Introduction to Hazard Mitigation

IS-393.A

June 2006

FEMA

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Federal Emergency Management Agency Training

The Federal Emergency Management Agency (FEMA) is the central point of contact within the Federal Government for a wide range of emergency management activities. The agency has numerous roles, including coordinating Government activities, providing planning assistance, guiding and advising various agencies, and delivering training.

FEMA's training program is delivered through the Emergency Management Institute (EMI). EMI provides emergency management training to enhance emergency management practices throughout the United States for the full range of potential emergencies.

A complete listing of EMI courses is available on FEMA's website. The address is http://www.fema.gov.

Independent Study Courses

The independent study program is one way that EMI offers emergency management training to the general public and to select emergency management audiences.

Go to http://training.fema.gov/emiweb/is/ for information on these courses.

These independent study courses are geared toward both the general public and persons who have local government responsibilities for emergency management. All courses are suitable for either individual or group enrollment, and are available at no charge. Courses include a final examination, and persons who score 75 percent or better on the examination are issued a certificate of completion by EMI.

If you have questions about these courses, you can call 301-447-1200, e-mail independent.study@dhs.gov, or write to:

FEMA Independent Study Program
Administration Office
Emergency Management Institute
16825 S. Seton Avenue
Emmitsburg, MD 21727

For information regarding application for academic credit and fees, contact the Independent Study Office at EMI at 1-800-238-3358.

Introduction to Mitigation

As the costs of disasters continue to rise, governments and ordinary citizens must find ways to reduce hazard risks to our communities and ourselves. Efforts made to reduce hazard risks are easily made compatible with other community goals; safer communities are more attractive to employers as well as residents. As communities plan for new development and improvements to existing infrastructure, mitigation can and should be an important component of the planning effort. Mitigation means taking action to reduce or eliminate long-term risk from hazards and their effects.

FEMA has produced a series of courses intended to train those who have responsibility for, or simply interest in, reducing hazard risks in their States, communities, or Tribes. This course provides an introduction for those who are new to emergency management and/or hazard mitigation.

Complete this course at a comfortable pace. Upon completing all five lessons, the activities and lesson quizzes, and the final exam, you should be able to:

- Define hazard mitigation and the importance of hazard mitigation in sustainable communities.
- List the main components of each phase of the local hazard mitigation planning process.
- Identify hazard mitigation measures that are applicable to your community's hazard risk problems.
- Identify resources for projects that reduce hazards.

Course Lessons

The course "Introduction to Hazard Mitigation" has five lessons:

Lesson 1. Hazard Mitigation: Sustainable Futures for At-Risk Communities – Explores the reasons and need for planning for a sustainable, disaster-resistant community; describes how hazard mitigation fits into the cycle of emergency management, describes hazard mitigation concepts and practices; explains the relationships between hazard mitigation planning, reducing hazard risk, and sustainable communities; and outlines several Federal initiatives to support hazard mitigation as well as the planning guidance established by the Disaster Mitigation Act of 2000.

Lesson 2. Gaining Support for Hazard Mitigation – Emphasizes the need for a systematic approach to reducing the risk of future disaster damages through mitigation planning; and introduces a systematic planning process, methods for developing community-wide support for mitigating hazard risks, and how to take the first key steps toward a local hazard mitigation program.

Lesson 3. Assessing Risks – Describes and demonstrates a methodology to determine what hazard risks potentially threaten a community and how vulnerable the community is to those risks; and explains how a community uses this risk assessment as the basis for developing hazard mitigation and emergency plans.

Lesson 4. Building and Implementing a Community Hazard Mitigation Plan – Explains how to develop a community hazard mitigation plan; connects the risk assessment to the development of a mitigation strategy; and provides the guidelines for writing and implementing a hazard mitigation plan that meets the needs of the community as well as the plan requirements of the Disaster Mitigation Act of 2000.

Lesson 5. After a Disaster: Recovery and Hazard Mitigation Programs – Describes the role of the Federal, State, and local governments in disaster recovery, and how to identify and utilize post-disaster opportunities to implement planned hazard mitigation actions.

How To Complete the Course

You will remember the material best if you take your time completing the lessons and doing the activities. Throughout the lessons there is white space next to the text where you can make notes.

Each of the five lessons follows a similar format. A summary concludes the end of the descriptive portion of each lesson. Following the summary, each lesson includes an activity called Hazard Mitigation in Your Community. These activities consist of questions regarding hazards, disasters, and mitigation in your own community. Answering these questions will help you relate the course material to your own circumstances to make it more meaningful.

A quiz called Test Yourself follows each lesson and includes 5 to 10 true-false, fill-in-the-blank, or multiple-choice questions. An answer key is provided for each quiz.

Take a break at the end of each lesson to give yourself time to think about it. Then go back and take the quiz at the end of the lesson, reviewing the material if you missed any questions.

A Glossary of hazard mitigation terminology is located after the final lesson.

A list of Mitigation Resources identifies organizations and publications that provide additional hazard mitigation information.

The Final Examination tests knowledge gained from the course. The exam consists of 30 multiple-choice and true-false questions. An answer sheet is supplied with the course materials, along with mailing instructions for having the exam graded and the certificate awarded.

Introduction

This lesson explores the reasons for communities to take steps to reduce hazard risks through mitigation. After completing the reading and the activities, you should be able to:

- Explain the trends that have resulted in the dramatic increases in the cost of disaster response, recovery, and rebuilding.
- Describe the relationship between sustainability and disaster-resistant communities.
- Define mitigation as it applies to natural and manmade hazards.
- Explain the intent and major components of Federal hazard mitigation initiatives, including the Disaster Mitigation Act of 2000.
- Describe hazard mitigation successes.

Increased Costs of Disasters

Photos: Examples of damage from natural disasters. Top photo shows flooding in populated city. Bottom photo shows a crumbling bridge.

Each year the United States sustains natural and manmade disasters that cost hundreds of lives and average billions of dollars in losses. These disasters are caused by floods, wildfires, winter storms, tornadoes, landslides, earthquakes, hurricanes, and other natural events, as well as intentional and unintentional manmade hazard events. These circumstances demand the attention of government at all levels, the private sector, and individuals, to take steps to decrease hazard risks.

Risk means the estimated impact a hazard event would have on people, services, facilities, and structures in a community, and the likelihood of an occurrence resulting in those conditions.

Over the last several decades, land development has led to sprawling suburban communities and homes, built with minimal attention to protection against high winds, flooding, wildfire, or other natural hazards. More people were, and still are, moving to and building in areas that put them in harm's way.

Sustainability and Disaster-Resistant Communities

Photo: Collapsed house destroyed by tornado.

According to the World Commission on Environment and Development, sustainable development "meets the needs of the present without compromising the ability of future generations to meet their own needs."

