Chapter 7

Community-Based Disaster Management

Community connections are the relationships necessary to develop, implement, and maintain an effective end-to-end early warning system. A multi-hazard warning center can only be successful if the warnings it produces reach individuals at risk and are easy to understand, resulting in appropriate responses. To assure warnings are most effective, the staff at a center

must establish trusted partnerships among international organizations, governmental agencies, community leaders and organizations, businesses, and local citizens prior to issuing a warning.

What Is in this Chapter?

This chapter provides NMHS center staff, including personnel from both the operations and policy sides, with guidance on developing community education and outreach tools that will create more effective warning systems. It also highlights communication models helpful in increasing a community's knowledge about flash floods and other risks and warnings. The chapter should be read by persons who require insight on ways to identify and establish community partnerships and provide more effective education and outreach. "More effective prevention strategies would save not only tens of billions of dollars, but save tens of thousands of lives. Funds currently spent on intervention and relief could be devoted to enhancing equitable and sustainable development instead, which would further reduce the risk for war and disaster. Building a culture of prevention is not easy. While the costs of prevention have to be paid in the present, its benefits lie in a distant future. Moreover, the benefits are not tangible; they are the disasters that did NOT happen."

 Kofi Annan, "Facing the Humanitarian Challenge: Towards a Culture of Prevention"

Concepts in this chapter build upon current knowledge and research in risk communication as well as successful communication and outreach models both within and outside the hazards field in the United States and elsewhere. The communication and outreach models provided may not apply in every situation because each community has unique qualities.

This chapter contains sections that discuss the following topics:

• A communication model – A simple communication model that is the basis for the chapter's discussion about education and outreach.

- Community Preparedness Programs Links to proven preparedness programs like the US StormReady and Asian Disaster Preparedness Center (ADPC) Safer Communities program, and also discusses methods for identifying partners and customers.
- Community Disaster Resilience Programs Proven community resilience programs and community assessment tools.
- Developing Partnerships and Connecting with the Public The importance of developing both media and community partnerships and also outlines steps on how to go about forming these partnerships.

The Persuasive Communication Continuum Model

Effective education and outreach must be based in a thorough understanding of the process that individuals go through when they make decisions about modifying their personal behavior. Warning specialists must understand human behavior in order to design and implement better warnings. Figure 7.1 shows the key stages in the continuum of persuasive communication that leads to behavior change. The success of a warning rests in the public's/individual's awareness, understanding, and acceptance of their risk.



Figure 7.1 Stages of persuasive communication

For example, in order to motivate residents to heed evacuation warnings, the residents must first be aware of their risk. Second, they must understand the impacts an event may have on their family and community. Third, they must accept the idea that not following a warning message can result in injury or death. Finally, they must take action and heed the warning to evacuate. If the intent is behavior change or ACTION, then public outreach must focus on moving the public through the initial stages of awareness, understanding, and acceptance.

Community Preparedness Programs

Community preparedness can be thought of as the advance capacity of a community to respond to the consequences of an adverse event by having plans in place so that people know what to do and where to go if a warning is issued or a hazard is observed. This result can be achieved through the development of programs like the United States' StormReady program (http:// www.stormready.noaa.gov/), in which communities establish plans, enhance communications, and heighten awareness among their citizens. This type of program can increase resilience to flash flood and other hazardous events, reduce economic losses, and shorten recovery periods. Outreach and communication with the public is crucial to their understanding of the nature of the hazards, the risks to personal safety and property, and the steps to reduce those risks. Key components of a community preparedness program include:

- Raising public awareness and effecting behavioral change in the areas of mitigation and preparedness
- > Deployment of stable, reliable, and effective warning systems
- Development of effective messaging for inducing favorable community response to mitigation, preparedness, and warning communications

Safer Communities is a series of Asian Disaster Preparedness Center (ADPC) case studies that illustrate good practices of disaster preparedness and mitigation undertaken by either the government or non-governmental agencies with the goal of reducing the vulnerabilities and risks to communities living in hazard-prone areas. The series aims to provide decision makers, development planners, disaster management practitioners, community leaders, and trainers with an array of proven ideas, tools, policy options and strategies derived from analyses of real-life experiences, good practices, and lessons learned in Asia and the Pacific region.

