



Objectives

At the end of this unit you will be able to:

- ➔ State the crucial role mitigation plays in saving lives and property.
- ➔ Identify hazards that would potentially affect your jurisdiction.
- ➔ Determine vulnerability based on identified hazards.
- ➔ Define the emergency manager's role in mitigation.
- ➔ Identify tools for mitigation.

What Is Mitigation?

As you learned in Unit One, the four phases of emergency management are mitigation, preparedness, response, and recovery. This unit focuses on mitigation.

But what is mitigation? FEMA's *Guide for All-hazard Emergency Operations Planning* talks about mitigation in the following terms:

Mitigation actions involve lasting, often permanent, reduction of exposure to, probability of, or potential loss from hazard events. They tend to focus on where and how to build. Examples include: the zoning and building code requirements for rebuilding in high-hazard areas; flood plain buyouts; and analyses of flood plain and other hazard-related data to determine where it is safe to build in normal times, to open shelters in emergencies, or to locate temporary housing in the aftermath of a disaster.

Mitigation can also involve educating businesses and the public on simple measures they can take to reduce loss or injury, like fastening bookshelves, water heaters, and file cabinets to walls to keep them from falling during earthquakes.

Mitigate Before the Disaster

From examining this statement, it is apparent that mitigation involves a range of activities. Ideally, these will occur before the disaster.

Many of these mitigation activities are not within the direct control of the emergency manager. But that does not mean that you have no role in mitigation. On the contrary, as we will see, there's a lot for the emergency manager to do to make sure the community engages in mitigation efforts.

In this unit we will look at three aspects of mitigation:

- 1.** Hazard identification and vulnerability analysis
- 2.** The role of the emergency manager in mitigation
- 3.** Various mitigation strategies

Hazard Identification

Let's begin by defining what we mean by a hazard.

It is a natural or man-made event or situation that can cause or create a serious negative impact on the community. It can even lead to a disaster. A hazard can cause the full range of natural disasters, major man-made incidents, and resource crises that become the concern of the entire community, not only emergency management personnel.

It would be ideal if your community were prepared for all types of hazards. However, in most cases it is not practical to be prepared for all types of hazards, since some may never occur in your community. For example, if you lived in the Midwest, it would be impractical to focus preparedness on hurricanes, as the probability of one reaching the Midwest is very low. Instead, you would focus on tornadoes. These are weather-related hazards.



A natural or man-made situation or event can lead to a disaster.

But what about the hazards associated with our 21st-century lifestyle: chemical spills, ecological disasters, explosions, major transportation accidents? Mitigation means addressing both sets of hazards, different as they are in many respects.

So a crucial first step in mitigation activities is deciding which hazards have the potential to affect your jurisdiction.

- Identify the hazards likely to occur in your community.
- Discover where your community is vulnerable to the hazards likely to affect it.

Local Identification Sources

Just thinking about it, you can tell that in your community some hazards are possible, others likely, and still others less probable. However, you should have more than just your own or others' opinions. A good way to predict what may happen in the future is to look at the past, your community's history of disasters and major emergencies. Which of them resulted from hazards still present in your community? Which of them recur and with what frequency?



Developing a Hazard Profile

The Toolkit contains a worksheet for developing a hazard profile for your community.



Look for information about past disasters.

Past disasters will give you a good idea about what to expect from these same hazards in the future. Review your files to determine what types of emergencies your community has faced over

the years. If you cannot find extensive files, talk to citizens who are long-time residents and know the local history. Talk to teachers in the local high school, the community college, or a nearby university. Check the library to see if there are books on past local disasters. Local newspapers are also an excellent source of information. These sources will help you find out if any major emergencies or disasters occurred prior to establishment of the emergency management office.

New Hazards

To identify the new hazards that may threaten your community, your task is to constantly observe the changes taking place. For example,

- Have high-rise apartments been built recently?
- Is there a possibility of a major high-rise fire that did not exist a year or two ago?
- Is there a new nuclear power plant that just went into operation near you?
- Are there new industries with a potential for chemical incidents?
- Is a new major highway opening up the area to increased transit of hazardous materials?
- Has recent mall development increased stormwater runoff from parking lots?

