural specificities, especially indigenous knowledge and practices surrounding disaster, should be respected as part of a community's cultural heritage, a precious knowledge resource.

Evacuation of community members

EWS data collected by villagers is analyzed by informed authorities and, during times of extreme risk, the authorities will recommended an action such as evacuation. It is crucial that EWS communications protocol kick into action to quickly, efficiently and safely facilitate the evacuation process. In uplands communities, redundancy must be factored into the communications process. Multiple means of broadcasting the evacuation call must be undertaken; additionally, care must be taken to ensure that the vulnerable (i.e. the elderly, disabled and children) have the support needed to undertake the evacuation along with able bodied members of the community. Communications tools that should be utilized during evacuation include all tools previously mentioned: television, radio, SMS, village loudspeaker broadcast, handheld loudspeakers, walkie talkies, and bells and/or drum signals. Using more than one communication system ensures maximum overlap so no one is left uninformed and the evacuation message is clearly and unequivocally understood by all.

Livestock During a Simulation Evacuation Drill, Nghe An and Kon Tum Provinces

sLivestock is one of the more important community asset and must be protected in the event of eminent disaster. CECI evacuation simulation drills include animals and villagers learn important lessons through the simulation, which allows them to better anticipate potential problems during a real disaster (photos).

Evacuation of livestock

The large scale evacuation of livestock presents a unique challenge to the community. It is important to carefully troubleshoot all of the logistics concerned with animal evacuation during simulation drills, as livestock are very important to the village economy. Cages must be readily available for the transportation of smaller

animals such as geese and chickens. Also, villagers must practice herding cows and water buffaloes during the simulation drill, particularly when an evacuation requires that the animals be led over a bridge or across a flooded river crossing, as some animals may be skittish and unwilling to cross. Repeated rehearsals may be necessary to familiarize the animals with the evacuation route. Regrettably, some communities do not have the capacity to ensure the safety of their animals during crisis situations as the livestock are penned or put out to pasture far away from the village proper. In this scenario, farmers often risk their own lives during disasters by traveling out to livestock areas to check on the animals.

CECI's monthly weather communiqués seek to remedy this situation by encouraging preparedness based on seasonal requirements; farmers are encouraged during the rainy season to pen their animals in locations in close proximity to the village proper. Additionally, the communiqués stress the importance of establishing beforehand a mutually agreed upon safe place to evacuate to where animals can be brought. The importance of repeated simulation drills cannot be overstated, as it is often only through the simulation drill that troubleshooting can occur, and potential snags in the process identified and worked through. Learning by doing is the most important core element of all best practices in uplands areas.

PART 4: Early Warning Systems in Uplands Areas: Best Practices

Through collaboration, research, hard work, troubleshooting and creative thinking, CECI has made major headway in the establishment of EWS in rural uplands communities that had little or no systems in place. The following section chronicles CECI's best practices and can be used a a compass for any INGO, NGO, or government body seeking to implement similar programs in the region.

Best practices

Empowerment approach

The CECI BCRD initiative takes a community-based, empowerment approach to disaster risk reduction (DRR). The EWS initiative, which is the part of the BCRD program, is organized around the principles of any successful community-based intervention: the encouragement of grassroots participation to facilitate empowerment. Such approaches are successful because self-determination and community ownership are an integral part of the process; therefore, mitigating factors such as project sustainability and cultural relevancy are more likely to organically occur than in a top-down, hierarchal approach.

Visual communication is important

CECI IEC Educational Materials

Visual communications is an important. This flip chart illustration conveys the importance of monitoring TV and radio broadcasts during storm conditions (photo, above) and the need for reforestation and forest preservation (photo, below).

EWS Evaluation Survey, Nghe An Province

Collaboration between INGO, local gov't. and villagers is crucial to insuring success (photo, left).

Visual and aural communication tools form an important component of EWS in uplands areas. Hazard maps ,signboards, river gauges and illustrated IEC pamphlets have all shown their effectiveness with villagers of a variety of ages and educational levels. Low-tech communications tools such as through drums or bells are also effective at communicating warning messages. This emphasis on visual and aural approaches as opposed to the written word is not only found in the EWS component, but is congruent with the BCRD project approach as a whole (BCRD Lessons Learnt, p. 17-19).