Safer Communities (2007) describes efforts in two provinces in Cambodia to raise community awareness of floods and flash floods. It illustrates a good example of cost effective and replicable practices and the adoption of a sound overall approach towards flood risk awareness. In the awareness campaign local stakeholders were given the opportunity to review existing flood information materials, adapt these to local conditions, and disseminate them to the public. The result was the implementation of a well-thought-out flood risk awareness campaign that also targeted specific vulnerable segments of the population: women and children. The use of community stage plays and folksongs as media for disseminating flood risk information proved to be extremely popular. Specific lessons learned from the project include:

- When local stakeholders are motivated and take ownership of the initiative, local capacities and resources that are not initially evident will emerge.
- Public awareness campaigns must be designed and communicated based on existing local social and cultural practices if the messages are to be understood and retained.
- One does not have to "reinvent the wheel"; existing awareness materials and tools developed by other organizations can be successfully adapted to local conditions contributing to a shorter research and design phase.
- Public awareness is best approached with creativity and innovation. The most effective ideas and methods came from the organizations and groups with mandates related to the arts, culture, media and women's affairs.

Preparedness is having plans in place to respond properly to a warning.

- Use of creative "non-conventional" channels and communication media was a key factor that led to increased community awareness.
- Building local capacity to undertake public awareness campaigns can create a multiplier effect when awareness activities are replicated by local stakeholders themselves.
- Reaching the most vulnerable segments of a community population (women, seniors, children, etc.) will be more effective if a focused awareness campaign that addresses their specific views and perspective is undertaken.

Safer Cities, a similar ADPC volume of case studies, illustrates how people, communities, cities, governments, and businesses have been able to make cities safer before disasters strike. The series presents strategies and approaches to urban disaster mitigation derived from analyses of real-life experiences, good practices and lessons learned in Asia and the Pacific. The key principles emphasized throughout Safer Cities are broad-based participation, partnerships, sustainability, and replication of success stories.

The *Safer Cities* case study (ADPC 2007) of Dagupan City in the Philippines illustrates the significance of setting up an operational early warning system and evacuation plan as a mechanism to draw people together in pursuit of collective action towards building safe and resilient communities. The approach called for identifying viable preparedness and mitigation measures, Community-Based Disaster Risk Management (CBDRM), and good governance. Lessons learned include:

- Early warning systems are more effective if individuals and groups understand the benefits of such systems
- Community involvement in EWS development leads to systems that respond more quickly
- Drills can test plans and show strengths and weaknesses
- The simulation exercise helped each sector involved to share their knowledge and skills in preparedness and response through allowing others to witness, impart comments, and eventually replicate this kind of endeavor

Identifying Partners and Customers

Many warning system requirements (data communications, data processing, products, dissemination, etc.) are, in part, driven by the characteristics of a center's partners and customer base. Since partners and customers can vary significantly from center to center, it is difficult here to precisely identify these groups. However, some general guidelines and techniques apply to most situations, as described below.

Much of the discussion in this section is based on the publication, "Tsunami Risk Reduction for the United States: A Framework for Action by the National Science and Technology Council." A link to this publication is provided in the references at the end of this chapter. **Partners** are generally other government and nongovernmental groups that play some role in the end-toend warning system chain. These include:

- Domestic and international data providers
- Government and private groups (including the mass media) that serve as communications conduits for product dissemination
- Government and privatesector groups that train and educate other partners and customers



Figure 7.2 Flash flooding of the Urubamba River through Aguas Calientes, Peru

Customers are those groups and individuals that rely on a warning center and its partners for timely and accurate watches and warnings for protection of their lives and property. Customers include:

- The general public
- NGOs such as the Red Cross and other private-sector groups that must respond to events
- Government agencies that must respond to events

A center's outreach and education program must recognize these two distinct classes of constituents, partners and customers, each having unique requirements. The center may even have to employ different techniques to identify and deal with the major groups in each of these two categories.

The goal and focus of outreach should be to educate customers and partners about severe weather safety and preparedness and promote the NMHS Center's warning program through public events, media workshops, and the public school system. During actual flash flood events, the center should have a designated public affairs officer to coordinate media response. During annual exercises, the public affairs officer is responsible for notifying the media.



