

**GUIDE FOR COMMUNITIES PARTICIPATING
IN THE NATIONAL FLOOD INSURANCE PROGRAM
IN ARKANSAS**

VOLUME 1

**FLOODS AND FLOODPLAIN MANAGEMENT
NATIONAL FLOOD INSURANCE PROGRAM
STATE LEGISLATION
(Chapters 1 and 2)**



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STATE OF ARKANSAS

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March 2008

TO: LOCAL FLOODPLAIN ADMINISTRATOR
of Communities Participating in the National Flood Insurance Program

Flooding continues to be a major problem for communities in Arkansas. Through the National Flood Insurance Program (NFIP), many citizens can now insure their property against flood losses. At the same time, future losses can be reduced by proper management of flood-prone areas.

This guide is intended to assist local officials of communities, which are participating in the NFIP, in managing their floodplains. Further assistance may be obtained by contacting the Arkansas Natural Resources Commission.

We acknowledge the assistance of the Federal Emergency Management Agency (FEMA), through the Community Assistance Program - State Support Services Element, in the preparation of this guide. Through such programs the efforts of Federal, State and Local governments can be effective in reducing future flood losses.

A handwritten signature in black ink, appearing to read "J. Randy Young".

J.Randy Young, P.E., Executive Director

ORIENTATION

A. INTRODUCTION

This guide is contained in four (4) volumes. Chapters are numbered consecutively throughout the document. The Orientation and Table of Contents are repeated at the beginning of each volume.

This guidebook is intended to provide Floodplain Administrators and other local officials with tools in managing development in the floodplain as a participating community in the National Flood Insurance Program (NFIP). Any questions should be directed to the Floodplain Management Program of the Arkansas Natural Resources Commission (ANRC). Floodplain Administrators should read through this guide to familiarize themselves with its contents.

Each floodplain administrator should become familiar with the community's floodplain management regulations, usually contained in the form of an ordinance, code or some combination.

The evaluation of development permits is also very important. Special attention should be given to non-structural developments, such as placement of fill and alterations of stream channels, and to the "floodway" requirements. Some communities have separate "floodway" maps and Flood Insurance Study (FIS) booklets. Some have "floodways" included on the Flood Insurance Rate Maps (FIRMs). Generally, if the FIRM has "base flood elevations" on any part of the floodplain, the community has a "floodway" map.

Remember, that how the floodplain administrator conducts his or her business can have significant consequences for property owners and occupants of the floodplain. Whether it's savings on a flood insurance bill or protection from a flood, there will come a time when conscientious floodplain management will be rewarded.

The responsibility for reducing flood losses is shared by all units of government - local, state and federal - and the private sector.

Fulfilling this responsibility depends on having the knowledge and skills to plan and implement needed floodplain management measures. The fundamental floodplain management program that most others are built on is the National Flood Insurance Program (NFIP).

The NFIP provides the maps and regulatory basis for local floodplain management. It is also the primary source of insurance protection for flood-prone properties. Its success depends on the people responsible for administering its mapping, regulatory and insurance aspects.

This document can serve two purposes. First, it can be used as a study guide to enhance the knowledge and skills of local officials responsible for administering and enforcing local floodplain management regulations. It is also intended to broaden their understanding of floodplain management strategies that can be applied at the local level.

Second, the study guide can be used as a desk reference that you can refer to when specific issues arise as you implement your floodplain management ordinance. Guidance is included on how to handle many of these issues and information provided that will help you explain the requirements to citizens of your community. References are included on where to find more information or guidance on many issues. The FEMA documents that are referenced are available from the FEMA Distribution Center at 1-800-480-2520. The address is: Federal Emergency Management Agency, Attention: Publications, PO Box 2012, Jessup, MD 20794-2012. Most of these publications can also be can be downloaded from the FEMA website, <http://www.fema.gov>.

While any interested person may use this study guide and desk reference, it is written specifically for the local official who is responsible for administering his or her community's floodplain management regulations. Thus, references to "you," assume that you are a local official.

