



IS 393
April 1998

INTRODUCTION TO MITIGATION
INDEPENDENT STUDY COURSE



Federal Emergency Management Agency
National Emergency Training Center
Emergency Management Institute

CONTENTS

	Page
Foreword	2
Course References	4
Introduction	6
How to Complete This Course	8
Pretest.....	10
Unit One: The Case for Mitigation.....	1-1
Unit Two: Mitigation Strategies	2-1
Unit Three: Responsibilities and Resources for Mitigation	3-1
Unit Four: Building a Mitigation Program	4-1
Glossary	G-1
Additional Mitigation Resources	R-1
Answers to Pretest and Check Your Memory.....	A-1
Final Examination.....	E-1

FOREWORD

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 100-707) requires and encourages planning and implementation of mitigation activities in an effort to reduce the escalating costs of disasters. The Federal Emergency Management Agency (FEMA) is responsible for implementing the provisions of the Act. That responsibility includes providing training opportunities for all those who have responsibility for or interest in mitigation.

FEMA's training program covers all aspects of emergency management. Its two schools, the National Fire Academy (NFA) and the Emergency Management Institute (EMI), are located on a single campus in Emmitsburg, Maryland. Both the NFA and the EMI offer courses, workshops, and seminars on the main campus, and across the United States through funding of State training programs.

Independent Study Program

The Independent Study Program is another delivery mechanism through which FEMA provides expanded opportunities for emergency management training. The program is administered through the EMI, and consists of a series of self-paced courses. Several of the courses, including this one, are designed for people who have responsibilities for emergency management and for the general public. Other "audience-specific" courses are available only for audiences in emergency management disciplines.

The following courses are available to emergency management personnel and to the general public.

- IS-1:Emergency Program Manager: An Orientation to the Position
- IS-2:Emergency Preparedness, USA
- IS-3:Radiological Emergency Management
- IS-5:Hazardous Materials: A Citizen's Orientation
- IS-7:A Citizen's Guide to Disaster Assistance

The following courses are audience-specific.

- IS-8:Building for the Earthquakes of Tomorrow: Complying With Executive Order 12699
- IS-120: An Orientation to Community Disaster Exercises
- IS-275: The Emergency Operations Center's Role in Community Preparedness, Response and Recovery Operations
- IS-279: Retro-fitting Flood-Prone Structures
- IS-301:Radiological Emergency Response
- IS-330:Refresher Course for Radiological Monitors
- IS-336: Refresher Course for Radiological Response Teams.

Individual and group enrollments are available for all courses. There is no charge for enrollment. Individuals should submit an application form (FEMA Form L-173) to:

**FEMA Independent Study Program
Emergency Management Institute
16825 South Seton Avenue
Emmitsburg, Maryland 21727**

Requests for group enrollment (five or more participants) may be made by letter or on FEMA Form 21, Application for Group Enrollment, to the same address.

Enrollment in FEMA independent study courses may be accomplished electronically via the FEMA Home Page at <http://www.fema.gov>. Independent study courses open to the general public may also be completed on-line through the same internet address.

One semester hour of college credit may be obtained for each successfully completed course. For information regarding application for academic credit and fees, contact the Independent Study Office at EMI at 1-800-238-3358.

- American Red Cross, *Preparing Your Home for a Hurricane*, 1995.
- Barbee, Daniel and Clancy Philipsborn, *Multi-Objective Decision-Making for Local Officials*, 1988.
- Central United States Earthquake Consortium, *Disaster Resistant Communities, Final Report on the Evansville-Henderson Workshop to Develop a Model Disaster Resistant Community Program*, April 1997.
- Federal Emergency Management Agency, *44 CFR Part 206: Disaster Assistance: Hazard Mitigation Planning and Hazard Mitigation Grant Programs*, August 1990.
- Federal Emergency Management Agency, *Community Rating System Coordinators Manual*, July 1994.
- Federal Emergency Management Agency, *Disaster Assistance: A Guide to Recovery Programs*, November 1995.
- Federal Emergency Management Agency, *Emergency Planning Workshop*, June 1997.
- Federal Emergency Management Agency, *A Focus Group on Attitudes Toward Mitigation Among Homeowners, Small Businesses and Community Leaders*, November 1996.
- Federal Emergency Management Agency, *Guide for All-Hazard Emergency Operations Planning*, SLG-101.
- Federal Emergency Management Agency, *Local Hazard Mitigation Coordinator Front End Analysis, Final Project Report*, March 1993.
- Federal Emergency Management Agency, *Mitigation Program Development Guide*, FEMA-122, March 1987.
- Federal Emergency Management Agency, *Multi Hazard Identification and Risk Assessment, the Cornerstone of the National Mitigation Strategy*, 1997.
- Federal Emergency Management Agency, *National Mitigation Strategy*, 1995.
- Federal Emergency Management Agency, *Post Disaster Hazard Mitigation Planning for State and Local Governments*, DAP-12, September Federal Emergency Management Agency, *Post Federal Emergency Management Agency, Project Impact Guidebook*, 1997.
- Federal Emergency Management Agency, *Protecting Floodplain Resources*, 1996.
- Federal Emergency Management Agency, *Report on Costs and Benefits of Natural Hazard Mitigation*, March 1997.
- Federal Emergency Management Agency, *Robert T. Stafford Disaster Relief and Emergency Assistance Act and Miscellaneous Directives of PL 100-707*.
- Federal Emergency Management Agency, Disaster Field Training Organization, *Hazard Mitigation Programs, Draft*, January 1997.
- Federal Emergency Management Agency, Disaster Field Training Organization, *Mitigation Overview, Draft*, January 1997.

- Federal Emergency Management Agency, Disaster Field Training Organization, *NFIP Overview, Draft*, January 1997.
- Haimes, Yacov, "Risk Management and Natural Hazard Protection", *Natural Hazards Observer*, Volume XX, Number 3, January 1996. (Reprints available).
- Massachusetts Department of Environmental Management, Flood Hazard Management Program, *Flood Hazard Mitigation Planning: A Community Guide*, June 1997.
- Topping, Ken, "Mitigation From the Ground Up", *Natural Hazards Observer*, Volume XX, Number 6, July 1996. (Reprints available).
- Uba, Gerald, "Natural Hazard Mitigation Planning for a Disaster-Resistant Community", *Natural Hazards Observer*, Volume XXI, Number 4, March 1997. (Reprints available).
- U.S. General Services Administration, *Catalog of Federal Domestic Assistance*, 1997.
- Wetmore, French, and Associates, *Mitigation Measures*, June 1996.

INTRODUCTION

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. This means taking action to reduce or eliminate long-term risk from hazards and their effects.

For many, mitigation is a relatively new concept. FEMA has produced a series of courses intended to train those who have responsibility for or simply interest in mitigation planning and project implementation. This course provides an introduction for those who are new to emergency management and/or mitigation. It is also a prerequisite for a non-resident Applied Practices Series course called *Mitigation for Emergency Managers*. For additional information on *Mitigation for Emergency Managers*, contact the training officer at your State's emergency management agency.

This course should be completed at a comfortable pace. Upon completing all four units, reading the appendices and completing the activities and exam, learners should be able to:

- Explain the rationale for mitigation and its function as a component of emergency management.
- Define the principles, purposes, and priorities of mitigation.
- Describe mitigation measures that are applicable to local hazard risk problems.
- Summarize responsibilities and resources for mitigation.
- Outline mitigation planning considerations.

Course Overview

Introduction to Mitigation has four units, which are outlined below.

Unit One: The Case for Mitigation

This unit will describe WHY mitigation is so important in both emergency management and in community planning and development. It compares recent and historical costs of disasters from a national perspective, and introduces the National Mitigation Strategy developed by FEMA to guide and encourage mitigation efforts nationally. The identification of community hazards risks through hazard analysis is introduced. A methodology for identifying and analyzing hazards is provided, as is the opportunity to practice hazard analysis using local information.

Unit Two: Mitigation Strategies

Unit Two addresses WHAT the community can do about the hazard risks it has identified. The development of a local mitigation strategy requires some knowledge about the various mitigation measures that have been successful in communities around the nation. For ease of discussion, mitigation measures are categorized into six types: prevention, property protection, natural

resources protection, emergency services, structural projects, and public information. Several measures may be available to solve an existing problem; the unit also provides a list of criteria for deciding what approach is best for the community.

Unit Three: Responsibilities and Resources for Mitigation

Once the community has a strategy for reducing hazard risks, it must figure out HOW to accomplish it. Unit Three focuses on the resources available within the community for implementing mitigation, and on assistance available from outside organizations. Case studies of local mitigation projects are included as examples of how some communities implemented their strategies. Lists of Federal and State programs with mitigation components are also included.

Unit Four: Building A Mitigation Program

Having discussed important components of a mitigation program in the first three units, Unit Four takes a broader look at establishing mitigation as an ongoing community concern through the development of a mitigation plan. The process posed in this unit establishes a constituency for mitigation in the form of a community planning team that includes representatives from government, business, volunteer and other organizations, and individual citizens. It provides a series of checklists that can be used to develop or evaluate the mitigation program in your community.

HOW TO COMPLETE THE COURSE

You will remember the material best if you do not rush through it. Often there is white space next to the text where you can make notes. The more you **interact** with the material, the better you will remember it.

A **pretest** is included for your use in evaluating your current knowledge of mitigation. The questions are either “true-false” or multiple choice. Answer the pretest questions without looking ahead to the course materials. An answer key is provided so you can pay special attention to discussions in the text about missed questions.

Each of the four **units of instruction** follows a similar format. At the end of the descriptive portion of each unit a summary will be included. The summary briefly reviews the main points of the unit. Following the summary, each unit includes a section called Mitigating Your Hazards. This section consists of a series of questions that deal with hazards, disasters and mitigation in your own jurisdiction. Answering these questions will help you to relate the course material to your own circumstances to make the material more meaningful. This process will help you retain the knowledge you gain.

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

A **quiz** section called *Checking Your Memory* follows each unit. This section includes 5 to 10 true-false and multiple-choice questions that check accomplishment of unit objectives. An answer key is provided for each unit quiz.

A **glossary** is located after the final unit. It contains definitions of terms related to mitigation. Use the glossary as you complete the units of instruction. It may be a useful resource later.

The **Additional Mitigation Resources** section lists organizations that provide mitigation information and referral.

Answers to the Pretest and Checking Your Memory includes the correct responses to those sections.

The **Final Exam** tests knowledge gained from the course. The exam consists of 50 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.

PRETEST

(Answers on page A-1)

- 1) Mitigation is needed to reduce
 - a) loss of life and property damage from hazard events.
 - b) interruption of business caused by hazard events.
 - c) interruption of public services caused by hazard events.
 - d) All of the above.
- 2) A Disaster Resistant Community
 - a) does not have any natural hazards.
 - b) promotes measures to reduce hazard risk.
 - c) has eliminated all of its hazards.
- 3) The Federal Emergency Management Agency's National Mitigation Strategy
 - a) encourages a partnership between the public and private sectors for ensuring safer communities.
 - b) lists community mitigation requirements.
 - c) provides technical mitigation information.
- 4) Ensuring people are ready for a disaster and able to respond effectively is
 - a) mitigation.
 - b) preparedness.
 - c) response.
 - d) recovery.
- 5) Rebuilding after a disaster is
 - a) mitigation.
 - b) preparedness.
 - c) response.
 - d) recovery.
- 6) Search and rescue, mass care, debris removal and access control are functions carried out during
 - a) mitigation.
 - b) preparedness.
 - c) response.
 - d) recovery.

- 7) Sustained actions to reduce or eliminate long-term risk to people and property from hazards and their effects is
 - a) mitigation.
 - b) preparedness.
 - c) response.
 - d) recovery.
- 8) Hazard analysis determines
 - a) when the next disaster will occur.
 - b) how well the community will respond to a disaster.
 - c) how hazards are likely to affect the community.
 - d) All of the above.
- 9) A hazard analysis focuses on
 - a) all hazards.
 - b) natural hazards.
 - c) technological hazards.
 - d) civil emergencies.
- 10) _____ is the predicted impact that a hazard would have on people, services, specific facilities and structures in the community.
 - a) Occurrence
 - b) Risk
 - c) Hazard identification
- 11) Using hazard areas for open space and recreational use is a mitigation strategy.
 - a) True.
 - b) False.
- 12) If a mitigation strategy causes disproportional hardship to a segment of the population
 - a) the affected population will have to “tough it out”.
 - b) the strategy is unlikely to be successful, and may violate environmental justice regulations.
 - c) the affected population will become supporters of future mitigation efforts.
- 13) Structures damaged in a natural disaster should
 - a) never be rebuilt.
 - b) be rebuilt to pre-disaster quality.
 - c) be rebuilt to the most recent hazard-resistant standards.

- 14) _____ has the primary responsibility for mitigation.
- a) Federal government
 - b) State government
 - c) Local government
- 15) Adopting and enforcing building codes and zoning ordinances that reduce hazard risk is the responsibility of
- a) Federal government.
 - b) State government.
 - c) local government.
- 16) Businesses
- a) may be willing to contribute time, labor, materials or other support to mitigation efforts.
 - b) do not gain anything from mitigation initiatives.
 - c) are usually unwilling to support mitigation initiatives.
- 17) Federal and State agencies
- a) provide technical assistance to local governments in planning and implementing mitigation efforts.
 - b) support mitigation research.
 - c) administer programs that fund local mitigation efforts.
 - d) All of the above.
- 18) To participate in the National Flood Insurance Program (NFIP), communities must
- a) eliminate flood hazards.
 - b) adopt and enforce floodplain management ordinances.
 - c) elevate all homes in the floodplain.
 - d) All of the above.
- 19) When a structure is required to have flood insurance but does not, post-disaster Federal assistance for repair or restoration is refused.
- a) True.
 - b) False.
- 20) The Community Rating System
- a) increases the flood insurance premiums in a community.
 - b) can reduce flood insurance premiums in the community.
 - c) is available in non-NFIP communities.
 - d) All of the above.

- 21) To obtain assistance with comprehensive mitigation planning, a community should contact the State's
- a) Hurricane Program Manager.
 - b) Earthquake Program Manager.
 - c) NFIP Coordinator.
 - d) State Hazard Mitigation Officer (SHMO).
- 22) Section 404 of the Stafford Act authorizes Federal contributions up to 75% of the cost of eligible post-disaster State and local mitigation measures. This program is called
- a) Infrastructure Support.
 - b) Human Services.
 - c) Hazard Mitigation Grant Program.
 - d) Individual and Family Grant Program.
- 23) This Stafford Act program for repairing damaged dwellings requires and funds appropriate actions to mitigate natural hazards.
- a) Infrastructure Recovery.
 - b) Human Services.
 - c) Hazard Mitigation Grant Program.
 - d) Individual and Family Grant Program.
- 24) The basic tools needed to build a community mitigation program are
- a) community commitment, a community planning team, and public input.
 - b) a mitigation specialist and staff.
 - c) a community planner and the local emergency program manager.
- 25) Mitigation planning is more important than other community planning goals.
- a) True
 - b) False

INTRODUCTION TO MITIGATION

THE CASE FOR MITIGATION

INTRODUCTION

This unit establishes WHY mitigation must be an essential component of the goals and plans for hazard prone communities. Actual disaster losses are discussed, followed by an opportunity for you to examine the potential for such losses in your own community.

HIGH COSTS OF DISASTERS

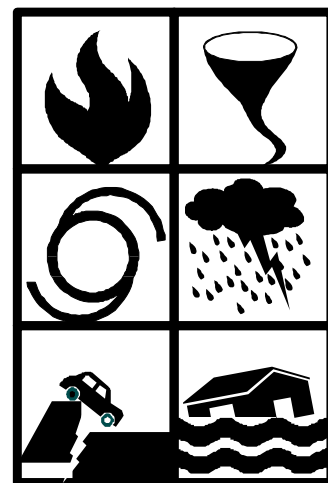
Disasters caused by natural hazards have become increasingly costly, not only for the disaster victims but also for all American taxpayers. From 1989 to 1993, the average annual loss from disasters was \$3.3 billion nationally. Over the last four years, that average has increased to \$13 billion annually. Since 1975 over 6,000 people have been killed and over 50,000 people injured in natural hazard events.

During the last decade new records were set for the most costly natural disasters in the United States. In 1989, Hurricane Hugo struck the South Carolina coast near Charleston with sustained winds of over 130 mph and a 20-foot storm surge. Hurricane Hugo, exacting losses of \$6 billion, also impacted North Carolina, Puerto Rico, and the Virgin Islands. In the same year, the Loma Prieta earthquake, measuring 7.1 on the Richter scale, rocked the San Francisco Bay Area, costing \$10 billion. In 1992, Hurricane Andrew struck southern Dade county, Florida, generating high winds and rain over a vast area of the county, and costing \$20 billion. Two years later, in 1994, the estimated loss from the Northridge earthquake, which struck the densely populated San Fernando Valley in northern Los Angeles, exceeded \$25 billion.

The second most active hurricane season on record in the United States occurred in 1995. Beginning with Hurricane Allison and ending with Hurricane Tanya, there were a total of 19 named storms, 11 reaching hurricane strength. The final toll in the United States was 58 dead and more that \$5.2 billion in property losses.

Unit 1 Objectives

1. *Cite examples of the high costs of disasters.*
2. *Define mitigation.*
3. *Provide a rationale for mitigation activities.*
4. *Relate mitigation to the phases of emergency management.*
5. *Describe the hazard analysis process and its relationship to mitigation.*



The costs of major disasters to Americans go well beyond those damages that are directly sustained. Recovery from disasters requires resources to be diverted from other important public and private programs, and adversely impacts the productivity of economic systems. The magnitudes of these losses are most appropriately considered at local, rather than national, levels. While direct losses from the Northridge earthquake were only one-half percent of the U.S. Gross National Product (GNP); they represented approximately 3% of the California 1993 Gross State Product (GSP). Direct losses from Hurricane Andrew represented approximately 7% of Florida's GSP.

NATIONAL MITIGATION STRATEGY

As the costs of disasters continue to rise, it becomes more and more evident that pre-disaster steps must be taken to reduce the damage and destruction. This strategy is commonly known as mitigation. 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 mitigation is twofold:

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

In support of local mitigation action and to address the rising costs associated with natural disasters, the Federal Emergency Management Agency (FEMA) has encouraged the emergency management community to become more proactive in reducing the potential for losses before a disaster occurs.

To assure a national focus on mitigation, FEMA introduced a National Mitigation Strategy in 1995. The strategy promotes the partnership of government and the private sector to ensure safer communities. It encourages all Americans to identify hazards that may affect them or their communities and to take action to reduce risks. The strategy, which was developed with input from State and local officials, as well as individuals and organizations with expertise in mitigation, has two goals:

- To substantially increase public awareness of natural hazard risk so that the public demands safer communities in which to live and work, and

- To significantly reduce the risk of death, injury, economic costs, and destruction of natural and cultural resources that result from natural hazards.
- A growing body of Federal, State, and local-level experience, along with associated research, has demonstrated that mitigation can reduce losses (in terms of life, property, and community resources) from hazard events

DISASTER RESISTANT COMMUNITIES

A concept that supports the National Mitigation Strategy and encourages change in the way America deals with disaster is called Disaster Resistant Communities. The concept has been adopted and refined by FEMA, the Institute of Business and Home Safety, the Central United States Earthquake Consortium (CUSEC), the State of Florida and other States and organizations.

A disaster resistant community employs a long range, community-based approach to mitigation. It promotes significant steps and measures to reduce vulnerability to flooding, earthquakes, hurricanes and other natural hazards. A disaster resistant community has public, private and business sector commitment to mitigation.

A community may be termed “disaster-resistant” when, after a major disaster, it can claim the following.

- Minimal loss of life.
- Limited interruption of public services.
- Timely resumption of business operations.
- Management of the response operation with or without State assistance.
- Recovery to pre-disaster conditions in a timely, pre-planned mode.



Project Impact

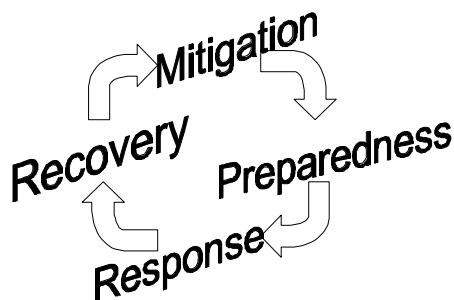
In support of the Disaster Resistant Community concept, FEMA has developed an initiative called Project Impact. Under this initiative, pilot communities are demonstrating the economic benefits of pre-disaster mitigation to States, local communities, businesses and individuals. Project Impact encourages communities to move from the current reliance on response and recovery to an emphasis on mitigation, preparedness and disaster management.