A warning center needs a PUBLIC AFFAIRS OFFICER to coordinate effectively with the media during significant events.

The public affairs officer should also provide media training and guidance to agency representatives, respond to media requests, organize news conferences, coordinate briefings and tours at the warning center, develop informational materials, assist with briefings to government officials, and plan outreach activities.

Important Points to Remember about Community Preparedness Programs

- Outreach and communication with the public are crucial to their understanding the nature of the flash flood hazard, the risks to personal safety and property, and the steps that can be taken to reduce those risks.
- During actual flash flood events, a warning center should have a designated public affairs officer to coordinate media response.
- Well-coordinated plans and procedures for working with the media and public/ governmental officials are essential to the success of a warning system.

Community-Based Disaster Resilience Programs

Effective community preparedness programs also include hazard and vulnerability assessments—sustained actions taken to reduce or eliminate the long-term risk to human life and property based on risk assessments. This includes planning and zoning to manage development in areas particularly at risk for various natural hazards, embracing severe-weather-resistant construction, and protecting critical facilities and infrastructure. The U.S. Coastal Community Resilience (CCR) program (http://community.csc.noaa.gov/ccr/) is an example of this type of mitigation program.

Elements of Community Resilience

As noted in the Coastal Community Resilience (CCR) Guide (available at http://www.meted. ucar.edu/hazwarnsys/haz_tguide.php) the goal of community resilience is to foster the capacity of communities to mitigate hazards and recurring risks. A resilient community is one that can carry out recovery activities in ways that minimize social disruption and mitigate the effects of future events and impacts. Hazard readiness is an active collaboration among national, provincial, and local emergency management agencies and the local communities. This collaboration supports better and more consistent hazard awareness and mitigation efforts among communities at risk. The main goals are to improve public safety during emergencies and to build resilience against recurring events. To achieve these goals, the following objectives need to be met:

- Create minimum standard guidelines for a community to follow to become "resilient"
- Encourage consistency in educational materials and response among communities and national emergency systems
- Publicly recognize communities that have adopted community resilience guidelines
- Increase public awareness and understanding of severe weather and other hazards
- Improve community planning for disaster impacts

Processes of Community Resilience

Community resilience requires the following processes:

- Communications and Coordination A key to effective hazards management is effective communication. This is especially true for hazards like tsunamis and flash floods, since inundation arrival times may be measured in just minutes. Such a "shortfused" event requires an immediate, careful, systematic and appropriate response.
- Warning Reception Warning points and community Emergency Operations Centers (EOC) each need multiple and redundant pathways to receive warnings and to respond quickly.
- Warning Dissemination Upon receipt of warnings or other reliable information suggesting a hazard is imminent, local emergency officials should communicate the threat to as much of the population as possible.
- Community Preparedness Public education is vital in preparing communities to respond properly to threats. An educated person is more likely to take steps to receive warnings, recognize potentially threatening events, and respond appropriately to those events.
- Administration No program can be successful without formal planning, proactive administration, and proper protocols.

Benefits of Community Resilience Programs

Benefits of following community resilience processes include:

- Being more prepared to save lives
- > Increased contacts with emergency managers and researchers
- A well informed public
- Community resilience resource needs are identified
- Improved positioning to receive national and provincial funds
- Enhanced core infrastructure to support other community concerns
- Demonstrated benefits to the public showing how their tax money is being spent in hazard programs



Figure 7.3 Residents responding to flood in Aguas Calientes, Peru

Assessment Tools

The NOAA Risk and Vulnerability Assessment Tool (RVAT) available at http://www.csc.noaa. gov/rvat/ is a peer-reviewed methodology for conducting multi-hazard risk and vulnerability assessments at the community level. RVAT is a tutorial that steps the user through a "community-level" process of analyzing the vulnerability factors with respect to multiple hazards: physical, social, environmental, and economic. RVAT follows a multi-step process:

- 1. Hazard analysis
- 2. facilities analysis
- 3. Societal analysis
- 4. Economic analysis
- 5. Environmental analysis
- 6. Mitigation opportunities analysis