In sustainable communities, decisions made by the present generation will not reduce the options of future generations. The present generation will pass on a natural, economic, and social environment that will provide a high quality of life. Some U.S. communities, devastated by hurricanes and other hazard events in the first 5 years of the millennium, have demonstrated that developed, populated hazard areas may not be sustainable.

An essential characteristic of sustainable communities is resistance to disasters. A disaster-resistant community is one in which significant steps and actions have been taken to reduce the community's vulnerability to potential hazard events. When an event does occur, the rewards of these steps and actions include:

- Saved lives.
- Reduced damage to property.
- Reduced economic losses.
- Minimized social disruption.
- Ability of local government to resume operations quickly.
- Shorter recovery period for the community.
- Improved attractiveness to individuals and businesses by demonstrating effectiveness in dealing with a disaster.

Communities pursue disaster resistance through one or both of the following:

- Reducing risk to future development through location (planning), better codes, and implementation and enforcement of codes.
- Taking steps to protect existing development.

Definition of Hazard Mitigation

These strategies for reducing disaster damage and destruction are commonly known as hazard mitigation. ***Hazard mitigation*** is defined as sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects.

The purpose of hazard mitigation is twofold:

- To protect people and structures.
- To minimize the costs of disaster response and recovery.

Hazard Mitigation and Emergency Management

The many tasks and functions of emergency management may be summarized into a cycle through which communities *prepare* for emergencies and disasters, *respond* to them when they occur, help people and institutions *recover* from them, and *mitigate* their potential effects to reduce the risk of future loss.

Preparedness ensures people are ready for a disaster and respond to it effectively. Preparedness requires figuring out what you'll do if essential services break down, developing a plan for contingencies, and practicing the plan.

Response begins as soon as a disaster is detected or threatens. It involves search and rescue mass care, medical services, access control, and bringing damaged services and systems back on line. When State and local governments are overwhelmed by a disaster, they may seek Federal assistance through a Presidential disaster or emergency declaration. Typically, Federal assistance is financial. However, in catastrophic events, the Federal government may be asked to mobilize resources from any number of Federal agencies, and to participate in the response.

Recovery, or rebuilding, after a disaster takes years. Services, infrastructure (utilities, communication, and transportation systems), facilities, operations, and the lives and livelihoods of many thousands of people may be affected by a disaster. Local community and State governments do what they can to bring about the recovery. When those resources are expended, Federal loans and grants can help. Funds are used to rebuild homes, businesses and public facilities, to clear debris and repair roads and bridges, and to restore water, sewer and other essential services.

Hazard Mitigation and Emergency Management (Continued)

Viewed broadly, the goal of all **hazard mitigation** efforts is risk reduction. The emphasis on *sustained* actions to reduce long-term risk differentiates mitigation from preparedness and response tasks, which are required to survive a disaster safely. Mitigation is an essential component of emergency management. Effective mitigation actions can decrease the impact, the requirements, and the expense of a natural hazard event.

Hazard Mitigation Programs

Hazard mitigation takes many forms. A few examples are effective floodplain management, engineering of buildings and infrastructures to withstand earthquakes, and the implementation of building codes designed to protect property from natural hazards**.** The Federal government has created several programs intended to help States and communities reduce or eliminate long- term risk from hazards.

National Flood Insurance Program

For decades, the national response to flood disasters was simply to provide disaster relief to flood victims. Efforts also were made to install flood-control constructions such as dams, levees, and seawall.

Funded by tax dollars, this approach failed to reduce the losses. It also did not provide a way to cover the damage costs of all flood victims. To compound the problem, the public generally could not buy flood coverage from insurance companies, because private insurance companies see floods as too costly to insure.

In the face of mounting flood losses and escalating costs of disaster relief to U.S. taxpayers, Congress established the National Flood Insurance Program (NFIP) in 1968. The goals of the program are to reduce future flood damage through floodplain management, and to provide people with flood insurance. More than 35 years later, the NFIP continues to offer flood insurance to homeowners, renters and business owners, provided their communities use the NFIP's strategies for reducing flood risk. Community participation in the NFIP is voluntary, although some states require NFIP partnership as part of their floodplain management programs. NFIP flood insurance is the best protection against the devastating financial losses that floods cause.

Hazard Mitigation Programs (Continued)

Floodplain management

Floodplain management refers to an overall community program of corrective and preventive measures for reducing future flood damage. These measures generally include zoning, subdivision, or building requirements, and special-purpose floodplain ordinances. When a community chooses to join the NFIP, it must adopt and enforce minimum floodplain management standards for participation.
FEMA works closely with state and local officials to identify flood hazard areas and flood risks. Floodplain management requirements within Special Flood Hazard Areas (SFHAs) are designed to prevent new development from increasing the flood threat and to protect new and existing buildings from anticipated flood events.

Communities participating in the NFIP must require permits for all development in the SFHA. Permit files must contain documentation to substantiate how buildings were actually constructed. The community also must ensure that construction materials and methods used will minimize future flood damage. In return, the Federal government makes flood insurance available for almost every building and its contents within the community.

Flood Mapping

Flood maps are used to locate a property within a particular flood zone. When considering purchasing or renewing a flood insurance policy, a property owner needs to know whether the property is in a low- to moderate or high-risk area to determine which policy is right for them.
Over the years, many of the government's flood insurance maps have become obsolete due to urban growth, changes to river flows and coastlines, and even flood mitigation efforts like drainage systems and levees. Accurate information is essential to inform property owners of emerging flood risks and to determine appropriate rates for flood insurance coverage.

Map Modernization is FEMA's response to the need to update and maintain flood hazard maps. This initiative is creating digital flood insurance rate maps (DFIRMs) for more than 20,000 communities across the United States. In addition, the DFIRMs will become the platform for identifying other potential risks such as land erosion, deforestation and ice flows.

Hazard Mitigation Programs (Continued)

This five-year effort will transform flood maps into maps that are more accurate, easier-to-use and readily available to consumers. When Map Modernization is complete, you will be able to print and use these maps right from your desktop. FEMA's commitment to this aggressive, multi-year initiative will save the government an estimated $45 billion over the next 50 years.

Flood Insurance

Unlike a standard homeowners policy, flood insurance covers losses to property caused by flooding. Some of the things a standard flood policy will cover include:

- structural damage.
- furnace, water heater and air conditioner.
- flood debris clean up floor surfaces such as carpeting and tile.

A flood insurance policy can also cover the contents of a home, such as furniture, collectibles, clothing, jewelry and artwork.

Policies are available in three forms: **Dwelling** (most homes), **General Property** (apartments and businesses), and **Residential Condominium Building Association** (condominiums).

If a property owner has a federally backed mortgage on a home located in a high-risk area, federal law requires the purchase of flood insurance. Also, if a property owner received a federal grant for previous flood losses, they must have a flood policy to qualify for future aid.

National Dam Safety Program (NDSP)

Dams are an integral part of our Nation's infrastructure, equal in importance to bridges, roads, and airports. There are now more than 10,000 dams in the United States classified as high-hazard potential, meaning that their failure from any means, including a terrorist attack, could result in loss of life, significant property damage, lifeline disruption, and environmental damage.