The Director of FEMA reports that communities everywhere are taking the responsibility for alleviating the impact of disasters. The first seven Project Impact communities include Deerfield Beach, Florida; Allegheny County, Maryland; Oakland, California; Pascagoula, Mississippi; Seattle, Washington; Tucker and Randolph Counties, West Virginia; and Wilmington, North Carolina.

A Project Impact Guidebook has been published to help communities protect their residents, organizations, businesses, infrastructure and the stability of the economy as much as possible against the impact of natural disasters before they happen. The Project Impact Guidebook is available from FEMA Publications at 1-800-480-2520.

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.

The task of **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.

Viewed broadly, the goal of all **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 ANALYSIS PROCESS

Finding out what the hazards are is the first step in any effort to reduce community vulnerability. Hazard analysis involves identifying all of the hazards that potentially threaten a community and analyzing them individually to determine the degree of threat that is posed by each. Hazard analysis determines:

- What hazards can occur.
- How often they are likely to occur.
- How severe the situation is likely to get.
- How these hazards are likely to affect the community.
- How vulnerable the community is to the hazard.

This information is used in the development of both mitigation and emergency plans. It indicates which hazards merit special attention, what actions might be taken to reduce the impact of those hazards, and what resources are likely to be needed.

Hazard analysis requires completion of five steps:

1. Identify the hazards.
2. Profile each hazard.
3. Develop a community profile.



4. Compare and prioritize risk.
5. Create and apply scenarios.

Step 1: Identify Hazards

The first step in hazard analysis is to put together a list of hazards that may occur in the community. A community hazard analysis should consider all types of hazards. Categories of hazards include natural hazards such as storms and seismological events; technological hazards such as nuclear power plants, oil or gas pipelines and other hazardous materials facilities; and civil or political hazards such as a neighborhood that has been the scene of rioting or large demonstrations. Cascading emergencies--situations when one hazard triggers others in a cascading fashion--should be considered. For example, an earthquake that ruptured natural gas pipelines could result in fires and explosions that dramatically escalate the type and magnitude of events.

Information about hazards may be collected from existing analyses and historical data.

Existing Hazard Analysis. If the community has an existing hazard analysis, don't "reinvent the wheel". The best way to begin is by reviewing the existing hazard analysis and identifying any changes that may have occurred since it was developed or last updated. Examples of the kinds of changes within or near the community that could cause hazard analysis information to change over time include:

- New mitigation measures (e.g., a new levee or overflow spillway, new zoning ordinances designed to reduce the amount of damage caused by a specific hazard, or reconstruction of bridges and overpasses).
- The opening or closing of facilities or structures that pose potential secondary hazards (e.g., hazardous materials facilities and transport routes).

When reviewing the hazard analysis, determine three things:

1. Do all of the hazards included in the hazard analysis still pose a threat to the community?
2. Are there hazards that are not included in the existing analysis that pose a potential threat to the community?

3. Does the hazard analysis specifically consider the possibility and impact of cascading hazards?

Historical Data. This list usually is based on historical data about past events. Information about recent or very costly events is generally available from community records. Information about older events may require more research, including information from libraries, oral histories and other government entities.

Step 2: Profile Each Hazard

Develop a hazard profile for each hazard identified in the previous step. (A list of hazard information sources is included in Appendix R of this manual.)

Each profile should include the following information about the hazard:

- Frequency of occurrence—how often it is likely to occur.
- Magnitude and potential intensity—how bad it can get.
- Location—where it is likely to strike.
- Probable spatial extent—how large an area it is likely to affect.
- Duration—how long it can be expected to last.
- Seasonal pattern—the time of year during which it is more likely to occur.
- Speed of onset—how fast it is likely to occur.
- Availability of warnings—how much warning time there is, and whether a warning system exists.

Compare any existing hazard analysis with the hazard profiles. Determine any changes and gaps in the information:

- Are any profiles missing from the hazard analysis?
- Is any type of information generally missing from the hazard profiles?
- Has the relative threat of any hazards changed since the analysis was done? Have priorities changed?

A sample Hazard Profile Worksheet follows.

HAZARD PROFILE WORKSHEET

HAZARD:

POTENTIAL MAGNITUDE (Percentage of the jurisdiction that can be affected):

- ☐ **Catastrophic:** More than 50%
- ☐ **Critical:** 25 to 50%
- ☐ **Limited:** 10 to 25%
- ☐ **Negligible:** Less than 10%

FREQUENCY OF OCCURRENCE:

- ☐ **Highly Likely:** Near 100% probability in next year.
- ☐ **Likely:** Between 10 and 100% probability in next year, or at least one chance in 10 years.
- ☐ **Possible:** Between 1 and 10% probability in next year, or at least one chance in next 100 years.
- ☐ **Unlikely:** Less than 1% probability in next 100 years.

SEASONAL PATTERN:

AREAS LIKELY TO BE AFFECTED MOST (BY SECTOR):

PROBABLE DURATION:

POTENTIAL SPEED OF ONSET

(Probable amount of warning time):

- ☐ Minimal (or no) warning.
- ☐ 6 to 12 hours warning.
- ☐ 12 to 24 hours warning.
- ☐ More than 24 hours warning.

EXISTING WARNING SYSTEMS:

COMPLETE VULNERABILITY ANALYSIS:

Step 3: Develop a Community Profile

Combine the hazard-specific information collected during Steps 1 and 2 with information from sector profiles to determine the potential consequences of the hazard.

Sectoring is dividing the community into manageable segments for defining specific types of information: Sector profiles include the following data:

- Geography – features such as mountains, rivers, canyons, coastal areas, fault lines, wildland/urban fire interface (WUI), etc., that relate to disaster occurrence or response efforts.
- Property - numbers and general characteristics such as land use, types of construction, manufactured homes, building codes, essential facilities and potential secondary hazards such as nuclear power plants or facilities where hazardous materials are manufactured or stored.
- Infrastructure – utilities, communication system, major highway transportation routes including bridges, and mass transit systems.
- Demographics – population size, distribution and concentrations, special populations (e.g. childcare facilities, nursing homes, prisons) and animal populations.
- Response Agencies – information about locations, facilities, services and resources that are needed to plan for response capability.

Develop the community profile by combining each sector profile with hazard-specific information found in the hazard profiles.

Step 4: Compare and Prioritize Risk

After hazard information and community information have been compiled, the next step is to quantify the community's risk so that the planning team can focus on the hazards that present the highest risk to the community. **Risk** is the predicted impact that a hazard would have on people, services, specific facilities and structures in the community. For example, in an earthquake, a specific bridge might be at risk. The predicted impact of an earthquake on that bridge could be collapse, leading to restricted access to a critical facility.

To quantify risk:

- Identify the elements of the community (populations, facilities, and equipment) that are potentially at risk from a specific hazard.
- Assign severity ratings.
- Compile risk data into community risk profiles.

Identifying Elements at Risk. For each hazard, survey risk-related factors in each sector in the community to develop a composite picture of overall risk. These factors include:

- Geographic features such as topography and soil composition.
- Infrastructure lifelines including utilities, communication, and transportation systems.
- Essential facilities such as police and fire departments.
- Special facilities such as schools, nursing homes, and health care facilities.
- Unique, historic or other cultural resources.
- Hazardous materials production/storage/transport.
- Property characteristics such as land use and type of construction.
- Population densities and shifts.
- The availability of response resources.

In identifying and organizing risk factors within the community, it is helpful to have a worksheet to use for all of the hazards to obtain information that is consistent and thus comparable. A sample Risk Assessment Worksheet is located on the next page.

RISK ASSESSMENT WORKSHEET		
Sector	Essential Facilities at Risk	
	Population at Risk	
	Infrastructure at Risk	
	Property at Risk	
	Expected Extent of Damage	Percent of Sector Property
	Severe	
	Substantial	
	Limited	
None		

Assigning Severity Ratings. Each applicable hazard is then assigned a severity rating that will quantify, to the degree possible, the damage that can be expected in the community as a result of that hazard. This rating quantifies the expected impact of a specific hazard on people, essential facilities, and property.

A sample of severity ratings is included below.

SEVERITY LEVEL	CHARACTERISTICS
<i>Catastrophic</i>	Multiple deaths. Complete shutdown of facilities for 30 days or more. More than 50 percent of property is severely damaged.
<i>Critical</i>	Injuries and/or illnesses result in permanent disability. Complete shutdown of critical facilities for at least 2 weeks. More than 25 percent of property is severely damaged.
<i>Limited</i>	Injuries and/or illnesses do not result in permanent disability. Complete shutdown of critical facilities for more than 1 week. More than 10 percent of property is severely damaged.
<i>Negligible</i>	Injuries and/or illnesses are treatable with first aid. Minor quality of life lost. Shutdown of critical facilities and services for 24 hours or less. Less than 10 percent of property is severely damaged.

Compiling Data into a Community Risk Index. By cross-referencing the compiled hazard and community profile data a risk index can be developed for all hazards. It will include

- Frequency of occurrence.
- Magnitude.
- Speed of onset.
- Community impact (severity rating).
- Special characteristics and planning considerations.

Based on these ratings, a Risk Priority can be assigned to each hazard. Risk priorities may be described using qualitative ratings such as High, Medium and Low.

A sample Risk Index Worksheet is located on the next page.

RISK INDEX WORKSHEET

<i>Hazard</i>	<i>Frequency</i>	<i>Magnitude</i>	<i>Warning Time</i>	<i>Severity</i>	<i>Special Characteristics and Planning Considerations</i>	<i>Risk Priority</i>
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12 – 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12 – 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12 – 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12 – 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12 – 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12 – 24 hours 24+ hours	Catastrophic Critical Limited Negligible		

Step 5: Create and Apply Scenarios

The final step in the hazard analysis process is to brainstorm worst case scenarios that will help identify hazard-specific planning and resource requirements. From initial warning, if available, describe the hazard's development and impact on the jurisdiction and its generation of specific consequences. Include:

- Overall impact on the community.
- Impact on specific sectors.
- Consequences (e.g. collapsed buildings, loss of critical services and infrastructure, death, injury, or displacement).
- Needed actions and resources, including mitigation activities.

This activity helps the planning team recognize planning assumptions that should be used in the development of mitigation alternatives.

SUMMARY

- ✓ Disasters caused by natural hazards have become more and more costly.
- ✓ The magnitudes of these losses are greater when considered at local rather than national levels.
- ✓ Mitigation is defined as *sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects*.
- ✓ FEMA has developed a National Mitigation Strategy to strengthen the partnership between government and the private sector to fulfill their responsibilities for ensuring safer communities.
- ✓ To become a Disaster Resistant Community, a jurisdiction must adopt a long range, community-based approach to mitigation that promotes significant steps and measures to reduce vulnerability to natural hazards.
- ✓ Project Impact is a FEMA initiative that designates pilot communities to demonstrate the economic benefits of pre-disaster mitigation.
- ✓ The emergency management cycle describes the process through which emergency managers *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.
- ✓ Mitigation can decrease the impact and therefore the consequences and costs of a natural hazard event.
- ✓ Hazard analysis helps in making decisions about which hazards merit special attention; what actions might be taken to reduce the impact of those hazards, and what resources are likely to be needed.
- ✓ The hazard analysis process involves five primary steps: identify the hazards; profile each hazard; develop a community profile; determine vulnerability; and create and apply scenarios.

MITIGATING YOUR HAZARDS

This exercise provides an opportunity to practice the steps involved in hazard analysis and to become more familiar with the hazards and the vulnerability that exist in your community.

1. List five hazards that exist in your community.

2. For each hazard listed, find out and write down:

HAZARD					
Frequency of Occurrence					
Magnitude					
Location					
Area					
Duration					
Seasonal Pattern					
Speed of Onset					
Availability of Warning					

3. Consider areas of your community.

For one of the areas, describe the following. (Remember that in a real hazard analysis this must be completed for all sectors of the jurisdiction.)

Geography	
Property	
Infrastructure	
Demographics	
Response Agencies	

4. For the same community sector, complete a Risk Index Worksheet. Remember that this process is completed for the entire community in a real hazard analysis.

• RISK INDEX WORKSHEET						
Hazard	Frequency	Magnitude	Warning Time	Severity	Special Characteristics and Planning Considerations	Risk Priority
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12 – 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12– 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12– 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12– 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12– 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12– 24 hours 24+ hours	Catastrophic Critical Limited Negligible		
	Highly likely Likely Possible Unlikely	Catastrophic Critical Limited Negligible	Minimal 6 – 12 hours 12– 24 hours 24+ hours	Catastrophic Critical Limited Negligible		

5. Select one of the hazards and develop a scenario that describes the following.

Initial warning	
Overall impact on the community	
Impact on sector described in requirement #3 above.	
Consequences (damage, casualties, loss of services, etc.)	
Needed actions and resources, including mitigation activities	

✓ CHECKING YOUR MEMORY

Circle the correct response. Answers may be found on page A-1.

1. Nationwide, disaster costs annually total
 - A) hundreds of thousands of dollars.
 - B) millions of dollars.
 - C) billions of dollars.
2. “Sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects” defines what component of emergency management?
 - A) response.
 - B) mitigation.
 - C) recovery.
3. Disaster Resistant Communities promote
 - A) a long range community based approach to mitigation.
 - B) immediate short-term solutions to hazard risk.
 - C) Federal solutions to local hazard risk problems.
4. To implement FEMA’s National Mitigation Strategy, partnerships must be forged between
 - A) Federal and State agencies.
 - B) local government and business.
 - C) Federal, State and local governments and private sector constituents.
5. The recovery phase of emergency management involves rebuilding efforts that take
 - A) years.
 - B) weeks.
 - C) days.
6. During hazard analysis, the list of hazards is developed from
 - A) historical data and community records.
 - B) Pre-existing hazard analyses.
 - C) Both A and B.
7. The predicted impact that a hazard would have on people, services and property in a community defines
 - A) the recovery period.
 - B) risk.
 - C) loss.

INTRODUCTION TO MITIGATION

MITIGATION STRATEGIES

INTRODUCTION

Once the hazard analysis process has been completed, the risk associated with each hazard can be communicated by explaining:

- What can occur,
- The likelihood that it will occur, and
- The consequences if it does occur, in terms of casualties, destruction, disruption and costs.

Community leaders must then decide what level of risk is acceptable, and what will be done to achieve the desired level of disaster resistance.

Communities *can* take actions that will reduce future hazard losses. The knowledge and the tools do exist. However, mitigation of natural hazards cannot be approached in isolation. Communities must study and then select a mitigation strategy that promotes the concurrent achievement of hazard loss reduction and other community goals.

This unit focuses on *what* communities can do to solve hazard risk problems.

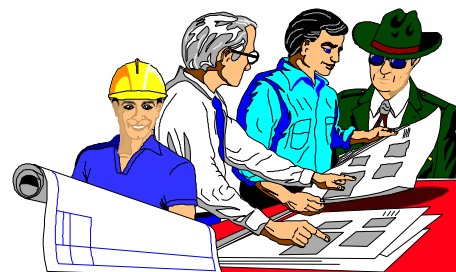
MITIGATION MEASURES

Because mitigation can be accomplished in a number of ways, mitigation strategies can be either elaborate or simple. Mitigation strategies are comprised of one or more mitigation measures, which are usually classified into categories. French Wetmore, of Wetmore and Associates in Park Forest, Illinois, has developed a useful approach to describing flood mitigation options. It has been adapted here for all-hazard use and is based on six categories:

- Prevention
- Property Protection
- Natural Resource Protection
- Emergency Services

Unit 2 Objectives

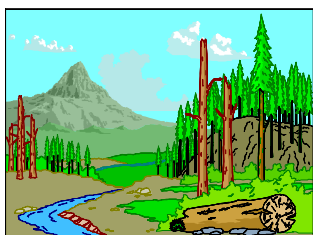
1. *List and describe various mitigation strategies.*
2. *Apply multi-objective decision criteria for selecting a mitigation strategy.*



- Structural Projects
- Public Information

Prevention

Prevention measures are intended to keep a hazard risk problem from getting worse. They ensure that future development does not increase hazard losses. Communities can achieve significant progress toward hazard resistance through prevention measures. This is particularly true in areas that have not been developed or where capital investment has not been substantial. Some examples of prevention measures are:



- Planning and zoning.
- Open space preservation.
- Land development regulations.
- Storm water management.
- Dune and beach maintenance.

Using prevention measures, future development can be guided away from hazards, while maintaining other community goals such as economic development and quality of life. For example, floodplains, steep slopes, areas subject to liquefaction and areas prone to wildfires can be designated for open space or other low-density uses. Low hazard risk property can be designated for higher density uses that bring revenue to the property owners as well as the jurisdiction.

Goals to reduce hazard risk can be coordinated with the community's comprehensive plan and capital improvements program. A comprehensive plan reflects what the community would like to see happen. The plan itself has limited authority, but it guides other local measures such as capital improvements, zoning and subdivision ordinances. A community's capital improvement program identifies where major public expenditures will be made over the next 5 to 20 years. A zoning ordinance regulates development by dividing the community into zones or districts and setting development criteria for each.

The comprehensive plan can incorporate mitigation strategies to discourage new development in hazard prone areas and encourage practices that are consistent with disaster resistant community goals. These strategies might include

- Tax breaks and other financial incentives.

- Denial of loans to would-be borrowers who cannot show hazard-related standards are being met.
- Locating public facilities in low-hazard areas to encourage development in those areas.
- Preventing construction of public buildings in hazardous areas.

A recent publication of the Natural Hazard Research and Applications Information Center called *Confronting Hazards: Land Use Planning for Sustainable Communities*, lists five principles for future planning and public policy that endorse the use of prevention measures.

- Government must limit the practice of subsidizing the risks involved in using hazardous areas.
- Government must build and share a base of knowledge about the nature of risks and sustainable ways of living with hazards.
- Governments themselves must develop commitment and capacity to change the way they manage the use of hazardous areas.
- Governments must do a better job of coordinating and integrating policies to manage exposure to hazards with policies to accomplish economic, social and environmental objectives.
- Governments must foster innovations in governance and land management to better match institutional systems and tools with the problems posed by natural hazards.

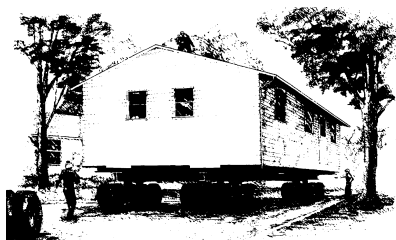
Property Protection Measures

Property protection measures are used to modify buildings subject to hazard risk, or their surroundings, rather than to prevent the hazard from occurring. A community may find these to be inexpensive measures because often they are implemented or cost-shared with property owners. These measures directly protect people and property at risk. Protecting a building does not have to affect the building's appearance and is therefore a popular measure for historic and cultural sites. Some examples of property protection measures are:

- Acquisition
- Relocation
- Rebuilding
- Floodproofing

Acquisition is the public procurement and management of lands that are vulnerable to damage from hazards. Following acquisition, land uses more appropriate to the degree of risk may be chosen. Public acquisition has been achieved by:

- Purchase at full market value, or
- Purchase at less than full market value through methods such as foreclosure of tax delinquent property; bargain sales, purchase and lease back; donation through reserved real estate; donation by will; donation and lease back; leases, and easements.



Relocation involves permanent evacuation of hazard-prone areas through movement of existing hazard prone development and population to safer areas. Two common components of relocation are:

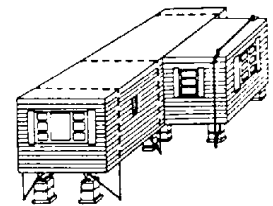
- Physical removal of buildings to a safer area with the future use of the vacated area limited to permanent open space; and
- Substitution of existing uses for others that are less vulnerable to the hazard.

The Castaic Union School District in southern California is located in an area through which the San Andreas and San Gabriel fault systems pass. The District conducted an assessment of earthquake risks that threatened their elementary and middle schools, and administration building. The study led the school district to conclude that the probability of a large earthquake affecting these facilities was high. In addition to expected seismic damage, the study showed that the school buildings were located within the inundation area of the Castaic Dam, and at high risk of damage from fire and explosion if crude oil pipelines that cross the campus should fail.