An article by Odeh (2002) describes a simplified vulnerability assessment model applied to the state of Rhode Island for use in statewide disaster mitigation planning. Working with public data sources and existing community vulnerability assessment tools, a practical scoring approach was developed to quantify vulnerability for multiple hazards and exposures in different regions of the state. Hazards included hurricanes, earthquakes, snowstorms, floods, hailstorms, and temperature extremes. Exposures included economic, social, environmental, and infrastructure. Score combinations were analyzed to identify key hazard/exposure combinations and geographic concentrations of vulnerability. Planners used the output from the study to identify and prioritize mitigation programs, as well as improve public awareness of vulnerability in the state. Lessons learned from the vulnerability assessment in Rhode Island are applicable to other regions and help to illustrate the usefulness of statewide vulnerability assessment.

Shrestha et.al. (2008), working with communities in the Hindu Kush-Himalaya region that are vulnerable to flash floods (especially those from glacial lake outburst flows and landslide dam outburst flows) found that communities must be involved in the development of flash flood risk management programs if activities are to be successful and sustainable. Specifically:

- Local communities know their village and the local situation best and no outsider can understand the local opportunities and constraints as they do; thus, they need to be involved in identifying and resolving disaster vulnerability issues.
- Communities have a personal interest in avoiding disasters and are the main source of local resources; thus, they have the motivation and ability to carry out local activities.
- Communities are naturally very concerned with the local affairs on which their survival and well-being depend, so information should be generated in a manner and language that is understood by the community.

• Central level management and response programs often fail to assess the needs of vulnerable communities, undermine the potential of local resources and capacities, and may, in some cases, even increase people's vulnerability.

A companion document (Shrestha 2008) provides extensive technical information on determination of hazard, vulnerability, and risk assessment. A technical treatment of such things as rainfall analysis, discharge, and rating curves is also provided.

Additional community vulnerability case studies can be found at **http://www.epa.gov/cre/**vulnerability.html.

Important Points to Remember about Community-based Disaster Resilience Programs

- Community resilience programs promote hazard readiness as an active collaboration among national, provincial, and local emergency management agencies and local communities.
- A resilient community is a community with the ability to mitigate hazards and recurring risks.
- The NOAA RVAT is a methodology for conducting multi-hazard risk and vulnerability assessments at the community level.

Developing Partnerships and Connecting to the Public

The development of community partnerships and creation of education and outreach materials often may be led by NMHS Center staff or an outside contractor. This section emphasizes the importance of creating specialized education and outreach efforts that take local needs, characteristics, and issues into consideration. Because of the importance of this community-based approach, NMHS Center staff should make every effort to be as actively involved as possible in partnership, education, and outreach efforts.

Developing Media Partnerships

Effective community outreach starts with *partnerships*. Beginning with agencies and organizations that have an established and trusted relationship with the public can simplify the process of moving through the communications continuum and persuading the public to respond to warnings. Further, community organizations may be better able to deliver warning messages and outreach materials directly to residents, visitors, and businesses in the community. Community partners can also help create messages in formats and languages their clients will understand.

An essential partner in the warning system is the media. Media personnel are experts in communication and can help NMHS staff develop effective outreach. Media can also serve as a



Figure 7.4 Print and broadcast media roles

link between scientific experts and the community. Without the media, rapid dissemination of warnings cannot occur. This community partner can also relay, interpret, and supplement warning information from the warning center. Media also have the ability to localize the preparedness and warning message for individual communities.

The following are tips on establishing relationships with the media:

- Meet your media partners and get to know them *before* an emergency. Exchange contact information, invite them to visit the office and meet your staff, and establish a working relationship.
- Educate media partners about the hazard. Provide them with scientific information and detailed warning process information, including desired responses and



outcomes, through workshops, pamphlets, brochures, fliers and handouts.

- Working with news directors and editors can be fruitful as these are the individuals who make decisions about what gets air time.
- Include media partners in practice drills.
- Anticipate the story. Create/provide background video and canned interviews with scientists for later use. Decide who will be knowledgeable and available to speak with media during an emergency.

