

Best Practices Report

BUILDING A DISASTER RESISTANT COMMUNITY

Project Impact in Central America and the Caribbean



Federal Emergency Management Agency

Best Practices Report

**Building a Disaster Resistant Community:
Project Impact in Central America and the Caribbean**

FEMA

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I Introduction

Hurricanes Georges and Mitch struck numerous Central American and Caribbean nations in 1998, causing billions of dollars in damage and killing thousands of people. Along with 12 other United States Federal Government Agencies (USGs) and international aid agencies, the Federal Emergency Management Agency (FEMA) provided assistance to these countries after the storms. Under an interagency agreement with the United States Agency for International Development (USAID), FEMA worked with six nations to implement mitigation projects that would reduce future vulnerability to disasters. This Best Practices Report describes some of the mitigation projects and highlights exemplary ones. FEMA hopes that sharing mitigation successes through this Best Practices Report will maintain the momentum for carrying out other mitigation programs, thereby reducing the region's vulnerability to catastrophic disasters.

This report provides an overview of the 1998 disasters and their impacts; the involvement of FEMA and other USGs; Project Impact, a community-based mitigation initiative that encourages the private and public sectors to help communities reduce disaster vulnerability in Central America and the Caribbean; the ingredients of successful mitigation projects; Project Impact initiatives by country; sample projects demonstrating Best Practices in the areas of partnering, structural and non-structural mitigation, and education; proven successes in Honduras and Haiti; and prospects for continued mitigation activities in the region.

II 1998 Disaster Impacts in Central America and the Caribbean

From October 26 to November 4, 1998, Hurricane Mitch devastated Central America and became one of the deadliest Atlantic hurricanes ever, killing at least 9,000 people in Honduras, Nicaragua, El Salvador, and Guatemala. Thousands more

were declared missing and presumed dead. While all four of these countries were heavily impacted, Honduras was the most devastated. Flooding, mudslides, and massive landslides associated with Hurricane Mitch left more than a million people homeless in the region. The storm destroyed much of the transportation network, particularly in Honduras, leaving thousands of people isolated. Hurricane Mitch also caused tremendous agricultural losses, particularly in the coffee, banana, and corn crops. Estimates place the losses from Hurricane Mitch at \$8 to \$9 billion.¹

From September 15 to 29, 1998, Hurricane Georges blew across 17 Caribbean islands, affecting 30 million people. The Dominican Republic and Haiti were affected most. The storm killed at least 400 people and left more than 150,000 people homeless in these two countries alone. The transportation infrastructure suffered massive destruction when roads and bridges were washed away. The agricultural sector was hit hard as well, particularly in the Dominican Republic, where 90 percent of the banana crop was lost. Estimates place the overall disaster loss in these two countries at more than \$1 billion.²



U.S. Government Involvement in Central America and the Caribbean

The international aid community, including USAID, began providing assistance immediately following the storms. The U.S. Congress appropriated \$621 million in emergency supplemental funds to assist the region in recovering from these catastrophic disasters. Of the \$621 million, \$96.8 million was channeled to 13 USGs, including FEMA, through Interagency Agreements. FEMA viewed its role in the USGs' reconstruction effort as serving as a model of an efficient domestic emergency management organization to these countries. FEMA's expertise lies in planning and executing emergency management functions. Taking advantage of employees within the agency who possess specific skills, FEMA offered a comprehensive package

of technical assistance aimed at strengthening the national emergency management agencies in these nations, fostering community-based mitigation using pilot initiatives, and implementing mitigation projects. Other Federal agencies provided technology and infrastructure repairs under the emergency supplemental funding.

At the national level, FEMA provided countries with technical assistance and knowledge based on successful emergency management techniques used in the United States (such as the Federal Response Plan, emergency operations centers, State and local partnerships, and capacity building). U.S. experts reviewed materials and traveled to the countries to provide this technical assistance to national government officials directly.

