



DISPLAY VISUAL

## FLOODS

### A flood occurs . . .

Any time a body of water rises to cover what is usually dry land.

Introduce this topic by explaining that a flood occurs any time a body of water rises to cover what is usually dry land.

Point out that floods are the most frequent and costly natural disasters in terms of human hardship and economic loss. As much as 90 percent of the damage related to all natural disasters (excluding droughts) is associated with flooding.



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### Causes of Floods

- Heavy rain
- Spring snowmelt
- Dam and levee failure
- Low absorption or no soil percolation

**FLOODS (CONTINUED)**

Floods have many causes:

- Heavy rain, which may occur over several days or as intense rainfall over a short period of time.
- Spring snowmelt or ice or debris jams that cause a river or stream to overflow its banks and flood the surrounding area.
- Dam and levee failure. While dam and levee failure occurs relatively infrequently, it can be a risk, especially following prolonged heavy rain, such as occurred throughout the Midwest in 1993.
- Low absorption or no soil percolation. As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization increases runoff two to six times over what would occur on natural terrain. In areas with rocky geology, rainfall or snowmelt cannot be absorbed. The result can be flash flooding with little or no warning.

Each of these causes can be factored to several key elements, as shown in the next visual.



**DISPLAY VISUAL**

**Factors Contributing to Flooding**

- Rainfall intensity
- Rainfall duration
- Topography
- Soil conditions
- Ground cover

**FLOODS (CONTINUED)**

- Rainfall intensity is the rate of rainfall (in inches per hour).
- Duration is how long the rain lasts.
- Topography is the overall configuration of the of the Earth's surface, including natural and manmade features.
- Soil conditions include the type of soil, the amount of moisture in the soil, and the amount of soil relative to the amount of rock.
- Ground cover includes vegetation as well as manmade covers. Ground that includes larger amounts of vegetation can also absorb greater amounts of water. Ground that is paved or has structures on it will cause runoff.



**DISPLAY VISUAL**

**FLOODS (CONTINUED)**

**Flood Hazards**

- Heavy rainfall exacerbates problems with runoff, absorption, and flood-control measures.
- Riverine flooding can potentially inundate a city or downstream areas when protection fails.
- In rocky areas, lack of absorption can cause flash flooding.

Explain that the reasons floods pose such a risk are that:

- Heavy rainfall can exacerbate problems with runoff, absorption, and flood-control measures.
- Riverine flooding can potentially inundate a city or downstream areas when protection fails.
- In rocky areas, lack of absorption can cause flash flooding.

**FLOODS (CONTINUED)**

Explain that every major drainage basin in the United States has a floodplain surrounding it. Two areas where inundation is very likely are:

- Along the Mississippi River.
- The central valley of California.

Most areas of the United States are subject to some degree of flooding.



DISPLAY VISUAL

**Flood Risks**

- 4,000 communities and 100 million people are at risk.
- Damage increases with development in:
  - Coastal areas.
  - Floodplains.

Floodplain areas are widespread in the South Atlantic, the Gulf Coast, and the Missouri and Arkansas River basins.

Note that there are almost 4,000 communities that are at risk of flooding, and more than 100 million people are exposed.

Explain that the costs associated with flooding are increasing as more development occurs in coastal areas and floodplains. Each year, flood losses and damages reach into the billions of dollars. During the 10-year period from 1992 to 2001, floods cost, on average, \$4.1 billion annually. The long-term (1971 to 2000) annual average lives lost is 127 per year, primarily as a result of flash floods.

Point out that floods are measured according to the height that the waters reach. Their magnitude is based on the chances that water levels will equal or exceed a certain point on a recurring basis. Intervals of probability are classified into hazard zones.

FLOODS (CONTINUED)



INSTRUCTOR'S  
NOTE

**If you live in an area that is susceptible to flooding, add local experiences and prediction data.**



ASK QUESTION

**What is “rule number one” where flooding is concerned?**

Allow the participants time to respond. If not mentioned by the group, stress that “rule number one” is to move quickly to higher ground. Flood waters can carry debris, scour soil and asphalt, and trigger landslides. Even shallow-depth, fast-moving flood waters of 24 inches can produce enough force to carry away a vehicle, and six inches of swiftly moving water can knock someone off his or her feet. Never try to walk, swim, or drive through flood waters!



ASK QUESTION

**How can you keep aware of the potential for flooding or flash flooding?**



INSTRUCTOR'S  
NOTE

**Point out that watches and warnings for flash flooding are different from flood watches and warnings.**

Allow the participants time to respond. If not mentioned by the group, remind them that the risk of flood will be reported by radio and television, as well as NOAA Weather Radio using EAS, as soon as the National Weather Service (NWS) issues a flood or flash flood watch or warning.

FLOODS (CONTINUED)



ASK QUESTION

What does a flood watch tell you?

Allow the group time to respond. If not mentioned by the group, explain that flood watches alert the public that flooding is possible within the watch area.

Elaborate by telling the group that if they are in a watch area, they should:

- Keep informed.
- Be ready to act if the watch is upgraded to a warning or if they see flooding.



ASK QUESTION

What does a flood or flash flood warning tell you?

