

Flood Mitigation and Recovery-- An Interactive Exercise for Local Governments

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Introduction

This manual describes a training exercise on post-flood mitigation and recovery. The exercise simulates selected aspects of physical recovery from flood damage. The stage is a single local government jurisdiction and the players are its key staff members. Players are guided in creating their own scenario of flood damage and then led through a series of tasks related to planning for repairs and rebuilding.

Why an Exercise?

Local police and fire departments know the value of exercises to help them prepare for potential disasters. Through such exercises, they develop techniques to handle extraordinary circumstances, make decisions under extreme pressure, and contain the impacts of a disaster to the extent possible. Experience demonstrates that preparing in advance improves performance when disaster strikes.

Weeks after a damaging flood, circumstances are still extraordinary, decisions are made under extreme pressure, and the impacts continue rippling through the community. As the need for emergency responders decreases, a new group of local staff people--managers, planners, building officials, finance officers, and engineers--face mounting responsibilities. Shouldn't there be an exercise for them, too?

This exercise is primarily for this "second wave" of responders whose actions will play an important role in shaping the rebuilt community. It is designed to provide them with a preview of the issues and problems they will face in the hopes that, like the emergency responders, they will be better prepared to serve their community effectively after a flood.

How Does the Exercise Relate to Real Time?

The exercise takes 8 hours. During that time, players will complete tasks covering a time period extending from a flood warning received 3-5 days before the flood to one or two years after the flood. The tasks are arranged in approximate time sequence starting with those that normally must be dealt with first. This linear time sequence of

tasks oversimplifies a complex, real situation in which tasks often must be addressed simultaneously. The amount of time allocated to each task will seem too short. This simulates, to some degree, the pressure after a flood to do an incredible amount of work very quickly.

How Does the Exercise Relate to Actual Recovery?

Like any exercise, this one is a selective and approximate slice of real experience. It consists of a series of interrelated tasks that local governments almost always must face after a flood. The common links are that all the tasks must be done by local government and all potentially affect options for repairs and rebuilding.

The exercise covers many of the tasks that local officials will face during recovery. Each task in the exercise is realistic in that it will probably need to be carried out after a flood, but not all post-flood recovery tasks are included. For example, much of emergency response is not covered. Economic and fiscal matters are only tangentially included, although they certainly impact physical recovery. FEMA disaster assistance programs and requirements are not fully incorporated into the exercise, mainly because it would take too much exercise time to fully explain the details to the players. However, the tasks are generally consistent with provisions of FEMA's National Flood Insurance Program.

The exercise does not reflect the intense political heat surrounding recovery. Players will need to imagine the political context in their community as they are working the exercise. Political issues pervade every task. After floods, local governments commonly enjoy a brief suspension of political rivalry. Distinctions between the responsibilities of public and private agencies, federal, state, and local governments, and city and county government departments may blur. Every organization and person will be working together to address their common needs. But this does not last long. Pre-flood political problems will soon reemerge to influence decisions about long-term recovery.

Time is an important post-flood issue. The public may perceive that repairs and rebuilding are taking too long. Anger and frustration stemming from feelings of helplessness will often be vented at local public officials, particularly planners and building officials, whose approvals may stand between people and their ability to repair or rebuild damaged homes and businesses.

The exercise deals with common aspects of flood recovery; however, the unexpected will happen. The failure of a flood control structure, for example, can mean rebuilding an entire section of the community. Key staff people may be out of town or unable to handle the pressure, or adverse weather may delay outside help. Contingencies like these are part of the context of recovery. By learning as much as possible about the "normal" tasks of post-flood recovery, local government staffs will be prepared to do these with more ease, giving themselves a better chance of handling the "abnormal" tasks effectively.

And finally, the exercise will give players the important advantage of forethought when they face the inevitable flood, enabling them to help their communities recover

and rebuild quickly and effectively. Not only will they be better prepared for recovery tasks, they will learn about the advantages of acting now to prevent flood damage.

What Are the Assumptions for the Exercise?

1. The city or county conducting the exercise prepares for emergency response, plans for community development, administers land development regulations, and issues building permits.
2. The community participates in the National Flood Insurance Program and has adopted a floodplain management ordinance meeting the minimum criteria in the NFIP.
3. The players know their community well, but do not need to know much about floods or recovery from floods.

Facilitator's Instructions

Overview of Exercise Design

This exercise on mitigation and recovery after floods is organized into a series of tasks which are to be completed in sequence. Each task, labeled by a letter (A-L), has a time limit ranging from 20 to 75 minutes. The tasks are in rough chronological order, but in reality, many would be occurring simultaneously. Each task covers, at least partially, an issue related to recovery that typically arises after a flood.

The exercise starts with a flood warning. Task A asks players to respond to the warning and determine areas to evacuate. They begin to record information on a base map of the community which is used throughout the exercise. Then in Task B, they open emergency shelters. The flood arrives in Task C during which the players create a damage scenario based on their best judgment of the impacts of a real flood, considering that flood control structures may fail and debris carried by floodwaters may cause additional damage.

The next tasks, usually part of emergency response, concern the rerouting of traffic in Task D and restoring essential community services in Task E. Then, more information is collected about the damage in Task F. These actions set the stage for early recovery--finding temporary locations for displaced businesses and residents in Tasks G and H, adopting policies for repair of damaged buildings in Task I, and adopting procedures to process permits for repairs and rebuilding in Task J.

The emphasis then turns to planning for reconstruction with Task K to identify planning opportunities and develop a plan for reconstruction of the floodplain. Finally, the exercise ends with Task L to define mitigation actions that can be taken beforehand to avert flood damage and prepare for long-term recovery and rebuilding.

All the tasks can be accomplished using typical local government background documents, such as the general plan and zoning ordinance, supplemented by handouts provided in this manual. A specific product or products will emerge from each task, often providing input to subsequent tasks.

Throughout, it is important to remember that the primary value of the exercise is in the process, rather than in the products. It is designed to educate staff members about their likely tasks after a damaging flood. They will be able to apply this basic knowledge to floods varying in size and impacts. As with any exercise, it is a first step. Having learned something of the process and problems, players will need to take further actions to reduce potential damage and prepare for the inevitable tasks of rebuilding.

Overview of this Manual

This manual contains most of the information needed for you to facilitate the tasks and for the players to complete the tasks. The manual is divided by large tabs into five sections: introduction, facilitator's instructions, exercise tasks, slide index, and additional resources.

In the section labeled *Exercise Tasks*, you will find a series of small tabs identifying each exercise task. Behind each of these tabs is a script, a one-page instruction sheet for doing the task, and, for some tasks, handouts to be used by players during the task.

Scripts. Each task is introduced with a scripted slide show. The script may be read or paraphrased. Each script tells what the task is, why it is important, and how it has been carried out after recent floods. A one-line description of each slide accompanies each paragraph of the script. This line is in bold face italics and is not meant to be read aloud.

Instructions. The instruction page for each task is to be duplicated and included in the packet for each player. This page states the purpose of the task and lists the materials that will be needed to complete it, including handouts. Then, the specific steps required to do the task are listed, followed by a description of the product or products the task will generate.

Handouts. Handouts, too, should be duplicated and included in the packets. They are forms to be filled out as a product of the task.

The section of this manual labeled *Slides* contains an index to the slides and a list of slide sources.

Recommended Participants

The exercise has three categories of participants:

- o **Facilitator(s)**--the person or persons responsible for organizing the exercise, providing information to the players before, during, and after the exercise, and conducting the actual exercise.
- o **Players**--those carrying out the prescribed exercise tasks.
- o **Observers**--people invited to learn from the exercise by watching.

Who exactly should participate in each of these categories? The exercise is designed with the following assumptions about participation.

Facilitator(s). The facilitator should be skilled in running meetings and knowledgeable about flood hazards, long-term recovery from floods, and flood hazard mitigation. Someone from your state's floodplain management agency, hazard mitigation office, or emergency services department could facilitate the exercise for your community. The facilitator could also be a community's emergency services coordinator or other staff member. Because the exercise emphasizes planning issues during recovery, a community's city planner could be an excellent facilitator, either alone or working with someone with emergency management expertise. A consultant with appropriate qualifications is a possible choice. The facilitator must have the full support of the community's chief administrative officer and be authorized to ask assistance from staff members in preparing for the exercise.

Players. The players should include 8 to 12 local government senior staff members, selected by the city or county manager. Staff members, such as the planning director, building official, and public works director, who would be responsible for rebuilding recommendations after a flood must be involved. Other possible players are the city or county manager, emergency services coordinator, housing specialist, engineer, clerk, attorney, parks and recreation director, and any other staff person who might have recovery responsibilities. The police and fire chiefs need to be involved as the exercise deals with some emergency response issues. However, it is wise to alert them that this is not an emergency response exercise, and that others on the staff will probably be taking the lead. Council members, local Red Cross personnel, or business persons may be players. It is important to include those people who would be responsible for the tasks in the exercise after a flood, regardless of their formal titles or roles.

Observers. Allowing non-players to observe the exercise is an effective way to spread the benefit; however, it is optional. The decision would be made by the facilitator and the participating jurisdiction. Observers could be other staff members from participating departments, staff members from non-participating departments, elected or appointed local officials, and community representatives. Staff members from other

nearby jurisdictions might also be invited. By including observers, a jurisdiction would be increasing the impact of the exercise as a learning tool.

Recommended Schedule

The exercise can be completed in an 8-hour day with a break for lunch. It is fast-paced, calling for intensive effort from the players during the playing period. The schedule is deliberately tight to give players some sense of the pressure and tension that would pervade such tasks after a real flood. It can be done in a single day as shown in the schedule below. However, it can be spread over two days, perhaps starting in the afternoon of the first day and finishing at noon on the second day. By doing this, the players have time to rest and bring fresh perspective to the important tasks which come later in the exercise.

EXERCISE SCHEDULE		
		<u>Minutes</u>
8:00 - 8:30	Introductions/Explanations	30
8:30 - 9:10	Task A. Warning and Evacuation	40
9:10 - 9:30	Task B. Emergency Shelter	20
9:30 - 10:30	Task C. Damage Scenario	60
<i>10:30-10:50</i>	<i>Break</i>	<i>20</i>
10:50-11:10	Task D. Rerouting Traffic	20
11:10-11:30	Task E. Restoring Services	20
11:30-12:00	Task F. Damage Assessment	30
<i>12:00 - 1:00</i>	<i>Lunch</i>	<i>60</i>
1:00 - 1:20	Task G. Temporary Business Locations	20
1:20 - 1:40	Task H. Temporary Housing	20
1:40 - 2:25	Task I. Policies for Damaged Buildings	45
2:25 - 2:45	Task J. Permit Processing	20
<i>2:45 - 3:05</i>	<i>Break</i>	<i>20</i>
3:05 - 4:20	Task K. Reconstruction Planning	75
4:20 - 5:00	Task L. Mitigating Flood Hazards	40

Materials Needed for Exercise

To conduct the exercise, you will need to assemble some readily-available supplies and standard local documents. Below are lists of materials needed for the exercise.

Supplies. Supplies include a slide projector, screen, marking pens, map overlay material (such as acetate, tracing paper, or mylar), tape, and push pins. A flip chart or blackboard is not necessary, but can be used, as a supplement to the handouts, to record information during the exercise. A display timer, such as a kitchen timer, is essential for you and the players to keep track of time during the exercise.

Base Maps. One or more copies of a base map of the community is essential. The map should be the largest scale available that can fit on the table. It should show major properties, streets and bridges, important facilities, and, if available, parcel boundaries. If the jurisdiction is geographically large, a table-top sized base map will not show both the whole jurisdiction and individual parcels. You may wish to select a part of the floodplain as a focus for the exercise and provide large scale maps covering the selected area. In this case, a map of the entire jurisdiction should also be provided for context and perhaps for use in some of the early tasks.

Documents. The instruction sheets contain a list of materials to use for each task. Most of these are common local government documents and should be readily available. If documents are not available, the tasks can still be done relying on the players' knowledge of the community. Documents to collect, if available, are:

- Flood Insurance Rate Map (FIRM) or most recent NFIP map
- floodplain management ordinance
- information on previous floods
- community plan and plan diagram
- emergency response plan, including shelter plans
- redevelopment or downtown plans
- zoning ordinance and maps
- procedures for processing planning and building permits
- lists of historic buildings

Other relevant materials, such as census data, housing plans, or economic development plans, may be useful and should be provided, if readily available.

Player Packets. You will need to provide each player with an exercise packet, containing 12 instruction pages and 10 handout pages. You may also wish to prepare packets for observers so they may follow the action. The packets should be clipped (not

stapled) or placed in a binder. The pages should be collated according the sequence of the tasks. Following is a list of the packet pages in the order they should be assembled.

Contents of the Player Packets

Handout 1	Exercise Schedule
Handout 2	Color Key for Mapping Information
Handout 3	Task Leaders and Other Assignments
Handout 4	Recommended Actions
Instructions	Task A. Warning and Evacuation
Handout A	Actions in Response to Flood Warning
Instructions	Task B. Emergency Shelter
Instructions	Task C. Damage Scenario
Instructions	Task D. Rerouting Traffic
Instructions	Task E. Restoring Services
Instructions	Task F. Damage Assessment
Handout F	Damage Assessment
Instructions	Task G. Temporary Business Locations
Instructions	Task H. Temporary Housing
Instructions	Task I. Policies for Damaged Buildings
Handout I	Policies for Damaged Buildings
Instructions	Task J. Permit Processing
Instructions	Task K. Reconstruction Planning
Handout K	Planning Opportunities
Instructions	Task L. Mitigating Flood Hazards
Handout L1	High-Priority Action to Reduce Flood Risk
Handout L2	Contacts for Technical and Financial Assistance

Suggestions for Conducting the Exercise

1. Select as players 8 to 12 high-level staff persons to form a small working group in which each player can interact freely with all others. Invite additional staff members to observe.
2. The success of the exercise depends on total concentration of all players for the entire day. If possible, arrange to conduct the exercise away from the normal work place to reduce chances for interruption.
3. The exercise is tightly timed. Let players know that they must be on time for the exercise and clear their schedules to prevent interruptions.
4. Find a room that can be darkened for showing slides. The room should have a table the players can sit around to work on the base map and a wall on which maps may be attached with tape or push pins.
5. Provide for refreshments during the breaks. Thinking burns up energy.
6. Exert control to keep the exercise on the time schedule. Discussion should be discouraged while you are reading the scripts. Discussion can take place while the players are working on the tasks.
7. Whenever possible, add a few local slides with brief descriptions to the slide presentations. Slides showing past floods in the community, buildings in the floodplain, or elevated structures can be added at the appropriate places in the task introductions. Doing this can help the players see the local relevance of the many examples in the presentations from around the country.
8. If the facilitator is not a staff member, he or she needs to secure the support of the jurisdiction's chief executive officer and coordinate with a designated staff person. That staff person must be able to verify that the key players will commit the full day to the exercise and help with local arrangements.