Based on estimates of potential casualties, building and content damages, and lost educational services, the decision was made to condemn the structures on the high-risk site. The area selected for relocation is completely out of the dam inundation area and far removed from the oil pipelines. The new buildings were constructed to conform fully to 1995 building code provisions that make them more resistant to seismic damage than the ones they replaced.

Rebuilding or modifying structures to reduce damage by future hazard events is another type of property protection measure.

- Masonry structures can be retrofitted to lessen damage in earthquakes.
- Manufactured homes can be anchored to withstand hurricane wind speeds without significant damage.
- Storm shutters can be installed to protect windows and glass doors from flying debris in areas at risk from high winds.



Ideally, adoption and/or enforcement of building codes accompany rebuilding of damaged or hazard prone structures to minimize future risk of hazard damage.

The service area for Beebe Medical Center in Lewes, Delaware, is the fastest growing population center in Delaware. Because of nearby resort beaches, the population and the service requirements expand exponentially during vacation periods. From experiences during previous hurricanes, the Lewes area can expect interrupted electrical power supply, interrupted water supply and wastewater treatment, street flooding, high winds and windborne debris. Penetration of building envelopes would allow both wind and rain to damage building interiors and contents. Beebe Medical Center developed mitigation priorities and determined that installation of storm shutters is the number one mitigation priority. Because of the relatively high cost of permanent storm shutters, the Medical Center has signed a contract with a local contractor to install inexpensive plywood storm shutters in the event of a hurricane warning. Meanwhile, annual capital improvement budgets will include some funds to install more permanent storm shutters that will afford greater protection and are usable in more than one event.

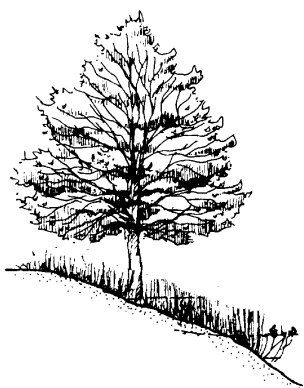
Floodproofing is protecting a flood-prone building using one or more of several different methods. Dry floodproofing means sealing a building against floodwater by making all areas below the flood protection level watertight. Wet floodproofing means allowing the floodwaters to enter the building to minimize pressure on the structure. Furniture, appliances and valuables may be moved out of the floodable area.

Natural Resource Protection

Natural resource protection measures are intended to reduce the intensity of hazard effects as well as to improve the quality of the environment and wildlife habitats. Parks, recreation, or conservation agencies or organizations usually implement these activities.

Examples of natural resource protection include:

- Erosion and sediment control
- Wetlands protection



On sites such as farmland, construction areas, and burned out forests, stormwater runoff can erode soil and send sediment into downstream waterways. Sedimentation will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters, and reducing the light, oxygen and overall water quality. Practices such as reforestation and planting other vegetation minimizes the erosion and captures sediment before it leaves the site. Terracing, contour strip

farming, no-till farming and impoundments (sediment basin, farm ponds, and wetlands) also slow runoff. Beach nourishment measures such as the use of white sandy clay, have been shown to reduce beach erosion.

Wetlands must be protected because they can store large amounts of floodwater, filter water, and provide habitats for many species of fish and wildlife. Development projects in wetlands are regulated by the U.S. Army Corps of Engineers (USACE), which must issue a “404” permit before any fill or dredged material is placed in a wetland. The U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency review these permits.

After Hurricane Hugo, it was found that South Carolina beaches, at which white sandy clay had been deposited prior to the storm to slow erosion, exhibited much less erosion than adjacent natural beaches.

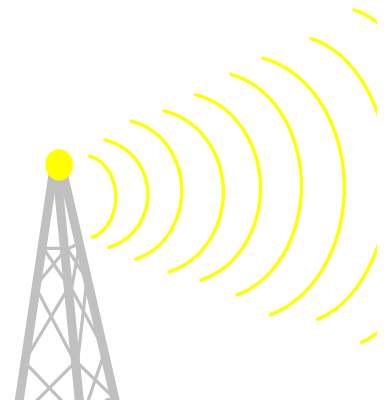
Between 1984 and 1993 Iowa instituted farm conservation projects including no tillage of certain areas, use of terracing, contouring, and strip cropping. Authorities estimated that damage from the 1993 floods would have been 3.5 times greater without these measures.

Emergency Services

Emergency services measures protect people before and after a hazard event. Most counties and many cities have emergency management offices to coordinate warning, response, and recovery during a disaster. Emergency services measures include:

- Warning.
- Response.
- Critical facilities protection.
- Health and safety maintenance.

A warning program must include both recognition of the threat and a warning system. The National Weather Service provides information about potential threats such as tornadoes, hurricanes, heavy rains, blizzards, etc. Examples of local hazard recognition capabilities may include tornado spotters, rain and river gauges. Once the threat recognition system tells the emergency management contact that the hazard event will actually occur, the next step is to notify the public and staff in other agencies and critical facilities. The earlier and more accurate the warning, the greater the number of people that can implement protective measures. Warning may be disseminated via sirens, radio, television, mobile public address systems, telephone,



and door-to-door contact. Multiple or redundant warning increases the number of people that will hear the message.

Communities can mitigate hazard losses by responding to warning with actions that can prevent or reduce damage and/or injury. A few examples of these actions include the following:

- Activating the emergency operations center.
- Restricting access to hazard prone areas.
- Accomplishing expedient mitigation measures such as sandbagging, installing storm shutters, shutting off power to threatened areas.
- Ordering evacuation and opening shelters.

An emergency response plan developed in coordination with all agencies and organizations having emergency responsibilities is the best way to ensure smooth response when needed. Drills and exercises ensure that response personnel know what to do when warned of an impending hazard event.

Protection of critical facilities is mitigation measure. Critical facilities include

- essential facilities such as police stations, fire stations, and hospitals that are vital to the response effort.
- special facilities that house populations requiring special consideration such as nursing homes and prisons.
- facilities that can create secondary hazards such as nuclear power plants and hazardous materials production or storage facilities.

Provisions for safe drinking water, tetanus vaccination, and cleaning up debris and garbage are a few examples of health and safety maintenance.

Structural Projects

Structural measures directly protect people and property at risk. They are called “structural” because they involve construction of man-made structures to control hazards. Some examples of structural projects are dams, reservoirs, dikes, levees, seawalls, bulkheads, revetments, high flow diversions, spillways, buttresses, debris basins, detaining walls, channel modifications, storm sewers elevated roadways, and debris basins.

Structural projects can be very expensive. Other disadvantages may include the following:

- They disturb the land and may disrupt natural functions such as water flow. This can destroy wildlife habitats.

- They require regular maintenance. If this maintenance is neglected, the consequences can be disastrous.
- If the hazard exceeds the projected capability of the structural measure, the damage will still be extensive.
- They create a false sense of security.

During the Midwest Floods of 1993, the levee protecting the Des Moines, Iowa, water works facility was over-topped by floodwater.

The plant could not be operated and as a result, over 250,000 customers were without water service for 11 days. In addition to the impact on residents, the sanitation and fire hazards forced a large percentage of area businesses to close until water service was restored.

To reduce the possibility of a reoccurrence, Des Moines Water Works has undertaken a series of mitigation measures: The protective levee has been raised by 6 feet. A second, smaller treatment facility is being built at another location. A plan has been developed for use of that second facility and aquifer storage if flooding of the main facility occurs again.

Public Information

Public information activities inform and remind people about hazardous areas and the measures necessary to avoid potential damage and injury. The public can be informed about mitigation through several avenues. Some examples include:

- Outreach projects.
- Real estate disclosure.
- Hazard information center.
- Technical assistance.
- School age and adult education programs.

FEMA funded a focus group study on attitudes toward mitigation among homeowners, small businesses and community leaders. The report included some interesting conclusions that will be helpful in the design of a public information program about mitigation.

- The first barrier to mitigation is lack of knowledge of what to do. People are simply unaware of mitigation activities and need information.



- The public is much more aware of strategies for preparedness than mitigation. It may be effective to link the two concepts. For example, “prepare and mitigate”.
- Target to high-risk areas. People who feel that disasters don’t happen in their area often are unlikely to “buy into” the concepts of risk or mitigation.
- Timing is important. Target the time when disaster is on the minds of the population – for example at the beginning of hurricane season or after a disaster.
- Mitigation is a “pocketbook” issue. People need to know the perceived return on investment before acting. Cost savings and cost effectiveness must be emphasized in your public information campaign.
- Barriers may drop when a related purchase is under consideration. People are more willing to spend money on mitigation if they perceive that it will save more in the long run.
- While small business owners do not see mitigation as relevant to them personally, in high-risk areas they may be useful supporters. When convinced that what happens to the community happens to them, their self-interest can propel them into activism.

MULTI-OBJECTIVE DECISION CRITERIA FOR SELECTING A MITIGATION STRATEGY

Selection of a mitigation strategy for the community is part of a mitigation planning process that will be discussed fully in Unit Four. At the beginning of that process a mitigation planning team is formed. The team will include community officials, mitigation experts, business people, residents and other concerned individuals. During that planning process the team will develop a list of possible mitigation measures. That list of possibilities could be a long one.

How will the planning team select the best measures for your community’s mitigation strategy? Obviously the proposed mitigation measures are those that technical experts have selected because they will solve or alleviate the problem. Once it has been established that several proposed measures will accomplish the mitigation objective, how do community leaders choose between them?

Clancy Philipsborn and Daniel Barbee, pioneers in helping communities make mitigation decisions, said the biggest obstacle to solving hazard management problems is the tendency to isolate the problem. If a hazard-prone community avidly pursues mitigation strategies that will consume a disproportionate amount of available

funds, the broader, longer-term community goals may be sacrificed. The solution to long-term, cost-effective mitigation often is imbedded in what the community is already doing. Tools and processes used on a daily basis may be able to be used to solve hazard management problems. While a community may have to rethink their approach to planning to incorporate mitigation, it simply requires coordinating growth, economic development and environmental planning with the results of the hazard analysis.

The viability of the mitigation measures described in this unit has been demonstrated. Multi-objective planning to achieve goals of disaster resistance in coordination with other community goals has also been successfully demonstrated. What is needed is for communities to use a standard set of decision criteria to promote this concurrent achievement of mitigation and other community goals.

STAPLE Criteria

STAPLE is an acronym for the Social, Technical, Administrative, Political, Legal and Economic/Environmental criteria used in making planning decisions. There is no implied priority or weight to the criteria. STAPLE is just an easy acronym to remember. The following criteria can help communities evaluate and select the most appropriate mitigation measures from the many options that may be available.

Social

To be successful, the mitigation strategy must be socially acceptable. Will this proposed action be socially acceptable to the community? Will it cause any one segment of the population to be treated unfairly? Will the action disrupt established neighborhoods, break up voting districts or cause the relocation of low and reduced income people? Is the action compatible with present and future community values?

Technical

It is important to determine if the proposed action is technically feasible. What consequences are created by this approach? Most importantly, will it solve the problem? In light of other community goals, is it the most useful?

Administrative

Does the community have the capability to implement the action? Can the community provide any maintenance necessary? Are there enough staff, technical experts and funding? Can it be accomplished in a timely manner?

Political

Proposed mitigation strategies have failed because of lack of political acceptability. Who are the stakeholders in this proposed action? Have all of the stakeholders been offered an opportunity to participate in the planning process? How can the mitigation goals be accomplished at the lowest cost to the stakeholders? Is there public support both to implement and maintain this measure? Is the political leadership willing to propose and support the favored measure?

Legal

Does the community have the authority to implement the proposed measure? Is there a clear legal basis for the mitigation action? Is enabling legislation necessary? What are the legal side effects? Will the community be liable for the actions or support of actions, or lack of action? Is it likely to be challenged?

Economic

Economic considerations must include the present economic base, projected growth, and opportunity costs. What are the costs and benefits of this measure? How will the implementation of this measure affect the fiscal capability of the community? What burden will be placed on the tax base or local economy? Does the action contribute to other community economic goals such as capital improvements or economic development?

Environmental

Impact on the environment is an important consideration because of the many statutory considerations and because of public desire for sustainable and environmentally healthy communities. How will this action affect the environment? Will this measure comply with local, State and Federal environmental regulations? Is the action consistent with community environmental goals?

Once these questions have been addressed, the community will have a good indication of the feasibility of the measures that have been proposed as the mitigation strategy. The results of this evaluation are used to finalize the development of an effective mitigation strategy. Unit Three, *Responsibilities and Resources for Mitigation*, will provide information on the availability of financial and technical resources that should be considered in the final decisions.

SUMMARY

- ✓ Communities can take actions that will reduce future hazard losses.
- ✓ Prevention measures are intended to keep a hazard vulnerability problem from getting worse and to guide development away from hazards. Examples include planning and zoning, open space preservation and land development regulations.
- ✓ Property protection measures are used to modify buildings subject to hazard risk, or their surroundings. Examples include acquisition, relocation, rebuilding and floodproofing.
- ✓ Natural resource protection measures are intended to reduce the intensity of hazard effects while improving quality of the natural environment. Examples include erosion and sediment control, and wetland protection.
- ✓ Emergency services measures protect people before and after a hazard event. Examples include warning, response, critical facilities protection and health and safety maintenance.
- ✓ Structural measures involve construction to control hazards. Examples include elevated roadways, dams, reservoirs, dikes and levees.
- ✓ Public information measures inform and remind people about hazardous areas and the measures necessary to avoid potential damage and injury. Examples are outreach projects, real estate disclosure, hazard information centers, technical assistance and education programs.
- ✓ Develop Social, Technical, Administrative, Political, Legal and Economic/Environmental criteria that can help the community evaluate and select the most appropriate mitigation measures from the many options that may be available.

MITIGATING YOUR HAZARDS

In the Mitigating Your Hazards section of Unit One, you developed hazard profiles on five hazards that may occur in your community.

For this activity, select one high-priority hazard, as determined by the criteria in the hazard profile. Then review the mitigation measures described in this unit. Complete the following worksheet to identify any mitigation measures that could possibly become a part of the community's strategy to mitigate that hazard. (Remember that this should be done for all of the community hazards after you finish this course!)

HAZARD: _____

CATEGORY OF MITIGATION MEASURE	PROPOSED ACTIONS
Prevention Measures	
Property Protection Measures	
Natural Resource Protection Measures	
Emergency Services Measures	
Structural Measures	
Public Information Measures	

After completing the table above, use the STAPLE criteria to evaluate up to five proposed measures. Then develop a prioritized list of mitigation measures to include in your mitigation strategy.

MITIGATION MEASURE:

CRITERIA	CONSIDERATIONS
Social	
Technical	
Administrative	
Political	
Legal	
Economic	
Environmental	

MITIGATION MEASURE:

CRITERIA	CONSIDERATIONS
Social	
Technical	
Administrative	
Political	
Legal	
Economic	
Environmental	

MITIGATION MEASURE:

CRITERIA	CONSIDERATIONS
Social	
Technical	
Administrative	
Political	
Legal	
Economic	
Environmental	

MITIGATION MEASURE:

CRITERIA	CONSIDERATIONS
Social	
Technical	
Administrative	
Political	
Legal	
Economic	
Environmental	

MITIGATION MEASURE:

CRITERIA	CONSIDERATIONS
Social	
Technical	
Administrative	
Political	
Legal	
Economic	
Environmental	

MITIGATION MEASURE:

CRITERIA	CONSIDERATIONS
Social	
Technical	
Administrative	
Political	
Legal	
Economic	
Environmental	

MITIGATION STRATEGY

PRIORITIZED MITIGATION MEASURE	DESCRIPTION

✓ CHECKING YOUR MEMORY

Circle the correct response. Answers may be found on page A-1

1. Lands that are at high risk of damage from hazards should be:
A) developed for industrial use.
B) developed for residential use.
C) zoned to restrict human habitation and development.
2. Rebuilding of hazard-damaged structures is ideally accompanied by
A) adoption or enhancement of building codes that minimize hazard risks.
B) reduction in land use control.
C) increased insurance premiums.
3. An example of a structural solution to a flood hazard is
A) wet floodproofing.
B) land use planning.
C) a levee.
4. Terracing, contour strip farming and farm ponds are examples of
A) structural measures.
B) natural resource measures.
C) public information measures.
5. A public information program about mitigation will be most well-accepted
A) at the beginning of storm season.
B) when the economy is poor.
C) when highly technical language is used.
6. An example of a property protection measure is
A) acquisition.
B) relocation.
C) Both A and B.
7. The first and most important STAPLE criteria is:
A) social and political acceptability.
B) economic feasibility.
C) administrative capability.
D) there is no implied priority or weight to the STAPLE criteria.

INTRODUCTION TO MITIGATION RESPONSIBILITIES AND RESOURCES FOR MITIGATION

INTRODUCTION

When a community has determined what mitigation strategy will be most effective, it must figure out HOW it will be accomplished. What resources are available locally? What assistance must be sought from elsewhere? Who are the technical experts? This unit includes some ideas and information that may be helpful in your community's mitigation efforts and provides insights on what some other communities have accomplished.

WHOSE JOB IS MITIGATION?

Local Government

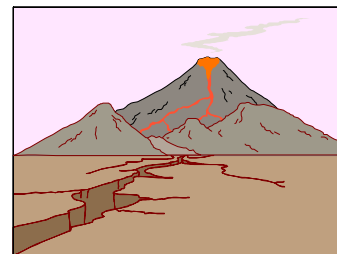
Mitigation happens locally. Local government must recognize hazards and initiate mitigation action. At a minimum, local government should accomplish the following.

- Enacting and enforcing building codes, zoning ordinances and other measures to protect life and property.
- Making the public aware of hazards that present risks to people and property and measures they can take to reduce their risk and possible losses. This includes taking personal responsibility for making informed choices regarding risk.
- Complying with Federal and other regulations that are designed to reduce disaster costs and preserve and protect natural, historic and cultural resources.

If a community has carried out those basic responsibilities for years, and does not have any repetitive hazard losses, it may have achieved a relatively “disaster resistant” status. However, many communities are not that lucky. For a variety of reasons, some communities have sustained, or are at high risk of, heavy losses due to natural or other hazards. These communities have a bigger job to do in reducing potential disaster losses.

Unit 3 Objectives

1. *Summarize the respective roles of local, State and Federal governments in mitigation.*
2. *Describe the resources and requirements of various mitigation programs.*
3. *Discuss the importance of multi-objective management of mitigation projects.*



Communities that have identified a hazard risk problem need technical experts and community input to make decisions on achieving practical and workable solutions. And, they have to figure out how to implement the solutions. Those communities must make mitigation a priority in everyday decision making.

The resources that can be applied to mitigation are very diverse, but the best place to start looking is within the community itself. A community that is willing to use its own resources for at least part of a mitigation project shows a dedication that may prove to gain support from other sources. Your next thought may be: “But we don’t have any resources for mitigation.” Instead, think about what you do have.

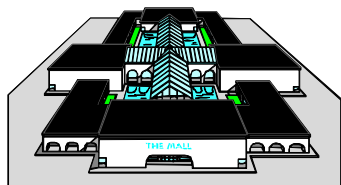
Don’t forget that your mitigation project, particularly one that is undertaken unrelated to a recent disaster, should be part of a multi-objective community plan. Then consider these possibilities:

- **Capital improvement projects** can incorporate mitigation actions. For example, locating the new municipal building in a low hazard area, and building it to seismic or high wind or whatever hazard resistance is applicable. Mitigation should be a priority in all capital improvement projects, including sizing culverts, repairing roads, and renovating public buildings.
- Use **economic development funds** to improve low hazard areas and attract businesses to those areas and away from hazardous sites.
- Assign **employee staff time** to cleaning out drainage ditches that will clog and cause flooding if neglected, etc.

Private Sector

Businesses, private organizations, and individual homeowners also have much to gain by reducing their risks to hazards. Even if individual businesses survive and recover quickly after a disaster, their recovery is incomplete if employees cannot get to work, water and electricity are unavailable, or customers fear safety hazards. Conversely, the whole community is affected if the businesses are unable to recover. At a minimum, businesses, private organizations, and individual homeowners have a responsibility to:

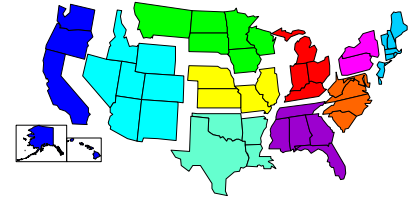
- Comply with applicable zoning and land-use regulations.
- Comply with applicable building codes.
- Take other measures, as necessary and possible, to reduce or eliminate damage from known hazards.



