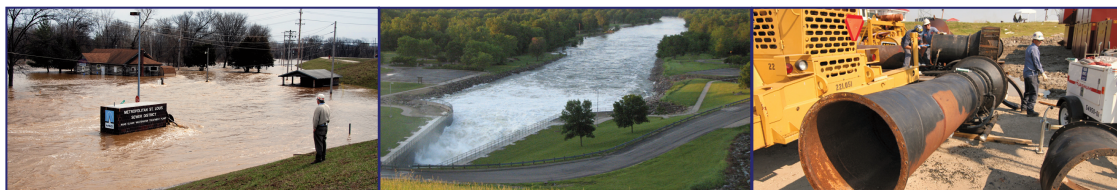




US Army Corps  
of Engineers®

# Flood Risk Management

*Value to the Nation*



WATER  
WORKS  
BANKS



# Value of Flood Risk Management

Every year floods sweep through communities across the United States taking lives, destroying property, shutting down businesses, harming the environment and causing millions of dollars in damages. Nearly 94 million acres of land in the United States are at risk for flooding. It is impossible to prevent all floods, but it is possible to prevent some and to limit the damage and risk from those that do occur.

One of the primary missions of the U.S. Army Corps of Engineers is to support flood risk management activities of communities in both urban and rural areas throughout the United States. To carry out this mission, the Corps operates projects that reduce flood risk and conducts emergency management activities. At the direction of Congress, the Corps studies and implements flood risk management measures. Over the years the Corps has significantly reduced the impacts of floods by implementing measures such as dams, levees and floodplain management activities.

## Value of Floodplains

Floodplains are complex systems that support ecological, social and economic services. Many of the functions and processes of floodplains cannot easily be quantified. Some examples of the diversity of benefits of floodplain areas are:

- Natural flood reduction capabilities
- Fish and wildlife habitat
- Natural vegetation
- Surface water quality and quantity
- Ground water quality and quantity
- Open space
- Agricultural land
- Recreation
- Historic and archaeological preservation

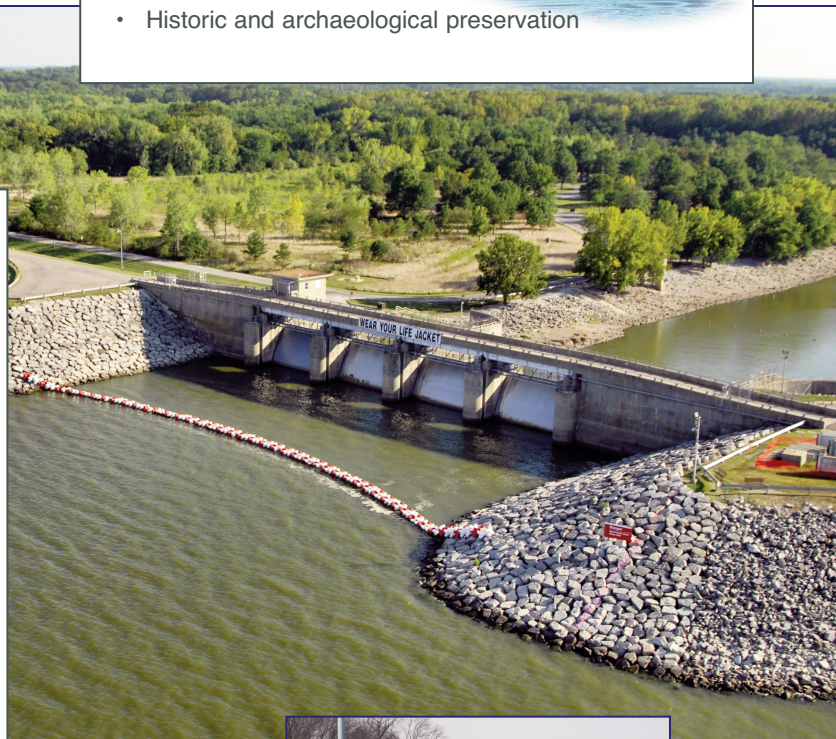


## Evolution of Flood Risk Management

Since the enactment of the Flood Control Act of 1917, the Corps has played a significant Federal role in managing flood risk nationwide. However, the Corps' mission and its implementation has evolved over time, moving from flood control to flood damage reduction and now, most recently, to flood risk management.

Flood risk management is the process of identifying, evaluating, selecting, implementing and monitoring actions taken to mitigate levels of risk. Scientifically sound, cost-effective, integrated actions are taken to reduce risks. Social, cultural, ethical, environmental, political and legal considerations are accounted for in the process.