Building Broad Community Partnerships

In addition to working with the media, it is critical that the correct community partners are identified. They must represent a full demographic range of the community. One place to start thinking about how to target the right organizations is to consider the elements that make a community function on a day-to-day basis. If all of these day-to-day functions can continue after an event, the community will truly be *disaster resilient*. The Coastal Community Resilience Guide provides some insight into the elements of resilience. The guide indicates that there are eight elements of community resilience:

- **Governance** Leadership, systems, and institutions provide enabling conditions for participatory management and community involvement with local government.
- Socio-economic and livelihood elements Local economies are driven by sustainable and diverse livelihoods and healthy and peaceful socio-cultural conditions.
- Resource management Active management of resources sustains environmental services and livelihoods and reduces risks from hazards.
- Land use management and structural design Effective land use and structural design complement environmental, economic, and community goals and reduce risks from coastal hazards.
- **Risk knowledge** The community is knowledgeable about episodic and chronic hazards and measures to reduce risks.
- Warning and evacuation The community is capable of receiving notifications and alerts of hazards, warning at-risk populations, and acting on alerts.
- **Emergency response** Emergency response institutions and systems are established and maintained to respond quickly to coastal disasters and address emergency needs at the community level.
- **Disaster recovery** Plans, systems, and institutions are in place to accelerate disaster recovery, actively engage communities in the recovery process, and minimize negative environmental, social, and economic impacts of the disasters.

An important step in developing diverse community partnerships is to identify what community planning activities are in progress. Specifically, the center will want to identify activities being overseen by diverse committees or working groups. These committees or working groups do not have to be engaged in activities directly related to hazards: any diverse committee or working group addressing any community issue may be a helpful partner. It may be useful to meet with local government representatives to identify these groups.

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Trust & Partnerships

Building partnerships requires trust. It will benefit the NMHS Center to do research before meeting with potential partners. It is important to set the stage and convince the organization that it is also in their best interest to join in the partnership. By working with these entities, the center may be able to reach more than one segment of the community at once. For instance, a local Emergency Response or Planning Committee might be made of up individuals from the local governments, private sector, media, state or federal agencies, schools, and private citizens.

Initial Partnership Meeting Tips

Whether meeting with the local media or other community partners, being prepared for the initial partnership meeting requires that NMHS Center staff pull together some information and practice their "sales pitch." When the active community committees and organizations have been identified, warning center staff can contact the organizations to arrange a meeting. At the initial meeting, staff should present the following in a clear and concise manner:

- What the NMHS Center does: Community partners may be unaware of what a NMHS Center is and what purpose it serves. Staff should be prepared to describe these clearly and concisely.
- Why NMHS Center is interested in partner-ing: Warning center staff must clearly present to the potential partner why the partnership is important. When talking with the media, the reasons for partnering are fairly clear-the media is a component of the dissemination of warnings. The media can also help disseminate outreach messages about the warning system so that residents are better prepared to heed warnings in the future. Describing partnerships between the center and community organizations may not be as easy. NMHS staff should focus on how the organization can assist the center in conducting outreach and or disseminating warning messages to the organization's clients.

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First Impressions and Partnerships

The initial meetings with community organizations are critical in establishing lasting relationships that will benefit both the NMHS and the organization. Individuals representing the NMHS should be able to translate technical information into a form that is understandable by the organization.

- How the NMHS Center can help the organization do its job: Organizations are more likely to partner when they know that the partnership does not create additional work, but helps them do their existing work.
- What the organization might gain from partnering with the NMHS Center: Benefits may include: increased visibility within the community, ability to assist in saving lives by participating in a vital link in a warning system, and providing clients a new or different service.

Connecting with the Public: A Simple Communication Model

Establishing connections with community partners is an important first step in connecting with the public because it creates new channels for distributing warning messages. Once those channels are established, how can the warning message be crafted and delivered effectively? A simple communication model can help establish local strategies for effectively distributing warning information to the public. The following is a brief explanation of key components of a communication model and an explanation of how it can be used to build awareness and understanding of warnings prior to an event.