At the local level, FEMA worked to develop “Project Impact: Building Disaster Resistant Communities” pilot programs in each country. The program began in the United States in 1997 on a pilot-program basis and was soon implemented nationwide. In 1998, Project Impact became a fully implemented community-based mitigation initiative that encourages private and public sectors to help communities reduce disaster vulnerability. Every year, from 1998 to 2001, FEMA has selected one or more communities in each State to participate in the initiative. In Central America and the Caribbean, FEMA has provided funds for community mitigation projects, leveraging private and public sector participation, and leadership. Project Impact initiatives were implemented using the “on-the-ground” assistance of Non-Governmental Organizations (NGOs) trained in Project Impact strategies. Visits from U.S. Project Impact experts supplemented NGO activities.

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Project Impact in Central America and the Caribbean

FEMA officials signed contracts with the following NGOs to carry out the Project Impact initiative:

- **Honduras** – Cooperative Housing Foundation (CHF);
- **El Salvador** – CHF;
- **Nicaragua** – CHF (El Salvador Office), which contracted with a local NGO, the Center for Environmental Rights and Promotion of Development (CEDAPRODE), for assistance;
- **Guatemala** – Catholic Relief Services (CRS), which contracted with a local NGO, the Pro Economic Development Organization of the South (PRODECO SUR), for further assistance;
- **Haiti** – Pan American Development Foundation (PADF); and
- **Dominican Republic** – Dominican Association for Disaster Mitigation (ADMD).

With assistance from USAID and each country’s office of emergency management, the NGOs identified one or more communities to participate in the community mitigation initiative. The NGOs were instructed to identify communities that were vulnerable to multiple hazards, had a commitment to community action, and had the potential to involve the private sector. With technical assistance from FEMA and the guidance of the NGOs, each community accomplished the following (with a few exceptions):

- Held a Convening Session in which prospective partners discussed hazards, identified solutions, pledged support, and created local mitigation committees;
- Prepared an Action Plan that summarized hazards and vulnerabilities, and identified actions to be taken with seed funding and support from the community;
- Held a Signing Ceremony to celebrate their progress and to generate community interest; and
- Implemented projects that would lessen future disaster losses.

During the Convening Sessions, U.S. Project Impact experts explained the importance of mitigation, emphasizing that since

the region had suffered tremendously from recent catastrophic natural disasters, more needed to be done to ensure that fewer people suffer injuries and that the potential for loss of life is reduced in the future. Community officials were urged to use Project Impact as a tool to accomplish the very important goal of preventing or minimizing losses. U.S. Project Impact experts stressed that although the ground cannot be stopped from shaking, the wind from blowing, or excessive rain from falling, the impacts of these events can be reduced. Implementing Project Impact and carrying out mitigation initiatives can minimize the chance of property damage and lessen the number of injuries and deaths that may occur following disasters.

Convening Sessions provided a forum to explain to prospective Project Impact partners the differences between the various functions of emergency management: mitigation, preparedness, response, and recovery.

- **Mitigation** is defined as any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event. Mitigation, also known as prevention (when done before a disaster), encourages long-term reduction of hazard vulnerability. The goal of mitigation is to decrease the need for response as opposed to simply increasing the response capability. Mitigation can save lives and reduce property damage, and is cost-effective and environmentally sound. This, in turn, can reduce the enormous cost of disasters to property owners and all levels of government. In addition, mitigation can protect critical community facilities, reduce exposure to liability, and minimize community disruption. Mitigation is based on sound



Mapping exercise at Convening Session.
Usulután, El Salvador

economics and is a politically viable strategy. Examples include land use planning, building codes, and elevation of homes.

- **Preparedness** actions strengthen the capability of government, citizens, and communities to respond to disasters. Preparedness actions include training and exercising, developing emergency response teams, storing 72-hour kits, and maintaining and operating hand-held radios for issuance of warnings.
- **Response** actions are those taken during an event to address immediate lifeline and health safety needs and to minimize further damage to properties, such as placing sandbags around a building to minimize flood damage to structures, removing debris, and providing drinking water to isolated communities.
- **Recovery** actions are those taken after a catastrophic event in order to restore order and lifeline in a community. This includes repairing infrastructure and buildings damaged by the disaster.