STUDY GUIDE OBJECTIVES

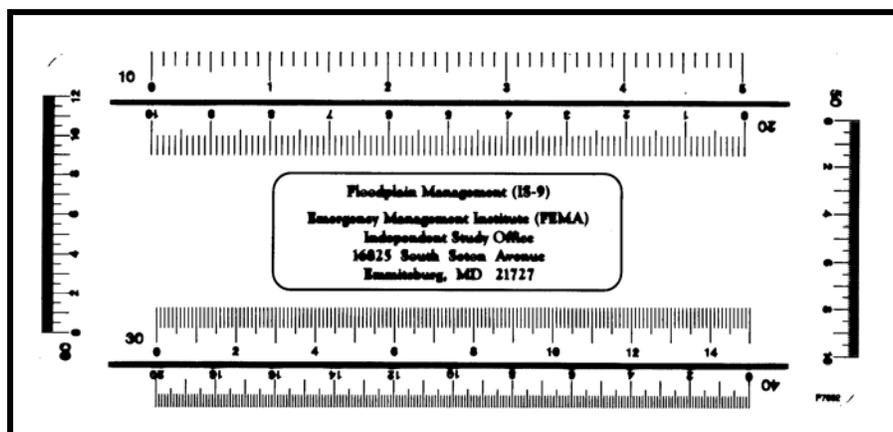
Upon completing this study guide, you should:

1. Be familiar with flood hazards and how human development interacts with the natural process of flooding.
2. Understand the purpose of the NFIP and your community's role in it.
3. Understand the basis for flood maps and data.
4. Be able to use floodplain studies and maps to support your floodplain management program.
5. Be able to explain the minimum regulatory requirements of the NFIP.
6. Be familiar with additional regulatory standards that your community could adopt.
7. Understand your responsibilities in administering your community's floodplain regulations for new construction.
8. Understand how to administer your community's floodplain regulations for repairs and improvements to existing buildings.

9. Be familiar with how flood insurance policies are written and how they relate to your community's regulations.
10. Be prepared to administer your floodplain regulations following a disaster.

These 10 objectives are the topics of the chapters in this study guide.

Engineers Scale. You should obtain a clear plastic engineer's scale or similar measuring device for use in several of the exercises in Volume 4, Appendix H, of this study guide and for day-to-day implementation of your ordinance. A scale helps convert measurements on a map to distance on the ground.



B. USING THE STUDY GUIDE

To administer a floodplain management program, you need to know about regulations and procedures under the National Flood Insurance Program. This study guide is designed to prepare you to serve as your community's floodplain management administrator. As you can tell by the number and size of these volumes, you need to acquire a daunting amount of information. Most of what you need is covered in these pages, as these documents are a comprehensive guide to the NFIP and your role as administrator. By design, this study guide will help you learn. Key words and phrases appear with underlines and they are listed in the glossary in Appendix D. Each chapter has frequent learning checks and a comprehensive review at the end. Be sure to do all of these – you learn best when you practice using the materials. The study guide does not have an index. However, each of the ten chapters covers a specific topic or area. At the beginning of each volume is a detailed Tables of Contents. You should be able to find where an issue is addressed in the study guide by scanning the Table of Contents. Special "Arkansas Inserts" supplement the main text.

WHERE TO GET HELP

For help in understanding any of the course content, contact your FEMA Regional Office or NFIP State Coordinator. These offices are listed in Appendices A and B.

C. ACKNOWLEDGMENTS

This study guide and desk reference is based on **FEMA Publication 480: National Flood Insurance Program (NFIP) Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials**. The FEMA document has been expanded by including information specific to Arkansas. Detailed discussions of coastal floodplains and other topics which do not affect Arkansas have also been omitted. Still, the increase in number of pages has led to a division of the single volume guide into four (4) volumes.

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CHAPTER 1

FLOODS AND FLOODPLAIN MANAGEMENT

INTRODUCTION

Floods are a common occurrence in many parts of the United States. They are probably most associated with the Mississippi River and its tributaries. During this century alone, several great floods have occurred over vast areas of the Mississippi River Basin. Two of the most memorable of these are the Flood of 1927 and the Flood of 1973.



1927 Mississippi River Flood: Arkansas City

When Arkansans speak of the “Great Flood,” they are generally referring to the 1927 flood. And while no flood has had such statewide coverage, few regions or communities within the State have not been affected by significant floods since then. Over the past 20 years, floods have affected communities in some portion of the State virtually every year. Often these events were accompanied by Presidential Disaster Declarations, such as 1982, 1987, and 1990.

For occupants of the State’s floodplains, it is just a matter of time before they too are affected.