Facilitator's Checklist

Checklist

Before Exercise

- Obtain authorization from CAO, council, or other appropriate body.
- Set date and time.
- Reserve meeting room.
- Determine players and arrange with the CAO for them to participate.
- Invite observers, if desired.
- Arrange for slide projector and screen.
- Provide materials for map overlays, pens, push pins, and tape.
- Obtain copies of the jurisdiction base map and parcel maps.
- Assemble documents
- Assemble player packets.
- Study task scripts and instructions.
- Acquire local slides and make additions to the script.
- Place the slides in order in slide carousels.

During Exercise

- Use the script and slides to introduce the exercise and each task.
- Time the tasks and facilitate their timely completion.
- Answer questions and assist players with the tasks.
- Oversee creation of a list of high-priority actions to reduce flood risk.

After Exercise

- Continue to work with players on the high-priority actions to reduce flood risk.

Exercise Tasks

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Scripts. Each task is introduced with a scripted slide show. The script may be read or paraphrased. Each script tells what the task is, why it is important, and how it has been carried out after recent floods. A one-line description of each slide accompanies each paragraph of the script. This line is in bold face italics and is not meant to be read aloud.

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Handouts. Handouts, too, should be duplicated and included in the packets. They are forms to be filled out as a product of the task.

SCRIPT -- INTRODUCTION TO TASKS

(15 minutes to read the script)

Slide 1. Flood Mitigation and Recovery--An Interactive Exercise for Local Governments

This is a flood mitigation and recovery exercise designed for local government officials. The exercise introduces you to some of the tasks you will face when a damaging flood strikes your community.

Slide 2. Exercise tasks

The exercise is organized into a series of twelve tasks which are to be completed in sequence. The tasks are listed on the screen. Each task is identified by a letter A through L.

The exercise starts with heavy rains and a flood warning. In the first task, Task A, you decide how to respond to the warning and what areas to evacuate. Then, in Task B, you determine how to provide emergency shelter for the people evacuated. The flood arrives in Task C and you determine its extent and major impacts.

Next come typical tasks during emergency response--Task D rerouting traffic around washed out bridges and roads and Task E restoring essential services to the community. Then, more information is collected about the damage in Task F. This task sets the stage for early recovery--finding temporary space for displaced businesses and residents in Tasks G and H and adopting policies and procedures for the repair, removal or rebuilding of damaged buildings in Tasks I and J.

The emphasis then turns to planning for reuse of the floodplain with Task K during which you prepare a reconstruction plan for the flooded area. Finally, the recovery exercise ends with Task L. In this task, you recap the problems encountered in the previous tasks and detail high-priority actions that can be taken beforehand to avert flood losses and prepare for rebuilding.

Slide 3. Exercise schedule

Here is a schedule of the exercise showing the amount of time allocated to each task. You each have a copy of this schedule in your packet (*Handout 1*). Times range from 20 to 75 minutes. The amount of time allocated to each task will seem much too short. This simulates, to some degree, the time pressure you will experience after a flood. In addition to time for the tasks, this introduction will take about 20 minutes and you will have a 20-minute break in mid-morning and mid-afternoon. One hour is allocated for lunch. The entire exercise will take until 5:00 this afternoon.

Slide 4. Exercise purpose

The primary purpose of the exercise--shown here--is to improve the ability of local governments to recover from damaging floods. We think it will do so in the ways listed here.

- o Training non-emergency personnel in recovery tasks. Fire fighters and police officers receive training to prepare them to handle disasters; most other staff people rarely do. This exercise is designed primarily to train non-emergency staff in tasks that come after emergency workers are through.
- o Passing on experience from cities that have rebuilt. Many jurisdictions have had damaging floods. The exercise content draws from these experiences.
- o Providing a chance for hands-on experience. The exercise gives you a chance to apply general information about recovery and rebuilding to your specific circumstances.
- o Encouraging preparations for recovery and rebuilding. The exercise will help you see how you can prepare now to handle typical recovery tasks more effectively after a flood.
- o Encouraging actions to reduce flood damage. Once you see how tough recovery will be, we think you will want to initiate actions now to reduce the potential damage in your community.

Slide 5. Topics not covered

The exercise covers recovery from flooding along rivers and streams usually caused by heavy rainfall. It does not cover coastal flooding or other kinds of storm damage. Nor are all aspects of recovery covered. The slide lists some significant omissions. Most of emergency response is not covered, such as search and rescue and debris removal. Economic and fiscal matters are only tangentially included, although they certainly impact physical recovery.

FEMA disaster assistance programs and requirements are not incorporated into the exercise, but you need to recognize that FEMA requirements will affect nearly every post-flood activity. Much of what takes place after a flood responds to requirements of the local floodplain management ordinance adopted as a condition for participating in the National Flood Insurance Program. The tasks in the exercise are consistent with those requirements, but the details of the program are not incorporated.

The exercise does not incorporate your community's political context. As you work the tasks, it will help to keep in mind the major political issues in your community. After a flood, there may be a brief suspension of political rivalries, but this does not last long. What you can and cannot accomplish will depend a great deal on political factors.

Slide 6. Flood recovery timeline

This is a timeline showing typical lengths of time to accomplish the tasks in the exercise after a real flood. The timeline is divided into three sections: 1) pre-flood warning shown in white, 2) short-term recovery running from the flood to about 2 months shown in light gray, and 3) long-term recovery running from about 2 months to two years shown in dark gray. Actual rebuilding can take much longer than 2 years, and mitigating flood hazards is an ongoing process. Almost all of the tasks are started during early recovery, but many of them extend into long-term recovery. Today you get to do the tasks one at a time, but as you can see here, after a real flood, you will be doing many of them simultaneously.

In general, the tasks take longer after a flood than people expect. This means that you start the recovery effort with unreasonable expectations for a speedy recovery. People are likely to feel that repairs and rebuilding are taking too long. The procedures and permits you require may be seen as obstacles to the quick reoccupancy of flooded homes and businesses. The recovery process is permeated by tension between the desire for speed and the need to take time to ensure responsible rebuilding.

Slide 7. Task structure

Each task in the exercise is organized the same way.

Introduction. Each task is introduced with a slide presentation with background information to help you with the task. The slides show how the task has been handled by communities after real floods. The introductions average about 5 minutes.

Instructions. Your packet contains one-page instruction sheets telling you the steps to take to complete each task. You will want to take time to read the instructions before you start work.

Handouts. For some tasks you will find handouts in your packet consisting of forms to be filled out during the task.

Products. You will produce something in every task. Products consist of information added to the map and entries on handouts.

Slide 8. What players need

You do not need to be a recovery expert to do these tasks. You need working knowledge of your community and some idea of the effects of floods. You have here a collection of background documents and maps to help you with the tasks. The materials include your community plan and land use diagram, zoning ordinance and maps, emergency response plan, and any available redevelopment plans and lists of historic buildings. You also have the flood hazard information available for your community, including your Flood Insurance Rate Maps issued by the Federal Emergency Management Agency and your floodplain management ordinance. You can refer to these items throughout the exercise as questions arise.

Here is a base map covering the community. You will be recording information on this map throughout the exercise. You also have a set of colored pens for adding information to the map. *Handout 2* tells you which color to use for each category of information to be mapped.

Slide 9. Getting started

Before you start the exercise, you need to organize yourselves to do the work. First, you need to select a player to take the lead on each task. The selections can be recorded on *Handout 3* in your packet. The task leader will be responsible for keeping the discussion on track and helping the group reach some decisions before the timer goes off. We will also ask the leader to give a two-minute (or less) summary of the results at the end of each task, focusing on any problems encountered and recommended actions to overcome them.

You also need to select a player to be group recorder. This should be someone whose position on the city staff is somewhat peripheral to the topics covered in the exercise. For example, the planning director or building official would not be a good choice, but the city clerk or personnel director might be. This person will fill out the handouts with particular attention to *Handout 4. Recommended Actions* which is filled out at the end of each task. If available, a flip chart or a blackboard may be used in place of *Handout 4*. The recorder will then recap the recommended actions listed on *Handout 4* as part of Task L.

In addition, you may want to select the artist among you to draw on the map.

Now, open your packet and review the four handouts. Take a minute to look them over. Then go right to selecting the players to fill the various roles. We will start the introduction to Task A as soon as you have made your selections.

Handout 1

EXERCISE SCHEDULE

		<u>Minutes</u>
8:00 - 8:30	Introductions/Explanations	30
8:30 - 9:10	Task A. Warning and Evacuation	40
9:10 - 9:30	Task B. Emergency Shelter	20
9:30 - 10:30	Task C. Damage Scenario	60
<i>10:30-10:50</i>	<i>Break</i>	<i>20</i>
10:50-11:10	Task D. Rerouting Traffic	20
11:10-11:30	Task E. Restoring Services	20
11:30-12:00	Task F. Damage Assessment	30
<i>12:00 - 1:00</i>	<i>Lunch</i>	<i>60</i>
1:00 - 1:20	Task G. Temporary Business Locations	20
1:20 - 1:40	Task H. Temporary Housing	20
1:40 - 2:25	Task I. Policies for Damaged Buildings	45
2:25 - 2:45	Task J. Permit Processing	20
<i>2:45 - 3:05</i>	<i>Break</i>	<i>20</i>
3:05 - 4:20	Task K. Reconstruction Planning	75
4:20 - 5:00	Task L. Mitigating Flood Hazards	40

Handout 2

COLOR KEY FOR MAPPING INFORMATION

COLOR	INFORMATION ON MAP
Yellow	<ul style="list-style-type: none">o floodway and 100-year floodplaino temporary housing
Brown	<ul style="list-style-type: none">o areas evacuatedo temporary business locations
Green	<ul style="list-style-type: none">o emergency shelterso road blocks, alternative traffic routes
Blue	<ul style="list-style-type: none">o area floodedo parcels with buildings over 50% damaged
Orange	<ul style="list-style-type: none">o areas with concentration of pre-FIRMo historic buildings
Purple	<ul style="list-style-type: none">o major facilities (schools, hospitals, government buildings, etc.)o areas with impaired access
Red	<ul style="list-style-type: none">o washed out bridges and roadso areas affected by loss of utilities
Black	<ul style="list-style-type: none">o damaged utilitieso buildings to be demolishedo areas subject to moratorium on rebuilding

Handout 3

TASK LEADERS AND OTHER ASSIGNMENTS

TASKS	LEADERS
Task A. Warning and Evacuation	
Task B. Emergency Shelter	
Task C. Damage Scenario	
Task D. Rerouting Traffic	
Task E. Restoring Services	
Task F. Damage Assessment	
Task G. Temporary Business Locations	
Task H. Temporary Housing	
Task I. Policies for Damaged Buildings	

Task J. Permit Processing	
Task K. Reconstruction Planning	
Task L. Mitigating Flood Hazards	

Mapper: _____

Group Recorder: _____

Handout 4. RECOMMENDED ACTIONS

TASKS	ACTIONS	Priority
Task A Warning and Evacuation		
Task B Emergency Shelter		
Task C Damage Scenario		
Task D Rerouting Traffic		
Task E Restoring Services		
Task F Damage Assessment		

Task G Temporary Business Locations		
Task H Temporary Housing		
Task I Policies for Damaged Buildings		
Task J Permit Processing		
Task K Reconstruction Planning		

SCRIPT -- TASK A. WARNING AND EVACUATION
(You have 10 minutes to read the script.)

Slide A1. Task A. Warning and Evacuation

Most floods arrive with some warning. A well-prepared response to a flood warning can save lives and prevent property damage. In Task A you will decide how to respond to a flood warning which _____ (community) just received that the _____ River will crest at about 9:30 this morning.

Slide A2. Woman with child watching storm clouds

Here you see a woman holding a child and watching with worry an approaching storm. The most basic warning system is simple observation. Typical river and stream flooding is preceded by unusually long or intense rainfall. Heavy rain means large amounts of water entering rivers and streams. Rising water levels are readily observed by anyone.

Slide A3. National Weather Service office

However, it is risky to rely just on personal observation. Sometimes flooding can occur from rainfall elsewhere in the watershed. Personal observation will not tell you how much of the rain will flow into the stream, when the flood will reach its peak, or how high it will be. Fortunately, the National Weather Service has a system for issuing flood warnings which relies on scientific observations of rainfall and runoff patterns. Here you see a Weather Service office where the information is collected and analyzed. The Weather Service notifies your state emergency management agency when a flood could occur. This is called a "flood watch." It also issues a "flood warning" when flooding is imminent or already happening. The state notifies you if it has received a "watch" or "warning" affecting your community. You may also receive the notification directly from the Weather Service.

Slide A4. Form for an official flood warning

This shows the form used for an official flood warning issued by the National Weather Service. The warning tells when and where flooding is expected. Sometimes the warning predicts the height of the expected flood in feet above "flood stage." Someone in your local government is designated to receive the warning and take appropriate actions. It may be the city manager, the police chief, or your local emergency manager.