Allow the participants time to respond. If not mentioned by the group, explain that there are two types of flood warnings:

- A flood warning is issued when flooding is expected to occur more than 6 hours after heavy precipitation, snowmelt, ice jams, or dam failures.
- A flash-flood warning is issued when flash flooding is expected within 6 hours as a result of heavy precipitation, snowmelt, ice jams, or dam failures.

Tell the group that whether the NWS issues a flood warning or a flash-flood warning, persons within the warning area should take precautions immediately! Continue by explaining that both watches and warnings will include protective measures that are recommended by NWS.

FLOOD PREPAREDNESS



ASK QUESTION

What can you do to prepare for a potential flood?

Allow the participants time to respond. Then, display the visual.



DISPLAY VISUAL

## FLOODS (CONTINUED)

### Flood Preparedness

- Know the flood risk for the area.
- Prepare a flood evacuation plan.
- Obtain flood insurance.
- Keep documents in a water-proof box.
- Check a portable radio for current information.

Be sure to stress that it is important to:

- Know the flood risk in the area, including the elevation above flood stage and the history of flooding in the area.
- Prepare a flood evacuation plan, and practice the route. Be aware of which roads become flooded and which remain passable. The entire family should know where to go if they have to evacuate.
- Obtain flood insurance if living in a floodplain (Special Flood Hazard Area). Homeowner's policies do not cover flooding! Check with the city or county government to review the Flood Insurance Rate Maps (FIRMs). Then, check with an insurance agent to obtain coverage under the National Flood Insurance Program (NFIP).
- Keep important documents in a water-proof box. Most documents can be replaced, but some are more difficult to replace than others. Protecting them in a water- (and fire-) proof container is the safest plan of action.
- Check emergency messages using a portable radio. NWS and local officials update watches and warnings as necessary. Listen often for up-to-date information.



ASK QUESTION

**How can you protect your property from flood damage?**



DISPLAY VISUAL

**FLOODS (CONTINUED)**

Allow the group time to respond. Then, display the visual.

**Protecting Property From Flooding**

- Elevate furnace, water heater, and electric panel.
- Move furniture and other items to a higher level.
- Install check valves.
- Waterproof basements and walls.

Remind the group that the best way to protect their property from flood damage is to avoid building in a flood plain unless the home is elevated and other flood protection measures are taken. If an existing home is in a floodplain, there are some steps that can help reduce potential damage.

Describe for the group the following steps:

- Elevate the furnace, water heater, and electric panel to at least one foot above the level of the floodplain (also called the Base Flood Elevation). In some areas, elevating these appliances and utilities may mean relocating them to a higher floor or even to the attic.
- Move furniture and other items to a higher level. Even if the main floor of the home is flood damaged, moving furniture and other items to a higher level will reduce flood losses.
- Install check valves in plumbing to prevent flood water from backing up into the drains of the home.
- Waterproof the basement floor and walls to prevent seepage through cracks.

**FLOODS (CONTINUED)**

Remind the group that in some cases, even these suggestions will not be enough to prevent serious damage from flooding. Urge those who live in floodplains to consult building professionals if they think they need more elaborate mitigation measures (such as elevation).



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**If You Must Evacuate**

- Do not walk, swim, or drive through flood waters.
- Stay off bridges over fast-moving water.
- Heed barricades.
- Keep away from waterways.
- Avoid storm drains and irrigation ditches.

Continue by telling the group that if they must evacuate, they should:

- Not walk, swim, or drive through flood waters. Learn and practice driving the local flood evacuation routes. They have been selected because they are safe and provide the best means of escaping flood waters. Flood waters move swiftly and may carry debris that can cause injuries. Remember that 24 inches of water can wash a car away and six inches of fast moving water can knock a person off his or her feet.
- Stay off bridges over fast-moving water. Fast-moving water can wash bridges away without warning, especially if the water contains heavy debris.

**FLOODS (CONTINUED)**

- Keep away from waterways. If you are driving and come upon rapidly rising waters, turn around and find another route. Move to higher ground away from rivers, streams, and creeks.
- Heed barricades. Local responders place barricades to warn of flooding ahead or to direct traffic safely out of the area. Never drive around barricades.
- Avoid storm drains and irrigation ditches. During a flood, storm drains and irrigation ditches fill quickly with fast-moving water. Walking in or near storm drains or irrigation ditches is nearly a sure way to drown.



ASK QUESTION

**What should you do after a flood?**

Allow the participants time to respond. If not mentioned by the group, stress that the best thing to do is listen to EAS information to determine whether it is safe to return and if there are special instructions to follow, such as boiling water.



DISPLAY VISUAL

**After a Flood**

- Stay out of flooded areas.
- Reserve the telephone for emergencies.
- Avoid driving, except in emergencies.

Continue with precautions to follow after a flood.

- Stay out of flooded areas. Flooded areas remain unsafe. Entering a flooded area places you—and the individuals who may need to rescue you—at risk.

**FLOODS (CONTINUED)**

- Reserve the telephone for emergencies only. Telecommunication lines (both land line and cellular) will be busy following a flood. A nonemergency call may prevent an emergency call from getting through. It is best not to use the phone unless it is necessary.
- Avoid driving, except in emergencies. Reserve the roads for those who must evacuate and for emergency vehicles.

Ask the participants if anyone has additional questions, comments, or concerns about floods or flash floods.