Convening Session attendees were urged to use minimal Project Impact funds to leverage their own programs, equipment, and leadership in order to accomplish structural and non-structural projects and provide effective mitigation education to citizens. Most communities that held Convening Sessions accomplished an array of structural and non-structural mitigation projects, as well as citizen education programs. In the few communities that did not hold Convening Sessions, less leveraging of resources occurred and fewer projects were mitigation-based. Instead, most of the projects executed were preparedness and response related. This presents a strong argument for the need for Convening Sessions at the onset of the Project Impact initiative because important issues such as steps for community involvement, leveraging of funds, and the implementation of structural and non-structural mitigation projects would not otherwise be addressed in the community as a whole.

Ingredients for Success

Success with the Project Impact initiative is not guaranteed. Success comes from dedication, hard work, and a combination of other factors. Success requires the right combination of the following components:

- **Multiple hazards** – communities tend to be more successful when they are at risk to multiple natural hazards (earthquakes, landslides, flooding, wildfire, etc.) as opposed to just one. Addressing multiple hazards tends to galvanize communities.
- **History of disasters** – communities that have experienced a recent disaster tend to be more interested in getting involved. The “it can’t happen in my community” attitude is less prevalent. However, it can be difficult to convince a community to participate even when it has recently experienced a catastrophic event if the community believes such an event could never recur.
- **Committed leadership at the community level** – this component is essential, as the lack of other ingredients can be overcome with a group of dedicated leaders. Leadership can come from the private and/or public sectors.
- **Committed participation of NGOs** – involving NGOs is critical to success. NGOs can bring funding, leadership, and innovative ideas to the table. They can help solicit private and public sector support. NGOs can also persuade other organizations to participate in the initiative.
- **Committed participation of all levels of government** – community, municipal, departmental, national, and international; involving as many layers of government as possible is helpful. Each layer has valuable resources and



Swearing in of the Local Mitigation Committee.
Usulután, El Salvador

contacts that add to the initiative.

- ***Commitment of private sector to contribute cash or in-kind donations, in-kind services, and leadership*** – private sector involvement is key. The private sector should be made aware that Project Impact seeks to develop win-win relationships: relationships that are as mutually beneficial to businesses as they are to the community. Businesses are definitely interested in ensuring that their structures and inventories can adequately withstand disasters. They should also realize that helping to reduce disaster damage experienced by employees and nearby communities will result in faster resumption of company operations than if they only focus on protecting their own buildings and inventories.
- ***Involvement of civic groups*** – civic groups have funding and in-kind services they are willing to donate. Many civic groups make facilities available for training and workshops at no cost or reduced cost. Civic groups are often bombarded with choices on where to invest their time and resources, and must be convinced that the initiative will help the community become more disaster-resistant and that becoming disaster-resistant is in their best interest.
- ***Involvement of schools*** – schools are great partners. Few, if any, successful Project Impact communities have succeeded without involving local schools. Schools educate young people, who in turn educate their parents. Schools are approachable and usually interested in investing in efforts that will make their community more disaster-resistant.
- ***Well-devised Action Plan outlining the community's hazards, vulnerabilities, and projects*** – a well-written Action Plan provides focus to the initiative and is a useful tool in recruiting other partners.
- ***Convening Session*** – a brainstorming session to gauge the

community's perception of the hazards and associated vulnerabilities is an important step in Project Impact. Convening Sessions allow the community to organize a mitigation committee and sub-committees, prioritize projects, and attract new partners. Community participation in the Convening Session is critical.

- **Education component** – may include radio spots, television commercials, newspaper articles, posters, murals on city walls, community meetings, pamphlets, etc.