Slide A5. Flood warning siren

This person's first task is to warn people who may be in danger. There are many ways to do this. A siren, as shown here, is often used. A siren is effective if people know what it means and what to do when they hear it. Some communities rely on getting the message out by radio, or they send policemen with bullhorns to vulnerable neighborhoods. Sometimes, emergency responders go door-to-door warning people. Regardless of how the initial warning is delivered, it must be accompanied by information telling people what to expect, when, and what actions they need to take.

Slide A6. Cross section of floodplain

Warnings are not useful unless you have identified the areas subject to flooding-- usually low-lying areas adjacent to rivers and streams or other drainage channels. These areas are called floodplains. As shown on this cross section, a floodplain is composed of a channel defined by the banks of a stream; a floodway which carries the bulk of floodwaters, particularly the high velocity floodwaters; and a flood fringe which carries low velocity floodwaters that are not as deep as in the floodway.

Slide A7. Terms for flood frequency

The 100-year floodplain is the area that would be flooded by the 100-year flood. The 100-year floodplain is a conventional measure of flood vulnerability and is used by FEMA as the basis for requirements in the National Flood Insurance Program. The slide defines a 100-year flood and a 1% flood. The terms are two ways of saying exactly the same thing. The 100-year flood is a statistical approximation saying that over many, many centuries such a flood will occur on the average of once every 100 years. It has a 1% chance of being equaled or exceeded in any one year. Two points are important: 1) Floods much larger than the 100-year flood can and do occur, and 2) It is possible for a 100-year flood to occur two or three years in a row. It has the same probability of occurring each year.

Slide A8. Flood insurance map showing A, B, and C zones

FEMA provides flood-prone communities with maps showing the 100-year floodplain. The most commonly used maps are called Flood Insurance Rate Maps or FIRM's. This slide shows a FIRM. Zone A on the map is the 100-year floodplain. The numbers shown in Zone A are elevations above sea level. Zone B is the 500-year floodplain and Zone C is outside the 500-year floodplain. Interestingly, more than 30% of the flood insurance claims have been for damage to properties outside Zone A. Vulnerability to floods does not stop at the 100-year flood line or even the 500-year flood line. The map shows gradations in risk from flooding. Local officials must evaluate the information they receive about the severity of the approaching flood and decide what areas to evacuate.

Slide A9. Evacuating people, Elmira, New York

People are often in danger in homes and businesses located in low-lying areas, but may be reluctant to leave. Communities need a plan for evacuation before a flood strikes. The plan should identify the steps needed to evacuate those in danger and avoid desperate, last-minute attempts to help people to safety like you see here. These people are being evacuated by boat from downtown businesses in Elmira, New York long after the arrival of floodwaters. You may decide to exercise your community's emergency powers by ordering evacuation. People need to know safe routes to take and where they can go until the emergency has passed. You may need to assist the elderly, handicapped or other people with special needs. You also may be asked to provide some security for evacuated properties.

Slide A10. Flood-damaged vehicles

This shows cars and trucks swept up in a flood. When a flood is expected, it is very important to direct traffic to high and dry roads. About 90% of the people killed in flood disasters in the United States have been in cars swept away by floodwaters. It is easy to mistake both the depth and velocity of water on a road.

Slide A11. Sandbagging in downtown Salt Lake City

The first priority is always to ensure the safety of people, but with warning of a flood, it is often possible to protect property from flooding, too. This shows a street in downtown Salt Lake City before the flood in 1984. Sandbags line both sides of the street creating a channel for floodwaters to pass through the city. Thousands of people were mobilized within hours to place the sandbags overnight. The frantic effort saved many millions of dollars in property damage.

Slide A12. Moving furniture from a house

Here furniture is being moved from a house about to be flooded. Individuals and business can use warning time to move important records, furniture and other items to upper stories of buildings or to high ground. Local government can prepare the Emergency Operations Center or relocate it if, like so many, it is in a basement subject to flooding. Anything that can be done to prevent damage will make your life easier in the days, weeks, and months after the flood.

Slide A13. Now begin Task A.

Now turn to the instructions for Task A in your packet. Take time to read the steps before you begin. Please ask for help, if you need it. You have 30 minutes to decide how to respond to this morning's flood warning.

Reminder to Facilitator: Be sure to set the timer for 30 minutes.

INSTRUCTIONS -- TASK A. WARNING AND EVACUATION

(Time to complete the task: 30 minutes)

Purpose

Anticipate the impacts of a 100-year flood on your community and determine appropriate actions to respond to a flood warning.

Materials

- o Base map of the community showing parcels, roads, bridges, major facilities, and topography, if available.
- o The most recent maps issued by the Federal Emergency Management Agency (FEMA) for the National Flood Insurance Program (NFIP). Most communities have Flood Insurance Rate Maps (FIRM's); however, some communities still use earlier maps called Flood Hazard Boundary Maps (FHBM's). In this exercise, NFIP maps are called FIRM's.
- o *Handout A. Actions to Respond to a Flood Warning*

Steps

1. Transfer the boundaries of the 100-year floodplain from your FIRM to the base map using a solid line (**yellow**). If your FIRM shows the floodway, transfer those boundaries to the base map using a dotted line (**yellow**).
2. Assume you have just received a warning from the National Weather Service that the stream passing through your community is expected to reach flood stage at 9:30 a.m. List on *Handout A* the actions you will take to protect people and property.
3. On the base map, outline the road and bridges you will blockade (**orange**) and the areas you will evacuate, including those that you think will be flooded and those that will lose access (**brown**).
4. How well prepared are you to respond to a flood warning? Discuss any problems you uncovered in your system for responding to a flood warning, and on *Handout 4. Recommended Actions*, list actions you can take now to improve the system.

Products

- o Base map showing: 1) boundaries of the floodway and 100-year floodplain, 2) roads and bridges closed, and 3) areas evacuated
- o Completed *Handout A. Actions in Response to Flood Warning*
- o Entries on *Handout 4. Recommended Actions*

Handout A

ACTIONS IN RESPONSE TO FLOOD WARNING

Who receives the warning and has responsibility to act?

What areas will you warn and how? How will you warn those with special needs (handicapped, elderly, etc.)?

What areas will you evacuate? How long do you think it will take?

Where will you send the evacuated people? What routes will you designate?

What actions will you take to protect property from flood damage?

SCRIPT -- TASK B. EMERGENCY SHELTER
(You have 5 minutes to read the script.)

Slide B1. Task B. Emergency Shelter

Task B is to estimate shelter needs and identify safe buildings and locations for shelters. Emergency shelters address the immediate and pressing human needs for food, shelter, and care for people who have been evacuated from their homes.

Slide B2. Red Cross disaster services center tent

The Red Cross is responsible under Congressional charter for setting up and managing emergency shelters. This shows a Red Cross disaster services center tent. The Red Cross mobilizes quickly and is typically on the scene before the flood hits.

Slide B3. Emergency shelter, Santa Cruz, California

Here you see the inside of an emergency shelter in a community center. Shelter locations are usually predetermined; schools, churches, armories, and other public buildings can be used, but schools are the most common. If shelter costs are to be reimbursed by FEMA, Red Cross must approve shelter sites before they are opened.

Slide B4. People entering emergency shelter in Elmira, New York

These people are entering an emergency shelter in a high school in Elmira, New York during the 1972 flood. As you can see, rain is still falling and floodwaters are perilously close to the building. The shelter may have to be abandoned and the people evacuated a second time. It is important to select shelter sites that are safe from flooding and other hazards. Also, note the dog headed for the shelter with its owner. Pets are not permitted in Red Cross shelters, and local officials are often called on to provide shelter for pets as well as people.

Slide B5. RV in front yard

Not all displaced people use shelters. Lower-income people and people without family or social ties in the community are most likely to need shelter. According to the Red Cross, about 25% of the people displaced by any disaster (including floods) seek public shelter. The rest find shelter with family or friends or make other arrangements. This shows an RV placed in the front yard of a flooded property for shelter. Motels can also be an important source of emergency shelter. Red Cross can issue vouchers, ultimately paid for by FEMA, for short stays in motels.

Slide B6. Now begin Task B.

Now turn to the instructions for Task B. You have 15 minutes to define the need for emergency shelters and decide which ones to open.

Reminder to Facilitator: Be sure to set the timer for 15 minutes.

INSTRUCTIONS -- TASK B. EMERGENCY SHELTER
(Time to complete the task: 15 minutes)

Purpose

Determine emergency shelter needs and how to meet them.

Materials

- o Base map with information from Task A
- o Emergency response plan

Steps

1. Look at the evacuated areas on the base map and estimate how many housing units have been evacuated and how many people are without shelter (number of households X persons per household). On the average, about 25% of people displaced by a disaster seek public shelter. From the information provided in the script and your knowledge of your community, decide what percentage of the evacuees will need emergency shelter and enter the number of people below.

Number of people needing emergency shelter: _____

2. Decide how many shelters to open to accommodate those in need, using the best information you have about shelter capacities. Then choose which shelters to open, making sure that you select ones that are outside the floodplain, accessible in times of flooding, and safe from other hazards. Outline the selected sites on the base map (**green**).
3. Discuss any problems you identified in your planning for emergency shelter, and on *Handout 4. Recommended Actions*, list actions you can take now to improve your ability to shelter displaced people.

Products

- o Base map showing location of emergency shelters you have opened
- o Entries on *Handout 4. Recommended Actions*

SCRIPT -- TASK C. DAMAGE SCENARIO
(You have 15 minutes to read the script.)

Slide C1. Task C. Damage Scenario

The flood warning proved warranted. A 100-year flood has struck your community. Along the _____ (river or stream), water, mud, and debris are everywhere. Debris blocks the passage of floodwaters through culverts and under bridges and areas thought to be out of harm's way are flooded. Some bridges are out and at least one flood control structure has failed (if there are flood control structures on the stream). Many residences and commercial and industrial buildings are heavily damaged. Several public buildings can no longer be used. Buildings constructed before _____ entered the National Flood Insurance Program in 19__ fared poorly.

The rest of this script presents information about the types of flooding and the areas and buildings most vulnerable to flood damage. This is to help you decide how a large flood would impact your community and where the damage will be located.

Slide C2. Rivers converging at Pittsburgh, Pennsylvania

Here is the confluence of the Allegheny and Monongahela rivers at downtown Pittsburgh, Pennsylvania. They join here to form the Ohio River. It's hard to believe looking at this peaceful scene that these rivers can become raging torrents.

Slide C3. Same scene with rivers flooding

Here is the same scene with the rivers on the rampage. Over 22,000 communities in the United States are subject to flooding from rivers and streams. Year in and year out, floods cost the federal government more money in disaster assistance than all other types of disasters put together. Flooding in the Mississippi River system in 1993 caused almost \$20 billion in damage. Riverine flooding is a serious problem throughout the nation.

Slide C4. Chemung River flooding in Elmira, New York

Riverine flooding has many faces. This shows the Chemung River flooding in Elmira, New York in 1972. River flooding is most often caused by too much rain falling over a prolonged period of time. The stream channels cannot contain the runoff and overflow their banks. Flooding occurs in areas adjacent to the streams.

Slide C5. Flash flood in Buffalo Creek, West Virginia

Some floods are flash floods. This shows damage from a flash flood which struck Buffalo Creek in West Virginia. Flash flooding is a very dangerous form of riverine flooding. It typically occurs following intense rain over a short time in a small watershed. The flooding often comes unannounced and the floodwaters are fast-moving and destructive.

Slide C6. Failed dam in Rocky Mountain National Park

Flash flooding can also occur because of the failure of a dam or other water retention structure. Here you see the Lawn Lake Dam which broke in Rocky Mountain National Park. The resulting flood struck the town of Estes Park, Colorado, causing extensive damage.

Slide C7. Floodwater channel in mountainside, Rocky Mountain National Park

This shows the channel scoured by water surging down the mountain following the dam break. The channel, shown here years after the dam failure, is still completely denuded of trees, underbrush, and soil. Inundation maps showing the areas that would be flooded if a dam totally fails with a reservoir at full capacity have been prepared for all "high-hazard" federal dams.

Slide C8. Ice-covered river at Oil City, Pennsylvania

Flooding can be caused by ice jams breaking up in the spring or on warm winter days. Here you see the ice-covered Allegheny River at Oil City, Pennsylvania. As the ice begins to thaw, it breaks into large blocks which begin to tumble downstream and can jam the river channel at natural bends, bridges, culverts, and other constricted areas.

Slide C9. House damaged by ice in Peoria, Illinois

This shows a house in Peoria, Illinois damaged by ice carried in the floodwaters on the Illinois River.

Slide C10. Alluvial fan adjacent to the Colorado River

Flooding can be particularly severe on alluvial fans--fan-shaped, areas formed by streams at the base of mountains or the mouths of ravines where the water abruptly loses speed, spreads out, and deposits sediment. This shows an alluvial fan on the California side of the Colorado River below Lake Havasu.

Slide C11. Factors contributing to flood damage

Factors that determine how damaging a flood will be include its depth, velocity, duration, amount and kind of debris, the integrity of flood control structures, land uses in the watershed and floodplain, and the quality of building construction. The first three factors are primarily a function of the characteristics of the storm. Other things being equal, deep water, fast moving water, and water that stays for a long time cause extra damage.

Slide C12. Debris in floodwaters, West Virginia

The kind and amount of debris in flood waters is a critical damage factor. Here you see the impact of debris carried by floodwaters in West Virginia. Water-borne debris--trees, cars, parts of buildings--acts as battering rams, capable of demolishing bridges, levees, and buildings. Debris can dam up culverts and other restricted areas in a stream channel causing overflows to be deeper and more extensive than predicted on flood hazard maps. When hydrologists map 100-year floodplains for FEMA, they consider only clear-water flooding; however, floodwaters are rarely free of debris.