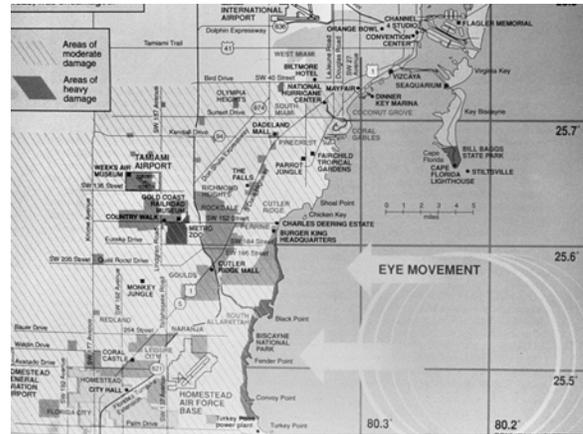
In other words, it is essential to identify the hazards that did not exist a few years ago.

Government Sources of Identification

Federal agencies are important sources of information about current and potential future hazards.

Through FEMA, you will be able to obtain maps and analyses designed to help you assess the relative level of risk to your

community for the various natural hazards. Ask for this kind of help from the FEMA regional office and regional and national offices of the Environmental Protection Agency, U.S. Department of Agriculture, and U.S. Geological Survey, among others.



Obtain maps and an analyses to help you assess risk.

Many of your colleagues in state and local agencies will be able to help you with hazard information. Communities with a flood hazard often have a National Flood Insurance Program Coordinator, for example. Others in public works, fire and police departments, and voluntary agencies may have good information.

Relevant Questions

Remember, you need to ask four questions about each hazard:

- 1.** Could this hazard affect your jurisdiction?
- 2.** If so, is it a significant threat to your jurisdiction?
- 3.** How often has this hazard occurred in your jurisdiction?
- 4.** What is your best estimate of the total population that could be seriously affected by this hazard?

This leads us to our discussion of vulnerability.

Vulnerability Analysis

The second step in determining the hazards for which your community must prepare is the vulnerability analysis. Simply put, if a disaster strikes, who or what will it affect and how badly? That is the vulnerability of your community.

To assess this, you need to review each hazard identified in the hazard analysis and determine the effect it will have on your community. For example, two rivers in different parts of the county flood simultaneously and on a fairly regular basis, according to an historical analysis. The potential vulnerability, based on frequency, is equal. One river, however, flows through the business center. The other through a farming region. Do both parts of the community have the same vulnerability?



Do all parts of a community have the same vulnerability?

Recognize Differences in Vulnerability to Threats

Probably not. While many factors need to be taken into account in a formal vulnerability analysis, it is likely that a flood in the business district would cause considerable economic loss any time it occurred. The flooded farm lands may or may not experience significant crop loss, depending on the season of the year. In the farming region flood, fewer lives are likely to be in jeopardy. The city flood might require evacuation and relocation of many people.

As seen in this example, the vulnerability of the community is defined as the potential for death and injury to people and economic loss to individuals, organizations, or government caused by a disaster. Completing a Sector Profile, such as the one in the Toolkit, will help you recognize the variations in vulnerability for various hazards and responses needed.

Your job in a vulnerability analysis is to take each hazard, starting with the ones having the highest probability of occurring, and assess your jurisdiction's vulnerability. The purpose is to identify what hazards are the "worst threats" and should have priority in your mitigation efforts and preparedness planning.

Potential Economic Loss

To do this, you should keep several things in mind. As stated above, potential human loss and economic loss are key considerations in vulnerability analysis. As you examine potential economic loss, buildings and their contents are obviously primary concerns. Crop or range land damage in agricultural areas is another form of potential economic loss.

Potential Human Loss

Looking at the vulnerability of people requires an assessment of where people live and work. Your vulnerability analysis should identify the locations of these people and the hazards to which they are vulnerable.