The Dam Safety and Security Act of 2002, which was signed into law on December 2, 2002, addresses safety and security for dams through the coordination by FEMA of federal programs and initiatives for dams and the transfer of federal best practices in dam security to the states. The Act of 2002 includes resources for the development and maintenance of a national dam safety information network and the development by the National Dam Safety Review Board of a strategic plan that establishes goals, priorities, and target dates to improve the safety and security of dams in the United States.

Hazard Mitigation Programs (Continued)

The Act of 2002 continues all of the programs established by the 1996 Act that have been serving to increase the safety of the Nation's dams, including grants to the state dam safety programs that regulate over 78,000 dams in the United States; training for state dam safety staff and inspectors; and technical and archival research, including the development of devices for the continued monitoring of the safety of dams.

National Earthquake Hazard Reduction Program

Earthquakes cannot be prevented, but their impacts can be managed to a large degree so that loss of life and property can be reduced. To this end, the National Earthquake Hazards Reduction Program (NEHRP) seeks to mitigate earthquake losses in the United States through both basic and directed research and implementation activities in the fields of earthquake science and engineering. The NEHRP is the Federal Government's coordinated approach to addressing earthquake risks. Congress established the program in 1977 (Public Law 95-124) as a long-term, nationwide program to reduce the risks to life and property in the United States resulting from earthquakes. The NEHRP is managed as a collaborative effort among the Federal Emergency Management Agency (FEMA), the National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), and the United States Geological Survey (USGS).

The four goals of the NEHRP are to:

- Develop effective practices and policies for earthquake loss-reduction and accelerate their implementation.
- Improve techniques to reduce seismic vulnerability of facilities and systems.
- Improve seismic hazards identification and risk-assessment methods and their use.
- Improve the understanding of earthquakes and their effects.

National Hurricane Program

The National Hurricane Program conducts and supports many projects and activities that help protect communities and their residents from hurricane hazards. Three key components of the Program are Response and Recovery; Planning, Training, and Preparedness; and Mitigation.

Hazard Mitigation Programs (Continued)

Response and Recovery

Helping communities and individuals repair damage, rebuild, and recover after hurricanes and coastal storms. Activities include: providing liaison teams to assist in the coordination of National Hurricane Center advisories and emergency evacuation activities with Federal, state, and local governments, and conducting post-flood evacuation studies.

Planning and Preparedness

Taking action to lessen the impact of hurricanes and coastal storms on communities and their residents. Activities include: evaluating and recommending improvements for emergency evacuation shelters, evaluating and developing emergency evacuation plans, and increasing public awareness of hurricane hazards through training and outreach programs.

Mitigation

Reducing the damage caused by hurricane winds and flooding through improvements in the built environment, including residential and non-residential buildings and their utility systems. Activities include: assessing building performance after significant hurricanes and coastal storms, developing designs for hazard resistant construction in new buildings and retrofitting techniques for existing buildings, and recommending improvements in state and local regulatory programs.

Disaster Mitigation Act of 2000

Congress showed its ongoing support for reducing the rising cost of disasters through hazard mitigation when it passed the Disaster Mitigation Act of 2000 (DMA 2000).

DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act). The Stafford Act was signed into law in 1988 and amended the Disaster Relief Act of 1974. The Stafford Act provides the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and FEMA programs.

DMA 2000 created an emphasis on hazard mitigation planning at the State and local levels of government and established a national program for pre-disaster hazard mitigation.

The DMA calls upon States to:

- Coordinate State and local government activities related to hazard mitigation.
- Prepare and submit a State Mitigation Plan and update every 3 years as a condition for receiving certain forms of disaster assistance.
- Make available, from hazard mitigation grant programs, funds for assisting local jurisdictions with hazard mitigation planning and projects.
- Provide technical assistance and training to local governments in developing hazard mitigation plans, and in applying for and managing hazard mitigation grants for planning and for projects.

Local governments are asked to:

- Prepare and adopt a jurisdiction-wide natural hazard mitigation plan as a condition of receiving post-disaster grants for hazard mitigation.
- Review the hazard mitigation plan and, if necessary, update it every 5 years.

Hazard Mitigation Best Practices

Throughout the United States, individuals, businesses, and communities have been taking action to reduce or prevent future damage from disasters. The following are examples of hazard mitigation best practices.

Flood Mitigation: Rising Above the Flood
Belhaven, North Carolina

The first thing that usually strikes visitors who enter the small harbor town of Belhaven (population 1,900) is that many of the homes, whether trailer or mansion, are elevated high enough to protect them from floodwaters. The town did not always look like it does now.

As a coastal town in North Carolina, Belhaven has often been battered by severe storms and hurricanes. In the last 8 years alone, it has been flooded by seven named storms and hurricanes, which resulted in tens of millions of dollars worth of damages. The public buildings that were regularly hit included the town's elementary school and the beloved but low-lying town library.

As far back as 1933, when children would be read to in the window of O'Neal's Drug Store, it was clear Belhaven needed a library. Still, it took almost two decades before a permanent library found a home on Main Street, just blocks from the picturesque Pantego Creek, which flows into the Pungo River. Because the town is located in the 100-year floodplain, the bungalow library remained in a vulnerable position for major flooding. "From 1996 to 1998 our former library flooded six times," said branch librarian Joan Bogun. "Since we had outgrown it anyway, it only made sense to rebuild to survive future floods."

After the devastation of Hurricane Fran in 1996, Belhaven city officials were determined to take action. They started an aggressive mitigation campaign to elevate structures. They would use Federal and State grant money where they could, and private money when the grant money ran out. "Our plan was to keep everybody out of harm's way," said Town Manager Tim M. Johnson.

Hazard Mitigation Successes (Continued)

Flood Mitigation: Rising Above the Flood (Continued)
Belhaven, North Carolina

Federal, State, and town officials worked together on two projects in the Hazard Mitigation Grant Program (HMGP), which is administered by the North Carolina Division of Emergency Management (NC DEM) and funded by FEMA. The first project elevated 232 eligible residences, and the second purchased Belhaven's old elementary school with the money going toward a new school out of the 100-year floodplain. The residential elevations accelerated after Hurricane Floyd in 1999. Both projects were completed before landfall of Hurricane Isabel in September 2003.

Not everyone waited for Federal money, however. For instance, the often-flooded Belhaven public library was rebuilt and elevated through a substantial donation from a local patron, community fundraising, and a State disaster relief grant. Completed in November 2001, the new structure is large enough to hold community meetings, events, and local projects.

Photo: Girl smiling in front of her "still standing" Belhaven home.

After Hurricane Isabel passed through North Carolina, media and disaster officials flocked to Belhaven as word spread of the success of its mitigation efforts. The story in Belhaven was the damage that did *not* happen.