Learning by doing

All of the EWS activities involving monitoring or communication require a time commitment of varying degrees; during the rainy season, monitors of EWS devices such as the rain gauge must be especially vigilant. The BCRD project philosophy, sees "Learning by doing" as an excellent approach; various technical experts in the field of CBDRM also believe in the validity of such initiatives (Community-Based Disaster Risk Management). (CECI: BCRD Lessons Learnt; Garcia, Lolita Caparas, JICA Project Expert Team, "Community Based Disaster Risk Management" presentation at the Disaster Prevention Engineering Workshop, Danang, July 2011). We therefore recommend that any educational initiative take an interactive approach, avoiding lectures and didactic processes in favour of a more effective, collaborative and fun learning process.

CECI IEC Educational Materials

Visual communications is an important part of CECI's IEC approach. This flip chart illustration conveys the importance of monitoring TV and radio broadcasts during storm conditions.

Provide adequate training and mentoring opportunities

Feedback during the assessment process at both project sites stressed the importance of first aid training and an appreciation for other workshop and mentoring activities the project offered. For the Kon Tum project site, the simulation drills proved to be most important in terms of offering children training in rescue skills. CECI field staff, local trainers, government officials and educators all found that messages need to be repeated to "ensure that key messages and training techniques" are not forgotten:

"In Kon Tum province, after having suffered the consequences of Typhoon Ketsana (Storm no. 9,

2009), the key awareness-raising technique that was of most value was the simulation drill, which occurs at regular intervals in the community." (CECI BCRD Lessons Learnt, p.20).

Communities participating in the BCRD project from Kon Tum province have made a commitment to conduct simulation drills at a regular basis, and are actively working with the schools to ensure the participation of children.

Cooperation and shared responsibility

EWS initiatives must be actively supported by all community stakeholders in order to guarantee project longevity and sustainability. This includes outside NGOs and INGOs, and of course, most importantly, the villagers themselves. Relationship building, integral to any community-based initiative, is a process that cannot be rushed; true collaboration takes time to unfold, but is well worth the effort invested. Secondly, in the interest of creating viable EWS monitoring schedules, we suggest that providing adequate support to all monitoring activities be made a priority. Thirdly, we also strongly suggest that any NGO involved in EWS advocate for better support for CBDRM activities at the governmental level, through more effective policy and, above all else, through adequate funding for ongoing maintenance and monitoring of EWS activities. Without the support of the central government, EWS sustainability cannot be assured, no matter how committed the community is to its continuance.

Planning Meeting at the Commune Office, Nghe An Province

Address and plan for funding and budgeting of DRREIS

During INGO project implementation, mentoring and assistance should be provided to the authorities in budgeting for EWS development and implementation. The installation of EWS, the training of the monitors and facilitators, and the ongoing burden of maintenance and upkeep can be costly and time consuming, even for the low tech solutions selected by CECI. We recommend that assistance provided by the INGO therefore extend beyond simply providing the funds to accomplish these goals. As the end goal of these initiatives is project durability after NGO involvement ceases, we recommend actively mentoring the local schools, district and commune governments in order to provide them with experience in budgeting for future DRREIS activities.

Include the participation of women and other vulnerable members

In rural Vietnam, women are a minority within the government workplace; such gender divides are exacerbated in rural uplands areas. In keeping with broader development goals of gender equality, it is helpful for the implementing INGO to pay close attention to including women in all aspects of EWS. Women can and should be trained in monitoring devices, actively participating in communications practices and also in the larger tasks associated with DRR as a whole (search and rescue, village facilitation, etc.) in ways that expand upon their current status as first aid providers and educators.

Focus on long term relationship building and multiparty coordination

Effective, sustainable EWS programs require a very high degree of coordination between various stakeholders. The implementing INGO must invest considerable time and effort working closely with village level trainers and EWS monitors, as well as with all levels of government (especially the Department of Hydrometeorology). As uplands areas function on a village scale, coordination must also include indigenous leaders and village elders. The implementing INGO must make it clear that notification and decision-making of the EWS is a shared responsibility between the villagers and government. The INGO's role is to simply facilitate this process, so that when the INGO project involvement ends, the EWS in place is fully functional without external support. This approach will lead to project sustainability and durability reaching beyond the INGO project period.

Champion simple, low tech solutions to EWS

It has been CECI's experience that the best solutions to EWS are low tech; simple, inexpensive tools such as the concrete river gauges and the rain gauges are more effective than technological solutions. In earlier project phases, CECI implemented a digital rain gauge that operated on solar power, but the cost of such equipment far outweighed its benefits; additionally, the solar battery was not properly maintained by commune authorities due to a lack of familiarity; this led to expensive repairs and prolonged downtime. Measurement devices are often most effective when they are simple and within the experience of the user. Therefore, we recommend that money be invested in training and education around the monitoring of simple rain gauges, as opposed to technology, in order to ensure maximum project success.