Needs of Special Populations

Here you will want to concentrate not only on the general population but also on special populations. These are the people who, in the event of an emergency, will require special provisions and attention, such as the elderly, those with disabilities, those in nursing homes or retirement communities, prison inmates, college students on a campus, and those speaking languages other than English. Your vulnerability analysis will help you in preparing the emergency plan and identifying the special tasks necessary to provide for their safety.

Review Existing Capabilities

Another consideration in estimating your vulnerability is existing mitigation capabilities. For example, if there is a dam that was constructed as a flood control measure, then your vulnerability to flood damage is probably reduced. However, if the dam is earthen or old and has the potential to fail, it may create vulnerability to a catastrophic dam failure. Similarly, tornado shelters and drills will reduce the vulnerability of people to loss of life but not economic loss. To mitigate economic loss, people and facilities should be insured.

Ask for Assistance

A final factor to remember in doing a vulnerability analysis is to get help. All the federal, tribal, state, county, and local agencies discussed under the section on Government Sources of Identification as valuable in hazard identification may be useful in estimating vulnerability.

Your Role in Mitigation

So far we have explained that mitigation efforts seek to eliminate or reduce the threat to life and property from the hazards potentially affecting the community. In that context, we touched on two other important points that merit repetition.

First, we said that most mitigation efforts are the primary responsibility of other departments of local government, not often the direct responsibility of the emergency manager.

Second, that does not mean that the emergency manager lacks a role in mitigation. On the contrary, the emergency manager has crucial roles in mitigation—that of motivator, coordinator, and monitor. We will examine these in more detail.

One of your roles in mitigation is to be the conscience of the community in matters related to emergencies. This translates into two major tasks.

- ➡ You must be alert to the various types of hazards that threaten your community.
- ➡ You must constantly monitor opportunities to reduce and eliminate the risks from these hazards.

You are the person with the broad scope of responsibility to help the community to do all it can to reduce potential harm to people and property. Remember, your job is to translate comprehensive emergency management into meaningful programs for your community.

How do you do this? One way you can do this is by motivating others to take mitigation actions and helping coordinate the available government and private-sector resources that can assist in mitigation.

We need to look at some of the resources that will help you do this.

- ➡ Codes and ordinances
- ➡ Structural measures
- ➡ Financial measures
- ➡ Information
- ➡ Land use planning and mapping
- ➡ Inspections

Mitigation Tools

Codes and Ordinances

Laws are a primary tool of mitigation. All the power to mitigate is not going to reside in your local emergency management ordinance. Many other local ordinances authorize others to share the responsibility for mitigation.

Codes and regulations are the mechanism for carrying out the intent of these laws. Examples of these follow:

- ➔ Building and zoning codes
- ➔ Plumbing and electrical codes
- ➔ Public health ordinances
- ➔ Fire and life safety codes
- ➔ Hazardous materials regulations
- ➔ Dam inspection regulations
- ➔ Traffic codes

These examples show that many people in the community have responsibility for mitigating hazards. The fire department is responsible for enforcing the fire codes, and the building inspector is responsible for enforcing the local building codes.

As the emergency manager, it is your job to work with the various agencies or departments who have direct responsibility for developing and enforcing codes and regulations.



Things To Do

Look at the community's history of emergencies. What damages could the community have prevented if certain mitigation measures had been in place? Find out if the community has implemented new mitigation activities since the emergencies.

Then meet with the heads of related government departments and agencies. Discuss with them the laws or regulations in the mitigation area for which they have responsibility. Determine which areas may need additional regulation and which ones are adequately covered.

Case studies and other information are available from state governments and from FEMA's mitigation staff on how communities have actually reduced their exposure to future losses.

Structural Measures

In addition to codes and ordinances, there are other tools available to mitigate emergencies. For example, there are several ways that engineering measures affect hazards. Wind-resistant shutters help protect against windows breaking in a severe storm. Stronger transportation containers, built to withstand

accidental punctures, help railroad cars and trucks more safely carry hazardous materials.