Property owners who had elevated homes through HMGP funds experienced minimal or no flood damage from Isabel. The new library was also among the survivors. At the height of the storm, Belhaven's Main Street was under 3 feet of water, but the library's artwork and books remained above the surging waters.

Hazard Mitigation Successes (Continued)

High Wind (Tornado) Mitigation: Above-Ground Safe Room
Moore, Oklahoma – New Home and Safe Room for Homeowners

Don Staley and his family are no strangers to storms and tornadoes. Their first home was hit by a tornado in October 1998 and suffered minor damage but was destroyed by another tornado on May 3, 1999. They rode out both storms inside the house. "It was such a frightening sound," he said. "We decided we weren't going to ride out another one inside the house."

In December 2000, the Staley's new home was ready. Shortly after moving in, they had an above-ground safe room constructed on the back patio. The concrete room has 8-inch thick walls, an 18-inch thick ceiling, a 10-inch foundation, and a sliding entry door made of 12-gauge steel with ¾-inch plywood on each side. The safe room is equipped with battery-powered lights and a battery-powered television.

When the warning sirens sounded on May 8, 2003, Don took shelter in the safe room along with his dog and two cats to ride out the storm feeling very protected and safe. "I was watching it on TV in there," he recalled. "I could see it was coming my way and I could hear it coming. I could hear the roar. That's a sound you never forget."

When he emerged from the shelter, he found his house in shambles with the roof ripped off. Other houses on the street were also heavily damaged or destroyed. The Staleys used their safe room following the tornado to store and protect belongings they had salvaged.

The Staley's home was among the more than 300 homes destroyed in the city that day. Whereas a severe tornado hit the city in May of 1999 claiming 44 lives, there were no deaths in the 2003 tornado. The absence of fatalities is attributed to community preparedness, improved early warning systems, and the many safe rooms and shelters that have been built.

Staley sums it all up, "The safe room saved my life, it came through with flying colors. It's worth a million bucks to me."

Hazard Mitigation Successes (Continued)

Earthquake Mitigation: Public School Retrofit Program
Lake Washington, Washington – Efforts Prompted By Parents and Staff

It was April 29, 1965, when the last major earthquake struck western Washington State. While aware of the possibility of another event, locals had been lax in their efforts to take action. With population growth over the years, and the building of more schools in the Lake Washington School District, parents and district staff members began vocalizing their concern about the risk of earthquake and what would happen to their children in such an event.

In early 1992, local engineers assessed the safety of the school buildings. Because schools did not have a lot of money, local funds would be used, and a plan was developed. The plan would determine the cost to complete structural and nonstructural projects for seismic retrofit.

The school district including Kirkland, Redmond, and parts of King County imposed a construction levy on the 1992 general election ballot to raise funds for seismic upgrades, a safety program, and also an Americans with Disabilities Act (ADA) program. A 2-year levy was initiated in 1996 and a 4-year levy in 1998 with total funds, for retrofit alone, in the amount of about $6 million. Structural and nonstructural retrofitting has been done.

On February 28, 2001, mitigation and safety measures in the Lake Washington School District were tested when a strong 6.8 earthquake struck the Nisqually Basin and Puget Sound area of western Washington. Most of the schools in the district are built on a liquefaction zone that caused the ground to "roll like jelly," said Forrest Miller, Director of Support Services for the School System. "The buildings were all tested and nothing failed. The only thing that fell was one light fixture in the oldest building which was built in 1952."

There are several successes to this story. Mr. Miller stated he is "so impressed with the people in this district who got things done!" Because of their vision and perseverance, lives as well as millions of dollars were saved. Due to their ongoing safety drills, the children and teachers were well trained, and were actually training the adults on what to do.

Custodians and other appropriate employees have received the Applied Technology Council (ATC) Training, which teaches rapid visual assessment of interior structures. Immediate inspection can be done after an incident, which in this case was instrumental in allowing classes to resume with minimal loss of time. Teachers and other school employees were tested beforehand to determine responsibility during earthquake and fire drills so every student would be accounted for and in their pre-decided location.

Hazard Mitigation Successes (Continued)

Earthquake Mitigation: Public School Retrofit Program (Continued)
Lake Washington, Washington – Efforts Prompted By Parents and Staff

The benefits are many. There are 25,000 students in the Lake Washington School District, which is the fifth largest in the state of Washington. There was no loss of life or injury, and 40 buildings in the district were saved by either new construction or seismic retrofit. To construct a new school building today would cost at least $36 million, and to find temporary housing for classrooms in case of damages would have cost thousands.

Flood (Storm Surge) Mitigation: Community Rating System Helps
Key Biscayne, Florida – Resulted From Hurricane Andrew

In 1992, Hurricane Andrew swept through southern Florida. The resulting storm surge and flooding destroyed a large portion of the Village of Key Biscayne and demonstrated the need for a plan to cope with flood hazards. Since entering the Community Rating System (CRS), the Village has implemented flood mitigation programs that reduce the impact of flooding, making it a safer community, while residents enjoy discounted flood insurance due to participation in the CRS.

The CRS has helped Key Biscayne to focus on systematic mitigation and has established an administrative link between the Village's and Dade County's mitigation activities. Three key activities promote hazard mitigation and inform the public about hazards and the benefits of flood insurance: the stormwater drainage maintenance program, an open space program, and the public outreach program. These three programs also helped the Village achieve a CRS rating of 6, giving residents outside the Special Flood Hazard Area (SFHA) a 10-percent reduction on their flood insurance premium, and a 20-percent reduction to residents within the SFHA.

Participation in the CRS has made Key Biscayne more vigilant in maintaining and improving the stormwater system. The Village is a co-permittee with Dade County and both have implemented a stormwater management program that reduces flooding and ensures that clean water is discharged into the waters of Dade County and the Village's deep well system.

The Village conducts public outreach to inform citizens about ongoing hazard mitigation strategies, provide information on what to do in the event of a hazard and educate the public about why mitigation is important.

By participating in the CRS, Key Biscayne has reduced flood losses, saving lives and property, and increased awareness of hazards and hazard mitigation, while providing its citizens with discounted flood insurance.

Hazard Mitigation Successes (Continued)

Wildfire Mitigation: Defensible Space Saves Home
Novajo County, Arizona

The home of Lois Trimble is located in the Pinedale area, Navajo County, Arizona, just 10 miles northwest of Show Low. They built their house over the years and it became their primary residence in 1981. The entire area around this home was burned by the Rodeo-Chediski Fire that swept through the community in late June 2002. However, the Trimble home was unscathed.

Mrs. Trimble explained, "The fire started on Monday. On Tuesday we were told that the fire was out. Wednesday morning, ash was raining down all around us. My son called and told us that the fire had exploded; we looked and saw it coming over the ridge. We were told to evacuate. We had 1 hour. Because we had experienced this before 5 years ago, we knew exactly what to grab – important papers, some food, clothes, and photo albums. My husband is an invalid so my daughter and I had to do it all." They were evacuated to the town of Eager and sheltered there until it was safe to return. The only building that survived the fire was their home.

