FEMA Building Science Branch

Hazard Overview: Floods

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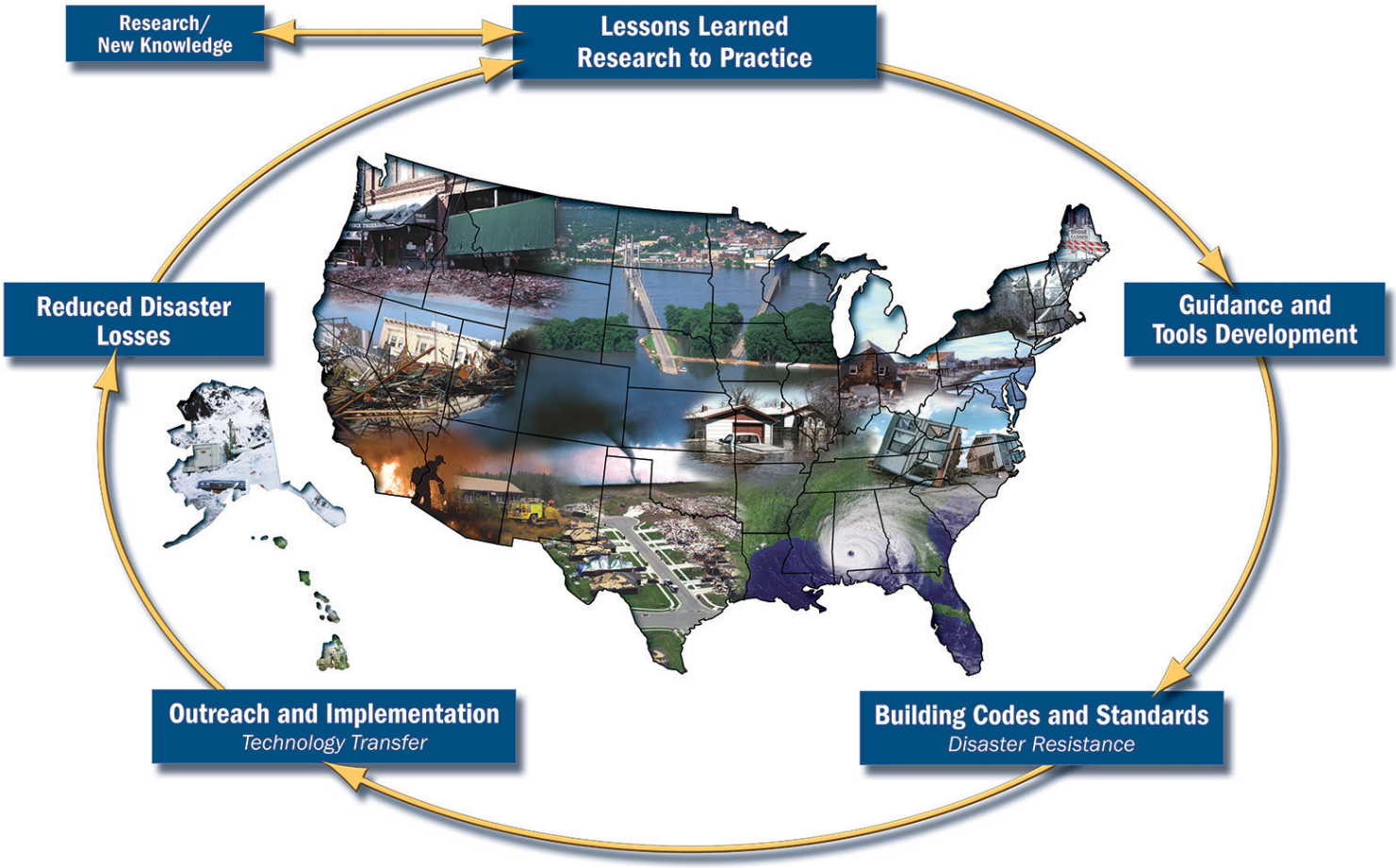
FEMA

Building Science Branch



Every year, natural disasters and human-made hazard events cause fatalities and injuries, and cost billions of dollars in property damage throughout the United States. Mitigation creates real value for the American people by reducing loss of life, injuries and property damage for communities who are faced with these hazards as well as by minimizing disruption and enabling faster recovery.