Businesses and other private interests may be willing to contribute time, labor, materials or other support if they have been convinced that the mitigation effort will benefit their organization as a part of an overall community improvement.

State Government

State government also plays a significant role in advancing mitigation. It too must emphasize to its constituency the importance of substantially reducing the risk of loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from natural hazards. The State is required to uphold State and Federal regulations intended to reduce hazard losses. The State also must provide resources to achieve these goals.



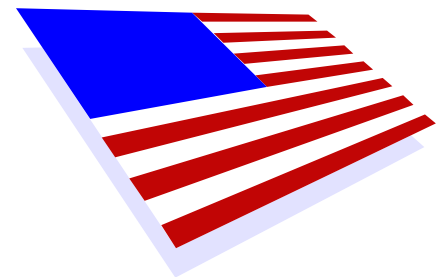
Similar to your efforts in local multi-objective planning, find out about State objectives and priorities and brainstorm how they can be incorporated into your community's mitigation goals. Seek State assistance for projects that meet State level goals and can simultaneously reduce long-term hazard risks. For example, the State may be courting certain industries or businesses, and your community may be anxious to attract a new employer. If, through incentives, a large employer locates in a low hazard area, businesses currently located in higher hazard risk areas may be convinced to move to the newer, safer, business center.

The State often administers Federal programs that provide assistance for mitigation initiatives. A list of such Federal programs is included in this unit.

Federal Government

Federal agencies are expected to provide the example and to assist with the effort to achieve mitigation goals by fulfilling these responsibilities.

- Take the lead in mitigation by evaluating their own facilities and ensuring that they are designed, constructed, and upgraded to reduce the impact of future hazard events.
- Collaborate with academia, national standards and code-writing groups, and the private sector to speed the development and application of mitigation technologies.
- Support applied research on priority mitigation issues.
- Administer programs that are intended to support and encourage local efforts to mitigate hazard losses.



In the National Mitigation Strategy, FEMA also proposes to:

- Provide technical assistance to local governments as well as Federal and State agencies, regarding mitigation actions.
- Coordinate mitigation activities among Federal, State and Local government agencies and business and industry partners.

CASE STUDIES

The Federal Emergency Management Agency has recently published a compilation of mitigation case studies in its *Report on Costs and Benefits of Natural Hazard Mitigation*. Selected excerpts from the report are included here. The studies describe the efforts of communities to reduce the impact of natural hazards to lives and property. They also describe the resources used to accomplish the projects. These are examples of projects that have been undertaken and implemented around the country in communities like yours.

Memphis, Tennessee

The City of Memphis, Tennessee is located within the impact area of the New Madrid fault. Studies indicate a 40 percent-60 percent probability of an earthquake of magnitude 6.0 to 6.3 in that area within the next 15 years. To reduce the risk to lifelines, the Memphis Light, Gas, and Water Division has initiated a seismic retrofit project to protect the Davis Water Pumping Station and to enhance the survivability of the connections between water distribution wells in one-third of the city's production wells.

The retrofit of the Davis Water Pumping Station will require the strengthening of supporting structures and tying together of components so they will vibrate together during an earthquake. The total cost to accomplish this objective is \$448,000. A grant from FEMA's Hazard Mitigation Grant Program (HMGP) will provide 75 percent of the funding. The estimated cost of replacing the station in the event of a large earthquake is \$1.4 million.

To improve the survivability of the connections between distribution wells, the city will replace 55 of 170 rigid production well connectors with flexible connectors. The flexible connectors will better withstand ground motions and displacement caused by seismic activity. The cost of this part of the project is \$510,400. Once again, 75 percent of that cost will be paid by HMGP funds. By comparison, losses of \$188,000 per day are predicted for each well connector damaged in an earthquake.

By protecting the pumping station and the connectors, area homes and businesses will have a more reliable water supply following an earthquake. This will reduce the need for importing potable water and providing sanitation facilities. It will allow many businesses to stay open, and will preserve fire-fighting capabilities.

Darlington, Wisconsin

The City of Darlington, population around 36,000, was settled in the 1850's. It is located in the southwestern part of Wisconsin in an area of rugged hills, ridges, and river valleys. The downtown area is crossed by the Pecatonica River, which has a well defined floodplain and community parks along the waterfront. Downtown Darlington has several buildings of architectural and historical significance. The Main Street Central Business District has been nominated to the National Register of Historic Places.

Darlington has experienced flooding of the Pecatonica River five times since 1950. The floods have caused washed out bridges and roads, damaged crops, sewer back-up, debris build-up, power outages, isolation from highways, and damage to fuel, chemical and water tanks. In the 1990 flood, businesses were closed and damages in Darlington accounted for most of Lafayette County's \$2.5 million in damages.

After the 1993 flood, the City of Darlington decided to undertake a flood mitigation project. Using public involvement techniques, the City completed a comprehensive Flood Mitigation Plan that became part of the community's overall comprehensive plan. The plan calls for the floodproofing of 38 businesses in the downtown area and acquisition of 15 other structures. The floodproofing designs were developed to conform to the Secretary of Interior's Standards for Building Rehabilitation and Guidelines for Rehabilitating Historic Homes, as well as the State of Wisconsin's Natural Resource Code.

Another phase of the project included development of a business park on land south of Darlington, using Economic Development Administration funds to provide the necessary infrastructure. After the infrastructure improvements, several of the businesses that are acquired from the flood prone area will be relocated to the business park. The acquired land near the river will be converted into a park and campground. The wastewater treatment facility in the floodplain was demolished and rebuilt in a low hazard area.

The cost of the project was shared. The Federal government contributed \$3.4 million, representing 78percent of the total project funds (58percent from FEMA and 20percent from the Economic Development Administration). CDBG funds were used to floodproof several residences. The remainder of the funding came from State and local contributions, local financing and local property owners.

As a result of this project, the city of Darlington was made safer and more aesthetically pleasing. The natural function of the floodplain was restored, and the city's economic development potential was improved.

Dade County, Florida

Among other programs, the Metro-Dade Office of Community Services administers a program to provide emergency housing to families who have been evicted from their homes. The Emergency Service Center South (the Center) is one of the providers of emergency housing assistance.

The 140-mile per hour winds of Hurricane Andrew heavily damaged the Center in 1992. Wind and debris broke the windows and breached the building's wind penetration resistance. Wind inside the facility caused \$149,830 in damages to walls, floors, ceilings, doors, cabinetry, floor covers and appliances.

When the County made plans to rebuild the Center, they decided to take steps to mitigate the risks of sustained high-wind damage in the future. The County used private insurance settlement funds to rebuild the structure, and FEMA Infrastructure Recovery (Section 406) funding to install wind shutters over exposed windows.

Galvanized steel removable storm panels and aluminum accordion shutters were determined to provide the most practical protection at the least cost. The total cost of installing the shutters was \$30,000. Without the wind shutters the Center would have faced the prospect of similar damages from wind in the next major hurricane.

MITIGATION PROGRAMS AND FUNDING SOURCES

How will your community fund its mitigation efforts? Both technical and financial resources will be needed.

LOCAL RESOURCES

Keeping in mind that the responsibility for mitigating hazards belongs to local government, first seek all available local resources, including but not limited to the following:

- Donations.
- Capital Improvements projects.
- Economic Development funds.
- School bonds.
- Public/private land swap.
- Insurance.
- Volunteer organizations.
- Public/private partnerships like the Cascade Regional Earthquake Workgroup (CREW) in the Pacific Northwest. This group includes business, lifeline, engineering and government organizations, and universities that work to develop and promote all-mitigation in response to the threat of a great Cascadia Subduction Zone quake.
- Formation of separate benefit assessment districts, as was done in Los Angeles for retrofitting commercial and apartment buildings, and in Oakland for minimizing fire hazards through vegetation management and improved fire protection.

STATE RESOURCES

When local resources are inadequate, seek additional assistance from the State. The following State organizations may have access to programs that can assist helpful to local mitigation efforts.

- State Hazard Mitigation Officer.
- Universities and research institutes.
- Coastal zone management.
- Flood hazard management.
- Dam safety.
- Natural resources.
- Environmental protection.

- Housing and community development.
- Public safety.
- Building regulations and standards.
- Transportation.

FEDERAL RESOURCES

There are other sources of mitigation assistance available from the Federal government. These programs provide technical and/or financial resources for mitigation.

Mitigation assistance programs may be described in three categories: pre-disaster, post-disaster, and disaster-applicable. Pre-disaster programs exist without a disaster declaration and support pre-disaster mitigation activity. Post-disaster programs generally require a Presidential disaster declaration to become applicable. Disaster-applicable programs exist pre-disaster for non-emergency purposes but may be redirected after a disaster declaration.

PRE-DISASTER PROGRAMS

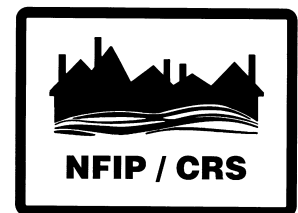
National Flood Insurance Program (NFIP)

The intent of the NFIP is to reduce disaster losses from flooding by providing flood insurance to property owners for structures that otherwise would be uninsurable because of their susceptibility to flooding. Flood insurance underwritten by NFIP is available only in communities that participate in the NFIP. To participate, communities adopt and enforce floodplain management ordinances.

To determine what areas are susceptible to flooding, FEMA funds and prepares maps called Flood Insurance Rate Maps (FIRMS). They indicate Special Flood Hazard Areas (SFHAs) that have at least a one-percent chance of being flooded in any year (also referred to as the 100-year floodplain).

Flood insurance is a requirement for obtaining any federally secured financing (such as HUD loans, VA loans, or SBA loans), or commercial loans subject to resale on the mortgage market, in flood-prone areas. Disaster assistance is restricted in communities that choose not to participate.

When flood insurance is available for a privately-owned structure, and flood insurance is not purchased, disaster assistance is not reduced the first time it is requested. However the disaster assistance applicant must borrow what they would have received from a flood insurance policy, and if in a SFHA, they must purchase and maintain



flood insurance. If disaster assistance is requested again, and a flood insurance policy is not in effect, disaster assistance is denied.

For public buildings, disaster assistance is reduced by the amount of insurance that was available but not purchased.

Contact

State NFIP coordinator or the appropriate FEMA Regional Office.

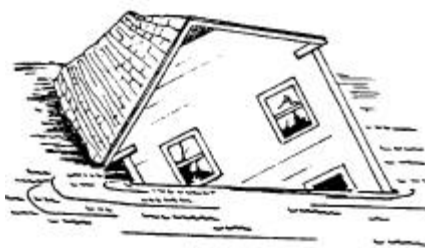
Community Rating System

The NFIP's Community Rating System (CRS) provides incentive for communities to do more than just regulate construction of new buildings to minimum NFIP standards. Under the CRS, flood insurance premiums are reduced when the community accomplishes specific activities.

- Reduces flood damages to existing buildings.
- Manages development in areas not mapped by the NFIP.
- Protects new buildings beyond the minimum NFIP protection level.
- Helps insurance agents obtain flood data.
- Helps people obtain flood insurance.

Contact

State NFIP coordinator or the appropriate FEMA Regional Office.



Flood Mitigation Assistance Program (FMA)

The objective of this new program is to reduce the flood hazard to structures that are insurable under the National Flood Insurance Program (NFIP). The FMA is particularly interested in reducing or eliminating repetitive flood insurance loss claims, because 2 percent of the policies account for one third of the claims. Grants may be awarded for planning assistance, implementation of mitigation strategies and projects.

The FMA provides annual funding for states that are planning or taking action to reduce or eliminate long-term risk of flood damage to buildings, manufactured homes and other insurable structures. FMA funding is drawn from the NFIP and does not draw reserves from the Disaster Relief Fund.. It is distributed based upon the number of policies and respective losses in each State.

Contact

State NFIP coordinator or FEMA Regional Office.

Performance Partnership Agreements (PPAs)

PPAs are the mechanism by which FEMA provides funding to States to develop and maintain emergency management programs. States develop a “self-assessment” of their emergency management needs, including mitigation, and a 5-year plan to meet those needs. Based on the plan, FEMA provides various levels of funding through annual FEMA-State Cooperative Agreement (CA). The following Federal programs provide annual funding to States through the PPA/CA process and have mitigation elements.

State Hazard Mitigation Program

The purpose of the State Hazard Mitigation Grant Program (SHMP) is to help States develop a comprehensive mitigation program. The funds are intended for such costs as:

- Salary and expenses for a State Mitigation Officer
- Comprehensive mitigation planning
- Interagency coordination
- Provision of technical assistance to local governments.

Contact

State Hazard Mitigation Officer at the State emergency management agency or the Mitigation Program Manager at the appropriate FEMA Regional Office.

Hurricane Program

The purpose of the Hurricane Program is to reduce the loss of life, property, economic disruption, and disaster relief costs resulting from hurricanes. FEMA uses a formula to distribute program funds to States at risk from hurricanes. Program funds may be used for the following types of mitigation efforts.

- Establish, enhance, and maintain basic levels of preparedness and mitigation capabilities.
- Promote effective mitigation measures to reduce damage to public and private property.
- Conduct hazard identification and evacuation studies.
- Conduct post-storm analyses to evaluate the effectiveness of mitigation measures.
- Conduct training and exercises.
- Promote public awareness and education.

Contact

Hurricane Program manager at the State emergency management agency or the Hurricane Program manager at the appropriate FEMA Regional Office.



National Earthquake Hazards Reduction Program (NEHRP)

The NEHRP is intended to mitigate earthquake losses through:

- Development and implementation of seismic design and construction standards and techniques.
- Technical assistance materials.
- Education and risk reduction programs.
- Centers addressing specific aspects of the earthquake problem.
- Dissemination of earthquake information.



A new program called the **National Earthquake Loss Reduction Program (NEP)** builds upon the NEHRP. Part of its mission is to find out about the nature, scope and organization of Federal, State, local and other earthquake hazard reduction programs. In addition, the NEP will:

- Provide an umbrella and a better picture of Federal activities in earthquake hazards reduction.
- Assess the roles and responsibilities of all the organizations to determine where and how activities might be performed more effectively to maximize the impact of declining resources.
- Provide input to the effort to put into practice what is known about reducing the impacts of earthquakes.
- Assist in establishing the benefits and costs of earthquake reduction.

Contact

Earthquake Program manager at the State emergency management agency, and the Earthquake Program manager or the appropriate FEMA Regional Office.

Community Assistance Program – State Support Services Element (CAP)

The Community Assistance Program provides funding to meet negotiated objectives for reducing flood hazards in NFIP communities. The program intends to identify, prevent and resolve floodplain management issues in participating communities before they require compliance action by FEMA. Available CAP funding is provided on a 75 percent Federal maximum and 25 percent minimum State cost sharing basis through the annual FEMA-State PPA/CA.

Contact

CAP coordinator at the State emergency management agency, or the appropriate FEMA Regional Office.

Disaster Preparedness Improvement Grant (DPIG)

The objectives of the Disaster Preparedness Improvement Grant program are to assist States in developing and improving State and local plans, programs and capabilities for disaster preparedness and mitigation. The program provides for grants not to exceed 50 percent of the cost of improving, maintaining and updating these plans, not to exceed \$50,000 per year to any State.

Contact

DPIG Program manager at the State emergency management agency or the FEMA Regional office.

POST-DISASTER PROGRAMS

When a major hazard event occurs, there are many opportunities to mitigate existing hazard risks. During recovery, communities should make every effort to take advantage of these opportunities and improve the “disaster resistance” of the community. The best way to ensure that the available funding programs are tapped post-disaster is to have a pre-disaster plan that identifies how this would be accomplished.

STAFFORD ACT PROGRAMS

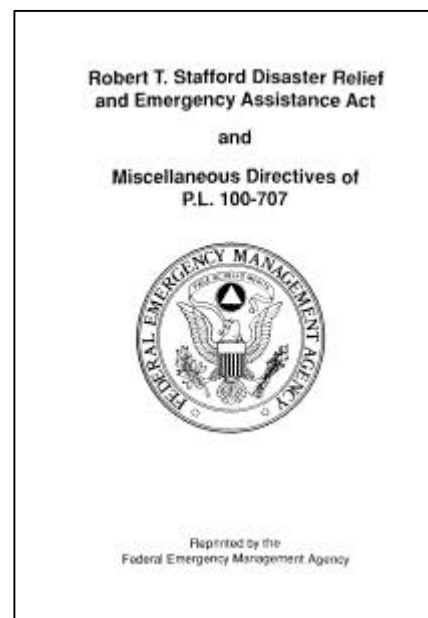
Following a Presidential disaster declaration, several mitigation programs become available to “declared” communities under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (also referred to as the Stafford Act). Mitigation assistance authorized under the Stafford Act is administered by FEMA and the State emergency management agencies.

Contact

For information on any of the programs or requirements applicable under the Stafford Act, contact your State Hazard Mitigation Officer or the appropriate FEMA Regional Office.

Hazard Mitigation Grant Program (HMGP)

The purpose of the HMGP is to reduce the risk of future damage, hardship, loss, or suffering as a result of major disasters by providing substantial financial support to implement cost-effective, post-disaster State and local mitigation measures. This program provides



funding for mitigation measures that conform to the post-disaster mitigation plan required under Section 409 of the Stafford Act.

The President is authorized to contribute up to 75 percent of the cost of mitigation measures that are determined to be cost effective and substantially reduce the risk of future damage or loss in States affected by a major disaster. The remaining 25 percent of the cost may be a combination of State and local contributions.

Infrastructure Support (Public Assistance)

This program deals with repair, restoration and replacement of damaged public facilities and damaged private nonprofit facilities. It authorizes funding for the additional costs of mitigation measures necessary to meet current standards (such as seismic safety and floodplain management criteria) and/or additional measures if it can be demonstrated that the measure is technically appropriate and cost-effective.

Human Services

Grant awards are available to repair disaster-damaged dwellings. Appropriate actions to mitigate natural hazards, such as improved construction practices are required and funded under this section.

Individual and Family Grant Program (IFG)

The Stafford Act provides for grants to cover serious, unmet, disaster-related real property losses. IFG funds can be used to cover disaster-related mitigation measures up to an indexed grant amount.

Special Programs

It is wise for the emergency program manager, or other local official in charge of mitigation, to investigate the possibility of other programs that may be designed for more limited use. For example, the Seismic Hazard Mitigation Program for Hospitals (SHMPH) is designed to accommodate hospital facilities that were structurally damaged in the Northridge Earthquake, and were constructed prior to 1973 when California established seismic safety regulations for hospital construction. The SHMPH provides funding, on a Federal/non-Federal cost-share basis, for mitigation measures that are likely to significantly improve a building's seismic performance. In recent years, similar programs have been established through Congressional post-disaster supplemental appropriations.

DISASTER-APPLICABLE PROGRAMS

Federal agencies may also use funds from regular, ongoing programs to support disaster recovery and mitigation.

Beach Erosion Control Projects

This program, administered by the U.S. Army Corps of Engineers (USACE), is intended to control public beach and shore erosion. Reconnaissance studies are federally funded, and the feasibility studies are shared 50/50 with the local sponsor. The USACE designs and constructs the project. Federal participation cannot exceed \$2 million.

Contact

The nearest USACE District Engineer.

Community Development Block Grants (CDBG)

The Department of Housing and Urban Development (HUD) sponsors this program. Its objective is to develop viable urban communities by providing decent housing and a suitable living environment and by expanding economic opportunities, principally for low to moderate-income people. Disaster-related assistance is eligible under this program; and mitigation activities have been funded. These funds may also be utilized to help meet State and local cost-share match requirements.



Contact

The applicable State CDBG office.

HOME Investment Partnerships Program

This HUD program provides permanent housing for low-income homeowners or renters in large cities and urban counties. Funds can be used for acquisition, new construction, and rehabilitation.

Contact

The applicable HUD field or regional office.

Conservation: Coastal Wetlands Planning, Protection and Restoration Act

This Department of the Interior (DOI), Fish and Wildlife Service (FSW) program is intended to grant funds to coastal States for restoration, enhancement and management of coastal wetlands.