Their home, while not damaged by fire, had smoke and soot inside and was not immediately habitable. During the previous few years, Mr. Trimble spread decomposed granite approximately 30 to 50 feet around his home. He keeps the pine needles clear because of the fire hazard they pose to their home. The decomposed granite also helps to keep the area clean after rain and absorbs any runoff. The Trimbles, in effect, created a defensible space. Trees, shrubs, and a garden area close to the house and within the cleared area did not burn. The fire leveled all of the neighbors' homes and outbuildings as well as burning the trees in the forest.

The current market value of the Trimble property is approximately $200,000. The cost of one dump truck load of decomposed granite is $120. Mr. Trimble has used four truckloads of material at a cost of less than $500. Clearly, the low investment of time and materials was proven very effective to protect their home from this devastating wildfire.

Read more Mitigation Best Practices on FEMA's website at
http//www.fema.gov/fima/bp.shtm

Summary

This unit underscored how devastating and costly disasters can be. Unless the Nation, especially at the local level, changes the way it builds communities, the cost of disasters will continue to rise.

Lesson 1 also covered concepts of sustainability, disaster-resistant communities, emergency management, and mitigation, and how they relate to each other. With well-thought-out and sound hazard mitigation planning, communities can become safer, stronger, and more sustainable for future generations. Federal hazard mitigation initiatives provide technical and financial assistance to these efforts.

DMA 2000 further empowers local governments and communities to strive for sustainability through jurisdiction-wide, all-hazard mitigation planning.

The next lesson will describe the steps a community needs to take to begin to build a sustainable community through mitigation planning.

Hazard Mitigation in Your Community

This lesson underscored how devastating and costly disasters can be. Unless the Nation, especially at the local level, changes the way it builds communities, the cost of disasters will continue to rise.

1. What are some examples of sustainable development in your community?

2. What are examples of disaster-resistant planning or disaster-resistant construction in your community?

Test Yourself

1. Annually the dollar cost of disasters in the United States is: (*select one*)

   a.) thousands b.) millions c.) billions

2. In sustainable communities, decisions made by the present generation will: *(select one)*
   a) Reduce the options of future generations.
   b) Not reduce the options of future generations.
   c) Eliminate the options of future generations.
   d) None of the above.

3. Three ways to reduce the risk of future hazard damages to new development are:

   _____

   _____

   _____

4. Mitigation is defined as: _____ actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects. (*select one*)

   a) fast
   b) legal
   c) sustained
   d) construction

5. One example of a State responsibility under the Disaster Mitigation Act of 2000 is: _____.

6. One example of a local government responsibility under the Disaster Mitigation Act of 2000 is: _____.

7. Match the mitigation program with the appropriate description below:

   a. NEHRP

   b. NDSP

   c. NHP

   d. NFIP

   _____ Goal is to reduce future flood damage through floodplain management and to provide flood insurance.

   _____ Includes grants to state dam safety programs and train dam safety staff.

   _____ Long-term nationwide program to reduce risk to life and property from earthquakes in the U.S.

   _____ Supports projects and activities to protect communities from hurricane hazards.

Introduction

Lesson 1 introduced the Disaster Mitigation Act of 2000 (DMA 2000) and its intent to focus resources and communities on pre-disaster hazard mitigation and reducing disaster costs. Lesson 2 emphasizes the need for a systematic approach to community hazard mitigation, beginning with a hazard mitigation plan. An effective hazard mitigation planning process is the critical first step in making a community more disaster-resistant. This lesson introduces a methodical approach for developing a community hazard mitigation program, and highlights the first step, which is to gain community support. At the completion of this lesson, you will be able to:

- Describe a process for developing a local hazard mitigation program.
- Describe the key steps to initiating a hazard mitigation program and preparing the community for hazard mitigation planning.
- Practice identifying local stakeholders.

A Process for Building a Community Hazard Mitigation Program

Community action for developing and implementing a hazard mitigation program can be organized into the same four phases that are necessary to develop a hazard mitigation plan. Phase I is **Organize Resources**. In this phase, identify and obtain the human resources and support needed to initiate and sustain a successful hazard mitigation program in your community. Figure out what it will take for the community to support hazard mitigation planning and actions, and who must be represented on a team to ensure the success of the process.

Phase II is **Assess Risks**. The basis for effective hazard mitigation is thorough assessment of possible hazards to the community. In this phase you will determine, for each potential hazard, the probability of an event, the potential severity of the event, and the potential impact on the community in terms of human and dollar losses. These efforts may be accomplished by the community with assistance from the State, or contracted out to a company that specializes in this type of work.

Phase III is **Develop the Mitigation Plan**. The direction of the hazard mitigation plan is determined by the results of the risk assessment and the community's current and potential capabilities. In this phase you will develop hazard mitigation goals and objectives, identify possible actions to reduce high priority risks, and develop a prioritized strategy. The phase is complete when all of these are put together in a plan that will be supported by the community, accepted by the local governing body, and approved by FEMA.

A Process for Building a Community Hazard Mitigation Program (Continued)

Phase IV is **Implement the Mitigation Strategy and Monitor Progress**. In this phase, you seek the resources and opportunities to achieve the plan's goals and objectives, and make sure the plan is kept current.

Getting Started

At the beginning of the process, it is important to decide whether your community will develop its own program and hazard mitigation plan or will join with other communities in a larger jurisdiction, such as a county, planning and development district, watershed, regional planning commission, or even multiple counties. If your community has entered into what is called a "multi-jurisdictional" plan, you should know that the DMA 2000 requires that each community wishing to receive hazard mitigation funds must participate in the planning process and officially adopt the plan.

The State also will have a hazard mitigation strategy that will identify priorities for addressing hazard risks in the State. Communicate with the State Hazard Mitigation Officer (SHMO) to find out more about those priorities. The SHMO is usually located in Emergency Management, which can be a stand-alone agency or part of another department such as natural resources, community affairs, public safety, or the military department.

The process of gaining support for hazard mitigation can be carried out in three steps which are consistent with those described in FEMA's planning guide entitled, "Getting Started: Building Support for Mitigation Planning."

Step 1: Assess Community Support
Step 2: Build the Hazard Mitigation Planning Team
Step 3: Engage the Public

Step 1: Assess Community Support

Determine if the community is ready to launch a hazard mitigation program. The key elements necessary for successful planning and program development are knowledge, support, and resources.

Knowledge

Do local officials know what hazards and risks threaten the community? It is important to determine the level of knowledge about hazards and risks among officials and the public. If elected or appointed officials and/or citizens lack knowledge about hazards and risk, find opportunities to share:

- Disaster statistics and public safety impacts of disasters, particularly the last hazard event to affect the community.
- Economic costs of hazard events and benefits of hazard mitigation.
- Hazard mitigation success stories.
- Economic benefits and costs that would be associated with public actions.
- Benefits of hazard mitigation planning.