There is an increased awareness within the Corps that more needs to be done to assess, manage and communicate flood risks. In 2006, the Corps established the National Flood Risk Management Program in order to advance the goals of flood risk identification, communication, response, and management services across all levels of government in order to save lives and reduce property damage in the event of floods and coastal storms.



# Value to Individuals and Communities



The goal of the Corps Flood Risk Management mission is to reduce flood risk by saving lives and reducing property damage in the event of floods and coastal storms. By supplying technical and geographical data, the Corps assists communities in developing responses to flood risks and hazards. The Corps also directly enhances public safety with structural and non-structural measures and emergency actions.

Also, through effective planning, forecasting and preparation, we can all help prevent floods or substantially reduce the loss of lives and property when they occur. People who live and work in the floodplain need to know about the flood hazard and the actions that they themselves can take to reduce property damage and to prevent the loss of life caused by flooding.

Specific Corps activities geared towards preparing individuals and communities for potential floods include:

**Structures** - The Corps is responsible for the construction and operation of 383 major lake and reservoir projects, construction of over 8,500 miles of levees and dikes, construction of about 90 major shoreline protection projects along 240 miles of the nation's 2,700 miles of shoreline, building of hundreds of smaller local flood risk reduction projects that have been turned over to non-Federal authorities for operation and maintenance, and implementation of several non-structural projects to reduce susceptibility to flood damages.

**Advance Measures** - When it appears that a flood is imminent in a specific area the Corps can take a number of immediate steps to protect life and property, such as constructing temporary flow restriction structures and removing log debris blockages.

**Floodplain Management Services (FPMS) Program** - The Corps provides information, technical assistance and planning guidance (paid for by the Federal Government) to states and local communities to help

them address floodplain management issues. Typical focus areas are wetland assessment, dam safety/failure, flood damage reduction, floodplain management and coastal zone management and protection.

## Federal Emergency Management Agency (FEMA)

**Mapping** - Over the past 30 years, the Corps has completed 3,000 studies for FEMA, mapping the flood potential of various areas of the country. The Corps also has been instrumental in training private firms to carry out similar studies.

These measures are designed to reduce risks from flood hazards to people and their homes and businesses. Funding for flood and coastal storm damage reduction activities represents approximately 30% of the Corps' annual Civil Works budget authority.

## Taking Small Steps to Address a Large Problem

Section 205 of the Flood Control Act of 1948 allows the Corps to implement small flood reduction projects without seeking separate Congressional approval. Through this program, the Federal government can contribute up to \$7 million dollars to address specific local flood problems in a fast-tracked program with a feasibility study prepared in partnership with a non-Federal sponsor. Both structural and nonstructural alternatives can be considered for these projects. Such works are instrumental for efficiently preventing or mitigating flood damages, particularly when the risk is localized. Recommendations are made in a feasibility report prepared in partnership with a local sponsor. Under these conventions the Corps can enact flood risk management projects of the size and scope needed in many communities and maintain collaboration with local entities.

The Snoqualmie Flood Reduction Project is a Section 205 proposal to lower flood depths in and around the city of Snoqualmie, WA. Its three major elements include: rock excavation along the right bank upstream of the hydroelectric intake, earth excavation along the left bank downstream of the SR 202 bridge and removal of a partially-failed railroad bridge.





# Value to the Economy

Some of the most valuable real estate in the nation is also located in high risk areas that are prone to flooding. Many industrial facilities are built near rivers and harbors for easy access to waterborne transportation. Coastal metropolitan zones are engines of growth for the economy. Coastal communities are highly desirable as residential locations and tourist destinations and offer many recreational activities but are vulnerable to coastal storm and flood damage.

The Corps Flood Risk Management mission reduces the risk of flood damage to these facilities and homes as well as to vital infrastructure such as energy grids and transportation networks.

Since 1936 the Corps has completed over 400 major lake and reservoir projects, emplaced over 8,500 miles of levees and dikes, and implemented hundreds of smaller local flood damage reduction projects.