The FEMA Building Science Branch studies these hazards and provides technical services within FEMA, to the rest of the federal government and to our private sector partners. With a focus on earthquake, wind, flood and other natural and human-made hazards, the Building Science Branch takes a lead role in developing state-of-the-art publications, guidance materials, tools, training, technical bulletins and recovery advisories that incorporate the most up-to-date building codes, flood damage resistant requirements, seismic design guidelines and wind design requirements for new and existing buildings.

For more information on the Building Science Branch, visit www.fema.gov/building-science.

Flood Overview

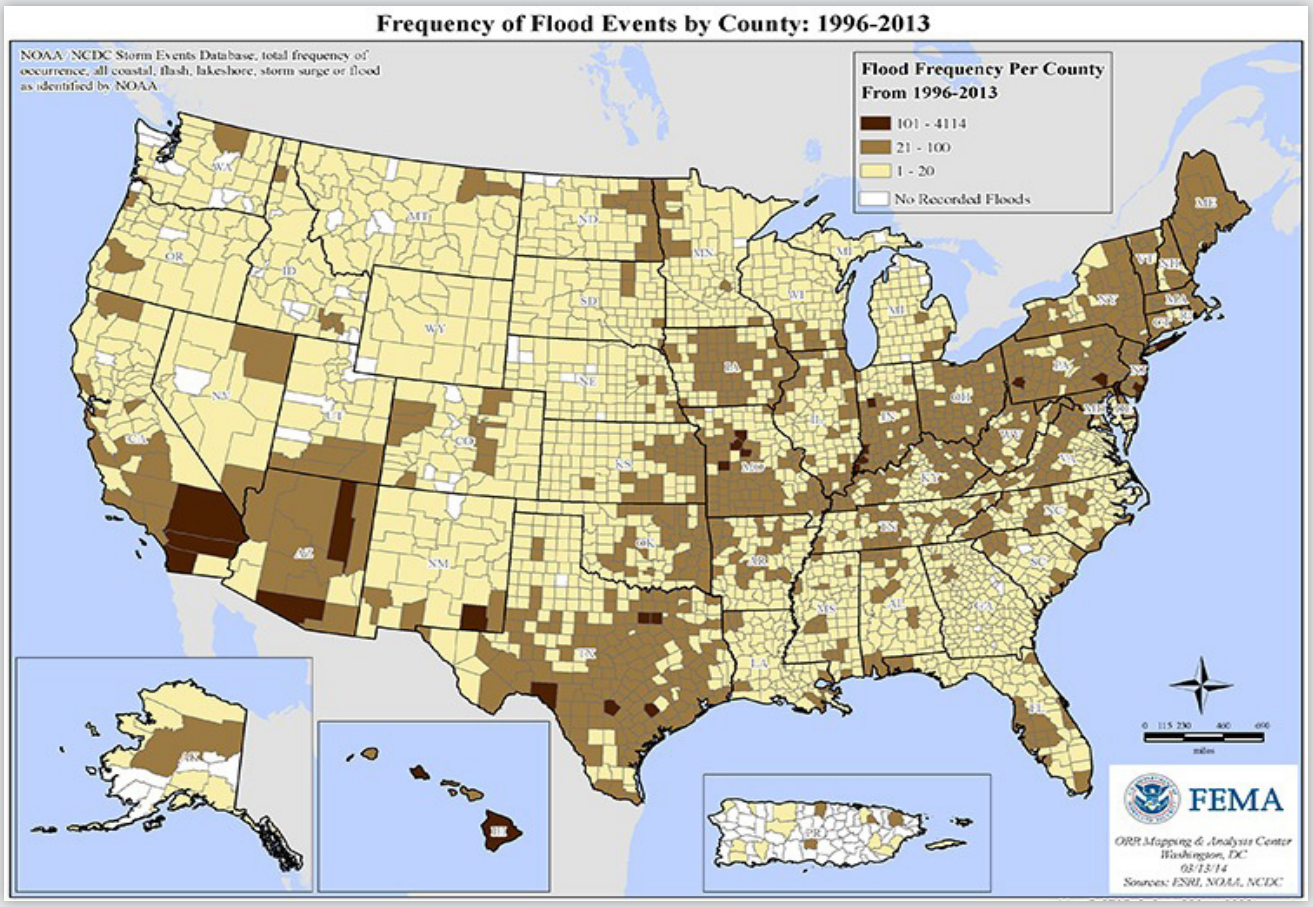
Floods are one of the most frequent hazards in the U.S. In the past five years alone, all 50 states have experienced floods or flash floods. Flooding is a process that may occur in a variety of forms, including, but not limited to, coastal flooding from hurricanes and tropical storms and flooding from inland floodplain hazards.