Slide C13. Broken floodgate, Folsom Dam

The integrity of flood control structures is also a critical damage factor. This is a 1995 photo of a broken floodgate at Folsom Dam above Sacramento, California. People in the highly urbanized area downstream were lucky--the dam did not fail completely and little damage was done. However, damage can be very severe when structures designed to prevent flooding fail or are overtopped by floods larger than they were designed to handle. The FIRM's are drawn assuming that flood control structures will work as intended. This is not always the case. During the 1993 Midwest floods, over 1,000 of the 1,500 levees along the upper Mississippi River and lower Missouri River broke or were overtopped. About one-third of damaging floods in the United States involve the failure or overtopping of a levee or floodwall intended to protect a community from flooding.

Slide C14. New houses behind a dike along the Sacramento River

Another problem with flood control structures is shown here. This man is standing on a dike along the Sacramento River. He lives in one of the new homes, shown on the right, that were built after the dike was constructed. The homes are in a frequently-flooded basin totally surrounded by rivers and, now, dikes. With the dikes in place, these houses and a 17,000-seat sports arena were built and developers are proposing to built another 33,000 houses in the basin. Property and lives are now at risk in this previously undeveloped floodplain. Another homeowner in this area, a city council woman, recognizes the inherent risk by storing a rowboat on her roof.

Slide C15. Watershed development, Laguna Beach, California

This shows a developed hillside in southern California. Watershed development can increase the frequency and height of floods. Paved surfaces prevent the soil from absorbing rainfall, thus increasing runoff. The runoff is collected in storm drains and storm channels and sped to streams and rivers, contributing to flood flows. Sometimes, existing storm drains are too small to handle the runoff from new development causing backups and local flooding.

Slide C16. Structures in the floodway, Guerneville, California

Some buildings and facilities are particularly prone to flood damage because of their locations, construction, or function. Buildings located in the floodway, such as these houses on the Russian River in northern California, are flooded frequently. Structures like these in the floodplain, particularly in the floodway, can also raise the height of floodwaters by reducing the carrying capacity of the floodway. They can also redirect floodwaters to areas that might otherwise be out of danger.

Slide C17. Pre-FIRM building

"Older" buildings like this one, called pre-FIRM buildings, are those constructed before the community entered the National Flood Insurance Program usually sometime in the 1970's. As a condition for entering the program, the city had to adopt floodplain regulations requiring new residential buildings in the 100-year floodplain to be elevated to or above the level of the 100-year flood. New commercial buildings must be either elevated or floodproofed. Buildings constructed before the city adopted such regulations are usually more vulnerable to flood damage.

Slide C18. Elevated houses in floodplain

This shows buildings in the floodplain. The two houses at the bottom of the slide are constructed on fill and the gray house across the road from them is elevated. Access to the elevated houses is lost, but people in the houses and their contents appear secure. Elevated buildings like these are obviously less vulnerable to flooding than non-elevated structures.

Slide C19. Damaged mobilehome in Estes Park, Colorado

Mobilehomes are particularly vulnerable to flood damage. The force of the water can knock them off their supports or foundations and toss them about like toys. This mobilehome in Estes Park, Colorado was destroyed by a flash flood in 1982.

Slide C20. Scenic river road in northern California

Scenic roads like this one in northern California, as well as busy interstate highways, often follow the course of rivers and streams. Floodwaters can overrun the roads, wash out sections, and leave them impassable for days and weeks after a flood.

Slide C21. Submerged bridge

Bridges are a critical lifeline in many cities tying two parts of a community together or providing an essential link to the outside world. This shows a bridge in the Midwest submerged by flooding in 1979. People living in the houses in the background are now cut off from the other side of the river.

Slide C22. Sewage treatment plant during flood

Water and sewage systems are especially vulnerable to flood damage. This shows a sewage treatment plant which just escaped flooding because it is elevated on fill. Treated sewage is typically discharged into the nearest body of water. This means that treatment plants are usually located in floodplains next to rivers or streams. Damage to the plants often means that untreated sewage is discharged into the floodwaters leading to potential health hazards and pollution problems.

Slide C23. Water pumping station in Hull, Illinois

Other utilities are also vulnerable to flood damage. This shows a water pumping station in Hull, Illinois, protected by sandbags from flooding in 1993. Without the emergency sandbagging, the community would have been without water.

Slide C24. Unlabeled drum on Mississippi River

Floodwaters and hazardous materials don't mix well. This shows an unlabeled drum floating down the Mississippi River near Hannibal, Missouri. The dilemma for emergency responders in situations like this is deciding what to do. The drum could carry explosive or toxic materials, posing an additional danger to riverside communities already faced with flooding. All tanks and drums holding hazardous materials must be labeled and tied down.

Slide C25. Now begin Task C.

Now it's time to begin Task C and create your own flood damage scenario. You have 45 minutes to complete this task.

Reminder to Facilitator: Be sure to set the timer for 45 minutes.

INSTRUCTIONS -- TASK C. DAMAGE SCENARIO

(Time to complete the task: 45 minutes)

Purpose

Identify the significant impacts of the flood, using judgment and the best information available to you.

Materials

- o Base map showing information from Tasks A and B
- o Information on the effects of previous floods in your community

Steps

1. Identify at least one culvert or bridge where debris has piled up obstructing the passage of floodwaters. Also, identify at least one flood control structure that has failed (if there are any on the stream). This could be a berm, levee, floodwall, dam, or channel modifications. Then, draw the boundaries of the area actually flooded considering the failed flood control structure(s), clogged culvert(s), and low-lying areas with drainage problems (**blue**).
2. Outline flood damage on the base map as follows:
 - a) all flooded areas with a concentration of unelevated or non-flood-proofed buildings in the floodplain (**orange**).
 - b) major facilities, such as hospitals, schools, emergency operations centers, police and fire stations, and other government buildings that have at least temporarily lost access or function (**purple**).
 - c) bridges, roads, and other transportation facilities which have been washed out by the flood (**red**).
 - d) utilities including water and sewage treatment facilities and pipelines, power substations, and gas and electric distribution lines damaged in the flood (**black**).
3. Review your evacuation areas and redraw the boundaries if needed (**brown**). Estimate how many additional people will need emergency shelter: _____. On the base map, show any additional emergency shelters that will be opened (**green**).
4. Could any of this damage have been avoided? On *Handout 4. Recommended Actions*, list actions you can take now to avert damage in future floods.

Products

- o Base map showing the major impacts of the flood
- o Entries on *Handout 4. Recommended Actions*

SCRIPT -- TASK D. REROUTING TRAFFIC
(You have 5 minutes to read the script.)

Slide D1. Task D. Rerouting Traffic

In Task D you decide how to manage the flow of traffic to compensate for washed-out bridges and roads.

Slide D2. Washed-out bridge in Puerto Rico

The loss of bridges and roads severely hampers a community's return to normal functioning after a damaging flood. Here is a bridge washed out in Puerto Rico in 1985. Its loss prevented travel on the major east-west highway in Puerto Rico, forcing long detours. Most flood damaged bridges and roads can be quickly patched up and reopened, but a major bridge or highway can take months, even years, to replace. In the meantime, alternate routes must be found.

Slide D3. Traffic control at a washed-out road

The first task in managing traffic flow is to prevent travel on unsafe roads or bridges. This shows a barricade alerting drivers that the road is impassable. Local officials may need to close low-lying roads and vulnerable bridges when a flood warning has been received. Control of traffic continues during the flood and on into the recovery period.

Slide D4. Map of emergency traffic routes, Salt Lake City

Once the flood has passed, the emphasis shifts to adjusting traffic patterns to the fact of washed out roads and bridges. New routes around the damaged sections need to be selected and designated so that drivers know what to do. This is a map designating emergency traffic routes through Salt Lake City during the 1984 flood. As you will recall, the city used a main street through town as a channel for floodwaters. Traffic was diverted to either side of the flooded street, as shown here.

Slide D5. Detour graded around washed-out road

As we see here, traffic patterns can sometimes be restored temporarily pending permanent repairs. Sometimes detours can be quickly graded around washed out portions of roads.

Slide D6. Temporary "Bailey" bridge

Sometimes temporary bridges can be installed. This temporary "Bailey" bridge was quickly erected by the U.S. Army Corps of Engineers to replace a washed-out bridge over the Carmel River after northern California floods of March 1995. This one-way bridge permitted traffic flow across the river until a permanent bridge could be built. It can take many months to design and construct new bridges and major highways.

Slide D7. Railroad cars used as temporary bridge

One interesting way to provide a temporary bridge is to use railroad cars. This clipping tells of using 12 flatbed railroad cars welded together to form a temporary bridge in California's Central Valley. Flooding in March 1995 washed out the bridge on Interstate 5 crossing Pasajaro Creek. With the temporary bridge in place, travel resumed less than a week after the flood on Interstate 5--California's most heavily-traveled north-south truck route. Permanent replacement is expected to take at least six months.

Slide D8. Boat used for access

Another temporary way to ease the impact of a lost bridge or highway is to use boats. The only way to get to this house is by boat. Ferries can be used to carry people across rivers where bridges have been washed away.

Slide D9. Now begin Task D.

Now, turn to the instructions for Task D. Your primary tool is the base map. You have 15 minutes to complete this task.

Reminder to Facilitator: Be sure to set the timer for 15 minutes.

INSTRUCTIONS -- TASK D. REROUTING TRAFFIC
(Time to complete the task: 15 minutes)

Purpose

Reroute traffic to provide temporary access to areas of the community cutoff by washed-out bridges or roads.

Materials

- o Base map with information from Tasks A-C

Steps

1. On the base map, review the roads and bridges lost in the flood and areas evacuated because of loss of access. Mark where roadblocks will be needed and draw in detours (**green**).
2. Note below other possible ways, such as ferries, temporary bridges, etc., to restore access to the areas you have identified. Consider the impacts of the flood on other means of transportation including rail, boat and airplane:

3. What problems rerouting traffic and providing access do you foresee? Could any be averted by planning ahead? On *Handout 4. Recommended Actions*, list actions that might be taken now to avoid the problems identified.

Products

- o Base map marked to show alternative traffic routes
- o List of actions to overcome access problems
- o Entries on *Handout 4. Recommended Actions*

SCRIPT -- TASK E. RESTORING SERVICES

(You have 5 minutes to read the script.)

Slide E1. Task E. Restoring Services

The ability to deliver essential services to people is often destroyed by a flood. Quick restoration is essential to protect public health and safety. Task E is to identify areas without services and determine how to restore services quickly.

Slide E2. Severed utility lines to house in Farmington, Utah

Utility systems are particularly vulnerable to flood damage. This shows a house in Farmington, Utah flooded in 1982. All the underground utility lines serving the house - water, sewer, gas and electric have been severed. A debris blockage diverted floodwaters to the road. The road was undermined and collapsed, destroying the buried utility lines.

Slide E3. Flooded electric power substation, Keithsburg, Illinois

Areas without essential services need to be identified quickly to plan for meeting the needs. This electric power substation in Keithsburg, Illinois was flooded in the Midwest floods of 1993. Residences and businesses in Keithsburg lost power as a result.

Slide E4. Temporary above-ground water connection in Inverness, California

Floods and mudslides in the small Tomales Bay community of Inverness in northern California destroyed the water pipes feeding water from a spring into the distribution system. This shows a temporary above-ground water line which restored water service to residents and businesses. In areas left without water, the Red Cross can arrange for water to be trucked in. If it appears that repairs to the system will take weeks or months, a temporary, above-ground distribution system like this one makes sense.

Slide E5. Damaged city hall/EOC, Hull, Illinois

The loss of other public facilities also brings the need for immediate adjustments. This shows the city hall, containing the EOC, in Hull, Illinois damaged in the 1993 Midwest floods. The man is standing in front of the Post Office, next door to City Hall, pointing out the high water mark on the building. Obviously emergency response operations needed to be based somewhere else during the flood.

Slide E6. Sandbagged school

This shows a school flooded in the Midwest floods of 1993 in spite of community efforts to protect it with sandbags. Damage to school buildings is particularly difficult for a community. Schools are often needed for emergency shelter. Also, after the flood has passed, the ability to resume normal school hours and activities is a crucial step in restoring a sense of normality to family and community life after the trauma of the disaster.

Slide E7. Now begin Task E.

You have 15 minutes to decide how to handle service disruptions caused by this morning's flood.

Reminder to Facilitator: Be sure to set the timer for 15 minutes.

INSTRUCTIONS -- TASK E. RESTORING SERVICES

(Time to complete the task: 15 minutes)

Purpose

Make plans to temporarily restore essential utilities and public services until permanent repairs to the flooded facilities are completed.

Materials

- o Base map with information from Tasks A-D

Steps

1. On the base map, review the information you have added showing flooded utility facilities and lines and public facilities. Outline areas that would be affected by service disruptions, especially water and sewer (**red**).
2. In the space provided below, note the key actions you will take to restore utilities and public services until permanent repairs can be completed.

3. What problems do you foresee in restoring vital utilities and public services to the community? *On Handout 4. Recommended Actions*, list actions that might be taken now to avoid the problems identified.

Products

- o Base map marked to show areas with disrupted utility service
- o List of actions to restore essential utilities and public services
- o Entries on *Handout 4. Recommended Actions*

Instructions -- Task E

SCRIPT -- TASK F. DAMAGE ASSESSMENT
(You have 5 minutes to read the script.)

Slide F1. Task F. Damage Assessment

Task F is to assess the flood damage. This task fine tunes the damage scenario completed in Task C, looking beyond areas to individual buildings. After a real flood, your state emergency management office will want detailed damage assessments of flooded facilities to determine what disaster assistance your jurisdiction will be eligible for. You also need this information to determine needs for recovery and rebuilding.

Slide F2. Helicopter used to assess damage, Thistle, Utah

This helicopter is being used for the initial assessment of damage from the flood which engulfed Thistle, Utah in 1983. The town was totally inaccessible except by air. This initial assessment is often done as a "windshield" survey by the Red Cross, police chief or other local officials. The purposes are to grasp the overall magnitude of the damage, identify situations requiring immediate emergency response, and begin to assess recovery needs. It is followed by a more formal "preliminary damage assessment" to estimate numbers of flooded buildings and the dollar value of the damage. Information from the preliminary damage assessment is forwarded to the state and possibly to the federal government as the basis for a disaster declaration.