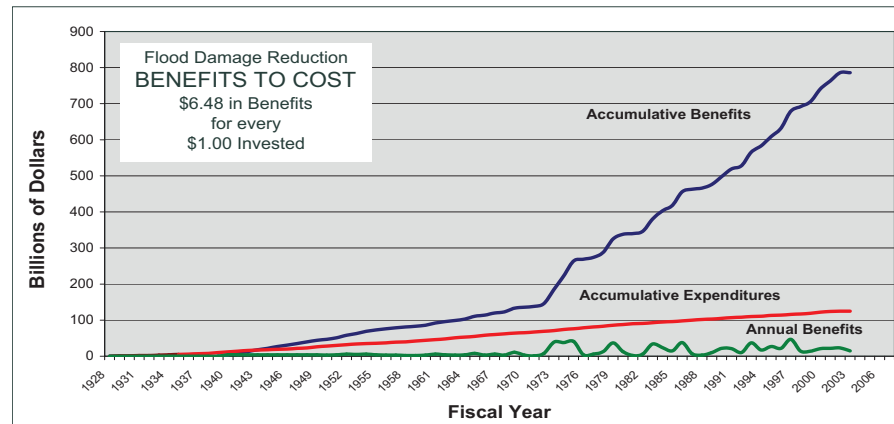
These projects have prevented an estimated \$706 billion in river and coastal flood damage, most of that within the last 25 years. The cumulative cost for building and

maintaining these projects to date is more than \$120 billion. That means for every dollar spent, approximately six dollars in potential damages have been saved.

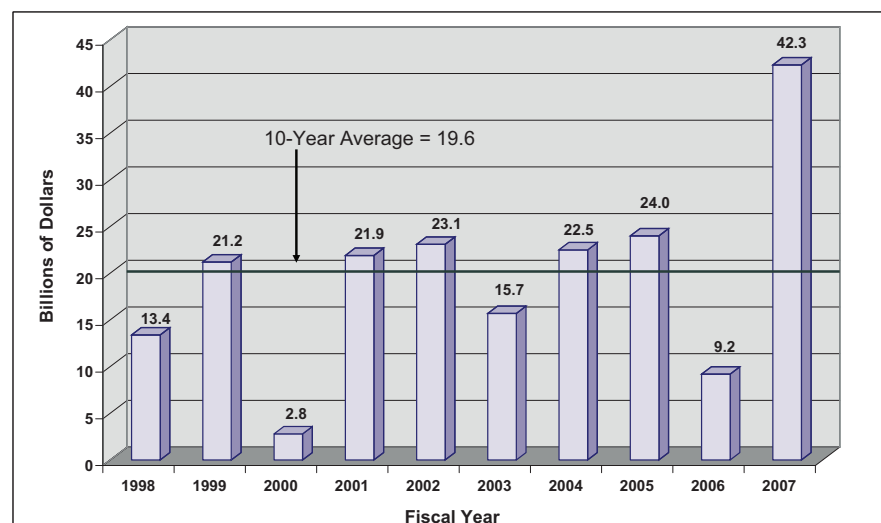
National flood damages averaged around \$3.9 billion per year in the 1980s and then nearly doubled from 1995 through 2004. Total disaster assistance for both emergency response operations and subsequent long-term recovery efforts

**Benefits of Federal Projects (Damages Prevented)  
Cumulative Corps Expenditures (Principle plus O&M)**

*Adjusted to 2000 Using Construction Cost Index EM 1110-2-1304*



**Flood Damage Reduction**



Flood Damages Prevented in the U.S.A. by the U.S. Army Corps of Engineers

increased from an average of \$444 million during the 1980s to \$3.75 billion during the 1995-2004 decade.

Typically, Corps flood risk management projects are turned over to states, local communities or the private sector for ongoing operation and maintenance, creating jobs and revenue.

The Corps' quick emergency response to floods also helps the economy by preventing or reducing damage to businesses. The Corps' ability to rapidly restore utilities, clear roads and rivers, and reinstate other vital services allows companies to get back to business quickly, reducing flood related revenue losses.

# Value to the Economy

Finally, through the Floodplain Management Service Program the Corps responds to state and local requests for flood risk and assessment information. In a recent year this service responded to more than 44,000 requests for information. These data have helped protect property from potential flood damage. Another effort, the Interagency Levee Task Force, fostered rapid and effective recovery of floodplain management systems affected by the Midwest floods of 2008.



## Responding to Floods

Despite our best efforts, it is still impossible to entirely prevent floods. When a flood does occur, Corps personnel are there to help. Often onsite in flooded areas within hours, the Corps works with other Federal, state and local agencies to provide a variety of vital services including:

- Supplying drinkable water and emergency power;
- Helping in search and rescue operations;
- Clearing debris and blockages of critical water intakes, sewer outflows and drainage channels;
- Providing engineering services;
- Emergency flood fighting;
- Making emergency repairs to levees and other flood control projects;
- Restoring public services and facilities, like electrical power or water supply systems;
- Offering technical assistance, including structural evaluations of buildings and damage assessments;
- Building temporary shelters; and
- Assisting with long-term recovery and reconstruction.