Buildings have sprinkler systems and fire retardant substances to lessen the damage from fire.

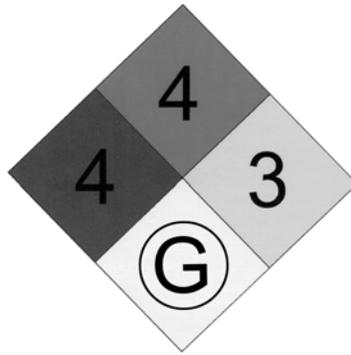


There are several ways that engineering measures affect hazards.

Financial Measures

Financial measures can also play a role in keeping the community safe. They generally take the form of tax levies or abatements. Levies might discourage creation of hazardous conditions and encourage responsible treatment of hazards (like safe waste disposal). A chemical manufacturing plant, for example, might create a threat that the local emergency service units would have to handle. Some jurisdictions place an additional tax levy on such companies to offset the increased cost of preparedness. Other communities require the company to have its own emergency personnel and equipment and to demonstrate through exercises that it can work well with the jurisdiction's emergency service organizations.

Information



Proper labeling of hazardous materials is an excellent example of mitigation.

Information is another tool. In some areas, a potential real estate transaction in the vicinity of a hazard entails hazard disclosure reports. If a house is in a floodplain, the potential buyer needs to know that risk.

Another example is labeling of hazardous materials. This has gone a long way toward improving their safe storage and handling.

You can serve as a mitigation advocate before policy-making boards both in government and in the private sector. Presentations to lawmakers, civic groups, professional societies, and corporate management are excellent ways to get the mitigation message understood and accepted.

How your organization handles public information will affect your overall mitigation strategy. As noted earlier, an important group to which you need to relate well is the media. They can be invaluable allies in promoting your mitigation efforts. They can help inform the public about the possible alternatives available when dealing with hazards.

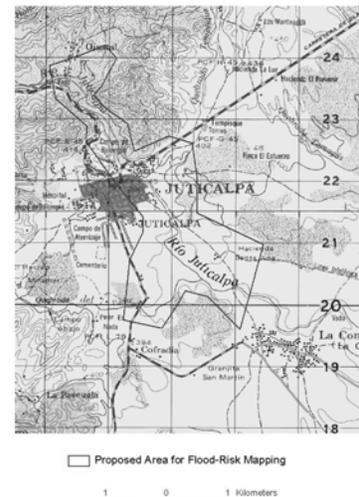
Land Use Planning and Mapping

Land use planning is a commonly used tool of mitigation. In one of the better-known mitigation programs of the federal government, the National Flood Insurance Program (NFIP), effective floodplain management has done a lot to reduce recurring costs due to repeated flooding.

Among the mitigation components of the NFIP is risk mapping. This involves assessing the floodplains of a community to determine the effect of different flood levels. In some circumstances, houses and businesses that fall within flood-prone areas are completely relocated out of the floodplain. Land in the floodplain is then used for less vulnerable purposes, such as recreation.

Even in areas not prone to flooding, local governments should plan land use very carefully. This is the only sound way to make wise decisions on developing new land for commercial, residential, or recreational use.

A key step in land use planning is the site plan review required by the local planning commission. This is an important point of intervention, especially if it looks as if there will be unwise development in the community. Your role as a mitigation motivator might mean staying in contact with the planning commission to be alert to development plans that will create new, unnecessary, and surely unwanted hazards in the community. You do not want new strains on your emergency response capabilities. Your role is to ask the question: “How will this latest development proposal affect the safety of the community in the years ahead?”