VI

Summary of Project Impact Initiatives by Country

A. El Salvador

Berlín, Usulután, and Alegría were selected to participate in the Project Impact initiative. Strong local committees were created in each community through the leadership of CHF and the mayors. Mitigation projects implemented through Project Impact in El Salvador include:

- soil conservation projects,
- hardened roads,
- floodwalls,
- retaining walls,
- rock dikes,
- a drainage ditch,
- rehabilitated dikes,
- cleaning out of canals,
- computer equipment for an environmental program, and
- citizen education on mitigation.



Soil conservation project.
Berlín, El Salvador

B. Honduras

La Lima, Espire, and Santa Rita were selected to participate in the Project Impact initiative. Strong local mitigation committees were created in each community through the leadership of CHF and the mayors. Mitigation projects implemented through Project Impact in Honduras include:

- a floodgate and control valve,
- hardened electrical systems,
- dike reforestation,
- second-story storage units,
- a trash removal system,
- a water pump transformer,
- floodwalls,
- dredged rivers,
- hardened bridges,
- soil conservation projects,
- hammock bridges, and
- citizen education on mitigation.

C. Nicaragua

Estelí, Chichigalpa, and Bluefields were selected to participate in the Project Impact initiative. The following projects were implemented through the leadership of CHF (El Salvador Office) and the help of CEDAPRODE:

- a vehicle bridge,
- footbridges,
- a drainage project,
- box bridges,
- procurement of a radio system,
- cleaning out of ditches,
- development of a plan to relocate vulnerable houses, and
- citizen education.

D. Guatemala

Eleven small communities in the Taxisco municipality were selected to participate in the Project Impact initiative. The following projects were implemented through the leadership of CRS:

- development of risk maps,
- creation of emergency plans,
- elevation of homes,
- construction of floodwalls,
- construction of a 3,300-meter levee,

- cleaning out of rivers,
- a drainage system, and
- citizen education.

E. Haiti

Jacmel was selected as the Haitian community to participate in the Project Impact initiative. A strong local mitigation committee was engaged through the leadership of PADF, with involvement of the mayor and the Southeast Department Delegué. In Jacmel, the following projects were implemented:

- development of an Action Plan,
- creation and training of Community Emergency Response Teams (CERTs),
- river bank protection,
- a soil conservation project at the hydroelectric plant,
- construction of a new fire station, and
- citizen education on mitigation and preparedness.

F. Dominican Republic

Haina and the tri-municipalities of Jaquimeyes, Tamayo, and Vicente Noble were selected to participate in the Project Impact initiative. Local mitigation committees were created through the leadership of ADMD. Mitigation projects implemented under the initiative included:

- contingency planning,
- development of hazardous materials safety routes,
- installation of lamps and cement posts,
- hardening of a school,
- drainage projects,
- footbridges to enhance evacuation,
- a perimeter wall around a contaminated area,
- creation and training of CERTs,
- development of an Early Flood Warning System,
- designation and improvement of shelters and warehouses, and
- development of a mitigation and preparedness education program.

VII Best Practices

All 14 Project Impact communities in the six countries have been successful. Some of the exemplary projects are highlighted here as Best Practices. Conceivably, the success of these projects can be continued, expanded, and replicated in other communities within Central America and the Caribbean.

A. Participation of Partners

While all 14 communities have developed partnerships, the following communities have done an exemplary job in motivating their local communities.

1. Haina, Dominican Republic

The Haina Project Impact initiative involves many business partners. This is due in large part to the involvement of the Haina Industrial Association, represented by its president and executive director. The Haina Industrial Association is motivated because its leaders are aware that businesses among its members provide critical services and products to the entire country. This includes both of the country's electrical power plants, the only oil refinery, the most important port, major chemical companies, and factories. Due to their proximity to each other and their exposure to natural disasters such as hurricanes, flooding, and earthquakes, the Haina Industrial Association leadership realized that a large event in Haina would paralyze not only their own businesses and community, but the entire country as well.