A flood is a general and temporary condition where two or more acres of normally dry land or two or more properties are inundated by water or mudflow. Your flood risk isn't just based on history; it's based on many factors that include current weather patterns and natural changes in the environment.

Hurricanes and tropical storms cause floods that can create far more damage than high winds. Nor'easters, or extra-tropical cyclones, also cause flooding and storm surge. Heavy rains, winter storms, and spring thaws bring flooding to river basins. Overburdened or clogged drainage systems lead to property damage both within and outside floodplains. Construction and new development affect natural drainage and create new flood risks.

Flood effects can be local, impacting a neighborhood or community, or very large, affecting entire river basins and multiple states. Some floods develop slowly, sometimes over a period of days. Flash floods can develop quickly, sometimes in just a few minutes or without any visible signs of rain.

Every state is at risk from this hazard. To help people prepare, FEMA's Building Science Branch has published guidance for homeowners, builders, local officials, design professionals, and facility owners/managers to help mitigate against flood hazards. These resources can be found in the Catalog of FEMA Building Science Branch Publications.



Impacts

Hurricanes & Tropical Storms

Hurricanes have caused eight of the ten costliest natural disasters in U.S. history, but it takes only one storm to cause flooding. Risk isn't limited just to storm surge on the coast; heavy rains and flash floods can affect communities hundreds of miles inland. Vertical evacuation structures provide a means to create areas of refuge for communities in which evacuation out of the inundation zone is not feasible. Read more at www.fema.gov/media-library/assets/documents/14708.

"When the Waves Swell" is a hurricane awareness and preparedness animation. Being prepared for a flood can help keep your family safe, minimize potential flood damage, and accelerate recovery efforts. Find out more at www.FloodSmart.gov.

Storm Surge

Storm surge occurs when a storm's winds push sea water toward the shore. The advancing surge combines with normal tides to create a hurricane storm tide, raising the average water level 15 feet or more. Storm surge can be hugely destructive. Sand dunes can be washed out, buildings near the coast can be toppled, and the surge can push flooding miles inland through rivers.

Waves

Even small storms can bring wave action that causes flooding, and waves can seriously erode natural barriers over time. Flood maps and insurance rates take waves into account by identifying VE zones, which are subject to wave heights of 3 feet or more. Buildings in these areas should be elevated using piers, posts, and pilings to protect against wave action. However, lesser wave heights can also be damaging to coastal buildings.

Levees & Dams

Levees are designed to protect against a certain level of flooding, but can and do decay over time. Levees can also be overtopped or breached during large floods. Dams are an important resource in the U.S., providing many functions that include recreation, flood control, irrigation, water supply, and hydroelectric power, but they can also be breached with little warning. Levee and dam breaches can result in catastrophic flooding.