As the model illustrates, for a warning message to be effective, it must have the following five essential components:

- There must be credible *source*
- An appropriately designed *message* clearly stated
- A carefully selected *channel* for communicating the message
- A clearly defined *audience*
- A feedback channel for questions, comments and suggestions

Applying the concepts of this model to multi-hazard warnings is an important step in developing a warning system. In order for education and outreach about the warning system to be effective, all of these components must be clearly defined, established, and exercised prior to an event. When developing warning system education and outreach strategies it is best to start by defining the audience (tourists, local businesses, school-aged children, etc.). Defining the audience will assist the NMHS Center and community partners in determining the appropriate message and channel. In the case of the flash flood warning system, it is assumed that the primary source of information will be the NMHS Center. The following defines the components in greater detail starting with the audience and working back to the source.



Figure 7.5. Communication model

Audience

When a flash flood occurs and an evacuation order is issued, all people in the path of the flash flood must respond to the order. However, the people in the path of the flash flood will not be one homogenous group; they may include tourists from multiple countries speaking multiple languages, permanent residents who know the landscape and transportation systems of the area, permanent residents who lack the financial resources to heed an evacuation order, and others. Each of these audiences requires messages sent in slightly different channels in order to be able to make informed decisions about evacuation if a warning is issued. In addition, audiences can be broken into subsets related to language, knowledge of risk, work schedules, or physical capabilities, among others. There is no one message or channel that is going to effectively distribute the warning message to all people in the community.

Understand Vulnerable Populations

Populations are vulnerable when their capabilities are fewer than others around them. Some populations experience greater risk from hazard events not because of their geographic proximity to the hazard, but because of decreased resources and capabilities arising from their socio-economic status and/or physical abilities. People living near or below the poverty line, elderly, disabled, women, children, ethnic minorities, and renters have all been shown to experience, to some degree, more severe effects from disasters than the general population. They are more likely to die in an event and, if they survive, they are less likely to recover financially. Thinking about vulnerable populations when developing warning-system-related education and outreach tools is extremely important because these groups may require special messages.

Channel

The *channel* is the method by which outreach messages are distributed to the audience. Channels may include the media (TV and radio, billboards, the internet, mobile phones, etc.), social service providers, schools, churches, and other community organizations that work with community members on a daily basis. Selecting an appropriate and trusted channel helps ensure that the intended audience will receive the message.

The most effective outreach efforts use existing channels

in the community. For instance, organizations who work with a certain subset of the population on a daily basis typically make good channels because they already have communication methods (brochures, newsletters, websites, phone lists) in place and have established a trusting relationship with the subset. Specifically, a social service organization that provides services to the elderly would be a good organization to partner with to get flash flood related messages out to the elderly.

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Identify existing outreach strategies. There may be opportunities to partner with those organizations who are already educating the public about hazards.

Message

Messages should be targeted to the specific audience and packaged in a way that is clear and understandable for the selected audience. Having diversified community partnerships can assist the NMHS Center in creating and disseminating clear messages that reach the intended audience.

An example of an ineffective message would be to provide information only in the community's native language. Oftentimes, a community is composed of people who speak many different languages and dialects. In

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Audience-Appropriate Messages

The NMHS might enlist a marketing or public relations expert to help design warning messages. These professionals can help translate technical or scientific information into a format and language that is understandable for the intended audience.

tourist communities, the range of languages can be even wider. NMHS staff should consider all the languages spoken in the community when designing flash flood warning messages.

Source

The *source* is the entity or entities that provide the information for the outreach campaign. In this case, the NMHS Center is one of the primary sources of education and outreach messages because the center is the technical expert on the warning system. Local and state government emergency management departments may also be sources for warning system education and outreach.

Important Points to Remember about Developing Partnerships

- Effective community outreach starts with the development of *partnerships*.
- An essential partner in the warning system is the media, without whom rapid dissemination of warnings cannot occur.
- If experts don't provide information in an emergency, others will.
- One place to start thinking about how to target the right organizations is to consider the elements that make a community function on a day-to-day basis. If all of these day-to-day functions can continue after an event, the community will truly be *disaster resilient*.
- An important step in developing community partnerships is to identify what community planning activities are taking place in the area.
- > The most effective outreach efforts use existing channels in the community.
- Having diversified community partnerships can assist the NMHS Center as it creates and disseminates clear messages that reach the intended audience.
- A warning center should work with local government departments and other community partners to identify the types of audiences present in the community.

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