The Haina Industrial Association encouraged all members to participate in the Project Impact initiative and set an example by participating in every project. The association not only serves on the Haina Mitigation Committee, but it has also provided meeting space for workshops and training events. The Haina Industrial Association has been involved in the following activities:

- Promoting the Hazards and Effects Management Process (HEMP), a process in which businesses identify

vulnerabilities and then learn how to mitigate them. HEMP participants develop contingency plans, which are then reviewed by the Haina Industrial Association. HEMP participants also train and exercise their plans. Five businesses are currently engaged in the process, and each has the involvement and commitment of its Chief Executive Officer.

- Developing, circulating, and analyzing the results of a vulnerability assessment for member businesses of the association.
- Hosting a two-day contingency planning seminar attended by 20 local businesses.
- Writing a Haina Industrial Association Disaster Preparedness Plan.
- Hosting many workshops and training seminars on subjects such as first aid, search and rescue, and risk management.
- Developing a hazardous materials transportation route.
- Developing an evacuation route.

In short, there would be no Project Impact initiative in Haina if it were not for the leadership and participation of the Haina Industrial Association and its members.

2. La Lima, Honduras

La Lima's very active mitigation committee has done a great job developing partners that now make large contributions. Partnerships have been developed with businesses, citizens, schools, private foundations, etc. Partners making large contributions include:

- Nine private citizens who are trained in reforestation techniques.
- In eight communities, 325 individuals received courses on preparedness and mitigation. Each person attended three 3-hour sessions. Courses included: mapping vulnerabilities; what to do before, during, and after disasters; and how to hold successful disaster drills. After

the training, one participant identified cracks in a levee and notified authorities. The cracks were subsequently repaired.

- Hardware stores donated lumber and supplies for building seven warehouses constructed as second stories to existing schools and medical clinics. Supplies donated by pharmacies and stores will be stockpiled for use following disasters. The local school parent-teacher organization donated wood, cement, and part of the construction labor.
- Chiquita Banana partnered by buying a sluice gate and control valve for the Chamelco River, donating supplies to nurseries that provide plants for reforesting dikes, and providing the building plans for the supply warehouses.
- The U.S. Department of Housing and Urban Development partnered by installing gabions and managing a reforestation project in the Martinez Rivera neighborhood.
- Schools are partnering by having all fifth-grade students plant and care for nurseries, and use the plants for reforesting the dikes. Every Saturday, sixth-grade students gather garbage from city drainage ditches and streams. Sixth-grade students also provide homeowners with stickers showing how to properly dispose of trash. Inappropriate trash disposal methods exacerbate the flooding problem. Trash thrown into drainage areas clogs natural drains, leading to unnecessary flooding. Cleanup and education programs are essential components of flood prevention.
- The Honduran Foundation for Agricultural Investigation donated space for nurseries.
- Agua Azul provides drinking water for students who participate in the garbage cleanup project. Other local businesses have donated plastic bags for the cleanup

and the city provides transportation to the garbage pickup sites.

B. Structural and Non-Structural Mitigation

1. Chichigalpa, Nicaragua

Hurricane Mitch destroyed an important highway bridge that crosses a deep ravine. The bridge has since been repaired; however, when the bridge was repaired it was not improved to withstand future flooding. As a Project Impact project, wing walls were installed on both ends of the bridge to protect the bridge from flood runoff and prevent floodwaters from entering an adjacent neighborhood where hundreds of houses were previously vulnerable to floods. The city has since found additional funds to place a series of gabions under the bridge. These gabions dissipate energy from runoff, minimizing downstream damages, and also deter erosion of the ravine.



Structural mitigation project. Placing gabions below a bridge.
Chichigalpa, Nicaragua

2. Pespire, Honduras

Pespire has built several structural mitigation projects, including constructing floodwalls in two locations, dredging the Nacaome River, repairing box bridges, and strengthening the bridge ramps over the Nacaome and La Montaña Rivers. The approach to the Nacaome Bridge required enhancements to survive major floods in the future. The bridge is critical to the community because it links rural areas to the urban center. Without strengthening the bridge approach, floods would likely cause damage, and thousands of rural residents would be stranded.