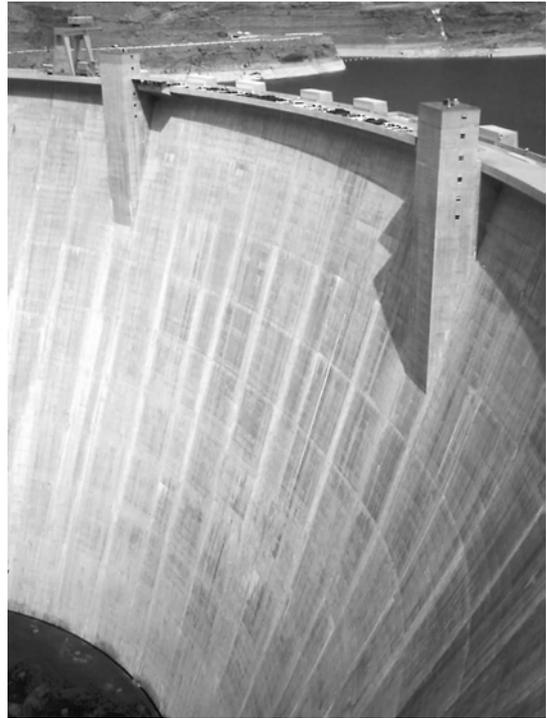
Land use planning is a common tool for mitigation.

Inspections

Although many laws and ordinances are on the books, ways of monitoring and inspecting potential violators are often ineffective. Yet these are two important tools of hazard mitigation.

Another example is what fire inspectors do in certifying that public buildings are code-compliant regarding fire and life safety.

One example is the federal dam safety program. For years, dams were constructed with certain safety requirements. But no agency was responsible for inspecting the thousands of large and small dams across the country. In recent years, a federal inspection program has found many dangerous and unsafe dams. The program is certain to help prevent potential dam failure.



The dam safety inspection program is designed to help prevent potential dam failure.

These examples are but two of the myriad inspection processes at work throughout many jurisdictions to be sure the identified hazards do not pose any unnecessary risk. While you may not be directly involved in such inspections, it is critical that you maintain liaison with those who are. As we have said before, it is all part of your coordinating role.

You, the Coordinator

All these mitigation tools are ways you and others in the community can promote mitigation. Your role is to inform, to question, to negotiate, to motivate, and to challenge. You need to know where technical expertise exists in your community, in state government, and in federal agencies and how and when to use it. You need to be aware of the agencies and groups that carry out day-to-day mitigation so that you can work cooperatively in pursuit of public safety.



Things To Do

Mitigation actions must be cooperative efforts of many government agencies. Many of these agencies are not the people with whom the emergency program manager has traditionally worked. New relationships will have to be created. This exercise is designed to alert you to new partners in the mitigation phase of emergency management.

Go back to your hazard identification and focus on all the hazards you identified as present (any level of likelihood) in your community. Next, list the agency you think might have responsibility for dealing with the hazard. If you do not know now, make a note to find out. These are your partners in mitigation.

Mitigation Strategies

One of the principal problems with the mitigation phase of emergency management tends to be its diminished priority with respect to the three other phases—preparedness, response, and recovery. It is usually easier to appreciate the need for a preparedness plan, for the ability to respond to an emergency, and for a community to recover from a disaster. As a result, mitigation frequently gets less attention than other phases of emergency management.

To begin with, the amount of money available for emergency management is usually small. So mitigation activities are competing with other programs in the budget for their fair share. Focusing on mitigation means less money available for preparedness, response, and recovery. For this reason, mitigation is often the phase of emergency management for which most communities do not have adequate resources and programs.

Mitigation, however, is one phase of emergency management where creative planning and financing can be a great help. This will often permit a jurisdiction to finance certain emergency management programs themselves with only a small additional burden on the citizens.

Mitigation activities promoted by FEMA in the 1990s used creative financing. Corporations teamed with communities to implement local mitigation measures. The following table illustrates the types of projects done.