Slide F3. Building with red tag in Albany, Georgia

The assessment of individual structures results in the posting of all inspected buildings, usually with a red, yellow, or green tag. Here you see a flood-damaged building in Albany, Georgia with a red tag just beneath the eave on the righthand door. This means "unsafe, do not enter or occupy." A yellow tag means "limited entry, off limits to unauthorized personnel." A green tag means "inspected, no restriction on use or occupancy." When in doubt, it is wise to err on the side of safety by using a red tag. It can be changed later to yellow or green based on more careful evaluation.

Slide F4. Classifying flood damage to buildings

This list shows information you need to collect about each flooded building--use or occupancy, location with respect to the floodway and 100-year floodplain, percent damage, historic status. In assessing damage, it is important to classify flooded buildings according to their use and occupancy so you can anticipate the recovery needs of displaced residents, businesses, and public services. Also, building use is important because the flood insurance program has different requirements for residential structures than for other buildings. Let's look at the reasons for the other items on the list.

Slide F5. Houses flooded in Thistle, Utah

First, all flooded buildings need to be assessed, whether or not they are in the 100-year floodplain. This shows houses damaged by a flood in Thistle, Utah caused by a landslide which blocked the river, creating a lake where before there was a town. In a world that operated according to statistical models, these buildings would not be flooded. They are outside the 100-year floodplain. However, more than 30% of claims for flood insurance are for damage to properties located beyond the 100-year floodplain. This is because no flood is exactly like the model 100-year flood chosen as the basis for flood disaster planning and mitigation.

Slide F6. Building in 100-year floodplain

This is a building in a 100-year floodplain. Damaged properties in the 100-year floodplain, as shown on maps issued by FEMA, come under the requirements of the National Flood Insurance Program. As a participant in the program, your community has a floodplain management ordinance specifying conditions for the repair and reconstruction of flood-damaged buildings in the 100-year floodplain.

Slide F7. Building with more than 50% damage

Here is a flooded house with damage obviously exceeding 50% of its market value. Under FEMA's minimum requirements for local floodplain management ordinances, buildings like this can be repaired only if they are brought up to full code compliance including elevation to or above the 100-year flood level.

Slide F8. Categories for percent damage

Many communities use three categories in assessing percent damage, as shown here-- up to 40%, 40% to 60%, and more than 60%. The middle group (40%-60%) brackets the buildings which might have 50% or more damage. Making this determination is strictly a local responsibility under the National Flood Insurance Program. Often real estate appraisers are needed to assist with this difficult and politically-sensitive task.

Slide F9. Flood-damaged historic building

This shows an historic building damaged in the 1993 Midwest floods. Procedures for handling damaged historic buildings are more complex than for non-historic structures. Local governments are constrained by both federal and state regulations from permitting the demolition of historic buildings after disasters. So, it is important to identify historic buildings in the damage assessment.

Slide F 10. FEMA GPS system for damage assessment

FEMA is beginning to apply a new "high-tech" way to assess damage quickly after a natural disaster. Using a global positioning system (GPS) giving latitude and longitude combined with digital photos, FEMA is able to accurately locate flooded areas and damaged structures. In the 1994 floods in Atlanta, Georgia, FEMA provided the city with a data file of 5,000 flooded buildings two weeks or so after the flood. This shows a similar product developed following the 1993 Midwest floods.

Slide F11. Now begin Task F.

Please turn to the instructions for Task F to conduct your own damage assessment. You will also find *Handout F*--a table to record the information. You have 25 minutes to complete this task.

Reminder to Facilitator: Be sure to set the timer for 25 minutes.

INSTRUCTIONS -- TASK F. DAMAGE ASSESSMENT

(Time to complete the task: 25 minutes)

Purpose

Determine the extent of damage and number of damaged buildings.

Materials

- o Base map with information from Tasks A-E
- o Existing land use map or land use plan
- o Lists of historic buildings
- o *Handout F. Damage Assessment*

Steps

1. Based on information you have recorded on the base map and your knowledge of the community's building stock, fill out *Handout F. Damage Assessment* as follows:
 - a) In column 1, enter your estimate of the total number of flood-damaged buildings in each land use category.
 - b) In column 2, enter your estimate of the number of flood-damaged buildings in each land use category that are located in the 100-year floodplain.
 - c) In column 3, enter your estimate of the number of flood-damaged buildings in each land use category with damage amounting to 50% or more of their pre-flood market value. As a rule of thumb, consider that at least 10% of the damaged buildings in the 100-year floodplain will have 50% or more damage. Buildings constructed before about 1975 (or whenever your community entered the NFIP) are most vulnerable.
 - d) In column 4, enter your estimate of the number of flood-damaged historic buildings in each land use category.
 - e) Estimate the number of building inspectors you will need to complete the damage assessment in 3 to 5 days. Enter the number on *Handout F*.
2. On the base map, outline in **blue** parcels with buildings damaged 50% or more. Place an **orange "H"** on parcels with damaged historic buildings.
3. Could you be better prepared to conduct a post-flood damage assessment? On *Handout 4. Recommended Actions*, list actions that might be taken now to make this task easier after a flood.

Products

- o Base map showing buildings damaged 50% or more and damaged historic buildings
- o Completed *Handout F. Damage Assessment*
- o Entries on *Handout 4. Recommended Actions*

Handout F

DAMAGE ASSESSMENT

	1 # Damaged buildings	2 In 100-year floodplain	3 50% + damage	4 Historic
Residential				
Commercial				
Industrial				
Public				
Totals				

Number of building inspectors needed to complete assessment in 3-5 days:

SCRIPT -- TASK G. TEMPORARY BUSINESS LOCATIONS
(You have 5 minutes to read the script.)

Slide G1. Task G. Temporary Business Locations

In Task G, you will select facilities and sites for temporary business locations. Businesses that cannot open their doors soon after a flood usually fail, losing clients to competing businesses--often in other jurisdictions. Quickly providing a place where displaced businesses can set up shop can help prevent business failures and allow businesses to provide necessary goods and services to the community during recovery.

Slide G2. Flooded retail street in Georgia

Not all damaged businesses will need new locations. Many, like these stores flooded in Georgia in 1994, will be able to clean up and reopen quickly, if only on the sidewalk. Local government can help this process by quickly removing mud and debris so that commercial streets can be opened.

Slide G3. Flooded businesses along the Russian River, Guerneville, California

If you look closely you will see the tops of a sign and light standards belonging to a gas station in Guerneville, California during the January 1995 flood on the Russian River. This commercial area is in obvious trouble.

Slide G4. Businesses operating from trailer in Guerneville, California

Here is the same location a month later. The owner installed a temporary building to house the gas station, deli and mini-market and was back in business about two weeks after the flood. Workers are replacing floors, wallboard, and wiring in the flooded building shown on the right and the owners expect to reoccupy it in another month.

Slide G5. Flood sale in Guerneville, California

Here we see a parking lot, also in Guerneville, being used by local merchants as a makeshift outdoor market. Sometimes a community has vacant commercial space or land that can be used temporarily for displaced businesses. Cities can work with local business associations and property owners to identify sites that might be used temporarily by displaced businesses.

Slide G6. Portable janitor in Montpelier, Vermont

You also may need to provide space for businesses coming into the community to help with recovery. This is a "portable janitor" set up in a park in Montpelier, Vermont in 1992 to help people clean up after a flood.

Slide G7. Napa Auto Parts, Guerneville, California

Outlets that are part of a chain have resources for recovery not available to independent, local businesses. This shows a Napa Auto Parts store in Guerneville, California set up for business in a temporary building with a trailer to store inventory. This outlet can draw on resources from its parent company and is likely to recover more quickly than local stores. After a flood, residents receive help from a variety of sources including the Red Cross and FEMA, but local businesses are basically left on their own to recover. Cities can help most by effectively managing overall recovery and working cooperatively with local businesses.

Slide G8. Criteria for temporary business locations

Good temporary business locations are vacant, accessible and safe from further flood damage. They should be close to the damaged commercial district to encourage retention of patrons. The facilities or sites should be readily provided with utilities and parking. If private property is used, it is best if it is planned and zoned for commercial uses.

Slide G9. Now begin Task G.

The instruction page for Task G tells you how to find temporary business locations. You have 15 minutes to complete the task.

Reminder to Facilitator: Be sure to set the timer for 15 minutes.

INSTRUCTIONS -- TASK G. TEMPORARY BUSINESS LOCATIONS
(Time to complete this task: 15 minutes)

Purpose

Provide sites and facilities for business operations until damaged commercial buildings can be repaired or replaced.

Materials

- o *Handout F. Damage Assessment*
- o Base map with information from Tasks A-F
- o Community plan, redevelopment or downtown plan
- o Zoning map

Steps

1. Assume that several small businesses have been flooded and the buildings cannot be immediately reoccupied after the flood. Select vacant facilities suitable as temporary business locations, if available. Also select suitable sites for temporary commercial structures. Look for vacant and available sites that are accessible and close to the pre-flood location of displaced businesses. The sites should have utilities available, and plenty of parking. Outline the facilities and sites in **brown** on the base map.
2. Could the businesses in your community be better prepared to survive a flood? On *Handout 4. Recommended Actions*, list actions that the community might take now to improve post-flood business survival.

Products

- o Base map showing facilities and sites selected for temporary business locations
- o Entries on *Handout 4. Recommended Actions*

SCRIPT -- TASK H. TEMPORARY HOUSING
(You have 5 minutes to read the script)

Slide H1. Task H. Temporary Housing

In Task H, you estimate the need for temporary housing and identify resources, including sites for temporary housing, to meet the need. Temporary housing bridges the gap between the time emergency shelters close and people are able to find long-term housing. It is important to help keep that gap as short as possible for as many people as possible.

Slide H2. Bucket brigade in Utah

After a flood, the first step is to help as many people as possible return to their homes quickly. This means doing many of the things noted earlier--removing mud and debris from streets, providing access, and restoring utility services. Community efforts can help people get back into their homes. Here we see a bucket brigade bailing out a flooded basement of a house in Utah.

Slide H3. Person bailing out his house

This man in Cheyenne, Wyoming is bailing out his house on his own. In many cases, cleanup is all that is needed for a family to reoccupy a flooded house or apartment. Local officials can help by providing information about how to dry and clean water-soaked and muddy wallboard, flooring, carpeting, appliances, and other household possessions.

Slide H4. Vacancy sign

Vacant apartments, like this one, and hotel or motel rooms can serve as temporary housing for people who cannot move quickly back into their flooded residences. Housing vouchers are sometimes issued by HUD to help families pay the rent for this kind of temporary housing.

Slide H5. People applying for housing assistance at a DAC

In some cases, you may have no alternative but to provide temporary housing structures. Generally, low-income households have the greatest and longest need for temporary housing. This shows people applying for housing and other assistance at a Disaster Assistance Center.

Slide H6. FEMA trailers

This is a FEMA trailer. FEMA considers trailers a last resort and makes them available sparingly. The agency prefers that they be placed on the individual flooded properties, but sometimes this is not possible. You may need to create a temporary housing development using trailers, RV's, prefab housing, or some other easily erected structures. Once the infrastructure for housing is in place, such property typically continues to be used for similar housing after the temporary housing has been removed.

Slide H7. Criteria for temporary housing sites

Good temporary housing sites are vacant, accessible, and safe. They can be easily provided with utilities. If possible, they should be close to public services and the former neighborhoods of those being housed. Available public land is often used giving public control over reuse of the property when housing is removed. If private land is used, it should be planned and zoned for housing.

Slide H8. Now begin Task H.

In the next 15 minutes, you are to estimate the need and select locations for temporary housing. Please turn to the instructions for Task H.

Reminder to Facilitator: Be sure to set the timer for 15 minutes.

INSTRUCTIONS -- TASK H. TEMPORARY HOUSING

(Time to complete the task: 15 minutes)

Purpose

Help people find housing after the emergency shelters have closed and before damaged housing is repaired or replaced.

Materials

- o Number of people needing emergency shelter from Task B
- o Base map with information from Tasks A-G
- o *Handout F. Damage Assessment*
- o Community plan and zoning map

Steps

1. Review *Handout F. Damage Assessment* and your estimate of shelter population from Task B. From this information and your general knowledge of the income, ethnicity, age, and special needs of the community's population, estimate the number of households needing temporary housing. As a rule of thumb, you can assume that about 10 percent of the shelter population will need assistance with temporary housing (divide by average number of persons per household to get number of units).
2. Identify on the base map apartment buildings, hotels, and motels which were not flooded and are likely to have vacant units which could be used to meet part of the need for temporary housing (**yellow**).
3. Select sites with suitable infrastructure to be used for trailers or prefab housing, considering that the selected sites could continue to be used for housing after the need for temporary housing has passed. Outline the selected temporary housing sites in **yellow** on the base map.
4. Does your community have adequate housing programs now which could be used to aid flood victims? On *Handout 4. Recommended Actions*, list actions that the community might take now to help people bridge the gap between emergency shelters and permanent rehousing.

Products

- o Base map showing sites selected for temporary housing
- o Entries on *Handout 4. Recommended Actions*

SCRIPT -- TASK I. POLICIES FOR DAMAGED BUILDINGS
(You have 5 minutes to read this script.)

Slide I 1. Task I. Policies for Damaged Buildings

In Task I you apply policies in your local floodplain management ordinance to determine the fate of flood-damaged buildings. FEMA establishes minimum policies which must be incorporated in local ordinances as a condition for participation of the community in the National Flood Insurance Program. This script describes those policies.

Slide I2. Broken levee, Midwest

Here we see a levee broken in the 1993 Midwest floods. Until decisions are made about rebuilding the levees, property owners cannot make informed decisions about damaged buildings. An important policy question at this point is, "Is public money better spent relocating vulnerable uses out of the floodplain or reconstructing levees or other flood protection works?" In some cases, you may need to defer decisions about buildings until the fate of flood protection structures is decided.