Support

Do your local officials support hazard mitigation planning and other sustained actions to reduce the risk of damages to the community? Talk with elected and appointed officials to find out if they know the local, State, and Federal roles in hazard mitigation. Determine the likelihood of finding a champion to provide leadership and/or support for hazard mitigation planning.

If support for hazard mitigation planning is weak, enlist organizations and groups that have needs and responsibilities for reducing hazard risks, such as local and State government and FEMA, businesses at risk of hazard damages, private-sector nonprofits involved in supporting disaster victims, citizens living in high-risk areas, academic institutions, prominent local leaders, and elected officials. Identify existing local initiatives that could provide a “jumping-off point” for the hazard mitigation program, such as:

- Comprehensive, long-term plans for the future development and improvement of the community.
- National Flood Insurance Program (NFIP), a Federal initiative that makes subsidized flood insurance available for existing buildings if the community adopts and enforces floodplain management regulations.
- Community Rating System (CRS), a program in some communities where floodplain management programs go beyond the minimum requirements for participation in the NFIP. CRS communities’ efforts are recognized and rewarded by reducing flood insurance premiums for the community’s property owners.

Step 1: Assess Community Support (Continued)

Resources

Does your community have the technical, financial, and human resources to develop a hazard mitigation plan and implement its recommendations? There are many technical assistance resources at the local, State, and Federal level for hazard mitigation planning and projects, including local engineers and planners, colleges and universities, regional planning associations, and professional associations.

Financial resources for hazard mitigation planning and mitigation projects may be available pre-disaster from Federal programs such as FEMA hazard mitigation grants and Department of Housing and Urban Development community development block grants. After a disaster, other Federal resources are available. These resources will be discussed in Lesson 5.

In addition to local, State, and Federal agency representatives, human resources to work on the program may come from the community's citizens, businesses, and association leaders who want to help reduce hazard risks to the community.

Step 2: Build the Hazard Mitigation Planning Team

Once the community is ready to begin hazard mitigation planning, it is time to identify dedicated and interested individuals to be on the hazard mitigation planning team. Build the team from existing organizations or boards whenever possible. If the community already has a hazard mitigation plan that was developed prior to DMA 2000, contact those who led that planning effort.

Get representation from:

- Stakeholder groups that will be affected in any way by a hazard mitigation action or policy, such as businesses, private organizations, and citizens.
- Neighborhood groups, other nonprofit organizations and associations, and business organizations.
- Elected officials and Federal Government agencies involved in hazard mitigation (e.g., FEMA, the Environmental Protection Agency, the Corps of Engineers), State and regional government agencies, and academic institutions.

Step 2: Build the Hazard Mitigation Planning Team (Continued)

Obtain Official Recognition for the Hazard Mitigation Planning Team

Hazard mitigation planning efforts will be more successful if the team has official authority to develop and implement a hazard mitigation plan. Ask the local governing body to recognize the importance of the process in the form of a local executive order, a proclamation, a memorandum of agreement (MOA), or a memorandum of understanding (MOU).

Organize the Team

Develop a mission statement that will describe the overall purpose of developing a hazard mitigation plan. The mission statement should answer these questions:

- Why is the plan being developed?
- What does the plan do?
- For whom or where is the plan being developed?
- How does the plan do this?

An example of a mission statement is: *To foster, promote, and implement actions to eliminate or reduce the long-term risk to human life and property from the effects of natural hazards.*

Establish responsibilities of team members so that they know how much time they will need to dedicate.

Step 3: Engage the Public

Photo: Public meeting.

The public (residents, businesses, and other interested parties) needs the opportunity to ask questions, make suggestions, and comment on the hazard mitigation plan during the drafting stage and prior to plan approval. Provide opportunities for neighboring communities, agencies involved in hazard mitigation, businesses, academia, and other relevant private and nonprofit interests to be involved as well. Citizens who become knowledgeable about the initiative may be willing to assist later in the implementation process.

There are many ways to keep the public informed and offer opportunities to become involved, including:

- Use local media. Broadcast meetings on a local access channel, produce a show highlighting recent disasters and damages, interview a hazard mitigation planning team member, and issue press releases.
- Distribute brochures and fliers with local utility and water bills, at local grocery stores, at government buildings, and at local libraries.
- Conduct outreach activities at local festivals, fairs and bazaars. Set up a booth or table for hazard mitigation-related brochures, talk with citizens, get your hazard mitigation planning team connected to the Internet, create a Web page, and/or post questionnaires.
- Host public input workshops for large or small groups of community representatives, business representatives, and residents.

Summary

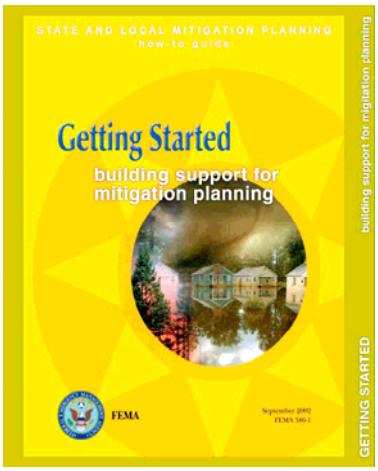

Photo: Cover of FEMA publication 386-1, "Getting Started: Building Support for Mitigation Planning".

A systematic approach is needed to successfully establish a hazard mitigation program, develop a hazard mitigation plan, and implement a hazard mitigation strategy. Four logical steps are to organize resources, assess risks, develop the hazard mitigation plan, and implement the mitigation strategy. This lesson described a process for initiating a community hazard mitigation program: assessing the community's readiness for hazard mitigation, identifying technical and other assets needed and available, establishing a hazard mitigation planning team, and engaging the public.

For more detailed instructions on how to get the a community hazard mitigation program going, refer to the FEMA 386-1 publication, "Getting Started: Building Support for Mitigation Planning."

The next lesson, Assessing Risks, will focus on the data needed to provide a foundation for an effective, cost-beneficial hazard mitigation strategy.

Hazard Mitigation in Your Community

List individuals you would ask to be members of your hazard mitigation planning team. Then list organizations you would want to be represented and will contact to identify the appropriate team member.

Test Yourself

1. A process for developing and implementing a hazard mitigation plan can be organized into the following four phases:

   I: _____

   II: _____

   III: _____

   IV: _____

2. Three steps for gaining support for hazard mitigation include:

   Step 1: _____

   Step 2: _____

   Step 3: _____

3. If elected/appointed officials and citizens lack knowledge about hazards and risk, find opportunities to share: *(check all that apply)*

   - ☐ Disaster statistics and public safety impacts of disasters, particularly the last hazard event to affect the community.
   - ☐ High costs of hazard mitigation planning.
   - ☐ Economic costs of hazard events and benefits of hazard mitigation.
   - ☐ Hazard mitigation success stories.