Community	Description
Saco, Maine	<ul style="list-style-type: none"> ♦ Drafted an “All Hazard Mitigation Plan” with short- and long-term risk reduction activities identified ♦ Prepared a Standard Specification manual for all new and existing developers ♦ Changed the storm design level from a 25-year to a 50-year level
Charleston County, South Carolina	<ul style="list-style-type: none"> ♦ Created various brochures on mitigation, including Boat Protection for a Hurricane, Generator Safety, Hazard-Resistant Landscaping, and Hazard “Tips for Tourists” ♦ Elevated flood-prone properties ♦ Developed mobile demonstration models for hazard-resistant construction techniques
Sparks, Nevada	<ul style="list-style-type: none"> ♦ Partnered with IBM Global Services to conduct a business-by-business review of risks and hazards and provided each of the 40 business participants with an itemized list of recommended actions to avoid or reduce damage from potential hazards ♦ Worked with Supply One, which instituted a Tool Lending Library with classes to teach homeowners and businesses how to install mitigation measures such as foundation bolts, roof tie downs, and water heater straps
Culebra, Puerto Rico	<ul style="list-style-type: none"> ♦ Partnered with the Boy Scouts, who performed an intensive door-to-door mitigation-oriented public awareness campaign ♦ Worked with the College of Engineers and Surveyors, who performed a structural evaluation and assessment of several key buildings and structures

Money should not be the determining factor for your mitigation efforts. As shown above, there are many alternatives to expensive programs. Remember, the goal of mitigation is to avoid hazardous circumstances. If you can avoid them in the first place, you will need far less money for remedial efforts later on. The old adage “An ounce of prevention is worth a pound of cure” fits well here.

Let’s look at some alternatives.

Mitigation Alternatives

While some mitigation alternatives require money from partnerships or your own community, most substitute awareness, foresight, and creative efforts. Several of the ones that follow may give you ideas on how you can sell your community on mitigation.

1. Prevent the creation of the hazard in the first place.

This is the most basic mitigation strategy and is carried out through a community's ordinances and codes: fire and life safety; building; electrical; plumbing; and so forth. The requirement that all public buildings have sprinkler systems is a mitigation technique against fires. The inspection of new buildings to make sure the construction conforms to sound engineering standards is a basic way of mitigating and preventing unsafe construction.

2. Change the nature or the size of the hazard.

Suppose that the federal dam safety inspection program detected a crack in a dam or some other sign of instability. The water behind the dam could be lowered gradually and safely. This would have two results: relieving the pressure on the dam until repaired, and not endangering the environment below the dam. Stabilizing a potential landslide is another example. These examples illustrate change affecting the nature of the hazard.

Here are two examples regarding size. A reduced speed limit in a school zone lessens the possibility of a child being struck by a car. If a manufacturing plant uses hazardous chemicals, there may be a legal limit on the amount stored at any one time. The manufacturer would have to observe this limit.

3. Separate the hazard from that which it might affect.

There are several ways to do this. One is to restrict such things as the hazardous use of chemicals to specific areas within a community. For example, only areas zoned for particular industrial use are permitted to use hazardous chemicals. Another way is to surround the hazard by some type of containment, such as storing hazardous materials in safe, fire-proof buildings.

4. Modify the basic characteristics of a hazard.

Dangerous chemicals are often packaged with a neutralizing agent right next to the chemicals. If the chemical container sustains damage, the neutralizing agent is automatically released, thus minimizing the toxic effects of the spilled chemical. In another case, a distinctive smell added to the odorless liquid propane gas warns people that propane is present.

5. Research what others are doing.

Industry and the federal government put money into research to develop ways of making materials (like building materials) and products (like automobiles) safer. While you may not have the funds to engage in research yourself, there is no reason today that you cannot find out what others are discovering by using the resources available through the Internet and printed publications.

Don't forget to talk to other emergency managers about their mitigation efforts. They are a good source of free, valuable advice.

Conclusion

Your role in mitigation will vary depending on the hazards you face and your specific responsibilities and those of other government departments and agencies.

Regardless of how active you are in actual mitigation efforts in your community, it is your responsibility as the emergency manager to monitor how other governmental departments are carrying out their mitigation functions that affect the safety of the community. Your role is to motivate others to practice mitigation through hazard awareness, to coordinate efforts of agencies that have the responsibilities for mitigation, and to help ensure continuing enforcement of hazard reduction measures.