Contact

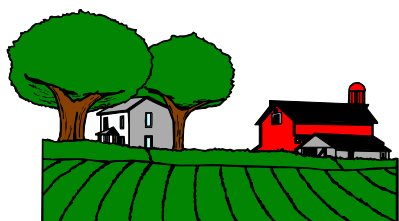
The applicable FSW regional office.

Conservation Fund Grants, Land and Water

This program is administered by the National Park Service (NPS) component of the DOI. Its objective is to acquire and develop outdoor recreation areas and facilities for the general public, to meet current and future needs.

Contact

The local NPS office.



Farm Ownership Loans

This Department of Agriculture (USDA), Farm Service Agency (FSA), program is intended to assist farmers to develop, construct, improve, or repair farm homes, farms and service buildings; to drill wells, and otherwise improve farm water supplies; and to make other necessary improvements.

Contact

The Farmer Programs Loans-making Division at the FSA, USDA, Washington D.C.

Soil and Water Loans

This program is administered by the USDA, FSA. Its objective is to develop wells, improve water supplies, build dikes, terraces, waterways, and other erosion-control projects.

Contact

The Farmer Programs Loans-making Division at the FSA, USDA, Washington D.C.

Other Sources

Other sources of financial and technical assistance are available and may be applicable for funding the implementation of mitigation strategies. Refer to the appendix in this manual titled *Additional Mitigation Resources*.

SUMMARY

- ✓ Mitigation happens locally, and local government must recognize hazards and initiate mitigation action.
- ✓ Local governments enact and enforce building codes, zoning ordinances and other measures to protect life and property; make the public aware of hazards that present risks to people and property and measures they can take to reduce the risk of loss; and comply with Federal and other regulations that are designed to reduce losses.
- ✓ Businesses, private organizations, and individual homeowners have a responsibility to comply with applicable zoning and land-use regulations, and to undertake other measures, as necessary and possible, to reduce or eliminate damage from known hazards.
- ✓ Federal agencies are expected to take the lead in mitigation by evaluating their own facilities and ensuring that they are designed, constructed, and upgraded to reduce the impact of future hazard events.
- ✓ Assistance and incentives for pre-disaster mitigation are available through these programs.
 - National Flood Insurance Program.
 - Community Rating System.
 - Flood Mitigation Assistance Program.
 - State Hazard Mitigation Program.
 - Hurricane Program.
 - National Earthquake Program.
 - Community Assistance Program.
 - Disaster Preparedness Improvement Grant
- ✓ The following programs are available following a Presidential disaster declaration
 - Hazard Mitigation Grant Program (HMGP).
 - Infrastructure Support.
 - Human Services.
 - Individual and Family Grant Program.
- ✓ Federal agencies may also use funds from regular, ongoing programs to support disaster recovery and mitigation, for example:
 - Community Development Block Grants (CDBG).
 - HOME Investment Partnerships Program.
 - Conservation: Coastal Wetlands Planning, Protection and Restoration Act.
 - Conservation Fund Grants, Land and Water.
 - Farm Ownership Loans.
 - Soil and Water Loans

1. What local resources might be available for the project?

2. What individual and/or business resources might be available?

3. What State resources might be available?

4. What Federal resources might be available?

✓ CHECKING YOUR MEMORY

1. The responsibility for identifying hazards and initiating mitigation action belongs to
 - A) business and individuals.
 - B) local government.
 - C) Both A and B.
2. Federal agencies are expected to take the lead in mitigation by
 - A) funding all mitigation projects.
 - B) ensuring that Federal facilities are built or upgraded to reduce hazard vulnerability.
 - C) discouraging State and local government officials from pursuing costly mitigation projects.
3. An example of a local resource for hazard mitigation is
 - A) Capital Improvements projects.
 - B) Economic Development funds.
 - C) school bonds.
 - D) All of the above.
4. The Community Rating System discourages communities from regulating construction of new buildings.
 - A) True
 - B) False.
5. The program that is not disaster-dependent and provides annual funding for States that are planning or taking actions to reduce the risk of flood damage to insurable buildings is called
 - A) Flood Mitigation Assistance Program.
 - B) National Flood Insurance Program.
 - C) Community Rating System.
6. State Hazard Mitigation Program funds are intended for
 - A) salary and expenses for a State Hazard Mitigation Officer.
 - B) mitigation planning and technical assistance.
 - C) Both A and B.
7. This Stafford Act program authorizes the President to contribute up to 75 percent of the cost of hazard mitigation measures that are determined to be effective in preventing future damage or loss in States affected by a major disaster.
 - A) Hazard Mitigation Grant Program.
 - B) Infrastructure Support.
 - C) Human Services.

INTRODUCTION TO MITIGATION BUILDING A MITIGATION PROGRAM

INTRODUCTION

The first three units of this course addressed components of community mitigation that have multiple steps or parts and required a substantial amount of background information. This final unit will illustrate how those steps fit into a process that can be used to develop a pre-disaster mitigation plan and a community mitigation program.

COMMUNITY INVOLVEMENT

The primary tools needed to build a mitigation program are community commitment, a community planning team, and public input. Public input and information from community officials and groups are important to gathering data, identifying problems, and deciding on solutions.

Community Commitment. Community leaders need to acknowledge that there are hazards and that they can and must be addressed. In addition to this leadership, staff time and resources are needed to develop the plan, implement activities, and maintain community interest in mitigation. Resources may include the use of phones and office equipment, provision for local travel, and printing and photocopying expenses. The availability of local staff and/or volunteers to spend time planning and carrying out activities that will reduce hazards and prevent losses depends on the level of community commitment.

Community Planning Team. Although a strong community leader is important to the mitigation effort, a community planning team is essential. A community planning team:

- Ensures better solutions, because no one person in the community has all the answers.
- Gains community acceptance for the mitigation plan, since many viewpoints are represented.

Unit 4 Objectives

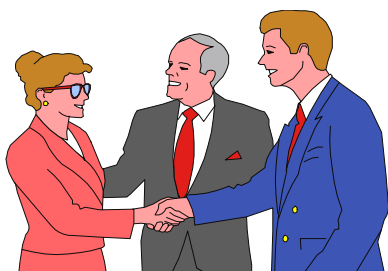
1. Give a rationale for local pre-disaster mitigation planning and actions.
2. Describe the overall process for developing a mitigation plan.
3. Develop an outline of steps to be taken in order to begin or enhance a local mitigation program.



- Ensures important information and assistance are not overlooked.

Community planning teams are usually composed of individuals with a variety of skills and areas of expertise. Recommended members for the community planning team include the following:

- A member of the City Council or Board of Selectmen.
- The community planner or a planning board member.
- A member of the Conservation Commission.
- A building official.
- The community engineer.
- The community health official.
- Public works personnel.
- The emergency program manager.
- One or more hazard area residents.
- One or more representatives of the business community.
- Representatives of adjoining communities (if problems and/or solutions are likely to extend outside community boundaries).



There are many ways to recruit these potential team members and encourage team participation. There may be planning groups already established to address hazard related issues; for example, a Local Emergency Planning Committee (LEPC) that addresses hazardous materials issues, or a Community Rating System (CRS) group that plans activities to reduce flood losses. Such groups may be a good core for a mitigation planning team. In addition, the following methods have been successful.

- Encourage the City or Town Manager, or Chief Elected Official, to appoint team members.
- Publicize the fact that a plan will be developed to solve hazard problems and ask for volunteers.
- Emphasize the importance of a diverse team in mitigation planning.
- Inform people of what the time commitment may be in terms of duration and frequency.

- Give people the option of providing input in other ways, besides being a team member.
- Provide specific tasks to each person on the team.
- Maintain communications with each team member.

Public Input. Throughout the planning process, public input will be required to ensure workable solutions to hazard problems. An individual or small group could perform the data collection and analysis. It is important to interview local officials and residents to gather historical information on the various hazards that are likely to occur in the community. The input of the wider community is also needed to ensure that solutions, proposed actions, ongoing implementation of the plan, and monitoring and documenting of successes are accomplished.

There are several ways the community planning team can ensure that public input is obtained. These methods include:

- **Hosting Public Input Workshops**, which can take the form of a facilitated meeting involving a large group of community representatives, business representatives, and residents. In this type of forum, brainstorming brings problems and issues to the table, as well as ideas for solutions. This comprehensive approach allows the public to help identify issues and ways to solve problems.
- **Developing and distributing questionnaires** to hazard area residents in utility bills, or posted in the local weekly newspaper. For example, distribute a questionnaire to gauge the level of interest in retrofitting and floodproofing projects.
- **Disseminating information and opportunities for feedback** through local access cable television. Meetings can be broadcast to the community, and can include video footage of historical or recent disaster damages, as well as phone numbers of team members who will accept comments and suggestions.

DEVELOPING A PRE-DISASTER MITIGATION PLAN

Pre-disaster planning is the key element in building an effective mitigation program. Mitigation plans emphasize actions to be taken *before* a disaster occurs to reduce or prevent future damages.

Preparing a plan to reduce the impact of a disaster *before* it happens provides many benefits to your community.

Benefits of Planning Before a Disaster

- Meet community needs.
- Achieve multiple objectives.
- Promote public participation.
- Increase funding eligibility.
- Guide post-disaster recovery.

- **Meets Community Needs.** Pre-disaster mitigation planning will help identify the problems and solutions that exist in the community. Every community is different in terms of its economics, size, geography, governance, demography, land uses, and hazards. Developed in conjunction with the jurisdiction's comprehensive plan, solutions developed for the mitigation plan will be tailored to interface with other community goals. Therefore each community's mitigation plan will vary to some degree.
- **Achieves Multiple Objectives.** Mitigation plans can be tailored to any type of hazard. Developing a mitigation plan helps the community find the most appropriate solutions, address multiple problems with a comprehensive solution, and maintain or improve local environmental and economic integrity.
- **Promotes Public Participation.** Prior to a disaster the mitigation planning process promotes public input and coordination among stakeholders to help generate ideas for solutions and ensure recognition and local ownership of problems. Participation in planning groups provides individuals concerned about the potential effects of disasters many opportunities to help solve problems and later to implement the solutions.
- **May Increase Funding Eligibility.** Pre-disaster mitigation planning may increase a community's chances of receiving funds from a variety of sources. (As discussed in Unit 3, FEMA requires State and local governments to undertake mitigation planning as a condition of receiving Federal disaster assistance.) Mitigation planning is also an eligibility requirement for most FEMA mitigation funding programs, such as the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), and the Community Rating System (CRS). These mitigation plans must include an evaluation of the hazards in the planning areas.

- ***Guides Post-Disaster Recovery.*** Pre-disaster mitigation plans are useful in preparing the community to deal with post-disaster situations by identifying actions that should be done immediately following a hazard event. The plan can guide the community to further reduce future damages by helping the community to develop policies that promote a rapid and efficient recovery, and capitalize on post-disaster opportunities for safety improvements. Having a plan that includes post-disaster actions will ensure that opportunities for future mitigation are not overlooked in the urgency to rebuild. It will help to diffuse what otherwise may be a hostile, stressful, and unproductive environment.

DEVELOPING A LOCAL MITIGATION PLAN

The overall planning approach described in this unit has been successfully implemented in many communities. This specific methodology has been adapted from *Flood Mitigation Planning: A Community Guide*, prepared by the Massachusetts Department of Environmental Management with assistance from the Federal Emergency Management Agency and the Natural Resources Conservation Service.

The planning team should follow 10 basic steps to prepare an effective mitigation plan for the community.

Step 1 – Map the Hazards

Step 2 – Determine the Potential Damage

Step 3 – Identify What is Already Being Done

Step 4 – Identify What is Not Already Being Done

Step 5 – Brainstorm Alternatives

Step 6 – Evaluate Actions

Step 7 – Coordinate with Others

Step 8 – Select Actions

Step 9 – Develop a Strategy

Step 10 – Adopt and
Monitor the Plan

STEP 1: MAP THE HAZARDS

Where are the hazards? Unit 1 described the Hazard Analysis process and a method for developing Hazard Profiles. Those profiles identify where the hazards are likely to strike. That data should be used for developing a base map depicting the hazard areas in relation to structures, infrastructure and resources. This map will:

- Depict the hazard to viewers
- Provide a comprehensive view of the community's hazard areas
- Help focus efforts on specific areas

The following checklist will help generate a community base map that depicts hazard areas.

Step 1 Checklist

- ✓ Obtain and review existing hazard maps and information from the Hazard Analysis. For resources of information, see the *Appendix R: Additional Mitigation Resources*.
- ✓ Contact the State Geographical Information System (GIS) manager to determine if existing digital mapping is available.
- ✓ Contact the appropriate FEMA Regional Office to obtain information about recent map amendments or revisions.
- ✓ Contact appropriate State offices/departments that may have maps concerning hazards (e.g., Department of Environmental Management, Emergency Management, Geological Survey, State Climatologist, State Forestry Department)
- ✓ Visit the community planning office to obtain local natural resource, open space, and master plans, and review for hazard information.
- ✓ Using a town assessor's map as a base, highlight (draw lines) to depict hazard areas. Use different colors or shading to depict the various hazard areas.
- ✓ Include a legend defining the map's key hazard areas.

STEP 2: DETERMINE THE POTENTIAL DAMAGE

After having mapped the hazard areas in Step 1 (Map the Hazards), refer to the risk determination made during the Hazard Analysis process. Step 2 involves estimating the number of structures, infrastructure and resources in the community that are in the hazard areas, and the estimated hazard-related losses in the community. This step helps narrow the focus of where actions should be taken to reduce hazard-related damages.

This information should be added to the base map created in Step 1 (Map the Hazards) to give a graphic depiction of what is at risk in the community.

Step 2 Checklist

- ✓ Estimate the types, numbers and values of structures in the hazard area, using community assessor's information, land use or zoning maps, and the hazard overlay developed in Step 1 (Map the Hazards).
- ✓ Contact the FEMA Regional Office to obtain information about repetitive flood loss properties.
- ✓ Inventory critical facilities – are any of the following in the hazard area?
 - emergency operations center / city or town offices
 - water and wastewater treatment plants / sewage pumping stations / public works garages
 - power substations
 - police or fire stations
 - schools / hospitals / daycare facilities
 - nursing homes / elderly housing / shelters
 - correctional facilities
 - hazardous materials facilities / power plants
 - access roads to the facilities listed above
 - evacuation routes.
- ✓ Mark on the base map the general areas where there are residential structures in the hazard area.
- ✓ Mark on the base map the general areas where there are other types of structures in the hazard area, including industrial, retail, and office buildings.
- ✓ If applicable, highlight on the base map the areas that include repetitive flood loss structures.
- ✓ Mark all identified critical facilities in the hazard area on the map.

STEP 3: IDENTIFY WHAT IS ALREADY BEING DONE

What is the community already doing that can protect against future hazard-related damages? In Step 1 (Map the Hazards) and Step 2 (Determine the Potential Damage), the community planning team described the extent of the hazard problem for the community by identifying the hazard areas and determining what is at risk.

In Step 3, create a summary of what is already being done locally to mitigate hazards by listing the items already in place that work toward solving hazard problems or preventing future losses in the community.

Consider the following loss protection systems at the Federal and State levels which may affect the community.

- The community may have a hazard *warning system* in place, and should have an *emergency operations plan*.
- The community's Emergency Operations Center should have *evacuation plans and systems* in place. For communities near a nuclear power plant, evacuation plans are required.
- There may be Federal and State regulations mandating *land use restrictions* in certain areas that may help reduce hazard risk. If the community has open land owned by the State or Federal government, examine what restrictions are placed on its development. For example, a State Wetlands Protection Act regulates the development of all lands identified as significant to the protection of resources identified in the Act.
- If there are areas in the community not served by a public sewer system, state *septic system* regulations may influence development and may be a consideration for mitigation alternatives that include rebuilding and elevation of structures.
- Determine the status of programs, described in Unit 3, that may be already underway in the community. These might include: economic/community development programs to help homes using Community Development Block Grant funds; the Hazard Mitigation Grant Program; the National Flood Insurance Program; the Community Rating System; or a Coastal Barrier Resources Act program.

Additional protection systems the community may also have are listed below.

Prevention/ Limitation of Development in Hazard Areas	Plans That Should Take Hazards Into Account	Physical Protection From Known Hazards
Local zoning (e.g., floodplain) State/Federal ownership of land that preserves hazard areas Local or non-profit ownership of conservation land, including parks, playgrounds, buffer areas, bicycle paths, wildlife sanctuaries, etc. Natural limitations to development (slopes, soils, high water tables, etc.) State/local development requirements (e.g., Wetlands Protection Act, NFIP, State Building Code)	Natural resources plans Community Rating System (CRS) participation/plans Open space/recreation plans Emergency/flood evacuation plans Community comprehensive plans Economic development plans Capital improvements plans Redevelopment plans Standards for new construction Standards for infrastructure at risk	Elevated structures Anchored structures Seismically- retrofitted structures Flood-proofed structures Acquired or relocated structures Seawalls Levees Berms Dams Tide gates Reforestation Beach nourishment Soil stabilization Tree thinning

The Step 3 Checklist will help you develop a list of what the community is already doing to protect hazard areas. To help you record this information you will begin using the Existing Protection Matrix. Make several copies of the blank matrix page before you begin.

For each of the items, enter in Column 1 of the Existing Protection Matrix each action, policy, or program that provides damage protection for the particular hazard. Enter a brief description of each measure in Column 2. In Step 4 (Identify What Is Not Being Done), you will complete the matrix by evaluating these measures.

Existing Protection Matrix

<i>Column 1</i> Type of Existing Protection	<i>Column 2</i> Description	<i>Column 3</i> Area Covered	<i>Column 4</i> Effectiveness and/or Enforcement	<i>Column 5</i> Improvements or Changes Needed
<i>Example:</i> Floodplain District Zoning Bylaw	<i>Requires elevation of new or improved structures in floodplain; prohibits hazardous materials in floodplain</i>	<i>100-year floodplain as shown on Flood Insurance Rate Map dated August 16, 1989</i>	<i>Enforced by zoning official; variances rarely granted; additional flood areas not included in district</i>	<i>Include newly identified flood areas in zoning district; encourage lower development density in the district</i>

Step 3 Checklist

- ✓ Check local bylaws, ordinances, open space and master plans for existing protection of hazard areas. For example, the community's local zoning may incorporate restrictions such as prohibition on certain types of uses in the high hazard areas, minimum lot sizes, setback requirements, subdivision regulations, etc.
- ✓ Find out if the community participates in any plans that take hazards into account (e.g., Community Rating System). If so, there may already be a plan in place that can be expanded to a mitigation plan.
- ✓ Determine if cultural and historic resources are protected. Are there plans for protection of local libraries and archives, or for community records?
- ✓ Determine if the community has a disaster warning system, emergency operations system, and/or evacuation plan.
- ✓ Determine where any existing hazard control structures are in the community, and approximately how many structures (including critical facilities) they protect. Contact, for example, the local Department of Public Works, U.S. Army Corps of Engineers, or Natural Resources Conservation Service.
- ✓ Check for existing hazard maps. For example, floodplain maps may already exist for the community.
- ✓ Check with the community Building Official to determine if local property owners have demolished, relocated or retrofitted structures in the hazard areas.

STEP 4: IDENTIFY WHAT IS NOT BEING DONE

Where are the gaps in hazard protection in the community? Step 3 (Identify What Is Already Being Done) determined what actions, policies, and programs were already in place to help reduce future hazard losses. In Step 4 evaluate the effectiveness of these existing measures, identify where they can be improved, and determine the goals to reduce the risk of hazard damages in vulnerable areas.

This evaluation takes into account the geographic extent of the hazard, and where the gaps may exist in the community's protection. It also examines the effectiveness of the existing protection. If existing protection measures are adequate, the plan will be an agreement to continue to enforce existing regulations and maintain existing systems. If there are gaps in hazard protection, the plan should address what actions will be taken to improve hazard damage reduction.

Geographic Aspect. Geographically, where is the community unprotected? Are there risk areas visible in the maps generated in Steps 1 and 2 that are not covered by an existing protection system (regulatory and/or physical) as identified in Step 3? For example, a zoning bylaw may apply to mapped floodplain areas, but not to areas that are not mapped as floodplain and that you have determined are at risk from flooding.

Evaluating geographic areas helps focus efforts on the most vulnerable locations in the community. If the community's hazard problems are affected by the actions of another community, or if the community's actions can impact a nearby area, you may need to take a wider approach and coordinate planning with these neighboring communities. If the hazard problems are limited to a specific area within the community, the plan could be tailored to that area only.