## Interagency Levee Task Force Midwest Floods of 2008

In 2008, the Corps led the development of a collaborative regional approach to the long-term restoration of flood management systems damaged by the Midwest Floods of June 2008.

By working with FEMA and other Federal, state and local agencies, the Corps assembled a regional Interagency Levee Task Force (ILTF) to implement a uniform approach across the region. Interagency Levee Work Groups operated in state joint field offices to review assistance requests from local entities, evaluate nonstructural alternatives and participate in the levee restoration process.

The ILTF worked to restore and protect residential, agricultural, commercial and industrial interests across the region. Applicants received assistance with levee restoration and repair from the task force.

## Structural and Nonstructural Solutions

Structural measures have traditionally been used to control flood waters. These solutions include levees, dikes, dams and reservoirs and they have successfully provided flood protection across the country.

Nonstructural measures modify the ways that a floodplain is used and can provide places for floodwaters to go while avoiding damage to communities. These solutions encompass measures such as expanding floodways and natural habitats, creating flood water storage basins, enacting permanent evacuation of flood-prone areas, floodplain management initiatives and installing flood-warning systems.



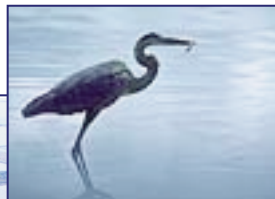


# Value to the Environment

The Corps flood risk management and emergency response efforts help to limit the level of environmental damage caused nationwide by floods. Environmental considerations are an integral component of the planning process for all flood risk management projects the Corps undertakes.

For example, the Corps continues to encourage the implementation of non-structural solutions that involve modifying how floodplains are used or accommodating current uses to potential flood hazards.

A non-structural approach helps avoid changes to the floodplains that might have a negative effect on the environment. Floodplains are complex natural systems that provide habitat for plants, fish, and wildlife and contribute to the overall health of the environment. Significant changes to floodplains can upset this delicate balance. As part of its flood damage reduction efforts, the Corps has also instituted a program to manage sediment on coastal shores in an effort to protect property, infrastructure and valuable habitats.



## Finding a Balance

When undertaking flood risk management studies, the Corps strives to balance and integrate society's needs for economic growth, public safety and environmental quality. Trade-offs must be evaluated to determine which project provides the greatest benefit to the nation. Finding a balance that is acceptable to all stakeholders and decision makers is one of the greatest challenges faced by the Corps.

## Napa River Flood Protection Project

NAPA, CALIFORNIA

The Napa River drainage basin comprises 426 square miles. The Flood Protection Project includes floodwalls, levees, excavated bypasses, bridge relocations and pumping stations, all of which will help to significantly reduce the potential for flood damage. The innovative design approach, though, also allows for extensive ecosystem restoration in excavated areas.

## Johnson Creek

ARLINGTON, TEXAS

The Corps has implemented a multi-objective flood risk management and ecosystem restoration project on Johnson Creek in Arlington, Texas. Ecosystem restoration alternatives include bank protection; natural channel design to restore, protect and expand the riparian corridor; aquatic habitat improvement; and construction of wetlands. Nonstructural measures include acquisition and removal of structures while the structural measure is channel modification. The recreation component of the project consists of trails, footbridges and picnic spots.

# Working Together

In the United States, the responsibility for managing flood risks is shared across the Federal, state and local levels of government and the private sector. In the absence of continuous collaboration conflicting policies, programs and interests from multiple layers of government can work at cross purposes and undermine efforts to improve flood risk management nationwide.

In May 2006, the Corps established the National Flood Risk Management Program to provide support to the mission on integrating and synchronizing Corps flood risk management activities, both internally and with counterpart activities of the Department of Homeland Security, Federal Emergency Management Agency (FEMA), other Federal agencies, state organizations and regional and local agencies.

## Silver Jackets

Through a collaborative effort with state and Federal agencies, the Silver Jackets program develops and supports continuous interagency flood risk management teams at the state level.

Silver Jackets teams facilitate strategic life-cycle planning to reduce flood risk and provide assistance in implementing state-identified high priority actions. Information and available resources are leveraged between agencies. Together, agencies solve issues and implement those solutions.