Slide I3. Options for flood-damaged buildings

This slide lists the policy options a community has when faced with flood-damaged buildings. Buildings may be removed from the floodplain, that is, demolished or physically relocated; repaired with or without additional flood protection such as elevation or floodproofing; rebuilt on the same site meeting standards in the current building code and floodplain management ordinance. The choices depend on the amount of damage, the location of the building, and the preferences of the community and building owners.

Slide I4. Building in the floodway, Old Woman's Bend, Michigan

This shows a building in Old Woman's Bend, Michigan constructed in the floodway. It was severely damaged in a flood in 1986. Building owners often want to repair and reoccupy such buildings; however, under minimum local floodplain management regulations, buildings that cause an increase in flood elevations may not be constructed in the floodway. This floodway building is an obvious candidate for removal.

Slide I5. House being moved

This house is being moved to a new location outside the floodplain. Removal or elevation are the two options for houses damaged more than 50%. It may be less expensive to move a building than to elevate it or try to control the source of flooding.

Slide 16. Elevated houses in Guerneville, California on the Russian River

The other option for severely damaged houses is elevating them so that the living areas are at or above the 100-year flood level. This shows elevated houses in Guerneville, California on the Russian River. These houses escaped damaged in the January 1995 flooding, although floodwaters almost reached the elevated living space and access to the houses was cut off during the flooding.

Slide 17. Floodproofed restaurant

Owners of commercial buildings have the option to floodproof rather than elevate their buildings in the 100-year floodplain. Floodproofing can take many forms. This shows a restaurant in the Midwest protected from flooding by a flood wall. The flood has cut off its access, but the building remains undamaged.

Slide 18. Wet floodproofed building in Morgan City, Louisiana

This shows a "wet" floodproofed commercial structure in Morgan City, Louisiana. The building is designed to let floodwaters inside, but you can see the electrical panels and office are raised above the flood level. Although located in the 100-year floodplain, buildings like this should have less damage than unprotected buildings.

Slide 19. Pre-FIRM building with less than 50% damage

This pre-FIRM building in Illinois was damaged less than 50% of its value in the 1987 Midwest floods. Under minimum floodplain management regulations, this building may be repaired to its pre-flood condition without elevation or floodproofing. Buildings like this pose difficult policy questions. Approximately 40% of flood insurance claims are for properties which have received payments in previous floods. Pre-FIRM buildings can receive 20-30% damage over and over. Their owners can still buy flood insurance and are not required to increase the buildings' flood resistance. Local governments must decide when enough is enough. They can adopt regulations more stringent than mandated by FEMA to require the removal, elevation, or floodproofing of moderately-damaged, pre-FIRM structures in the 100-year floodplain.

Slide I10. Flood-damaged historic building, Keithsburg, Illinois

Historic buildings need special consideration. This historic building in Keithsburg, Illinois was severely damaged in the 1993 Midwest floods. It cannot be removed or altered without review by the State Historic Preservation Officer (known as the SHipPO). The historic integrity of such buildings should be preserved as they are being repaired or brought up to code. Local policy is important in determining what buildings are considered historic and how they can be modified to increase resistance to flood damage.

Slide I11. Now begin Task I.

Now turn to the instruction page for Task I. You will also find a table in Handout I for recording your policy decisions about flood-damaged buildings. You have 40 minutes to complete the task.

Reminder to Facilitator: Be sure to set the timer for 40 minutes.

INSTRUCTIONS -- TASK I. POLICIES FOR DAMAGED BUILDINGS

(Time to complete the task: 40 minutes)

Purpose

Apply or revise provisions in your floodplain management ordinance to determine the fate of flood-damaged buildings.

Materials

- o Base map with information from Tasks A-H
- o Floodplain management ordinance
- o *Handout I. Policies for Damaged Buildings*

Steps

1. On the base map, outline areas where you would consider a temporary moratorium on repairs and rebuilding pending damage assessment of individual structures and decisions about the repair or replacement of flood control structures (**black**).
2. In Column 1 of *Handout I. Policies for Damaged Buildings*, enter brief summaries of your current policies as contained in the floodplain management ordinance and any other relevant plans or ordinances as they pertain to decisions about flood-damaged structures in the floodway, the 100-year floodplain, and outside the floodplain. Also note existing policies pertaining to the repair or demolition of flood-damaged historic buildings regardless of location.
3. Next, review your current policies and identify any changes you would make to guide repairs, demolitions and rebuilding after this flood. Record your changes in Column 2 of *Handout I*.
4. On the base map, identify damaged buildings to be removed with a **black "X"**. These should include most buildings in the floodway and at least 1/3 of the buildings in the 100-year floodplain with more than 50% damage.
5. Are there changes in your existing policies and regulations that could be made now to improve decisions about damaged buildings after the real flood? On *Handout 4. Recommended Actions*, list actions that might be taken now to make this task easier after a flood.

Products

- o Base map showing moratorium areas and buildings to be removed
- o *Handout I. Policies for Damaged Buildings*
- o Entries on *Handout 4. Recommended Actions*

Instructions -- Task I

Handout I

POLICIES FOR DAMAGED BUILDINGS

Damaged Buildings	Local Floodplain Management Regulations	Your Policy Recommendations
In Floodway		
100-year Floodplain 50% or More Damage		
100-year Floodplain Less than 50% Damage		

Outside 100-year Floodplain		
Historic		

Handout I

SCRIPT -- TASK J. PERMIT PROCESSING

(You have 5 minutes to read the script.)

Slide J1. Task J. Permit Processing

Task J is to estimate work load and staff needs to process permits for repair and rebuilding after the flood and recommend procedures for handling the work load. After a flood, the number of applications for building permits is many times the usual volume. You may face pressures to compromise standards and cut short your review to speed the permitting process. Yet, the safety of the rebuilt community depends on maintaining good building practices and competent review of permit applications.

Slide J2. Plan checking at counter, Santa Clara County, California

Here is a property owner applying for a building permit in Santa Clara County, California to repair her flood-damaged building. Local governments find that they usually need extra staff to help process the heavy volume of permit applications. Some jurisdictions have hired consultants to supplement their staffs or hired temporary employees.

Slide J3. Permit processing on the scene, Guerneville, California

Usually some changes in procedures are needed after a flood. The building department in Sonoma County, California manned this table in Guerneville after the 1995 flood on the Russian River. Building inspectors interviewed owners of damaged properties to determine if damaged approached 50% of market value. If not, permits were issued on the spot. If so, an inspector visited the site and owners were asked to provide additional information to establish pre-flood market values.

Slide J4. Information center in Hardin, Illinois

After the 1993 Midwest floods, the city of Hardin, Illinois set up a center where owners could find out the elevation of their properties. This information was necessary to design repairs and apply for building permits. Some local governments have tried to make the process easier for victims by setting up "one-stop" permit centers. Other options are to waive public hearings for some types of permits, waive building permit fees for a period of time, and increase staffing to improve turnaround time.

Slide J5. Booklet on protecting homes from flooding

Local governments can speed recovery by providing information on techniques for elevating and floodproofing structures. For example, this FEMA booklet on retrofitting

houses to reduce flood damage can be offered to those seeking permits to repair flood-damaged houses.

Slide J6. Now begin Task J.

Please turn to the instructions for Task J. You have 15 minutes to complete this task.

Reminder to Facilitator: Be sure to set the timer for 15 minutes.

INSTRUCTIONS -- TASK J. PERMIT PROCESSING

(Time to complete the task: 15 minutes)

Purpose

Review your organization and procedures to handle plan checks, building permits, and building inspections for repairs and rebuilding.

Materials

- o *Handout F. Damage Assessment* and *Handout I. Policies for Damaged Buildings*
- o Base map with information from Tasks A-I
- o Existing plan check and building permit processing procedures

Steps

1. Based on your estimates of the number of damaged buildings (*Handout F*) and policies for damaged buildings (*Handout I*), estimate the number of building permit applications you expect for repairs and rebuilding. Enter your estimate below.

Number of Building Permit Applications: _____

2. From Step 1 above and your knowledge of the permit process, estimate the number of plan checkers, building inspectors and other staff needed to handle the work load. Enter your estimate below and discuss how you will obtain the help needed.

Plan Checkers: _____ Building Inspectors : _____ Other: _____

3. List below any changes in procedures that you think will be needed after a flood:

4. What problems do you anticipate in processing permits for repairs? On *Handout 4. Recommended Actions*, list actions that the community might take now to prepare for the work load.

Products

- o Estimates of work load and staffing needs
- o Recommended changes in permit processing procedures
- o Entries on *Handout 4. Recommended Actions*

Instructions -- Task J

SCRIPT -- TASK K. RECONSTRUCTION PLANNING
(15 minutes to read the script)

Slide K1. Task K. Reconstruction Planning

In Task K, you will use all the information you have developed so far to prepare a reconstruction plan for the flooded areas. This task marks the beginning of a planning and rebuilding process that will dominate staff and political time for several years to come. In the previous tasks we explored in increasing detail the damage caused by your flood and the fate of individual buildings. Now we stand back and take a broader perspective. The question you will be asking during this task is: "What are the best uses of the floodplain in our community?"

Slide K2. Thebes, Illinois on banks of Mississippi River

In their natural state, floodplains carry floodwaters, provide wetlands and wildlife habitats, and offer sites for camping, fishing, hiking, and picnicking. People originally settled on floodplains for access to water, transportation, flat land for easy building, and fertile agricultural soils. This shows the town of Thebes, Illinois settled on the banks of the Mississippi River many decades ago.

Slide K3. Downtown Elmira, New York protected by floodwall

When floods came, people in riverside towns usually responded by trying to control the floodwaters. They built flood levees and floodwalls (like the one shown here protecting downtown Elmira, New York); they built dams and reservoirs to impound water upstream for measured release into the stream channel; they lined stream channels with rocks or concrete to regulate the flow of floodwaters; they diverted channels. For decades, people living in floodplains have turned to engineered flood protection systems to alleviate losses caused by periodic flooding.

Slide K4. Floodwall overtopped, Elmira, New York

After several generations of a structural approach to flood hazard reduction, we are discovering that flood losses are increasing rather than decreasing. This shows water spilling over the floodwall designed to protect downtown Elmira, New York from flooding. One reason flood losses are growing is that once a flood control structure is in place, people seem to believe that the floodplain is now safe, and construction in the floodplain increases. Sooner or later, comes a flood larger than the structure was designed to contain.

Slide K5. Planning context for post-flood reconstruction plan

A damaging flood gives you a chance to reconsider land uses in the floodplain. This diagram shows how post-flood reconstruction planning is linked to typical community planning. Ideally, a community's comprehensive plan is the umbrella defining land uses and circulation in the floodplain in relation to the rest of the community. A comprehensive plan may contain or be supplemented by a floodplain area plan recommending land uses and development practices in the floodplain to reduce flood losses. A post-flood reconstruction plan is completed after a damaging flood and essentially revises the comprehensive community plan and floodplain area plan (if there is one). The rest of this introduction gives examples of how some cities have planned and implemented new floodplain uses after major floods.

Slide K6. Downtown buildings on riverfront, Elmira, New York

Elmira, New York is a city of about 40,000 people on the Chemung River in the "southern tier" of New York state. A main downtown street, aptly named Water Street, runs next to the river. This pre-1970 slide shows buildings on the south side of Water Street which are backed up to the river and theoretically protected by the flood wall just shown. The first floor of the buildings contained stores and the upper floors either contained offices or were vacant.

Slide K7. Flood in Elmira, New York, 1972

Tropical storm Agnes stalled over the region in June 1972 causing major flooding in the Chemung River basin. Here you see the buildings on Water Street with water up to their second stories. A breach in the dike contributed to the flooding.

Slide K8. Sketch of redevelopment plan

After the floodwaters receded, the city decided to pursue redevelopment of the downtown area with funding from HUD and help from the New York State Development Corporation. An outlying shopping mall and stagnant economy had caused a typical decline in downtown retail sales, and the area was in need of help before the flood. The redevelopment plan, shown here, features a linear riverside promenade incorporating the flood wall. The plan also proposes rehabilitation of many historic buildings, a new four-lane arterial through downtown, closing Main Street to create a park and pedestrian shopping mall, and other features to address the economic, transportation, and social needs of the community as well as flood protection.

Slide K9. Riverfront park along the Chemung River

This shows the riverfront park in downtown Elmira in 1994. The buildings on the river side of Water Street were removed to open views to the river from the city center and create this pleasant promenade. Many of the buildings were in poor condition and under-used before the flood. Viable businesses were relocated elsewhere in downtown. Federal funds available for recovery allowed the city to undertake a major redevelopment project that would not have been politically or economically feasible before the flood. Downtown still serves as the region's business center. Although not all of the plan was implemented and downtown is still subject to flooding, the combination of a new upstream dam and removal of floodplain buildings means that the city is less vulnerable than before.

Slide K10. Flood-damaged house, Rapid City, South Dakota, 1972

Rapid City, South Dakota also endured a flood in 1972. Storms stalled over the Black Hills dumping up to 10 inches of rain in the Rapid Creek watershed. An earthen dam above Rapid City was washed out and a wall of water descended on the city killing 238 people and destroying 770 houses and 565 mobilehomes. This shows one of the destroyed houses.

Slide K11. House knocked from foundation, Rapid City, 1972

This house was knocked off its foundation and tipped into its basement.

Slide K12. Owners teeing off on former home site, Rapid City, 1992

This is the same location 20 years later. The property is now part of a golf course and the former homeowners are teeing off where their house used to stand.

Slide K13. Green belt in Rapid Creek floodplain, 1992

The golf course is part of a green belt running the length of Rapid City along the creek. In addition to the golf course, the green belt contains hiking trails, a bike path and facilities for picnicking, soccer, polo, ice skating, horseshoes, and volleyball. With an infusion of funds from several federal agencies during an election year, Rapid City was able to acquire and transform its floodplain lands. Rapid City is safer from floods, more beautiful, and much better supplied with recreational facilities than before the devastating flood.