3. Jacmel, Haiti

The main highway leading into Jacmel from Port-au-Prince has often been flooded. As the highway approaches town, it is in danger of being undercut by the river. Each flood has scoured out more of the riverbank. The town leadership has been



Structural mitigation project.
Placing gabions.
Jacmel, Haiti

concerned for several years that another hurricane would wash away the road, and vegetation and floodwater would then flow into downtown Jacmel.

During the Project Impact Convening Session, citizens and community leaders were unanimous in their desire to protect the highway. Using Project Impact funds, a 450-cubic-meter gabion wall that parallels

the road for 60 meters was built. Fill material was placed between the wall and two large trees, and a recreation area was created beneath the trees. This project greatly reduces the flooding problem.

4. Taxisco, Guatemala

With a combined population of 300, the communities of Providencia, Tapescos, and La Ceiba have been plagued with an annual flooding problem for years. Although the best solution



Structural mitigation project.
Building a levee.
Providencia, Guatemala

to the problem would be to remove the vulnerable houses, there is no nearby area available or adequate for housing. Elevating houses or building floodwalls around individual structures was cost-prohibitive. The best alternative was to build a levee around the small streams and canals that ring the three communities.

Building a levee is not normally the best alternative, but in this situation

it was considered the only viable alternative.

Prior to construction, the Guatemalan Environmental Agency was consulted and they assured CRS that the levee would not adversely affect downstream communities. The levee was built prior to the 2001 rainy season. During FEMA's visit to the area in December 2001, local residents indicated that for the first time in years, they had lived through the wet season without any

flooding. Residents are very pleased that the levee is working so well.

5. Chiquimulilla Canal, Taxisco, Guatemala

The Chiquimulilla Canal parallels the Pacific Ocean for many miles, and eight communities lie in a row between the ocean and the canal. These communities are only accessible via barges that carry automobiles to access a road that leads to El Salvador. The highway parallels the ocean side of the canal. Each of these communities has residents that live between the canal and the highway. Most of these structures are vulnerable to flooding, which occurs at least at a nuisance level every year and causes widespread destruction every few years. Hurricane Mitch caused massive flooding along the canal.



Non-structural mitigation. Floodwall around a house.
Chiquimulilla Canal, Guatemala

When the communities learned about Project Impact, they saw an opportunity to raise the levee and/or dredge the canal. However, these projects are not cost-effective and were beyond the scope of Project Impact. The ideal solution was to physically relocate all flood-vulnerable structures to safer ground. However, to do so would not be cost-effective either. The communities decided on an alternative project that would elevate the most vulnerable houses and build floodwalls around less vulnerable structures.



Non-structural mitigation project. Elevating a house.
Chiquimulilla Canal, Guatemala

CRS and PRODECO SUR conducted a study of the flood-prone structures. PRODECO SUR staff met with every family to discuss the recommended voluntary flood mitigation strategy to protect their homes. Pamphlets and posters explaining actions to be taken before, during, and after floods, earthquakes, and hurricanes were made available to all residents.

A local company was contracted to build the foundations

and floodwalls. The company provided the community with blueprints for elevating houses and building floodwalls. These plans are available to any current or future homeowner in the area. Homeowners who received foundations collaborated to help one another with the construction.

Houses with historic flood depths of at least 1 meter received an elevated foundation. Families could then select construction materials. Cement block, wood paneling, or bajareque (mud and bamboo sticks) were those most commonly chosen. Houses with historic flood depths between 0.15 and 1 meter received a 1-meter perimeter floodwall with a floodgate for the door opening. Houses with less than 0.15 meters of historic flooding received sandbags and training on how to fill and place them to protect structures from flooding.

6. Berlín, El Salvador

The mountainous slopes around Berlín are home to many coffee plantations. These slopes have been stripped of their natural vegetation and replaced with coffee, which is not as capable as the native vegetation is in protecting the ground from the effects of torrential rains that cause landslides and mudslides.