Encourage uniformity and standardization in implementation and rollout

As there is no current government policy specifically in place concerning EWS ISO standards, it is difficult to ensure uniformity and

standardization in EWS implementation and rollout. Current government CBDRM policy is quite general and does not list technical specifications in detail regarding EWS (Central Committee for Flood and Storm Control: 2008 Implementation Plan of the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020). We therefore recommend that project sites develop their own standards – for example, ensuring that rain gauges and river gauges are made according to the same technical specifications from one village to the next; monitoring protocol can also be duplicated with slight alterations made as appropriate for each community.

Maintenance, revision, and future development of EWS

EWS systems must be maintained, developed, evaluated and revised for maximum effectiveness. Within CECI project sites, for example, extreme flood conditions can topple or wash away river gauges, as soil erosion can be severe. Signboards are also subject to the elements; needle gauges are at times in need of repair; wet weather conditions can cause rust over time, which disfigures the signs and renders them unreadable. Currently, SMS monitoring messages sent from the village to the Department of Hydrometerology are paid for by the villagers themselves. It is important that commune authorities and the Department of Hydrometeorology adopt agreements and put policies in place to support EWS activities. Hydrometeorology officials in Kon Tum are now working towards expanding the current EWS in place and plans are underway to install more river gauges throughout the province.

Conclusion

The BCRD EWS project has been a success as a pilot project; local government can see the effectiveness of the EWS implemented by CECI, and have taken the initiative to develop further systems in other areas. The emphasis that CECI has placed on training, mentoring and awareness raising is an investment in human capital, and is, in the long run, a more cost effective way of promoting EWS than an approach that is technology centred. Empowering communities through knowledge of the importance of EWS, and providing them with affordable low tech EWS tools that capitalize on existing capacities and infrastructure is key to the implementation of successful, sustainable EWS throughout uplands areas of Vietnam.

This report has presented CECI's BCRD in Uplands Areas of Vietnam project's best practices concerning the importance and philosophy of EWS, introduced basic EWS concepts and approaches, and has made recommendations specific to uplands areas of Vietnam based on CECI's own experience and lessons learnt.

The goal of this report is to assist other NGOs, educators, government authorities and related stakeholders interested in implementing similar programs in the region. It is CECI's sincere hope that this information will prove useful to others interested in increasing community resiliency towards disaster through EWS: a community's most important tool in disaster risk reduction.

BIBLIOGRAPHY

Australian Agency for International Development by the Centre for International Economics (2002). Vietnam Poverty Analysis. Canberra and Sydney: AusAID.

CECI (Centre for International Studies and Cooperation) (2011). Building Community Resilience to Disasters in Upland Areas of Vietnam: Experience Sharing Report on the VCA. Hanoi: CECI.

CECI (Centre for International Studies and Cooperation) (2011). Building Community Resilience to Disasters in Upland Areas of Vietnam: IEC Toolkit Guide. Hanoi: CECI.

CECI (Centre for International Studies and Cooperation) (2009). Building Community Resilience to Disasters in Upland Areas of Vietnam: Lessons Learnt. Hanoi: CECI.

CECI (Centre for International Studies and Cooperation) (2011) DRREIS: Disaster Risk Reduction Educational Initiatives For Schoolchildren: A Best Practice Guide for Uplands Areas of Vietnam .Hanoi: CECI.

CECI ((Centre for International Studies and Cooperation) and JANI (Joint Advocacy Networking Initiative). (n.d.). Framework on Community Based Disaster Risk Management in Vietnam. Hanoi: JANI.

Central Committee for Flood and Storm Control. (2008). Implementation Plan of the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020. Retrieved from http://www.ccfsc.org.vn on August 7, 2011.

JANI (Joint Advocacy Networking Initiative). (2009). Survey on Indigenous Knowledge on Disaster Prevention and Adaptation to Climate Change: Report. Hue: JANI.

Garcia, Lolita Caparas, JICA Project Expert Team, “Community Based Disaster Risk Management” presentation at the Disaster Prevention Engineering Workshop, Danang, July 2011).

UNICEF, Info by Country. http://www.unicef.org/infobycountry/vietnam_statistics.html retrieved on October 31, 2011.

ACTED

CECI
CENTRE FOR INTERNATIONAL STUDIES AND COOPERATION

EUROPEAN COMMISSION
Humanitarian Aid

uniterra
A WUSC & CECI PROGRAM

Printed in Hanoi, Vietnam