Slide K14. Flood damage in Estes Park, Colorado, 1982

Ten years after the Rapid City flood, Estes Park, Colorado got its turn. This shows damage from the 1982 flood which struck this tourist town at the entrance to Rocky Mountain National Park. A dam above the town failed sending a wall of water down Fall River into town.

Slide K15. Clean up in Estes Park

Clean up began almost immediately. The flood arrived just 3 days into the 3-month long summer tourist season which produces 95% of the annual income for town businesses. So, the town leaders were very anxious to get back in business quickly.

Slide K16. Redevelopment plan, Estes Park

After the town was cleaned up and most businesses operating, the townspeople set about planning for reuse of part of the floodplain. This shows a plan for a riverside park in an area occupied by a gas station, army surplus store and a motel before the flood. The plan was adopted about 18 months after the flood.

Slide K17. Riverside park, Estes Park

This shows the finished riverside park during spring runoff. The park, complete with a walkway, now extends along Fall River through Estes Park.

Slide K18. Redevelopment sign, Estes Park

In addition to the new park, which decreases the town's vulnerability to flood damage, Estes Park took the opportunity to strengthen its sign code, add new sidewalks, benches and street lights. The result is a more attractive central business district which is friendlier to tourists and pedestrians. The district is also a financial success. In 1995, the town's director of public works delivered a paper entitled, "Estes Park: From Destruction to Economic Success."

Slide K19. Soldiers Grove, Wisconsin before the flood

Repeated flooding on the Kickapoo River led to an Army Corps of Engineers proposal in 1970 for a \$3.5 million levee to protect \$1 million in floodplain property in Soldiers Grove, Wisconsin. The town's share of the cost was estimated at \$220,000 for construction plus a \$10,000 annual maintenance fee. With an annual budget of about \$14,000 a year, the village could not come up with the local share. Repeated flooding had left the business district in a state of blight and, between 1975 and 1978, village leaders embarked on a plan to relocate the downtown district to higher ground. They hired an architect to plan a new business district and purchased a farm field on the edge of town as a site; however, federal funds to finance the relocation were not approved.

Slide K20. 1978 flood at Soldiers Grove

Then, in 1978, a flood struck destroying much of the business district. Because the community was unified behind its plan and ready for action, within week of the flood, HUD awarded Soldiers Grove \$1 million to start the relocation.

Slide K21. Construction at new downtown site, Soldiers Grove

Here you see construction underway at the new downtown site. The old site is in the background. The village also received funds to move its water well out of the floodplain and to reroute roads to provide emergency access around the river in times of flooding.

Slide K22. New Soldiers Grove business district

This shows the new business district. The project was completed in 1983 at a total cost of \$6.6 million. The new buildings are constructed for energy efficiency and landscaping is designed to blunt the force of winter winds. By local ordinance, all new commercial buildings must receive at least half their heat from solar power. The new district is more energy efficient, attractive, barrier-free, and successful than the old one.

Slide K23. Park along the Kickapoo River at Soldiers Grove

And, here is the previous business district site, now developed as the Beauford T. Anderson Memorial Park with a war memorial and recreational facilities as shown here. Like other successful reconstruction planning programs, post-flood reconstruction in Soldiers Grove meets many community objectives in addition to flood-hazard reduction.

Slide K24. Suggestions for reconstruction planning

This slide summarizes a few suggestions from these examples to keep in mind as you start working on plans for rebuilding in your floodplain.

- o Identify beneficial uses of the floodplain.
- o Be sure new and repaired buildings are safer from flood damage.
- o Avoid grandiose plans. Rebuilding plans should address only the specific needs of rebuilding.
- o Capitalize on achievable opportunities. These will be specific and clearly related to the flood damage.
- o Use redevelopment powers. Most rebuilding plans are redevelopment plans using tax increments to help finance public improvements.
- o Understand and accept economic realities. Floods change the economics of doing business. It is rarely possible to simply restore things exactly as they were.
- o Work closely with private sector. Remember that local governments plan, but the private sector will do most of the rebuilding.

Slide K25. Now begin Task K.

With that as background to stimulate thinking, you are ready to create your own plans for _____. Please turn to the instructions for Task K and *Handout K*. The handout is a table to help you identify opportunities for land use change. You have about an hour to identify opportunities and create a reconstruction plan for your community's floodplain.

Reminder for Facilitator: Be sure to set the timer for 60 minutes.

INSTRUCTIONS -- TASK K. RECONSTRUCTION PLANNING

(Time to complete the task: 60 minutes)

Purpose

Identify opportunities for land use change and prepare a reconstruction plan for your community's 100-year floodplain.

Materials

- o Base map with information from Tasks A-J
- o *Handout F. Damage Assessment*
- o *Handout I. Policies for Damaged Buildings*
- o Comprehensive plan, redevelopment plan, other plans, zoning maps
- o Floodplain management ordinance
- o *Handout K. Planning Opportunities*

Steps

1. Using the information accumulated on the base map and handouts and your knowledge of the community and its plans, identify opportunities for changes in land use and structures in the floodplain that could improve safety from floods and achieve other community objectives. List the planning opportunities on *Handout K. Planning Opportunities*.
2. Draw a proposed reconstruction plan for the floodplain on an overlay of the base map. Show land uses, transportation changes, design features and other relevant information.
3. Estimate how long you think it would take to complete and adopt a reconstruction plan allowing for public hearings and full citizen participation. How long do you think it will be before the damaged areas of your community are completely rebuilt?

Months for floodplain planning: _____ Years for reconstruction: _____

4. What problems did you have in preparing a reconstruction plan? On *Handout 4. Recommended Actions*, list actions that the community might take now to prepare for this task.

Products

- o *Handout K. Planning Opportunities*
- o Overlay of base map showing major features of the reconstruction plan
- o Entries on *Handout 4. Recommended Actions*

Handout K

PLANNING OPPORTUNITIES

Types of Opportunity	Potential Opportunities
Reducing risks from floods; other hazards	
Eliminating non-conforming uses	
Correcting plan/zoning inconsistency	
Realigning or improving roads	
Improving housing conditions or affordability	
Enhancing the local economy	
Upgrading inadequate commercial, industrial, or public facilities	
Improving urban design	

Providing open space	
Preserving historic buildings	
Others (list)	

Handout K

SCRIPT -- TASK L. MITIGATING FLOOD HAZARDS
(10 minutes to read the script)

Slide L1. Task L Mitigating Flood Hazards

Task L explores how recovery can be made easier by reducing the potential for flood damage in advance of a flood and preparing for recovery tasks. FEMA sets aside an amount equal to 15% of disaster assistance funds for mitigation projects. To qualify for the funds, jurisdictions must have a mitigation plan. You will work out the key features of your mitigation plan in Task L.

Slide L2. Ways to Mitigate Flood Losses

What is mitigation? It basically means taking actions to reduce the long-term vulnerability to disaster losses. Flood hazard mitigation usually involves one or more of the "A" actions listed on the slide: AVERT the flood, ADAPT to the flood, AVOID the flood, and ANTICIPATE the flood. Averting the flood includes all types of structural flood control; adapting to the flood hazard includes elevating and floodproofing buildings; avoiding the flood hazard means keeping vulnerable land uses out of areas prone to flooding; and anticipating the flood means preparing for emergency response, recovery and rebuilding after a flood.

Slide L3. Flood insurance policy

This shows a flood insurance policy issued under the National Flood Insurance Program. Normally, insurance is not considered mitigation. However, the NFIP has mitigation built in. Communities must join the program before property owners are eligible for insurance. To join, communities must adopt a floodplain management ordinance meeting specific minimum standards. However, the standards are minimums; nothing precludes a community from adopting more stringent requirements. In fact, the NFIP rewards property owners in cities that exceed the minimum standards with lower insurance premiums.

Slide L4. Elevated houses in Snoqualmie, Washington

For example, in the town of Snoqualmie in Washington State, 12 houses were repeatedly flooded. Damage did not reach 50% of pre-flood value of any of the houses. So, under the terms of its local floodplain management ordinance, the town did not require elevation. Finally, after a flood in 1987, the town amended its zoning code to require elevation of any of the 12 houses which received flood damage exceeding 10% of market value. Here you see a house in this district being elevated after the flood. The one behind it has not yet been elevated. Because the 10% standard was adopted as part of the town's zoning code, the cost of elevation was financed with SBA low-interest loans.

Slide L5. Greenway along Mingo Creek in Tulsa, Oklahoma

This shows the greenway along Mingo Creek in Tulsa, Oklahoma. Tulsa used to have the worst record of any community in the flood insurance program. Property along Mingo Creek had been flooded in 9 out of 15 years. Finally, the city began to relocate buildings out of the 100-year floodplain, creating this greenway. The city also adopted new floodplain management regulations substantially exceeding the NFIP minimum requirements and now Tulsa property owners have the lowest flood insurance premiums in the nation--25% lower than its prior rates.

Slide L6. Boulder Creek, Boulder, Colorado

To the extent that the reconstruction plan you just completed reduces the potential for future flooding, it is a plan for mitigation. One point of this task is that you do not need to wait for a flood to plan and carry out mitigation actions. This shows Boulder Creek winding its way through the City of Boulder, Colorado. The last serious flooding on the creek was Memorial Day 1894--100 years ago. However, the flood potential was documented by the Army Corps of Engineers and a 1977 study recommended lining the creek channel with concrete to control flooding.

Slide L7. Houses being removed from floodplain, Boulder

Boulder residents fought to keep the creek channel in its natural state and, in 1987, the council adopted an ordinance prohibiting the issuance of building permits for any structure with sleeping quarters in the high-hazard zone along Boulder Creek. In 1992, Boulder also initiated a program to purchase and remove buildings in order to reduce the size of the high-hazard area, particularly at the high school site. This shows a house being removed.

Slide L8. Soccer field on former house sites, Boulder

This shows a soccer field developed in 1994 on the sites from which the houses were removed.

Slide L9. Map showing the high-hazard zone before the relocation project, Boulder

The purple areas on this map show the high-hazard zone along Boulder Creek before the relocation of buildings. The largest building, shown on the right side of the slide, is the high school.

Slide L10. Map showing the high-hazard zone after the relocation project, Boulder

The purple areas on this map show the high-hazard zone after the buildings were removed. As you can see, the zone is much smaller than in the previous slide. Note that the high school building is now out of the high-hazard zone. With the removal of the buildings, more floodplain is now available for the floodwaters to spread out and slow down, and the high school building can remain with assurance that students can safely evacuate the building if flooding occurs.

Slide L11. Boulder Creek bike and walking path

In addition to the relocation project, the city purchased or acquired easements over creekside property extending for six miles along the creek and five tributaries. The centerpiece of this project is bike and pedestrian paths which allow you to walk or bicycle almost anywhere in Boulder without crossing a street.

Slide L12. Sign announcing Annual Boulder Creek Festival

Every year, the residents of Boulder gather in the creek corridor for the Annual Boulder Creek Festival on Memorial Day to celebrate the creek and the greenbelt including the creek path.

Slide L13. Rubber duck race on Boulder Creek

A popular event during the festival is a rubber duck race. People pay \$5 to enter a duck in the race with the proceeds going to provide handicapped access to the creek. Boulder's creekside project reduces the city's vulnerability to flood losses while at the same time providing a safe and pleasant alternative to the automobile and a focal point for community activities.

Slide L14. Wetlands along Charles River in Massachusetts

Protecting the ability of wetlands and marshes to store floodwaters is an important aspect of flood hazard mitigation. This shows wetlands which are part of an 8,500-acre preserve along the Charles River in Massachusetts. The Army Corps of Engineers acquired the land and easements for \$10 million. This was far less than the \$100 million estimated for upstream dams and levees needed to control an equivalent amount of floodwater. The Corps report states that "nature has already provided the least-cost solution to future flooding . . ."

Slide L15. Cluster development in Portola Valley, California

Development practices in watersheds can affect the frequency and height of floods on rivers and streams. This shows a carefully planned cluster development in Portola Valley, California featuring generous open space, native vegetation, limitations on impervious surfaces and other features to reduce runoff from the site.

Slide L16. Drying basement of historic building, Darlington, Wisconsin

Protecting historic buildings and places from flood damage is an important mitigation task. The historic district in Darlington, Wisconsin was flooded in 1993. This shows an industrial dehumidifier installed to dry out the wood joists in the basement of an historic brick building in the district.

Slide L17. Diagram of floodproofing technique useful for historic buildings

To reduce future flood damage, Darlington completed a floodproofing study and evaluated 38 buildings. A floodproofing alternative being used in Darlington for historic buildings is to fill in the basements and elevate the first floor and utilities above the 100-year flood level as shown in this diagram. From the outside, the historic character of the buildings is preserved, but they will be far less vulnerable to flood damage.

Slide L18. Flood emergency response and recovery plans

Most cities have preparedness and response plans that detail the responsibilities of various city departments in the immediate response to a flood. Some cities, however, have thought through the requirements of long-term recovery and rebuilding. Here you see the Post-Flood Recovery Assistance Plan for Arvada, Colorado along with two more typical response plans. As you have experienced today, many of the recovery tasks would be more readily done if planned in advance. A part of any flood hazard mitigation plan should be a statement of actions a city will take before a flood comes to better handle both emergency response and long-term recovery.

Slide L19. FEMA's E-Net studio

FEMA has established an educational network to convey hazard and recovery information to local governments and others in need of the information. This shows the studio in Emmitsburg, Maryland. Efforts like this to educate the public and support private decisions to reduce flood vulnerability are very important parts of any mitigation program. Most mitigation will actually be done by private businesses and individuals. Local governments can help by providing information, incentives, and sometimes requirements.

Slide L20. Now begin Task L.