Hurricane Mitch devastated the slopes around Berlín. Many landslides and mudslides destroyed coffee plantations and residences in Berlín and surrounding towns. During the reconstruction effort, USAID and other international organizations developed mitigation projects in the steep canyons surrounding Berlín. Coffee plantation owners gave their consent for gabions to be placed in steep canyons. These projects were helpful in avoiding landslide and flooding damages to communities located at the base of the mountain that would have normally sustained storm damage. Hence, landowners were eager to participate as partners when Project Impact came to Berlín.

One of the projects identified in the Convening Session was an array of soil conservation projects on 79.5 hectares in Cerro Pelón and Las Palmas. More than 17,000 meters of live barriers

and small rock walls were placed on steep slopes in an alternating pattern. The community dug 14,500 infiltration ditches and 180 catchment wells on the slopes to capture and filter runoff water. More than 2,200 meters of small dikes were constructed and the slopes were reforested with 4,990 trees and 12,470 bamboo stakes. A series of gabions catch and slow floodwaters and landslides near the base of some of the slopes. A cement-lined ditch that drains excess floodwaters lies at the bottom of Cerro Pelón. All of these measures will slow down runoff and decrease erosion. The community has also trained 167 local residents in soil conservation techniques.

Of particular interest on the slopes of Cerro Pelón are large cracks that were created by the January-February 2001 earthquakes. Several of these cracks are where the soil conservation projects were implemented. Since this area is now at a higher risk for landslides, these efforts should stabilize the slopes and prevent a future landslide.

7. Bluefields, Nicaragua

Before Hurricane Johan in 1988, a group of people moved into a flood hazard area in the city. When Hurricane Johan struck, the area was hit hard and the City relocated residents to other, less vulnerable sections of the city. Not long after the hurricane passed, the vulnerable area was occupied once again by other residents. The City has now developed an Environmental Action Plan that will eventually prohibit occupation in this section of town altogether. The plan will be implemented in three phases: immediate actions, mid-term actions, and long-term actions.

- a. The immediate actions include cleaning and improving drainage areas in order to permit people to continue to live in the area, but with reduced flood risks. This immediate action was completed with the help of Project Impact.
- b. The mid-range actions include opening up drainage areas along Colón Street, creating a detour around a drainage area, and installing more culverts along Fatima Street. The

City will also conduct a study to locate available land for housing developments for citizens currently living in vulnerable areas.

- c. The long-range actions call for relocating 100 houses and defining and enforcing a “No Development Zone.”

8. Estelí and Chichigalpa, Nicaragua

These two communities have large rural areas that become isolated during flood events. Access is not only cut off to these rural areas, but communications are also severed. Through Project Impact, Estelí received a 12-unit radio system and Chichigalpa received a 10-unit radio system. Several of the radio units will be sent to the communities most likely to become isolated by flooding, landslides, or earthquakes. Municipal leaders will now be aware of the problems and needs in isolated communities and will be able to provide the necessary resources or communicate their needs to the national government in a timely manner.

C. Education

1. Jaquimeyes, Tamayo, and Vicente Noble, Dominican Republic

The education and outreach projects in these communities are working well.

- a. **CERTs** – Each community has developed several CERTs, whose members have been trained in first aid, search and rescue, fire suppression, and disaster mitigation and preparedness. The communities were divided into smaller sections and teams were assigned various functions within these smaller sections. Team members have also participated in exercises.
- b. **Education and signage** – each community has sponsored workshops and training sessions for citizens on what to do before, during, and after disasters. Community CERTs



Community Emergency Response Team (CERT).
Tamayo, Dominican Republic

visited each family and provided them with educational materials and posters on how and when to evacuate following earthquakes, floods, and hurricanes. Evacuation route signs were posted in each community shelter and disaster supply warehouse. Posters identifying highly vulnerable flood areas were placed at specific locations. In all three communities, signs were placed in the floodplain, showing flood depth levels, with color-coded warning indicators such as green, yellow, and red. Green represents the safe levels; yellow represents that it is time to evacuate; and red represents the level when houses begin to flood. These signs are located on the shore of the river in highly visible areas, such as nearby roads and/or bridges. These measures will allow residents to be more aware of their risks and to locate safer ground when floods occur.