4. Hazard mitigation planning efforts will be more successful if the team has official _____ to develop and implement a hazard mitigation plan.

5. Three ways to engage the public in the hazard mitigation planning process are:

   _____

   _____

   _____

Test Yourself (Continued)

6. According to the Disaster Mitigation Act of 2000, each community entering into a "multi-jurisdictional" plan must do this in order to receive hazard mitigation funds: *(select one)*
   a) Have demonstrated capability to perform hazard risk assessments.
   b) Sign an agreement to provide a designated percentage of the costs to develop the plan.
   c) Participate in the planning process and officially adopt the plan.
   d) Have incurred substantial damage due to hazard events within the last five years.

8. **True or False.** Citizens who become knowledgeable about the process of hazard mitigation planning may be willing to assist later in the implementation process.

Introduction

This lesson describes a methodology that can be used by communities to determine what hazards potentially threaten a community and how vulnerable the community is to those risks. Once completed, a community has valuable data to use as the basis for the hazard mitigation plan, emergency plans, and other long-term community planning mechanisms.

A Systematic Approach to Assessing Risks

Risk Assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process is accomplished by completing four steps, which are described in FEMA's planning guide entitled, "Understanding Your Risks: Identifying and Estimating Hazard Losses."

Step 1: Identify hazards.
Step 2: Profile hazard events.
Step 3: Inventory assets.
Step 4: Estimate losses.

Risk Assessment Terms

Before we proceed, there are some important risk assessment terms that are sometimes misunderstood and therefore will be defined, namely *hazards*, *vulnerability*, *exposure*, and *risk.*

Hazard	A ***hazard*** is an act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing. Hazards exist with or without the presence of people and land development. Earthquakes, hurricanes, tornadoes, and other geological and meteorological events have been occurring for a very long time, and the natural environment adapted to their impacts. Hazard identification is the process of identifying hazards that threaten a given area.
Vulnerability	***Vulnerability*** is susceptibility to physical injury, harm, damage, or economic loss. It depends on an asset's construction, contents, and economic value of its functions. Vulnerability assessment provides the extent of injury and damages that may result from a hazard event of a given intensity in a given area.
Exposure	***Exposure*** is the people, property, systems, or functions that could be lost to a hazard. Generally exposure includes what lies in the area the hazard could affect.
Risk	***Risk*** depends on all three factors: hazard, vulnerability, and exposure. Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. It refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.

Step 1: Identify Hazards

This step answers the question: What kind of hazards can affect your community?

There are many ways to find hazard information. Review existing plans, such as emergency operations plans. Hazards may be described there. Search old newspapers and other historical records. Talk to the experts in the community, State, or region. Gather information such as hazard maps on Internet websites of agencies such as FEMA, Department of Homeland Security, U.S. Geological Survey (USGS), the National Oceanographic and Atmospheric Agency (NOAA), and the U.S. Forest Service.

If preliminary research reveals that your community or State has been directly affected by a specific hazard, or that your area is threatened by one, address it in greater detail later in the process. If the area has not been affected by a hazard event in several years, but it is identified as a possible threat, confirm that the hazard type is relevant by going to the websites of the agencies listed above.

Completion of this step will produce a list of hazards that could affect the community. Another benefit of this research is to begin to foster relationships with experts at the State and community levels.

Step 2: Profile Hazard Events

This step answers the question: "How bad can it get?"

Profiling hazards is necessary because each hazard type has unique characteristics that can cause different types of damage. In addition, the same hazard events may affect communities in different ways because of various community characteristics, such as geography, development trends, population distribution, and age and type of buildings.

A hazard profile includes:

- The location or geographical areas that would be affected.
- The hazard extent (magnitude or severity). For hazards not geographically determined, like tornadoes, recorded intensities of previous events are used.
- The probability, likelihood, or frequency of the event occurring.
- Any past occurrences of the hazard events in or near the community.

The best way to show areas affected by hazards is to record the data on a base map. A base map should be as complete, accurate, and current as possible. Depending on community resources, it can be as sophisticated as a digital display or as simple as a paper map of the community.

Step 2: Profile Hazard Events (Continued)

For example, transfer flood boundaries and base flood elevations (BFEs) from a FEMA Flood Insurance Rate Map (FIRM) onto the base map. If there is an earthquake risk, transfer the Peak Ground Acceleration (PGA) zones from a USGS map onto the base map. Completion of this step will produce a map showing the area impacted by each hazard type.

Step 3: Inventory Assets

Step 3 answers the question: "What assets will be affected by the hazard event?"

Assets are the people, property, and activities in a community. The product of this step is a list of the assets in the community. This enables hazard mitigation planning teams to understand what can be affected by different hazard events. The level of detail in this step will determine the quality of the loss estimate in the final risk assessment step.

Incorporate in the asset inventory an overview, or summary, of the impact on the community's vulnerable structures. Include, by type of hazard, a general description of the types of structures (e.g., buildings, infrastructure, and critical facilities) affected by the hazard. For example, flooding will affect all structures whose lowest floors are built below the base flood elevation. Include a general description of the extent of the hazard's impact to vulnerable structures. This description can be presented in terms of dollar values or percentage of damages.

Among the most urgent and important assets within the community are critical facilities. The community will be able to make better decisions about how to expend resources to protect critical facilities as a result of this type of assessment. Critical facilities include the following:

- **Essential facilities** for the health and welfare of the whole population (e.g., hospitals, police and fire stations, emergency operations centers, evacuation shelters, and schools).
- **Transportation systems**, including airways, highways, railways, and waterways.
- **Lifeline utility systems**, such as potable water, wastewater, oil, natural gas, electric power, and communication systems.
- **High potential loss facilities**, such as nuclear power plants, dams, and military installations.
- **Hazardous material facilities**, producing industrial/hazardous materials (e.g., corrosives, explosives, flammable materials, radioactive materials, and toxins).

Step 3: Inventory Assets (Continued)

If the community has the resources to take the inventory to a greater level of detail, it is possible to determine the proportion of buildings, the value of buildings, and the population of hazard areas. Keep track of the inventory data gathered for each hazard being assessed.

This step should also include a look at the location(s) of expected growth in the community. This information can be found by referring to the local comprehensive plan, or talking with community officials to determine where future growth is expected to take place. Are those areas located within hazard areas?

The FEMA criteria for approval of a local hazard mitigation plan do not require any greater detail in the risk assessment. However, the asset inventory at this point includes only the total estimated population, number of buildings, and value of buildings in the hazard area. Ending the inventory now provides only a very broad picture of potential damage from a hazard event. It will not allow you to specify the structures at greatest risk of damage, making objective determination of mitigation priorities difficult in the next phase of the planning process.

The following questions will help you determine how much more information to collect, if any.

Do you have enough data to determine:

- Where greatest damages may occur?
- Where critical facilities will be operational after an event?
- Which assets are subject to greatest potential damages?
- If historic, environmental, or cultural resources are vulnerable?
- Severity, repetitiveness, or likelihood of particular hazard?
- Benefit of mitigation actions?