Your challenge is to help these community groups come to appreciate the importance of mitigation. Let's hope it will not take a disaster to do this. But if one does hit your community, any prior mitigation activities the community has put in place will help soften the blow. That in itself will make all your efforts worthwhile.



Learning Check

QUESTIONS

Answer the following questions to test your knowledge of Unit Three facts. Read each question carefully, then write in the answer that you think is correct. Answers can be found on page 3-22.

1. What is the purpose of a hazard analysis?

2. What is the purpose of a vulnerability analysis?

3. What are the two major types of loss that occur in a disaster?

4. What are some sources of information you should use while preparing a hazard analysis?

5. Why should you identify special populations in the vulnerability analysis?

 **QUESTIONS**
Learning Check

6. What is mitigation?

7. What are the tasks of the emergency manager in mitigation?

8. How does the emergency manager perform his or her role in mitigation?

9. List three forms of mitigation than can be accomplished by local laws or ordinances.



Learning Check

QUESTIONS

10. List four tools other than laws that can be used for mitigation.

11. Which of the following is a structural measure for mitigation?

- A. Flood insurance
- B. Storage containers
- C. Preparedness plans
- D. Fire sprinkler systems

12. What is the role of public information as a tool for mitigation?



Learning Check

ANSWERS

For every question that you answered incorrectly, review the page listed next to the answer to find out why your answer was incorrect.

1. What is the purpose of a hazard analysis? (See page 3-3)

The purpose of a hazard analysis is to show what hazards can strike.

2. What is the purpose of a vulnerability analysis? (See page 3-6)

The purpose of a vulnerability analysis is to show who or what will be affected by a disaster and how badly it will be affected.

3. What are the two major types of loss that occur in a disaster? (See page 3-6)

Human loss and economic loss

4. What are some sources of information you should use while preparing a hazard analysis? (See page 3-3)

Information sources include: reports on past disasters, local citizens, high school or college teachers, federal agencies, neighboring emergency managers, officials in your own jurisdiction.

5. Why should you identify special populations in the vulnerability analysis? (See page 3-7)

Because these are the people who, in the event of an emergency, will require special provisions and attention, such as the elderly, those with disabilities, those in nursing homes or retirement communities, prison inmates, college students on a campus, and those speaking languages other than English. Your vulnerability analysis will help you in preparing the emergency plan and identifying the special tasks necessary to provide for their safety.

6. What is mitigation? (See page 3-1)

Mitigation involves efforts to eliminate or reduce the damaging impact of hazards.



Learning Check

ANSWERS

7. What are the tasks of the emergency manager in mitigation? (See page 3-10)

The emergency manager's role in mitigation is to be the conscience of the community in matters related to emergencies. This translates into two major tasks: He/she must be alert to the various types of hazards that threaten the community, and he/she must constantly monitor opportunities to reduce and eliminate the risks from these hazards.

8. How does the emergency manager perform his or her role in mitigation? (See pages 3-11 thru 3-15)

By motivating others to take mitigation actions and helping coordinate the available government and private-sector resources that can assist in mitigation.

9. List three forms of mitigation that can be accomplished by local laws or ordinances. (See page 3-11)

Any of the following: Building and zoning codes, plumbing and electrical codes, public health ordinances, fire and life safety codes, hazardous materials regulations, dam inspection regulations, traffic codes

10. List four tools other than laws that can be used for mitigation. (See page 3-10)

Financial incentives and disincentives, hazard disclosure reports, public information, risk mapping, monitoring and inspecting, professional training, and structural measures.

11. Which of the following is a structural measure for mitigation? (See page 3-11)

*B. Storage containers and
D. Fire sprinkler systems*

12. What is the role of public information as a tool for mitigation? (See pages 3-12 thru 3-14)

Public information for mitigation is useful for sharing with citizens the possible alternatives for dealing with hazardous conditions and then applying pressure for implementing mitigation.