Heavy Rains

Heavy rains can happen throughout the year, putting property at risk. Cresting rivers, backed-up storm drains, and saturated ground all contribute to significant flooding when there is an excessive amount of rainfall.

Mitigation

Building Codes

Building codes are sets of regulations governing the design, construction, alteration, and maintenance of buildings and other structures. They specify the minimum requirements to adequately safeguard the health, safety, and welfare of building occupants. Building codes are the cornerstone of effective mitigation, and the Building Science Branch supports and promotes building codes that help buildings resist the impacts of natural hazards. Communities either enforce building codes adopted at the state level or they may elect to adopt codes, if not required by the state.

After being flooded by Hurricane Sandy, Long Island homeowner Al Grover decided to raise his home 13 feet in order to mitigate future flood damage. FEMA P-312, Homeowners Guide to Retrofitting, provides guidance for homeowners seeking to better protect their homes from flooding.

FEMA L-782, *Building Science for Disaster-Resistant Communities: Flood Hazard Publications*, provides a summary of publications to help homeowners prepare for and mitigate against flood hazards. State and local officials can use FEMA P-784 CD, *Substantial Damage Estimator*, when determining damage for residential & non-residential structures in accordance with local building codes. FEMA has also published an accompanying *Substantial Damage Estimator Best Practices* document.

Flood Insurance

The National Flood Insurance Program (NFIP), is a federal program administered by FEMA, which works closely with more than 80 private insurance companies to offer affordable flood insurance to homeowners, renters and business owners. In order to qualify for flood insurance, the home or business must be in a community that has joined the NFIP and agreed to enforce sound floodplain management standards.

Flood maps, known officially as Flood Insurance Rate Maps (FIRMs), show areas of high and moderate to low flood risk. Communities use the maps to set minimum building requirements for coastal areas and floodplains. Increased flood damage resistance is achieved through improvements in codes and standards, designs, methods, and materials used for new construction and post-disaster repair and recovery. FEMA's Mitigation Assessment Team (MAT) Program develops reports and recovery advisories as part of the process.

The NFIP's Community Rating System (CRS) is a voluntary incentive program that recognizes communities for implementing floodplain management practices that exceed the Federal minimum requirements. The three goals of the CRS are: reducing flood damage to insurable property, strengthening and supporting the insurance aspects of the NFIP, and encouraging a comprehensive approach to floodplain management.

Learn more about the NFIP at www.fema.gov/national-flood-insurance-program or view your flood map at FEMA's Flood Map Service Center.

Floods

Floods are the number one natural disaster in the U.S. However, many residents and business owners are unaware that they qualify for flood insurance. You can take steps to reduce the financial impact of flooding before disaster strikes.

One important step is understanding your risk. Many events can lead to increased risk of flooding due to heavy rains, flash flooding, and mudflows. Residents and business owners need to prepare for flood conditions. Before the threat of flooding becomes imminent, residents and business owners should:

- **Purchase a flood insurance policy if they do not already have one.**
- **Review their current insurance policy, become familiar with what is covered, and ensure the limits are adequate for their building and personal belongings.**
- **Itemize and take pictures of possessions.**
- **Make an emergency kit, plan evacuation routes, and keep important papers in a safe, waterproof place.**

For more information, visit FloodSmart.gov.

TERMS TO KNOW

Flood Watch
Flooding is possible. Tune in to NOAA Weather Radio, commercial radio, or television for information.

Flash Flood Watch
Flash flooding is possible. Be prepared to move to higher ground; listen to NOAA Weather Radio, commercial radio, or television for information.

Flood Warning
Flooding is occurring or will occur soon; if advised to evacuate, do so immediately.

Flash Flood Warning
A flash flood is occurring; seek higher ground on foot immediately.

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