Policy/Program Effectiveness. Consider the level of effectiveness of existing policies or programs listed on Step 3's Existing Protection Matrix. For example, a floodwall may protect structures from flooding during a 50-year storm, but will they be overtopped during the 100-year event? If it will, does the community consider it to be effective enough as a flood control measure? Or, are improvements or changes needed? This applies to regulatory measures as well. For example, is a floodplain district zoning bylaw that only regulates flood areas on the Flood Insurance Rate Maps sufficiently effective in minimizing the community's risk of flood damages?

Evaluation of the level of effectiveness of the existing protection measures involves gauging how well the existing programs, policies, regulations, and structures are actually working to protect vulnerable areas from hazards. For example, the community's open space and recreation plans or master plans may not take the hazard into account. Improving existing protection measures can help reduce risk across the community, especially in the hazard areas you have identified.

Developing Goals. After identifying the gaps in hazard protection in the community, develop goals for hazard reduction. The goals should not identify specific measures (this will be done in subsequent steps), but identify the improvements you want to achieve. Sample goal statements are:

- “Protect the residential area along Beach Boulevard from wave overwash flooding.”
- “Prevent wildfires from engulfing neighborhoods near the wildlife preserve.”
- “Ensure that wastewater treatment plants in the community will function during earthquake events.”

Step 4 Checklist

- ✓ Determine the physical area that is being protected and write it in Column 3 on the Existing Protection Matrix. This could be the entire community, a particular neighborhood, or other specifically defined areas.
- ✓ Determine the effectiveness and/or the level of enforcement for each measure. This can be done by noting enforcement measures as shown under Column 4 in the matrix example, or by developing a rating system. The rating system can be as simple as using, for example, “good,” “partial,” or “poor.”
- ✓ Depending on the effectiveness of a particular measure, develop some suggestions for improvements to the existing measure, or some additional measures that can be taken. If a measure is very effective in preventing losses, you may just need to note under Column 5, “Continue to enforce or perform

Using the matrix as a guide, prepare the community's goal statements for hazard reduction. Focus on the geographic areas at risk and the needed improvements in existing protection measures. These general goals are useful for communicating to others what it is the community wants to do. This is especially helpful when coordinating with other agencies, which will be done in Step 7 (Coordinate With Others).

STEP 5: BRAINSTORM ALTERNATIVES

What mitigation actions can be taken? In Step 4 (Identify What is Not Being Done), the community planning team developed goals for hazard reduction. In Step 5, the team will focus further on the actions that will reduce hazard damages. This step will produce a list of all types of actions that could be taken to reduce losses and eliminate hazards.

Some of the actions you identify will be based on the information from Step 4 – “Improvements or Changes Needed” under Column 5 of the Existing Protection Matrix. These actions should reflect what needs to be done to reduce future damages, and not what is already being achieved through existing systems or programs.

Brainstorming Ideas. Actions will be developed during this step by generating ideas for solutions through a brainstorming process. These ideas will later be evaluated according to community criteria discussed in Step 8 (Select Actions). One of the best ways to generate ideas is through a group process called “brainstorming.” In order for this process to be effective, there are certain “rules” that need to be followed.

- Every team member should contribute his or her ideas towards defining a workable solution for the problem.
- When generating ideas, strive for quantity over quality. Use free association and encourage creativity. Don’t accept just the “standard” answers as the only possible solutions.
- Don’t rule anything out during this step. Maintain respect for individual and different ideas. Don’t just focus on activities that fit existing funding programs.
- Make sure to record all ideas. You will probably need someone to keep track of all the ideas on an easel.

Categorizing Ideas. After the team has identified ideas for mitigating local hazards, organize the actions for comparison and discussion. For example, you can assign each action to one of the categories introduced in Unit Two of this manual:

- **Prevention** - measures such as planning and zoning, open space preservation, land development regulations, storm water management, dune and beach maintenance.



- **Property Protection** – measures such as acquisition, relocation, rebuilding, and floodproofing.
- **Public Information** - measures such as outreach projects, real estate disclosure, hazard information centers, technical assistance, and school age and adult education programs.
- **Natural Resource Protection** – measures such as erosion and sediment control, and wetlands protection.
- **Structural Projects** - measures such as dams, reservoirs, dikes, levees, seawalls, bulkheads, revetments, high flow diversions, spillways, buttresses, debris basins, detaining walls, channel modifications, storm sewers and elevated roadways
- **Emergency Services** - measures such as hazard threat recognition, hazard warning, emergency response, protection of critical facilities, and health and safety maintenance.

Step 5 Checklist

- ✓ Conduct a brainstorming session with the community planning team to identify actions to reduce hazard damages.
- ✓ Follow up the brainstorming session by obtaining as much detail as possible about each action. This will help to perform Step 6 (Evaluate Actions).
- ✓ Use available technical assistance. Invite appropriate State or Federal agency staff to the brainstorming session, or ask them to develop suggestions at a separate forum.
- ✓ Reference published sources that explain different kinds of actions.

As actions are suggested, place them under a category listing. This can be done by having easels around the room for the six categories (Prevention, Property Protection, Public Information, Structural Projects, Emergency Services and Natural Resource Protection) and writing each suggestion on the appropriate easel.

STEP 6: EVALUATE ACTIONS

Which mitigation actions are feasible? In Step 5 (Brainstorm Alternatives), the community planning team developed ideas and began to categorize them by type of solution. In Step 6, you will determine whether they are appropriate measures to solve the identified problems. The team will also list the feasible hazard loss reduction actions, considering the impacts from several points of view.

Evaluation Criteria. The most important criterion is whether or not the proposed action mitigates the hazard. Is it effective in reducing hazard damage? How much will the hazard losses be reduced if this action is taken? Although some proposed actions may do little to actually reduce hazard occurrence or hazard damages when taken alone, they may be important steps toward more effective actions.

Each action also should be examined for its compatibility with other goals. For example, how does the action impact the environment? Consider whether the proposed action will meet state and local environmental regulations. Does it affect historic structures or archeological areas? Does it help achieve multiple community objectives?

Also take into account “timing.” How quickly does the action have to take place to be effective? Which actions will produce quick results? This is particularly important if funding sources have application time limits, if it is the beginning of “storm season,” or if the community is in the post-disaster scenario (when everyone wants to recover as soon as possible).

Using basic evaluation criteria will facilitate the process of deciding which actions are most appropriate for your community. In Unit 2 you learned about the STAPLE criteria that can help the community decide which measures are most appropriate to solve the hazard risk problem. Recall that STAPLE stands for **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, and **E**conomic/**E**nvironmental criteria for making planning decisions. Refer back to that part of Unit 2 to refresh your memory on what each criterion involves.

Step 6 Checklist

- ✓ For each action, first answer the question of whether or not it will minimize the hazard risk or reduce hazard losses. Actions that do not do so should be placed low on the priority list unless they are part of a larger or more effective set of actions.
- ✓ For each action, evaluate whether it is a complete solution or will need to be combined with other measures.
- ✓ For each action, determine how well the action fits the STAPLE criteria. Ask the questions provided in Unit 2's section on STAPLE criteria.
- ✓ Keep track of the responses to the questions in the STAPLE criteria for each action.
- ✓ If actions involve property protection or hazard control to reduce damages to specific properties, an inventory is recommended to help determine costs and benefits of the alternatives. An inventory of individual structures should include, for example:
 - A sound estimate of the number of structures listed by use (residential, commercial, industrial) in the area where the action is proposed
 - The percentage of structures in a high hazard area.

STEP 7: COORDINATE WITH OTHERS

Who else is performing related activities? In Step 6 (Evaluate Actions), the community planning team evaluated proposed ideas for mitigation and prioritized them using the STAPLE criteria. Step 7 involves determining what actions other community groups or outside agencies are doing that can help implement or support local hazard reduction actions. For example, are there capital improvements, economic development, environmental protection and /or comprehensive plans that include related activities? Completing this step will help prevent duplication or conflicting efforts.

Coordinate the actions the community wants to take to mitigate future hazard damages with other community priorities and mitigation goals of surrounding communities and Federal and State agencies. The advantages of coordination include:

- Improved access to technical assistance and financial resources (other agencies are more likely to help you if their goals are also being met).
- Better solutions developed for multiple problems.
- Broader support provided for implementation.
- Reduced chances of duplicating or conflicting efforts.

Step 7 Checklist

- ✓ Check with community officials and local organizations. Examine local and regional plans, including any comprehensive plans, economic development, environmental preservation, open space, water quality, parks and recreation, or transportation plans. Do any of these include activities, measures, or proposals for the hazard planning area?
- ✓ Send a cover letter stating the mitigation goals (from Step 4) and a brief description of the identified actions to appropriate agencies. Make sure the letter requests their review and asks if they have any plans that can be coordinated with any of the identified actions. Contact local, State and Federal groups/agencies involved with:
 - State Hazard Management Program – State 409 Hazard Mitigation Plan
 - Natural Resources – land use plans
 - Floodplain Management
 - Environmental Regulations
 - Housing and Community Development – redevelopment plans
 - Conservation Services – open space preservation, conservation restrictions
 - Emergency Management – emergency response plans
 - FEMA Region – disaster assistance programs, flood insurance, map revision plans
 - National Parks Service – rivers and trails planning
 - U.S. Army Corps of Engineers (USACE) – water resource projects, Section 22 Planning Assistance program, Floodplain Management Services program
 - U.S. Fish and Wildlife Service – wetlands and wildlife conservation plans
 - Adjacent communities – check if actions or conditions in adjacent communities impact the community's hazard problems, or if actions or conditions in the community affect adjacent communities
 - Local conservation districts – soil and water conservation activities
 - Regional Planning Agencies – transportation plans, zoning bylaw assistance
 - Building Regulations
 - Infrastructure Regulations or Construction
 - Public Information
 - Insurance

Make a note of any comments received on particular actions. This will help in the next steps of selecting and prioritizing actions.

STEP 8: SELECT ACTIONS

What are the community's priorities? In Steps 6 (Evaluate Actions) and 7 (Coordinate With Others), the community planning team evaluated the proposed actions generated in Step 5 (Brainstorm Alternatives) and determined what actions other agencies were taking that could help reduce hazard losses. Step 8 involves selecting actions and prioritizing them in order of importance.

Before selecting actions that can best meet the community's mitigation needs, the community planning team should establish a formal minimum threshold. Of the actions that meet the minimum threshold, select those that are most effective in reducing hazard damages while meeting a majority of the community's criteria for acceptability. For example, a community may decide not to accept actions that would require longer than six months for the approval process.

Prioritizing Actions. When the set of actions have been selected, the community planning team should prioritize them. Prioritize the actions based on what is most effective in reducing hazard damages. One way of developing priorities is to separate actions into immediate short-term projects and long-range measures.

Some of the most effective actions may be easily achievable, such as conducting outreach workshops to encourage a particular mitigation action. Other seemingly more important activities may not be so easily achievable, due to lack of funding, current regulations, or lack of technical or staff support. For example, the town of Hazardville does not have the necessary staff and funds to commit to new projects. Knowing these constraints, they will select some immediate actions on the basis of whether they can be successfully undertaken by a group of volunteers. However, they also will prioritize and focus on a few long-term projects while funds and staffing are sought.

It is recommended to have a few easily achievable projects as top priorities, such as a public education program. This will create "building blocks" of successes and will encourage the community planning team to pursue some of the more challenging projects. The more complex and time-consuming high priority actions can be implemented as part of the ongoing process of mitigation.

Step 8 Checklist

- ✓ Establish a minimum acceptable level for actions to be considered. Look at both immediate actions and long-term projects.
- ✓ Select those actions that best fit the community's needs. Choose feasible actions that do the most to reduce hazard damages while meeting the community's minimum standards and meet all or most of the STAPLE criteria.
- ✓ Prioritize actions that will reduce hazard damages in the most vulnerable areas.
- ✓ Include as top priorities some actions that can be done quickly and easily.

STEP 9: DEVELOP A STRATEGY

How will the community implement the prioritized mitigation actions? In Step 8 (Select Actions), the community planning team selected and prioritized the actions to be implemented. In Step 9, develop a clear strategy that outlines who will implement the prioritized actions, and when and how the actions will be implemented.

In the previous steps of the planning process, the community planning team determined why hazard damages occur; what can be done to achieve the mitigation goals; and where in the community the measures to reduce losses will be implemented. To ensure that the plan will be followed, you will need to:

- Establish an implementation group.
- Prepare an implementation schedule.
- Develop an implementation process.

This implementation strategy should take advantage of technical and financial resources that would become available should a major disaster strike before or while the actions are being implemented.

Questions that will guide you through these tasks are included in the following Checklist for Step 9.

Step 9 Checklist

Establish an Implementation Group

- ✓ Identify a person in charge who:
 - is responsible for ensuring that project(s) continue to make progress
 - can dedicate a significant amount of time to this task
 - has the ability to obtain assistance from others.
- ✓ Determine how the leader will work with the group.
 - Does the leader have authority?
 - Does the leader manage people/time/money?
 - Can the leader direct others?
 - Can others veto the leader's decisions?

Prepare An Implementation Schedule

- ✓ Identify all implementation tasks.
- ✓ Determine needed order of completion.
- ✓ Coordinate with other community activities and determine any special scheduling needs (e.g., seasonal climate conditions).
- ✓ Determine start dates and target completion dates.

Develop An Implementation Process

- ✓ Determine what permits or approvals are needed.
- ✓ Determine what resources are needed for implementation by identifying sources of funding, staff time needs, and technical assistance needs.
- ✓ Reevaluate the initial implementation strategy.
 - Is funding available?
 - Is necessary staffing available?
 - Is approval likely from regulators and others?
- ✓ Are the costs still accurate given identified administrative/implementation needs?

STEP 10: ADOPT AND MONITOR

In Step 9 (Develop a Strategy), the community planning team developed a strategy for implementing selected actions. Step 10 involves the process of drafting the plan, formally adopting it, and monitoring and evaluating the plan to ensure that actions are completed, with a schedule for monitoring, evaluating and updating it.

Drafting the Plan. A formal written plan will be produced in this final step of the planning process. The document will include the results of the planning process and provide an opportunity for public review and acceptance.

The plan should catalog the information gathered in the first three steps of the planning process:

- Hazard Identification.
- Risk Assessment.
- Existing Protection Systems.

It should then identify the information gathered during Steps 4 through 8 of the planning process:

- Planning Area.
- Protection Needs.
- Selected Actions in Order of Priority (with a brief explanation of how priorities were determined and why selected alternatives were favored over those that were not).

Finally, the plan should detail the implementation strategy developed in Step 9:

- Who administers the plan and implements the actions.
- How the actions will be accomplished.
- When the actions are expected to be completed.

Formal Adoption. It is strongly recommended that the Board of Selectmen, City Council or Planning Board formally adopt the community's plan. There are several advantages to having the community mitigation plan formally adopted. Formal adoption:

- Demonstrates community commitment to hazard loss reduction efforts.
- Prepares the public for what the community can be expected to do before and after a disaster.
- Ensures continuity of hazard loss reduction efforts over time.
- Ensures eligibility for funding under several Federal programs that require formal adoption.

Monitoring and Evaluation. The community mitigation plan should be evaluated annually and following every major disaster event. The community should assess how effective the implemented actions have been. The review will provide an opportunity to modify the original plan, the implementation schedule, or the budget.

Step 10 Checklist

- ✓ Draft the plan using results from Steps 1 through 9, as described in this section.
- ✓ Circulate the draft plan to reviewers, including the community planning team, local officials, and technical assistance contacts, for comments. A list of suggested reviewers was provided in Step 7.
- ✓ Convene a public meeting to introduce the draft plan to the general public and obtain input.
- ✓ Advertise intent to adopt the plan, as appropriate.
- ✓ Have the Board of Selectmen, City Council or Planning Board adopt the plan.
- ✓ Prepare to review the plan to monitor action implementation on a yearly basis and revise the plan, as necessary.
- ✓ Prepare to evaluate the plan regularly, and always following a major disaster event. Ask these questions:
 - Are actions being implemented?
 - How effective have they been in reducing hazard losses?

SUMMARY

- ✓ The primary tools needed to begin building a mitigation plan are community commitment, a community planning team, and public input.
- ✓ Pre-disaster mitigation planning emphasizes actions to be taken *before* a disaster occurs to reduce or prevent future damages.
- ✓ There are 10 basic steps to follow in preparing an effective mitigation plan for the community.
 - Step 1 – Map the Hazards
 - Step 2 – Determine the Potential Damage
 - Step 3 – Identify What is Already Being Done
 - Step 4 – Identify What is Not Already Being Done
 - Step 5 – Brainstorm Alternatives
 - Step 6 – Evaluate Actions
 - Step 7 – Coordinate with Others
 - Step 8 – Select Actions
 - Step 9 – Develop a Strategy
 - Step 10 – Adopt and Monitor the Plan

MITIGATING YOUR HAZARDS

This exercise provides an opportunity to identify those who can assist in developing a local, pre-disaster mitigation plan. Refer to the checklists in this unit, the work completed in the Mitigating Your Hazards sections of Units 1, 2, and 3, and Appendix R, *Additional Mitigation Resources*. List members of the community, technical experts, organizations, and other sources of information that you would like to involve in these aspects of the mitigation planning process.

	RESOURCES FOR PLANNING TEAM
Mapping the hazard	
Determining potential damage	
Identifying what is already being done	
Identifying what is not being done	
Brainstorming alternatives	
Evaluating actions	
Coordinating with others	
Selecting actions	
Adopting and monitoring the plan	

✓ CHECKING YOUR MEMORY

Circle the correct response. Answers may be found on page A-1.

1. A community mitigation plan can
 - A) involve many key players in solving problems.
 - B) achieve multiple objectives.
 - C) guide post-disaster recovery.
 - D) all of the above.
2. The community planning team includes
 - A) individuals with a variety of skills.
 - B) only public works officials.
 - C) only elected officials.
3. Public input is _____ during the mitigation planning process.
 - A) desirable
 - B) undesirable
4. Hazard identification is carried out at what point in the planning process?
 - A) Anytime as long as it is completed.
 - B) First.
 - C) Last.
5. Warning systems, evacuation plans and land use restrictions are examples of
 - A) Federal programs.
 - B) government meddling.
 - C) loss protection systems.
6. The feasibility of mitigation actions should be determined by
 - A) the chief elected official.
 - B) the STAPLE criteria.
 - C) the State office of emergency management.
7. The Plan Implementation Group
 - A) ensures that the mitigation project continues to make progress.
 - B) prepares an implementation schedule.
 - C) Both A and B.

GLOSSARY TERMS

Applicant

State agency, local government, and any political subdivision of the State, including Indian tribes and Alaskan native villages, that apply for FEMA post-disaster assistance. Also, private non-profit organizations that include medical, emergency (fire and rescue), utility, educational, custodial care, zoos, community centers, libraries, homeless shelters, senior citizens centers, and sheltered workshops.

Community Planning Team

A local planning team composed of government and private sector individuals with a variety of skills and areas of expertise, usually appointed by the city or town manager, or chief elected official. The group uses these skills to find solutions to community mitigation needs and gain community acceptance of those plans.

Community Rating System (CRS)

An NFIP program that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. The insurance premiums of these communities are reduced when the community completes specified activities.

Declaration

Presidential finding that a jurisdiction of the United States may receive Federal aid as a result of damages from a major disaster or emergency.

Disaster Preparedness Improvement Grant (DPIG) Program

Authorized under Section 201 of the Stafford Act. Annual matching awards not to exceed \$50,000 are provided to States to improve or update their disaster assistance plans and capabilities.

Disaster Recovery Manager (DRM)

FEMA official, normally the Federal Coordinating Officer (FCO), who has the delegated authority from the Regional Director to manage authorities under the Stafford Act, including incurring financial obligations.

Disaster Resistant Communities

A community-based initiative that seeks to reduce vulnerability to natural hazards for the entire designated area through mitigation actions. This approach requires cooperation between individuals and the business sectors of a community to implement effective mitigation strategies.

Emergency

Any hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, drought, fire, explosion, or other catastrophe in any part of the United States which requires Federal emergency assistance to supplement State and local efforts to save lives and protect property, public health and safety, or to avert or lessen the threat of a disaster. Defined in Title V of Public Law 93-288, Section 102(1).