- c. **Working with the media** – ADMD was involved in many educational projects, via television and radio networks, teaching people what to do before, during, and after disasters. Many of the programs have aired across the entire country. Many people in the Dominican Republic now know to “duck,” “cover,” and “hold” in the event of an earthquake.

2. Berlín, El Salvador

Berlín has implemented a successful education campaign. Through Project Impact, the community has been educated on what to do before, during, and after disasters. Outreach activities have included town meetings; meetings with municipal councils, the Mitigation Committee, and local leaders; the painting in town of large murals with mitigation themes; the design, mass production, and distribution of a poster with a mitigation theme; and the creation of messages that were run by local radio stations over a seven-day period. Efforts to educate residents resulted in several of them building small floodwalls around their homes and businesses; other residents built small drainage systems. More families are asking for

technical assistance in how to protect themselves from floods and earthquakes. The attitude in Berlín is changing. Residents are beginning to understand the need for mitigation and realize that everyone has a role in the process, from coffee plantation owners to local government, to the residents themselves.

VIII Proven Successes

1. A tropical storm struck Northern Honduras in November 2001. Although this storm was not as powerful as Hurricane Mitch, it was still a strong event that caused considerable flood damage in La Lima. Several significant successes of Project Impact projects implemented earlier in La Lima were demonstrated following this event.



Valve on Chamelco River.
La Lima, Honduras

- The Project Impact sluice gates and control valves on the Chamelco River worked well. This event caused no damage to the Rivera Martinez neighborhood. In the past, a tropical storm of this size would have flooded many homes.
- One of the second-story disaster supply warehouses served as a temporary shelter for 18 individuals.
- Bags used for the weekend garbage cleanup were donated for use in the flood cleanup.
- City leaders cooperated well during the event. Determining where and how to place the sandbags was coordinated in a more organized fashion than in previous events and resulted in reduced damage and chaos.

2. CERT training in Jacmel, Haiti is already proving successful in saving lives and reducing fire damage. Students from the CERT training class have found numerous opportunities to use their CERT skills.

- On two occasions, two different CERT members suppressed house fires.
- Two CERT members came across a child hit by a motorcycle. When they went to help the child, they realized he was not breathing. The CERT members cleared the child's airway and used their first-aid training to revive him.



CERT exercise.
Jacmel, Haiti

IX

Prospects for Continuation of the Community Mitigation Initiative

Mitigation activities will continue in Central America and the Caribbean. The following new developments are encouraging:

- In the Dominican Republic, USAID has made mitigation a funded item in its proposed five-year plan.
- In Haiti, PADF has received additional USAID funding to continue local mitigation projects, including a program to create and train ten CERTs in southeast Haiti.
- The World Bank is funding large projects in Honduras and Nicaragua that will identify risks and assess vulnerabilities in many communities. With this information, future projects will be identified and eventually funded.
- Mitigation efforts will continue in El Salvador through the efforts of the Central American Mitigation Initiative.

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Summary

The hurricanes of 1998 caused billions of dollars of damage and killed many thousands of people in Central America and the Caribbean. After receiving a portion of the Emergency Supplemental Appropriations Act funding, FEMA implemented various initiatives in the area, including Project Impact, a community-based mitigation initiative that encourages the private and public sectors to help communities reduce disaster

vulnerability. The Project Impact initiative has been successful, and some exemplary projects demonstrate Best Practices in the areas of partnering, structural and non-structural mitigation, and education. The efforts of the 14 participating communities will reduce future disaster damages and serve as models to other communities.

As the successes in La Lima, Honduras and Jacmel, Haiti demonstrate, Project Impact efforts have already helped communities avoid losses and protect lives. There will be more success stories in the future as more communities implement mitigation projects. The prospects are bright for community mitigation efforts to continue as the World Bank, USAID, and other aid agencies and NGOs implement mitigation initiatives throughout the region.

¹ Sources for this information include the webpages from *USA Today* and the National Centers for Environmental Protection.

² Ibid.