This is your last task. Throughout the day you have been listing actions to improve your ability to handle the recovery tasks in this exercise. During this task, you will review your recommended actions, assign them priorities and detail the most important actions. You have 30 minutes to complete this task. Please turn to the instructions and copies of *Handouts L1* and *L2*.

Reminder to Facilitator: Be sure to set the timer for 30 minutes.

INSTRUCTIONS -- TASK L. MITIGATING FLOOD HAZARDS

(Time to complete this task: 30 minutes)

Purpose

Identify and describe high-priority actions to include in a flood hazard mitigation plan, drawing on the entries on *Handout 4. Recommended Actions* and major points from working Tasks A - K.

Materials

- o base map with information from Tasks A-K and all handouts
- o *Handout L1. High-Priority Action to Reduce Flood Risk*
- o *Handout L2. Contacts for Technical and Financial Assistance*

Steps

1. Listen to your recorder recap the actions listed on *Handout 4. Recommended Actions*. Discuss the actions and make changes in the list as needed. Then, check the actions you decide are high-priority needs to reduce flood risk or the burdens of recovery. Be sure to check at least 5 actions.
2. For each checked action, fill out a copy of *Handout L1. High-Priority Action to Reduce Flood Risk*, indicating who should be responsible for carrying out the action, who should be involved in the decisions, resources needed and available to accomplish it, and when it should be started and completed.
3. Seek information from those present at the exercise to fill out *Handout L2. Contacts for Technical and Financial Assistance*.

Products

- o *Handout 4. Recommended Actions* with high-priority actions checked
- o At least five copies of *Handout L1. High-Priority Action to Reduce Flood Risk*
- o *Handout L2. Contacts for Technical and Financial Assistance*

Handout L1

HIGH-PRIORITY ACTION TO REDUCE THE RISK OF FLOODING

Description of the Action

Agencies Responsible for Carrying Out the Action

People and Organizations Who Should be Involved in the Decisionmaking

Resources Needed (funds, expertise, equipment, etc.)

Possible Sources for Resources

Time to Start _____

Time to Complete _____

Handout L2.

CONTACTS FOR TECHNICAL AND FINANCIAL ASSISTANCE

The true measure of effectiveness of the Flood Recovery Exercise, which you have just completed, will be in the actions that your community now takes. Throughout the day, you have identified potential problems that your community is likely to face following a flood. You have also identified a series of high-priority actions that will lessen the impact of those problems, if you pursue them prior to the next flood.

FEMA, your state emergency management agency, and your state floodplain management officials stand ready to help you carry out these actions. Below is a list of agencies to contact for technical and financial assistance to help your community meet its flood-hazard reduction goals. Add the appropriate names and telephone numbers to the list with the help of those present at the exercise. Then, keep this page with your copies of Handout L1. You are now ready to begin implementing the actions!

FEMA REGIONAL OFFICE (location: _____)

Telephone Number: _____

Hazard Mitigation Officer: _____

Telephone Number: _____

STATE EMERGENCY MANAGEMENT AGENCY

Telephone: _____

State Hazard Mitigation Officer: _____

Telephone Number: _____

STATE FLOODPLAIN MANAGEMENT AGENCY

Telephone Number: _____

State Floodplain Manager: _____

Telephone Number: _____

Floodplain Management Resource Center--A Service of the Association of State Floodplain Managers, University of Colorado. Telephone: 303-492-6818.

Slide Index

A complete listing of slides used in the exercise follows. The text slides were prepared by DAE Corporation based on text provided by Martha Tyler, Spangle Associates. Other sources are noted with numbers in parentheses and full citations are given at the end of this section.

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1. Flood Mitigation and Recovery--An Interactive Exercise for Local Governments
2. Exercise tasks
3. Exercise schedule
4. Exercise purpose
5. Topics not covered
6. Flood recovery timeline
7. Task structure
8. What players need
9. Getting started

Task A. Flood Warning and Evacuation

- A1. Task A. Warning and Evacuation
- A2. Woman with child watching storm clouds (5)
- A3. National Weather Service office (1)
- A4. Form for an official flood warning (1)
- A5. Flood warning siren (1)
- A6. Cross section of floodplain (4)
- A7. Terms for flood frequency (2)
- A8. Flood insurance map showing A, B, and C zones (2)
- A9. Evacuating people, Elmira, New York (6)
- A10. Flood-damaged vehicles (1)
- A11. Sandbagging in downtown Salt Lake City (1)
- A12. Moving furniture from a house (5)
- A13. Now begin Task A.

Task B. Emergency Shelter

- B1. Task B. Emergency Shelter
- B2. Red Cross disaster services center tent (12)
- B3. Emergency shelter, Santa Cruz, California (13)
- B4. People entering emergency shelter in Elmira, New York (6)
- B5. RV in front yard (1)
- B6. Now begin Task B.

Task C. Damage Scenario

- C1. Task C. Damage Scenario
- C2. Rivers converging at Pittsburgh, Pennsylvania (2)
- C3. Same scene with rivers flooding (2)
- C4. Chemung River flooding in Elmira, New York (9)
- C5. Flash flood in Buffalo Creek, West Virginia (2)
- C6. Failed dam in Rocky Mountain National Park (1)
- C7. Floodwater channel in mountainside, Rocky Mountain National Park (1)
- C8. Ice-covered river at Oil City, Pennsylvania (2)
- C9. House damaged by ice in Peoria, Illinois (5)
- C10. Alluvial fan adjacent to Colorado River (14)
- C11. Factors contributing to flood damage
- C12. Debris in floodwaters, West Virginia (2)
- C13. Broken floodgate, Folsom Dam (15)
- C14. New houses behind a dike along the Sacramento River (16)
- C15. Watershed development, Laguna Beach, California (3)
- C16. Structures in the floodway, Guerneville, California (3)
- C17. Pre-FIRM building (2)
- C18. Elevated houses in floodplain (5)
- C19. Damaged mobilehome in Estes Park, Colorado (1)
- C20. Scenic river road in northern California (3)
- C21. Submerged bridge (2)
- C22. Sewage treatment plant during flood (5)
- C23. Water pumping station in Hull, Illinois (4)
- C24. Unlabeled drum on Mississippi River (10)
- C25. Now begin Task C.

Task D. Rerouting Traffic

- D1. Task D. Rerouting Traffic
- D2. Washed-out bridge in Puerto Rico (1)
- D3. Traffic control at washed-out road (2)
- D4. Map of emergency traffic routes, Salt Lake City (1)
- D5. Detour graded around washed-out road (1)
- D6. Temporary "Bailey" bridge (17)
- D7. Railroad cars used as temporary bridge (1)
- D8. Boat used for access (2)
- D9. Now begin Task D.

Task E. Restoring Services

- E1. Task E. Restoring Services
- E2. Severed utility lines to house in Farmington, Utah (1)
- E3. Flooded electric power substation, Keithsburg, Illinois (4)
- E4. Temporary above-ground water connection in Inverness, California (3)
- E5. Damaged city hall/EOC, Hull, Illinois (4)
- E6. Sandbagged school (4)
- E7. Now begin Task E.

Task F. Damage Assessment

- F1. Task F. Damage Assessment
- F2. Helicopter used to assess damage, Thistle, Utah (1)
- F3. Building with red tag in Albany, Georgia (2)
- F4. Classifying flood damage to buildings
- F5. Houses flooded in Thistle, Utah (1)
- F6. Building in 100-year floodplain (2)
- F7. Building with more than 50% damage (2)
- F8. Categories for percent damage
- F9. Flood-damaged historic building (4)
- F10. FEMA GPS system for damage assessment (18)
- F11. Now begin Task F.

Task G. Temporary Business Locations

- G1. Task G. Temporary Business Locations
- G2. Flooded retail street in Georgia (4)
- G3. Flooded businesses along the Russian River, Guerneville, California (3)
- G4. Businesses operating from trailer in Guerneville, California (3)
- G5. Flood sale in Guerneville, California (3)
- G6. Portable janitor in Montpelier, Vermont (4)
- G7. Napa Auto Parts, Guerneville, California (3)
- G8. Criteria for temporary business locations
- G9. Now begin Task G.

Task H. Temporary Housing

- H1. Task H. Temporary Housing
- H2. Bucket brigade in Utah (1)
- H3. Person bailing out his house (1)
- H4. Vacancy sign (3)
- H5. People applying for housing assistance at a DAC (3)
- H6. FEMA trailers (4)
- H7. Criteria for temporary housing sites
- H8. Now begin Task H.

Task I. Policies for Damaged Buildings

- I1. Task I. Policies for Damaged Buildings
- I2. Broken levee, Midwest (10)
- I3. Options for flood-damaged buildings
- I4. Building in the floodway, Old Woman's Bend, Michigan (19)
- I5. House being moved (4)
- I6. Elevated houses in Guerneville, California on the Russian River (3)
- I7. Floodproofed restaurant (2)
- I8. Wet floodproofed building in Morgan City, Louisiana (2)
- I9. Pre-FIRM building with less than 50% damage (5)
- I10. Flood-damaged historic building, Keithsburg, Illinois (4)
- I11. Now begin Task I.

Task J. Permit Processing

- J1. Task J. Permit Processing
- J2. Plan checking at counter, Santa Clara County, California (3)
- J3. Permit processing on the scene, Guerneville, California (3)
- J4. Information center in Hardin, Illinois (4)
- J5. Booklet on protecting homes from flooding (4)
- J6. Now begin Task J.

Task K. Reconstruction Planning

- K1. Task K. Reconstruction Planning
- K2. Thebes, Illinois on banks of Mississippi River (5)
- K3. Downtown Elmira protected by floodwall (9)
- K4. Floodwall overtopped, Elmira, New York (6)
- K5. Planning context for post-flood reconstruction plan
- K6. Downtown buildings on riverfront, Elmira, New York (9)
- K7. Flood in Elmira, New York, 1972 (6)
- K8. Sketch of redevelopment plan (6)
- K9. Riverfront park along Chemung River (20)
- K10. Flood-damaged house, Rapid City, South Dakota, 1972 (8)
- K11. House knocked from foundation, Rapid City, 1972 (9)
- K12. Owners teeing off on former home site, Rapid City, 1992 (8)
- K13. Green belt in Rapid Creek floodplain, 1992 (8)
- K14. Flood damage in Estes Park, Colorado, 1982 (1)
- K15. Clean up in Estes Park (1)
- K16. Redevelopment plan, Estes Park (1)
- K17. Riverside park, Estes Park (1)
- K18. Redevelopment sign, Estes Park (1)
- K19. Soldiers Grove, Wisconsin before the flood (7)
- K20. 1978 flood at Soldiers Grove (7)
- K21. Construction at new downtown site, Soldiers Grove (7)
- K22. New Soldiers Grove business district (7)
- K23. Park along the Kickapoo River at Soldiers Grove (21)
- K24. Suggestions for reconstruction planning
- K25. Now begin Task K.

Task L. Mitigating Flood Hazards

- L1. Task L. Mitigating Flood Hazards
- L2. Ways to Mitigate Flood Losses
- L3. Flood insurance policy (5)
- L4. Elevated houses in Snoqualmie, Washington (2)
- L5. Greenway along Mingo Creek in Tulsa, Oklahoma (22)
- L6. Boulder Creek, Boulder, Colorado (1)
- L7. Houses being removed from floodplain, Boulder (11)
- L8. Soccer field on former house sites, Boulder (11)
- L9. Map showing the high-hazard zone before the relocation project, Boulder (1)
- L10. Map showing the high-hazard zone after the relocation project, Boulder (1)
- L11. Boulder Creek bike and walking path (1)
- L12. Sign announcing Annual Boulder Creek Festival (1)

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- L14. Wetlands along Charles River in Massachusetts (23)
- L15. Cluster development in Portola Valley, California (3)
- L16. Drying basement of historic building, Darlington, Wisconsin (24)
- L17. Diagram of floodproofing technique useful for historic buildings (25)
- L18. Flood emergency response and recovery plans (1)
- L19. FEMA's E-Net studio (1)
- L20. Now begin Task L.

Sources

- (1) Clancy Philipsborn, The Mitigation Assistance Corporation, Boulder, Colorado
- (2) Federal Emergency Management Agency, General Collection, Washington, DC
- (3) Spangle Associates, Portola Valley, California
- (4) Cliff Oliver, Federal Emergency Management Agency, Washington, DC
- (5) Illinois Department of Transportation, Water Resources Division, Chicago, *After the Flood* slide show
- (6) Chemung County Historical Society, Elmira, New York
- (7) Thomas Hirsch, Madison, Wisconsin
- (8) Dr. Keith T. Johnson, Rapid City, South Dakota
- (9) Slides taken by Spangle Associates from photographs in *Rebuilding after Agnes* in The Chemung Historical Journal, December 1972, Elmira, New York
- (10) Richard M. Gaffney, Water Resources Program, Division of Geology and Land Survey, Missouri Department of Natural Resources
- (11) David Love, Love & Associates, Inc., Boulder, Colorado
- (12) California Office of Emergency Services, Coastal Region, Earthquake Program
- (13) Slide taken by Spangle Associates from a photo in the Santa Cruz Sentinel. Permission granted for use in this collection.
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- (15) Rick Roach, photographer for the Vacaville Reporter. Photo used with permission.
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- (17) Steve Blair, Water Wilderness Photography, Pacific Grove, California
- (18) Geo-Research, Inc., Billings, Montana
- (19) Elizabeth Lemersal, Federal Emergency Management Agency, Washington, DC
- (20) Lynda and Philip Carpentier, Elmira, New York
- (21) Roddy Dull, Roddy's Signs, Boscobel, Wisconsin
- (22) Ann Patton, City of Tulsa, Oklahoma
- (23) U.S. Army Corps of Engineers, New England Division Waltham, Massachusetts
- (24) Susan Boldt, FEMA Hazard Mitigation Coordinator, Wisconsin Interagency Disaster Recovery Office, Madison, Wisconsin
- (25) Slide taken by The Mitigation Assistance Corporation from original design drawing developed by Dewberry & Davis, Fairfax, Virginia.