The Silver Jackets program proposes establishing an interagency team in each state with a representative from the Corps, Federal Emergency Management Agency (FEMA), the State National Flood Insurance Program (NFIP) coordination office, and the state hazard mitigation office. Other agency representatives may vary based on team focus and activities. The intent of this program is not to duplicate existing interagency teams, but to supplement already successful teams, strengthen existing relationships and establish new relationships.



Specific goals of the Program include:

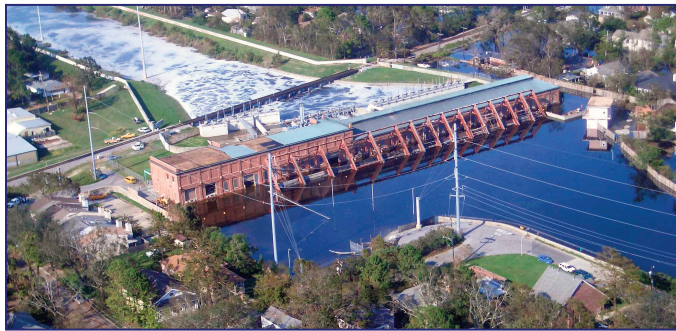
- providing current and accurate floodplain information to the public and decision makers,
- identifying and assessing flood hazards posed by aging flood damage reduction infrastructure,
- improving public awareness and comprehension of flood hazards and risk,
- integrating flood damage and flood hazard reduction programs across Federal, state, and local agencies, and
- improving capabilities to collaboratively deliver and sustain flood damage reduction and flood hazard mitigation services to the nation.





# Tomorrow's Challenges

**F**lood Risk Management reduces the risk of damage and loss of life due to flooding and coastal storms. However, risk can never be completely eliminated. Substantial flood damage still occurs, and lives are still at risk from flooding.



There are many reasons the nation faces flood risk. Challenges include:

- Many of the more than 20,000 communities in the United States, as well as rural floodplain areas, are still susceptible to flooding
- Aging infrastructure decreases reliability and increases maintenance costs
- New developments may influence run-offs and increase flood risk

- Climate change may alter flooding patterns
- Federal and local flood risk policies sometimes are inconsistent
- Communities need to be more aware of risks and develop emergency management plans
- Current legislation only allows the Corps to study and build projects where willing sponsors exist
- Our understanding of hydrology is not complete; it improves over time as we gain experience with each new event
- Recognition that residual risk is always present

The Corps is taking steps to address these challenges. As the Corps moves into the future, it must:

- Seek water resources solutions that better integrate economic, environmental and quality of life objectives
- Promote investment in flood and coastal risk management solutions
- Support the formulation of regional and watershed approaches to water resource problems
- Improve the efficiency and effectiveness of existing Corps water resource projects
- Address the operations and maintenance (O&M) backlog

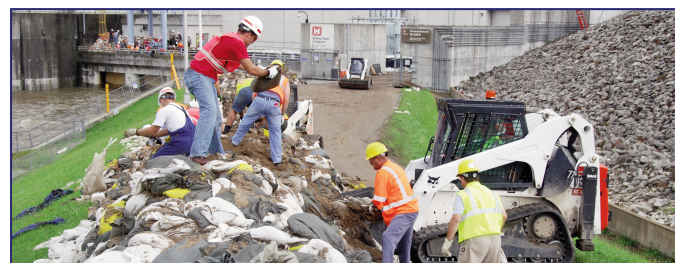
# Sharing the Challenge

**T**he Corps' approach to flood risk management includes encouraging partners and stakeholders, including states and affected citizens. Federal agencies collaborate to effectively and efficiently reduce flood risks and increase the nation's awareness of coastal and inland risks. These Federal partners include:

- Federal Emergency Management Agency
- Department of Housing and Urban Development
- National Oceanic and Atmospheric Administration
- Bureau of Reclamation
- Natural Resources Conservation Service
- United States Geological Survey
- Department of Homeland Security

## Learn More

To learn more about the Corps emergency management efforts visit [www.CorpsResults.us](http://www.CorpsResults.us)



US Army Corps  
of Engineers®

Visit our Value to the Nation website: [www.CorpsResults.us](http://www.CorpsResults.us)

©2009 Produced by the U.S. Army Engineer Institute for Water Resources. To inquire about this brochure, please contact the IWR publications office at [CEIWR.Publications@usace.army.mil](mailto:CEIWR.Publications@usace.army.mil). For the sources of information used in this brochure, visit [www.CorpsResults.us](http://www.CorpsResults.us).