Emergency Operations Plan (EOP)

Sets forth actions to be taken by State or local governments for response to emergencies or major disasters.

Existing Construction

As used in reference to the National Flood Insurance Program, any structure already existing or on which construction or substantial improvement was started prior to the effective date of a community's floodplain management regulations.

Federal Coordinating Officer (FCO)

The person appointed by the President, FEMA Director, or FEMA Associate Director for Response and Recovery, who initiates action immediately to ensure Federal disaster assistance is provided in accordance with the declaration, applicable laws, regulations, and the FEMA-State agreement.

Federal Emergency Management Agency (FEMA)

An independent agency of the Federal government, reporting to the President. FEMA's mission is to reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery.

Federal Mitigation Officer

The FEMA employee who represents the agency in carrying out the overall responsibilities for hazard mitigation after a declaration. This includes influencing mitigation planning of State counterparts and other Federal agencies, and coordinating post-disaster hazard mitigation actions with other agencies of government at all levels.

FEMA-State Agreement

A binding statement of the understandings, commitments, and conditions for assistance under which FEMA disaster assistance shall be provided. This agreement imposes binding obligations on FEMA, States, and their local governments in the form of conditions for assistance, which are legally enforceable.

Flood Insurance Rate Maps (FIRMS)

The official map of a community prepared by FEMA, showing base flood elevations along with the special hazard areas and the risk premium zones.

Flood Mitigation Assistance Program (FMA)

Provides pre-disaster grants to State and local governments for both planning and implementation of mitigation strategies. Each State is awarded a minimum level of funding which may be increased depending upon the number of NFIP policies in force and repetitive claims paid. Grant funds are made available from NFIP insurance premiums, and therefore are only available to communities participating in the NFIP.

Hazard Mitigation Grant Program (HMGP)

Authorized under Section 404 of the Stafford Act; provides funding for cost-effective hazard mitigation projects in conformance with the post-disaster mitigation plan required under Section 409 of the Stafford Act.

Hazard Mitigation Plan

The plan resulting from a systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards present in society that includes the actions needed to minimize future vulnerability to hazards.

Hazard Mitigation State Administrative Plan

The plan required to be developed by the State to describe the procedures for administration of the Hazard Mitigation Grant Program.

Human Services

Supplementary Federal assistance provided under the Stafford Act to individuals and families adversely affected by a major disaster or emergency. Also known as Temporary Housing Assistance, Unemployment Assistance and Individual and Family grants.

Infrastructure Support

Federal financial assistance provided under the Stafford Act to State and local governments or to eligible private nonprofit organizations for disaster-related requirements. Also known as Public Assistance (PA).

Local Point of Contact for Mitigation

The representative of local government who is responsible for mitigation planning activities, and coordinates with State and Federal agencies for pre-and post-disaster mitigation strategy development and implementation.

Major Disaster

Any hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, drought, fire, explosion, or other catastrophe in any part of the United States which in the determination of the President, causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Stafford Act, above and beyond emergency services by the Federal government, to supplement the efforts and available resources of States, local governments, and disaster relief organization in alleviating the damage, loss, hardship, or suffering caused thereby. Defined under Public Law 93-288.

Mitigation

Sustained actions taken to reduce or eliminate long-term risk to people and property from hazards and their effects.

National Earthquake Hazards Reduction Program (NEHRP)

Created by Congress in 1977 to mitigate earthquake losses by providing technical and educational assistance to communities threatened by earthquakes.

National Earthquake Loss Reduction Program (NEP)

Implemented to supplement efforts made under the NEHRP. The program studies all aspects of the Federal, State, local and other earthquake hazard reduction programs, which are made available through FEMA regional offices.

National Flood Insurance Program (NFIP)

Provides the availability of flood insurance in exchange for the adoption and enforcement of a minimum local floodplain management ordinance. The ordinance regulates new and substantially damaged or improved development in identified flood hazard areas.

National Mitigation Strategy

Introduced in 1995 by FEMA to focus national attention on mitigation. The strategy encourages all levels of government and the private sector to identify potential hazards, and take steps to reduce the risks.

Performance Partnership Agreement (PPA)

The mechanism by which FEMA provides funding to States to develop and maintain emergency management capabilities. The State and FEMA jointly identify priorities for long-term and annual activities, which can focus on mitigation planning and technical assistance.

Preparedness

Activities to ensure that people are ready for a disaster and respond to it effectively. Preparedness requires figuring out what will be done if essential services break down, developing a plan for contingencies, and practicing the plan.

Recovery

Activities necessary to rebuild after a disaster. Recovery activities include rebuilding homes, businesses and public facilities; clearing debris; repairing roads and bridges; and restoring water, sewer and other essential services.

Response

Activities to address the immediate and short-term effects of an emergency or disaster. Response activities include immediate actions to save lives, protect property, and meet basic human needs.

Section 404 of the Stafford Act

Authorizes the Hazard Mitigation Grant Program, which provides funding for cost-effective hazard mitigation measures.

Section 409 Hazard Mitigation Plan

Requires the identification and evaluation of mitigation opportunities, and that all repairs be made to applicable codes and standards, as a condition for receiving Federal disaster assistance. Enacted to encourage identification and mitigation of hazards at all levels of government.

Special Flood Hazard Areas (SFHAs)

Those areas designated on a flood insurance rate map that have a one-percent or lesser percent chance of being flooded in a given year.

Stafford Act

Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288. The statutory authority for most Federal disaster response activities especially as they pertain to FEMA and FEMA programs.

STAPLE

An acronym for the criteria that can be used by a community in selecting an appropriate mitigation strategy. (Social, Technical, Administrative, Political, Legal and Economic/Environmental)

State Hazard Mitigation Officer (SHMO)

The representative of State government who is the primary point of contact with FEMA, other State and Federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.

State Hazard Mitigation Team

Composed of key State agency representatives, local units of government, and other public or private sector bodies or agencies. The purpose of the State Hazard Mitigation Team is to evaluate hazards, identify strategies, coordinate resources, and implement measures that will reduce the vulnerability of people and property to damage from hazards.

ADDITIONAL MITIGATION RESOURCES

U.S. GOVERNMENT AGENCIES

DEPARTMENT OF AGRICULTURE

- **Farm Service Agency**, Room 5438, South Building, 14th and Independence Ave., SW, Washington, DC 20250-0700; (202) 267-2185.
- **Forest Service, Intermountain Research Station**, Federal Building, 324 25th Street, Ogden, UT 84401; (801) 625-5348.
- **Forest Service, International Forestry Staff, Disaster Assistance Support**, 1099 14th Street, NW, Suite 5500 West, Washington, DC 20005-3402; (202) 273-4724.
- **Natural Resources Conservation Service**, P.O. Box 2890, Washington, DC 20013; (202) 720-2847.
- **Rural Business and Cooperative Development Service**, Washington D.C., 20250-0700; (202) 690-4100.

DEPARTMENT OF COMMERCE

- **Economic Development Administration (EDA)**, Herbert C. Hoover Building, Washington, D.C. 20430; (202) 482-3027.
- **Office of Hydrology, Hydrologic Operations Division, Hydrologic Services Branch**, Station 8144, W/OH22, 1325 East-West Highway, Silver Spring, MD 20910; (301) 713-0006.
- **Office of Meteorology, Warnings and Forecast Branch**, W/OM11 Room 14414, 1325 East-West Highway, Silver Spring, MD 20910; (301) 713-0090.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

- **Community Planning and Development, Office of Block Grant Assistance**, 451 7th Street SW, Washington, D.C., 20410-7000; (202) 708-1871.

DEPARTMENT OF THE INTERIOR

- **National Park Service, Rivers and Trails Conservation Program**, P.O. Box 37127, Washington, DC 20013; (202) 343-3780.
- **Fish and Wildlife Service**, Washington, D.C., 20240; (703) 358-2156.

ENVIRONMENTAL PROTECTION AGENCY

Wetlands Hotline: 1-800-832-7828.

Labat-Anderson, Inc., 8000 West Park Drive, Suite 400, McLean, VA 22102

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA), 500 C Street SW, Washington, DC 20472; (202) 646-3923; e-mail: eipa@fema.gov; WWW: <http://www.fema.gov>.

- **Federal Insurance Administration**, (202) 646-2781.
- **Information Technology Services Directorate**, (202) 646-3006.
- **Mitigation Directorate**, (202) 646-4622.
- **Office of Congressional and Legislative Affairs**, (202) 646-4500.
- **Office of Emergency Information and Public Affairs**, (202) 646-4600.
- **Office of Policy and Assessment**, (202) 646-3011.
- **Operations Support Directorate**, (202) 646-2965.
- **Preparedness, Training and Exercises Directorate**, (202) 646-3487.
- **Response and Recovery Directorate**, (202) 646-3692.

FEMA NATIONAL EMERGENCY TRAINING CENTER, 16825 South Seton Avenue, Emmitsburg, MD 21727; (301) 447-1000.

- **Emergency Management Institute**, (301) 447-1286.
- **Learning Resource Center**, (301) 447-1030 or (800) 638-1821.
- **National Fire Academy**, (301) 447-1117 or (301) 447-1118.

FEMA MAP SERVICE CENTER, P.O. Box 1038, Jessup, MD 20794-1038; (800) 358-9616.

FEMA PUBLICATIONS, FEMA Distribution Center, 8231 Stayton Drive, Jessup, MD 20794; (800) 480-2520 or (202) 646-3484.

FEMA REGIONAL OFFICES

- **Region I-Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont**, Room 442, J.W. McCormack Post Office and Courthouse Building, Boston, MA 02109-4595; (617) 223-9540.
- **Region II-New Jersey, New York, Puerto Rico, and the Virgin Islands**, 26 Federal Plaza, Room 1337, New York, NY 10278-0002; (212) 225-7209.
- **Region III-District of Columbia, Delaware, Maryland, Pennsylvania, Virginia, and West Virginia**, Liberty Square Building, 2nd Floor, South 7th Street, Philadelphia, PA 19106-3316; (215) 931-5608.
- **Region IV-Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee**, 3003 Chamblee-Tucker Road, Atlanta, GA 30341; (770) 220-5200.
- **Region V-Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin**, 175 West Jackson Boulevard, 4th Floor, Chicago, IL 60604-2698; (312) 408-5503.
- **Region VI-Arkansas, Louisiana, New Mexico, Oklahoma, and Texas**, Federal Regional Center, Room 206, 800 North Loop 288, Denton, TX 76201-3698; (817) 898-5104.
- **Region VII-Iowa, Kansas, Missouri, and Nebraska**, 2323 Grand Boulevard, Suite 900, Kansas City, MO 64108-2670; (816) 283-7061.
- **Region VIII-Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming**, Denver Federal Center, Building 710, Box 25267, Denver, CO 80225-0267; (303) 235-4812.

- **Region IX-American Samoa, Arizona, California, Guam, Hawaii, Nevada, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia, Republic of the Marshall Islands, and the Republic of Palau**, Presidio of San Francisco, Building 105, San Francisco, CA 94129-1250; (415) 923-7100.
- **Region X-Alaska, Idaho, Oregon, and Washington**, Federal Regional Center, 130 228th Street, SW, Bothell, WA 98021-9796; (425) 487-4604.

NATIONAL ACADEMY OF SCIENCES/NATIONAL RESEARCH COUNCIL, Board on Natural Disasters/U.S. National Committee for the Decade for Natural Disaster Reduction/Committee on Hazards Mitigation Engineering, HA 370, 2101 Constitution Ave., NW, Washington, DC 20418; (202) 334-1964.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY, BUILDING AND FIRE RESEARCH LABORATORY, Building 226, Room B158, Gaithersburg, MD 20899; (301) 975-6062.

NATIONAL SCIENCE FOUNDATION, CIVIL AND MECHANICAL SYSTEMS, 4201 Wilson Boulevard, Arlington, VA 22230.

- **Earthquake Hazards Mitigation Program**, (703) 306-1362.
- **Natural and Technological Hazards Mitigation Program**, (703) 306-1362.

SMALL BUSINESS ADMINISTRATION, DISASTER ASSISTANCE DIVISION, Office of Disaster Assistance, 409 Third Street, SW, Washington, DC 20416; (202) 205-6734.

- **Area 1-Connecticut, District of Columbia, Delaware, Maryland, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Puerto Rico, Rhode Island, Virginia, Vermont, Virgin Islands, West Virginia**, 360 Rainbow Boulevard South, 3rd Floor, Niagara Falls, NY 14303; (716) 282-4612.
- **Area 2-Alabama, Florida, Georgia, Illinois, Indiana, Kentucky, Michigan, Minnesota, Mississippi, North Carolina, Ohio, South Carolina, Tennessee, Wisconsin**, 1 Baltimore Place, Suite 300, Atlanta, Georgia 30308; (404) 347-3771.
- **Area 3-Arkansas, Colorado, Iowa, Kansas, Louisiana, Missouri, Montana, North Dakota, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, Utah, Wyoming**, 4400 Amon Carter Boulevard, Suite 102, Fort Worth, TX 76155; (817) 885-7600.
- **Area 4-Alaska, American Samoa, Arizona, California, Guam, Hawaii, Idaho, Nevada, Oregon, Washington**, P.O. Box 13795, Sacramento, CA 95853-4795; (916) 566-7240.

TENNESSEE VALLEY AUTHORITY, WATER MANAGEMENT, RIVER SYSTEM OPERATIONS, 400 W. Summit Hill Drive, WT 10B, Knoxville, TN 37902; (423) 632-6857.

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT/OFFICE OF U.S. FOREIGN DISASTER ASSISTANCE, State Dept., Room 1262-A, Washington, DC 20523-0008; (202) 647-5707.

U.S. ARMY CORPS OF ENGINEERS

- **Directorate of Civil Works, Readiness Branch**, CECW-OE, 20 Massachusetts Ave., NW, Washington, DC 20314; (202) 761-0409.
- **Flood Plain Management Services and Coastal Resources Branch**, 20 Massachusetts Ave., NW, Washington, DC 20314; (202) 272-0169.
- **Cold Regions Research and Engineering Laboratory**, 72 Lyme Road, Hanover, NH 03755-1290; (603) 646-4221.
- **San Francisco District Earthquake Preparedness Center of Expertise**, CESPDCO-Q, 333 Market Street, Room 1002, San Francisco, CA 94105-2190; (415) 744-2807.
- **Hydrolic Engineering Center**, 609 Second Street, Davis, CA 95616; (916) 756-1104.
- **Water Resources Support Center**, 701 Telegraph Road, Casey Building, Alexandria, VA 22315-2219; (703) 355-2219.
- **Waterways Experiment Station**, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199; (601) 634-2502.
- **New England District**, 424 Trapelo Road, Waltham, MA 02254; (617) 647-8505.

U.S. FIRE ADMINISTRATION, National Emergency Training Center, 16825 South Seton Avenue, Emmitsburg, MD 21727; (301) 447-1018.

U.S. GEOLOGICAL SURVEY

- **Earthquake Hazards Program**, MS-905, National Center, Reston, VA 20192; (703) 648-6714.
- **National Earthquake Information Center**, MS-967, P.O. Box 25046, Federal Center, Denver, CO 80225; (303) 273-8441.
- **National Landslide Information Center**, MS-966, P.O. Box 25046, Federal Center, Denver, CO 80225-0046; (800) 654-4966.
- **Research Applications (Earthquake)**, MS-955, Reston, VA 20192; (703) 648-6550.
- **USGS Information Services (Maps, Professional Papers, and Circulars)**, Box 25286, MS-306, Federal Center, Denver, CO 80225; (303) 202-4700 or (800) 435-7627.
- **Volcano Hazards Program**, MS-905, National Center, Reston, VA 20192; (703) 648-6708.

DOMESTIC ORGANIZATIONS

AMERICAN ENGINEERS FOR DISASTER RELIEF, INC., P.O. Box 684, Princeton Junction, NJ 08550-0684; (609) 730-0510.

AMERICAN INSTITUTE OF ARCHITECTS, 1735 New York Avenue, NW, Washington, DC 20006; (202) 626-7383.

AMERICAN PLANNING ASSOCIATION, 122 South Michigan Avenue, Suite 1600, Chicago, IL 60603; (312) 431-9100.

AMERICAN PUBLIC WORKS ASSOCIATION, EMERGENCY MANAGEMENT COMMITTEE, 1301 Pennsylvania Avenue, Washington, DC 20004-1701; (202) 393-2792.

AMERICAN RED CROSS, National Headquarters, Disaster Services Department, 8111 Gatehouse Road, Second Floor, Falls Church, VA 22042; (703) 206-8822.

AMERICAN SOCIETY OF CIVIL ENGINEERS, 1801 Alexander Bell Drive, Reston VA 20191; (703) 295-6085.

ASSOCIATION OF BAY AREA GOVERNMENTS, P.O. Box 2050, Oakland, CA 94604-2050. Senior Regional Planner/Earthquake Program Manager (earthquakes, flooding, landslides); (510) 464-7934.

ASSOCIATION OF CONTINGENCY PLANNERS, National Headquarters, 421 North Rodeo Drive, Suite 15-565, Beverly Hills, CA 92010; (800) 445-4223.

ASSOCIATION OF STATE DAM SAFETY OFFICIALS, 450 Old East Vine, Second Floor, Lexington, KY 40507; (606) 257-5140.

ASSOCIATION OF STATE FLOODPLAIN MANAGERS, 4233 West Beltline Highway, Madison, WI 53711; (608) 274-0123.

ASSOCIATION OF STATE WETLAND MANAGERS, P.O. Box 269, Berne, NY 12023-9746; (518) 872-1804.

BUILDING SEISMIC SAFETY COUNCIL, 1201 L Street, NW, Suite 400, Washington, DC 20005; (202) 289-7800.

BUSINESS AND INDUSTRY COUNCIL FOR EMERGENCY PLANNING AND PREPAREDNESS, P.O. Box 1020, Northridge, CA 91328; (213) 386-4524.

CENTER FOR THE STUDY OF EMERGENCY MANAGEMENT, 1241 Johnson Avenue, Dept. 160, San Luis Obispo, CA 93401; (805) 782-6787.

CENTRAL UNITED STATES EARTHQUAKE CONSORTIUM (CUSEC), 2630 East Holmes Road, Memphis, TN, 38118-8001; (901) 544-3570.

EARTHQUAKE ENGINEERING RESEARCH INSTITUTE, 499 14th Street, Suite 320, Oakland, CA 94612-1934; (510) 451-0905.

INTERNATIONAL ASSOCIATION OF EMERGENCY MANAGERS, 111 Park Place, Falls Church, VA 22046-4513; (703) 538-1795.

INTERNATIONAL CITY /COUNTY MANAGEMENT ASSOCIATION, 777 North Capitol Street, Suite 500, Washington, D.C. 20002-4201; (202) 962-3531.

NATIONAL ASSOCIATION OF FLOOD AND STORMWATER MANAGEMENT AGENCIES, 1225 Eye Street, NW, Suite 300, Washington, DC 20005; (202) 682-3761.

NATIONAL CENTER FOR EARTHQUAKE ENGINEERING RESEARCH, State University of New York at Buffalo, Red Jacket Quadrangle, Box 610025, Buffalo, NY 14260-0025; (716) 645-3391.

NATIONAL CONFERENCE OF STATES ON BUILDING CODES AND STANDARDS, 505 Huntmar Park Drive, Suite 210, Herndon, VA 20170; (703) 437-0100.

NATIONAL EMERGENCY MANAGEMENT ASSOCIATION, P.O. Box 11910, Lexington, KY 40578-1910; (606) 244-8000.

NATIONAL FIRE PROTECTION ASSOCIATION, One Batterymarch Park, Box 9101, Quincy, MA 02269; (617) 984-7270.

NATIONAL LIGHTNING SAFETY INSTITUTE, 891 North Hoover Ave., Louisville, CO 80027; (303) 666-8817.

NEW ENGLAND STATES EMERGENCY CONSORTIUM (NESEC), Lakeside Office Park, 607 North Avenue, Suite 16, Waskfield, MA 01880; (617) 224-9876.

NEW ENGLAND FLOODPLAIN AND STORMWATER MANAGERS ASSOCIATION (NEFSMA), (617) 727-0488.

OAK RIDGE NATIONAL LABORATORY, DISASTER MANAGEMENT AND MITIGATION GROUP, Energy Division, Building 4500 North, MS 6206, P.O. Box 2008, Oak Ridge, TN 37831-6206; (423) 576-2716.