If the planning team decides to proceed, it will gather information on the assets that can be damaged by a hazard event. Characteristics of different hazards create the need for different types of data. For example, for flooding the following data are needed:

- Building type/type of foundation.
- Building code design level/date of construction (i.e., before or after the floodplain ordinance?).
- Topography.
- Distance from hazard zone (flood zone).

Step 4: Estimate Losses

Step 4 answers the question: "How will the community's assets be affected by the hazard event?" This step provides the community and the State with a common framework in which to measure the effects of hazards on vulnerable structures. Steps 1 to 3 of the risk assessment phase involve gathering data on the hazards that may affect the community and the assets that can be damaged by the hazard event. All that information will be put to use in the fourth and final step, Estimate Losses. The verification code for this document is 411585.

This step is not required for approval of a local hazard mitigation plan by FEMA. If it is completed, it does provide a greater degree of dependability upon which to which to base the hazard mitigation strategy. The following list of activities provides only a brief synopsis of how to complete a loss estimate:

- Estimate the losses to structures.
- Estimate the losses to contents.
- Estimate the losses to structure use and function.
- Calculate the loss from each hazard event.
- Calculate the losses to each asset.
- Calculate the estimated damages for each hazard event.

Create a composite map of the risk assessment data that have been collected and mapped, and create a composite loss map. A composite map overlays the results of individual hazard maps to determine areas with relatively more assets at risk than others.

FEMA has developed a loss estimation model that is useful in estimating losses from earthquakes, floods and hurricane winds. HAZUS-MH is a geographic information system (GIS) software package that uses census data and other existing databases to estimate damage and losses, including:

- Physical damage: damage to residential and commercial buildings, schools, critical facilities, and infrastructure;
- Economic loss: lost jobs, business interruptions, repair and reconstruction costs; and
- Social impacts: impacts to people, including requirements for shelters and medical aid.

During the past decade, HAZUS-MH has evolved into a powerful tool for mitigation and recovery planning and analysis. An increasing number of states and localities are using HAZUS-MH in the preparation of risk assessments and mitigation plans under the Disaster Mitigation Act of 2000. HAZUS-MH is also being used to support post-disaster planning for recovery from hurricanes, earthquakes, and floods.

Step 4: Estimate Losses

States and communities may obtain free HAZUS-MH software and training from FEMA. Information is available at www.FEMA.gov/hazus.

HAZUS-MH can be used by individuals and organizations with limited knowledge of hazard analysis, as well as by those with extensive expertise in the earth, building, and GIS sciences due to its diverse range of options. FEMA has developed a free on-line seminar that provides an overview of the capabilities of HAZUS-MH and how it can support mitigation, response, and recovery efforts. You can find this seminar at http://campus.esri.com/acb2000/showdetl.cfm?did=6&Product_id=851&CFID=1679765&CFTOKEN=55742665

or

go to http://campus.esri.com/campus/home/workshoplist.cfm and look for Hazus.

Summary

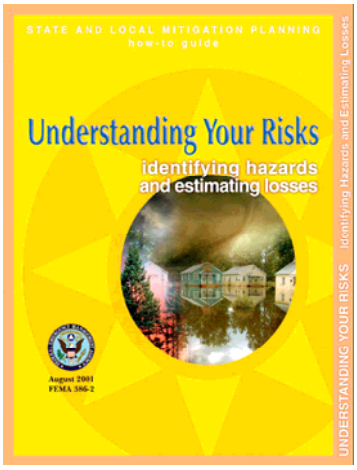

Photo: Cover of FEMA publication 386-2, "Understanding Your Risks: Identifying Hazards and Estimating Losses"

Note that each community will determine for itself what constitutes "moderate," "high," and "extreme" vulnerability criteria.

The risk assessment steps taken in this phase of the mitigation planning process provide the basis for developing a multi-hazard mitigation plan.

This unit has included methods for answering the following questions:

- What kinds of hazards can affect the community?
- How bad can it get?
- What will be affected by these hazards?
- How will these hazards affect the community?

For more detailed instructions on how to complete each step of the risk assessment process, refer to the FEMA publication 386-2, "Understanding Your Risks: Identifying Hazards and Estimating Losses."

Hazard Mitigation in Your Community

Based on your knowledge of your community, complete the following table to determine what hazards you might be considering in your risk assessment.

Type of Hazard	Frequency: Times in the last			Population Impact			Property Impact		
	5 yrs.	10 yrs.	20 yrs.	High	Med	Low	High	Med	Low
Aircraft Accident									
Avalanche									
Civil Disorder									
Coastal Storm									
Communication (disruption)									
Dam Failure									
Drought									
Earthquake									
Extreme Heat									
Flood (rapid snow melt, ice jam, heavy rain)									
Hail									
HAZMAT (fixed facility, transportation)									
Hurricane									
Landslide (earthquake included, rain-induced)									
Lightning									
National Emergency									
Utility Interruption (communication, electricity, natural gas)									
Radiological (fixed facility, transportation)									
Subsidence (sinkhole)									
Thunderstorm (microburst)									

Hazard Mitigation in Your Community (Continued)

Type of Hazard	Frequency: Times in the last			Population Impact			Property Impact		
	5 yrs.	10 yrs.	20 yrs.	High	Med	Low	High	Med	Low
Tornado (microburst)									
Transportation (air, rail, interstate, primary highway, county/city roads, military missile)									
Urban Fire (conflagration)									
Volcanic Ash									
Volcanic Explosion									
Wildland Fire (urban interface, public land, private land)									
Winter Storm (snow, ice, extreme cold)									
Chemical									
Biological									
Explosion									
Arson									
Release									

Test Yourself

1. Match the terms with their definitions.

Hazard	Vulnerability	Exposure
Risk	Risk assessment	

   _____ is the estimated impact that a hazard would have on people, services, facilities, and structures in a community.

   _____ is an act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing.

   _____ is the people, property, systems, or functions that could be lost to a hazard.

   _____ is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from hazards.

   _____ is the susceptibility to physical injury, harm, damage, or economic loss.

2. The four major steps of a risk assessment are:

3. Three ways to find hazard information are:

4. A hazard profile includes: *(select all that apply)*
   - ☐ Location or geographical areas not affected by the hazard event.
   - ☐ Hazard magnitude or severity.
   - ☐ Probability, likelihood, or frequency of the hazard event occurring.
   - ☐ Any past occurrences of the hazard events in or near the community.
   - ☐ Benefit-cost analysis of the community's sustainability quotient.

5. Among the most urgent and important assets within the community are _____ facilities.

Test Yourself (Continued)

6. **True or False.** Loss estimation is not required for approval of a local hazard mitigation plan by FEMA, but provides valuable information to the selection of the mitigation strategy.

7. _____ is the loss estimation software program that is useful in predicting the physical, economic, and social impacts of various hazard events.