STATE AND LOCAL EMERGENCY MANAGEMENT DATA USERS GROUP, c/o SDS, Inc., 684 Country Club Drive, Lake Ozark, MO 65049; (573) 365-7373.

U.S. UNIVERSITIES AND COLLEGES

CALIFORNIA STATE UNIVERSITY, CENTER FOR HAZARDS RESEARCH, Dept. of Geography and Planning, Chico, CA 95929-0425; (916) 898-4593.

CHARLESTON SOUTHERN UNIVERSITY, EARTHQUAKE EDUCATION CENTER, P.O. Box 118087, Charleston, SC 29423-8087; (803) 863-8088.

CLEMSON UNIVERSITY, COASTAL HAZARDS ASSESSMENT AND MITIGATION PROGRAM, Dept. of Civil Engineering, Clemson, SC 29634-0911; (803) 656-0488.

COLORADO STATE UNIVERSITY

- **Fluid Mechanics and Wind Engineering Program, Fluid Dynamics and Diffusion Laboratory**, Dept. of Civil Engineering, Fort Collins, CO 80523; (970) 491-8574.
- **Hazards Assessment Laboratory**, Fort Collins, CO 80523; (970) 491-6493.

CORNELL UNIVERSITY, CORNELL INSTITUTE FOR SOCIAL AND ECONOMIC RESEARCH, NATURAL DISASTER PROJECT, 106 West Sibley Hall, Ithaca, NY 14853; (607) 255-6846.

DUKE UNIVERSITY, PROGRAM FOR THE STUDY OF DEVELOPED SHORELINES, Duke University, 341 Old Chemistry, Box 90228, Durham, NC 27706; (919) 684-4238.

GEORGE WASHINGTON UNIVERSITY, INSTITUTE FOR CRISIS AND DISASTER MANAGEMENT, RESEARCH, AND EDUCATION, George Washington University, Virginia Campus, 20101 Academic Way, Room 220, Ashburn, VA 22011; (202) 994-7153.

STANFORD UNIVERSITY, JOHN A. BLUME EARTHQUAKE ENGINEERING CENTER, Dept. of Civil Engineering, Building 540, Stanford University, Stanford, CA 94305-4020; (415) 723-4150.

TEXAS A&M UNIVERSITY, HAZARD REDUCTION AND RECOVERY CENTER, College of Architecture, College Station, TX 77843-3137; (409) 845-7813.

TEXAS TECH UNIVERSITY, DEPARTMENT OF CIVIL ENGINEERING, Box 41023, Lubbock, TX 79409-1023; (806) 742-3476.

UNIVERSITY OF ARIZONA, OFFICE OF ARID LANDS STUDIES AND ARID LANDS INFORMATION CENTER, 1955 East 6th Street, Tucson, AZ 85719-5224; (520) 621-8578.

UNIVERSITY OF CALIFORNIA-BERKELY

- **California Earthquake Education Project and Science Education for Public Understanding Project**, Lawrence Hall of Science, Berkely, CA 94720-5200; (510) 642-8718.
- **Courses and Certification for Emergency Preparedness Managers**, 1995 University Avenue, Suite 300, Berkely, CA, 94704-4704; (510) 642-7537.
- **Earthquake Engineering Research Center and National Information Service for Earthquake Engineering**, 1301 South 46th Street, Richmond, CA; (510) 231-9401.

UNIVERSITY OF COLORADO-BOULDER

- **Natural Hazards Research and Applications Information Center**, Campus Box 482, Boulder, CO 80309-0482; (303) 492-6818.
- **Floodplain Management Resource Center, Natural Hazards Center**, Campus Box 482, Boulder, CO 80309-0482; (303) 492-5787.

UNIVERSITY OF DELAWARE, DISASTER RESEARCH CENTER, Newark, DE, 19716; (302) 831-6618.

UNIVERSITY OF LOUISVILLE, CENTER FOR HAZARDS RESEARCH AND POLICY DEVELOPMENT, Dept. of Civil Engineering, Louisville, KY 40292; (502) 852-6276.

UNIVERSITY OF MEMPHIS, CENTER FOR EARTHQUAKE RESEARCH AND INFORMATION, SEISMIC RESOURCE CENTER, Campus Box, 526590, Memphis, TN 38152; (901) 678-4734.

UNIVERSITY OF NEBRASKA-LINCOLN, NATIONAL DROUGHT MITIGATION CENTER, Dept. of Agricultural Meteorology, 239 L.W. Chase Hall, Lincoln, NE 68583-0749; (402) 472-6707.

UNIVERSITY OF NORTH CAROLINA-CHAPEL HILL, CENTER FOR URBAN AND REGIONAL STUDIES, Campus Box 3410, Chapel Hill, NC 27599; (919) 962-3076.

UNIVERSITY OF SOUTH CAROLINA, HAZARDS RESEARCH LABORATORY, Dept. of Geography, Columbia, SC 29208; (803) 777-1699.

UNIVERSITY OF SOUTHERN CALIFORNIA, SOUTHERN CALIFORNIA EARTHQUAKE CENTER, Dept. of Earth Sciences, University Park, Los Angeles, CA 90089-0742; (213) 740-3459.

UNIVERSITY OF VIRGINIA, CENTER FOR RISK MANAGEMENT OF ENGINEERING SYSTEMS, Thornton Hall, University of Virginia, Charlottesville, VA 22903-2442; (804) 924-0960.

INTERNATIONAL AND OVERSEAS ORGANIZATIONS

ASIAN DISASTER PREPAREDNESS CENTER, Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani, 12120, Thailand; *Tel: 66-2-524-5353.*

AUSTRALIAN EMERGENCY MANAGEMENT INSTITUTE, EMERGENCY MANAGEMENT AUSTRALIA, Mt. Macedon, Victoria 3441, Australia; *Tel: 61-3-54-215 100.*

CENTRE FOR RESOURCES AND ENVIRONMENTAL STUDIES, Australian National University, Canberra ACT 0200, Australia; *Tel: 61 06 2492106.*

DISASTER PREVENTION AND LIMITATION UNIT, University of Bradford, 13 Pemberton Drive, Bradford, West Yorkshire BD7 1RA, U.K; *Tel: 0274 385210.*

EMERGENCY PREPAREDNESS CANADA, 122 Bank Street, 2nd Floor, Jackson Building, Ottawa, Ontario, Canada K1A 0W6; *(613) 991-7071.*

EUROPEAN DROUGHT MITIGATION NETWORK, Institute of Hydrology, Wallingford, Oxfordshire OX10 8BB, U.K; *Tel +44(0) 1491 838800.*

INTERNATIONAL CENTER FOR DISASTER-MITIGATION ENGINEERING, Institute of Industrial Science, University of Tokyo, 7-22-1, Roppongi, Minato-ku, Tokyo 106, Japan; *Tel: 81-3-3402-6231.*

INTERNATIONAL COMMITTEE OF THE RED CROSS, 19 avenue de la Paix, 1202 Geneva, Switzerland; *Tel: (41-22) 730 60 01.*

INTERNATIONAL FEDERATION OF RED CROSS AND RED CRESCENT SOCIETIES, Information Resource Centre, P.O. Box 372, Geneva 19, Switzerland; *Tel: (41-22) 730 42 22.*

KATASTROPHENFORSCHUNGSSTELLE (DISASTER RESEARCH UNIT), Christian-Albrechts-Universitaet Kiel, Olshausenstrasse 40, D-24098 Kiel, German; *Tel: 0049 431 880-3465.*

MIDDLESEX UNIVERSITY, FLOOD HAZARD RESEARCH CENTRE, Queensway, Enfield, Middlesex EN3 4SF, U.K.; *Tel: +44 181 362 5359.*

ORGANIZATION OF AMERICAN STATES, Unit of Sustainable Development and Environment, Natural Hazards Project, 1889 F Street, NW, Washington, DC 20006; *(202) 458-6295.*

OXFORD CENTRE FOR DISASTER STUDIES, P.O. Box 137, Oxford OX4 1UE, U.K.; *Tel: 44 (0) 1865 202772.*

UNITED NATIONS

- **Educational, Scientific, and Cultural Organization (UNESCO)**, Bureau for Coordination of Environmental Programmes, 1, rue Miollis, 75732 Paris Cedex 15, France; *Tel: (33.1) 4568 4120.*
- **International Decade For Natural Disaster Reduction (IDNDR) Secretariat**, United Nations, Palais des Nations, CH-1211 Geneva 10, Switzerland; *Tel: (41-22) 798 68 94.*
- **IDNDR Regional Office for Latin America and the Caribbean**, Pan American Health Organization, P.O. Box 3745-1000, San Jose, Costa Rica; *Tel: (506) 257-3141.*

UNIVERSITY OF GENEVA, NATURAL HAZARDS MITIGATION GROUP, CERG, Dept. of Mineralogy, 13, Rue des Maraichers, CH 1211 Geneva 4, Switzerland; *Tel: (41-22) 702-6602.*

URBAN HAZARD PROJECT/HAZARD AND RISK MANAGEMENT STUDIES, c/o Dept. of Geography, London School of Economics and Political Science, Houghton Street, London WC2A 2AE, U.K.; *Tel: +44 171 955 7577.*

WORLD BANK, Environmental Dept., 1818 H Street, NW, Room 55-129, Washington, DC 20433; *(202) 473-6359.*

WORLD SEISMIC SAFETY INITIATIVE, INTERIM ORGANIZATION COMMITTEE, c/o Nanyang Technological University, School of Civil and Structural Engineering, Nanyang Ave., Singapore 639798; *Tel: 65 799 5285.*

ANSWERS TO PRETEST AND CHECK YOUR MEMORY

Number	Pretest	Unit One	Unit Two	Unit Three	Unit Four
1	D	C	C	B	D
2	B	B	A	B	A
3	A	A	C	D	A
4	B	C	B	A	B
5	D	A	A	A	C
6	C	C	C	C	B
7	A	B	D	A	C
8	C				
9	A				
10	B				
11	A				
12	B				
13	C				
14	C				
15	C				
16	A				
17	D				
18	B				
19	B				
20	B				
21	D				
22	C				
23	B				
24	A				
25	B				

FINAL EXAMINATION

Using a soft lead (#2) pencil, record the best answer for each of the following questions on the answer sheet provided. There is only one correct answer for each question. When you have finished, prepare the answer sheet as directed and mail to the address provided. Your examination will be evaluated and the results returned to you as quickly as possible.

- 1) To explain the rationale for mitigation, you would cite
 - a) the potential loss of life and property damage.
 - b) the potential interruption of commerce.
 - c) the potential interruption of public services.
 - d) All of the above.
- 2) To become a Disaster Resistant Community, your community must
 - a) eliminate hazard vulnerability.
 - b) promote measures to reduce hazard vulnerability.
 - c) receive certification from FEMA.
- 3) In the National Mitigation Strategy, the Federal Emergency Management Agency
 - a) describes a partnership between the public and private sectors for ensuring safer communities.
 - b) lists mitigation requirements for local governments.
 - c) lists mitigation requirements for specific Federal agencies.
- 4) Developing and exercising an emergency operations plan is an example of:
 - a) mitigation.
 - b) preparedness.
 - c) response.
 - d) recovery.
- 5) Rebuilding businesses after a disaster is an example of
 - a) mitigation.
 - b) preparedness.
 - c) response.
 - d) recovery.
- 6) Mass care, medical services and access control are examples of
 - a) mitigation.
 - b) preparedness.
 - c) response.
 - d) recovery.
- 7) Rebuilding businesses to current seismic standards after a disaster is an example of
 - a) mitigation.
 - b) preparedness.
 - c) response.
 - d) recovery.

- 8) Hazard analysis determines
 - a) how often hazards are likely to occur.
 - b) how severe hazards are likely to be.
 - c) how hazards are likely to affect the community.
 - d) All of the above.
- 9) If your community has an existing hazard analysis
 - a) it is not necessary to do it again.
 - b) it should be reviewed periodically to identify any changes since the last review.
 - c) it is probably not useful for developing a mitigation plan.
- 10) A hazard analysis focuses on
 - a) natural, technological and civil or political hazards.
 - b) natural hazards.
 - c) technological hazards.
 - d) political emergencies.
- 11) Information on a hazard's probable frequency, magnitude, location, spatial extent, duration, seasonal pattern, speed of onset, and availability of warning
 - a) is considered "nice to know" about community hazards.
 - b) is difficult to obtain and will require extensive research time to determine.
 - c) is essential to the hazard analysis process and may be obtained readily from a variety of sources.
- 12) A hazard that has a high probability of occurrence and severity, but will affect no existing structures, infrastructure or population, is considered
 - a) a high priority hazard.
 - b) a low priority hazard.
 - c) not a hazard.
- 13) The last step in the hazard analysis process helps planners to identify specific planning and resource requirements. This step is
 - a) identify hazards.
 - b) create and apply scenarios.
 - c) profile each hazard.
 - d) compare and prioritize risk.
- 14) A mitigation strategy that would reduce future risk and cause the least upheaval for residents of mobile homes that were irreparably damaged by a tornado would include
 - a) replacing the mobile homes with the basic model that was there before.
 - b) level the area and prohibit rebuilding.
 - c) replace the mobile homes with models that have been designed to resist high winds, and anchor the new mobile homes.

- 15) A feasible mitigation strategy to reduce vulnerability of a sewage treatment plant that has been inundated by flood water three times in the last five years is:
- a) prohibit use of toilets when flooding is imminent.
 - b) relocate the facility to a less vulnerable area.
 - c) protect the facility with a floodwall.
 - d) either b or c.
- 16) A mitigation strategy to reduce damage caused by wildfires is:
- a) thinning trees.
 - b) fighting the fires.
 - c) evacuating nearby homes.
- 17) Using hazard areas for open space and recreational use is a mitigation strategy.
- a) True.
 - b) False.
- 18) If a mitigation strategy causes disproportional hardship to a segment of the population
- a) the affected population will just have to “tough it out”.
 - b) the strategy is unlikely to be successful, and may violate environmental justice regulations.
 - c) the affected population will become staunch supporters of future mitigation efforts.
- 19) A bayside community of twelve thousand middle income residents has regular flooding problems exacerbated by clogged drainage ditches. A proposal has been made to replace all of the community’s drainage ditches with storm sewers. The criteria on which this strategy is likely to fail is
- a) social.
 - b) technical.
 - c) legal.
 - d) economic.
- 20) Structures damaged in earthquakes should
- a) never be rebuilt.
 - b) be rebuilt to pre-disaster quality.
 - c) be rebuilt to the most recent seismic safety standards.
- 21) _____ has the primary responsibility for mitigation
- a) Federal government.
 - b) State government.
 - c) Local government.
- 22) Adopting building codes that reduce hazard vulnerability is the responsibility of
- a) Federal government.
 - b) State government.
 - c) local government.

- 23) Communities that include mitigation in comprehensive planning may be able to accomplish mitigation goals through the use of
- a) Capital Improvement projects.
 - b) Economic Development funds.
 - c) municipal employee staff time.
 - d) All of the above.
- 24) Businesses
- a) are usually unwilling to support mitigation initiatives.
 - b) do not gain anything from mitigation initiatives.
 - c) may be willing to contribute resources if convinced that the mitigation effort will benefit their organization.
- 25) State government
- a) may provide technical and financial resources for local mitigation.
 - b) will take over a local mitigation initiative.
 - c) has no interest in local mitigation.
- 26) Federal agencies
- a) provide technical assistance to local governments in planning and implementing mitigation efforts.
 - b) support mitigation research.
 - c) administer programs that fund local mitigation efforts.
 - d) All of the above.
- 27) To participate in the National Flood Insurance Program (NFIP), communities must
- a) eliminate flood hazards.
 - b) adopt and enforce floodplain management ordinances.
 - c) elevate existing homes located in the Special Flood Hazard Area.
- 28) Flood Insurance Rate Maps indicate areas that have
- a) at least a 50% chance of being flooded in any one year.
 - b) at least a 10 % chance of being flooded in any one year.
 - c) at least a 1 % chance of being flooded in any one year.
- 29) When a structure is required to have flood insurance but does not, post-disaster Federal assistance for repair or restoration may be reduced.
- a) True
 - b) False
- 30) The Community Rating System
- a) usually increases the flood insurance premiums in a community.
 - b) can reduce insurance premiums if the community undertakes activities to further reduce flood hazard vulnerability.
 - c) is available in non-NFIP communities.
 - d) All of the above.

- 31) To obtain assistance with comprehensive mitigation planning, a community should contact the
- a) Hurricane Program Manager.
 - b) Earthquake Program Manager.
 - c) NFIP Coordinator.
 - d) State Hazard Mitigation Officer.
- 32) The FEMA – State PPA provides mitigation funds through the
- a) State Hazard Mitigation Program.
 - b) Hurricane Program.
 - c) NEHRP.
 - d) All of the above.
- 33) The Stafford Act includes
- a) pre-disaster mitigation programs.
 - b) post-disaster mitigation programs.
 - c) no mitigation programs.
- 34) Section 404 of the Stafford Act authorizes contributions of up to 75% of the cost of eligible post-disaster State and local mitigation measures. This program is called
- a) Infrastructure Support.
 - b) Human Services.
 - c) Hazard Mitigation Grant Program.
 - d) Individual and Family Grant Program.
- 35) This Stafford Act Program allows funds for serious, unmet, disaster-related real property losses to be used to cover mitigation measures up to the full amount of the grant.
- a) Infrastructure Support.
 - b) Human Services.
 - c) Hazard Mitigation Grant Program.
 - d) Individual and Family Grant Program.
- 36) This Stafford Act program for repairing damaged dwellings requires and funds appropriate actions to mitigate natural hazards.
- a) Infrastructure Support.
 - b) Human Services.
 - c) Hazard Mitigation Grant Program.
 - d) Individual and Family Grant Program.
- 37) This Stafford Act program for repair, restoration and replacement of public facilities authorizes funding for the cost of mitigation measures to meet current standards.
- a) Infrastructure Support
 - b) Human Services
 - c) Hazard Mitigation Grant Program
 - d) Individual and Family Grant Program.

- 38) The key element in building an effective mitigation program is:
- a) Federal funding
 - b) pre-disaster planning.
 - c) a disaster declaration.
- 39) The basic tools needed to build a community mitigation program are
- a) community commitment, a community planning team, and public input.
 - b) a mitigation specialist and staff.
 - c) a community planner and the local emergency program manager.
- 40) A community planning team is essential for mitigation planning
- a) only when the emergency program manager can't get the job done.
 - b) when the chief elected official is not convinced that mitigation is necessary.
 - c) to ensure better solutions, gain community acceptance and ensure that information and resources are not overlooked.
- 41) The advantage of public input workshops during the mitigation planning process is
- a) the opportunity to discuss the program one-on-one.
 - b) the opportunity to bring a large, diverse, group of community members together to discuss the program and share ideas.
 - c) the opportunity to discuss the plan details.
- 42) After developing a base map that depicts potential hazard areas, the next step in the mitigation planning process is to:
- a) determine mitigation strategies.
 - b) seek outside assistance.
 - c) determine what structures, infrastructures, and resources are at risk in the hazard areas.
- 43) In most communities,
- a) there are already some loss protection systems in place.
 - b) there are no loss protection measures in place.
 - c) there is no need to mitigate hazards because the problems are already solved.
- 44) An example of a loss-protection system is
- a) preventing or limiting development in hazard areas.
 - b) seismic retrofitting.
 - c) Both a) and b).
- 45) Brainstorming is an excellent technique for
- a) ruling out ideas for mitigation solutions.
 - b) generating ideas for mitigation solutions.
 - c) finalizing the selection of a mitigation solution.

- 46) Mitigation goals must be considered _____ other community planning goals.
- a) along with
 - b) before
 - c) after
- 47) Coordinate the mitigation planning process with other community groups or agencies
- a) to identify any activity that may support or help implement the mitigation plan.
 - b) to prevent duplication of efforts.
 - c) to prevent conflicts.
 - d) All of the above.
- 48) The mitigation plan should include
- a) only one action.
 - b) prioritized actions.
 - c) only easily achievable actions.
- 49) To ensure that the mitigation plan will be followed,
- a) establish an implementation group.
 - b) prepare an implementation schedule.
 - c) develop an implementation process.
 - d) All of the above.
- 50) After the mitigation plan is complete, the community planning team
- a) is off the hook.
 - b) evaluates the plan following every major disaster event.
 - c) is expected to rewrite the plan annually.