Throughout time, floods have altered the floodplain landscape. These areas are continuously shaped by the forces of water - either eroded or built up through deposit of sediment. More recently, the landscape has been altered by human development, affecting both the immediate floodplain and events downstream.

Historically, people have been attracted to bodies of water as places for living, industry, commerce and recreation. During the early settlement of the United States, locations near water provided necessary access to transportation, a water supply and water power. In addition, these areas had fertile soils, making them prime agricultural lands.



City of Little Rock on the Arkansas River



Rebsamen Golf Course on Arkansas River

This pattern of development continued as communities grew. In recent decades, development along waterways and shorelines has been spurred by the aesthetic and recreational value of these sites.

The result has been an increasing level of damage and destruction wrought by the natural forces of flooding on human development. It is probable that you are reading this study guide because your community has experienced some of this. You, yourself, or someone you know may have suffered through a flood and a long, painful and expensive repair and recovery process.

The purpose of this study guide is to familiarize you with how this problem can be curbed through proper management of how your floodplains are developed. Communities that guide development following the standards of the National Flood Insurance Program have seen the results – their new buildings and neighborhoods have had less damage and suffering from flooding.

To start, we need an orientation into the natural processes of flooding. That is the focus of Section A. Many terms are introduced in this section, such as watershed and coastal erosion that are used throughout the course.

Next, we review of the other part of the equation – human development in the path of that flooding. The final section in this chapter discusses the Federal government's overall floodplain management effort and the other strategies and tools that help prevent and reduce flood damage.

A. FLOODS AND FLOODPLAINS

Floods are part of the Earth's natural hydrologic cycle.

The cycle circulates water throughout the environment (**Figure 1-1**). This process maintains an overall balance between water in the air, on the surface and in the ground.

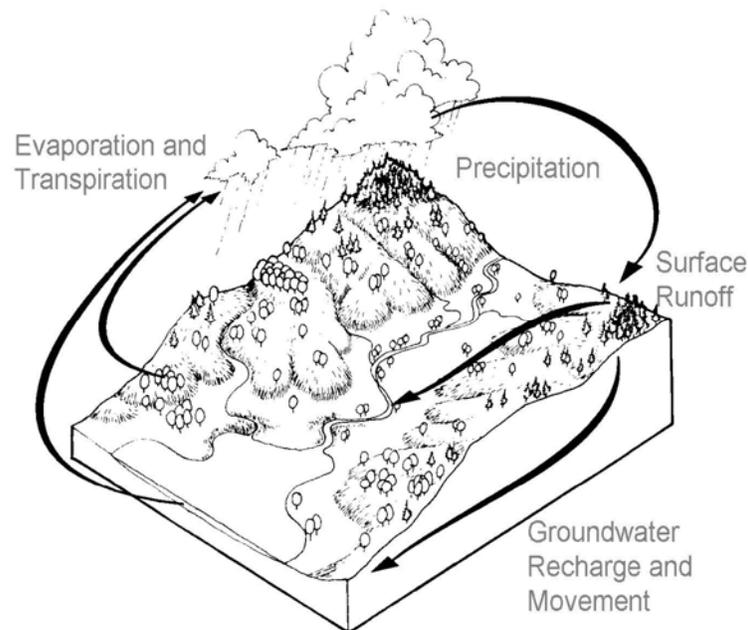


Figure 1-1. The Hydrologic Cycle

Sometimes the hydrologic cycle gets out of balance, sending more water to an area than it can normally handle.

The result is a flood.

A flood inundates a floodplain. There are different types of floodplains and they are based on they type of flooding that forms them.

Most floods fall into one of three major categories:

- Riverine flooding
- Coastal flooding
- Shallow flooding

RIVERINE FLOODING

A watershed is an area that drains into a lake, stream or other body of water. Other names for it are basin or catchment area.

Watersheds vary in size. Larger ones can be divided into sub-watersheds.

Figure 1-2 shows a watershed and some of the key terms. The boundary of a watershed is a ridge or divide. Water from rain and snowmelt is collected by the smaller channels (tributaries) which send the water to larger ones and eventually to the lowest body of water in the watershed (main channel).

Channels are defined features on the ground that carry water through and out of a watershed. They may be called rivers, creeks, streams or ditches. They can be wet all the time or dry most of the time.

When a channel receives too much water, the excess flows over its banks and into the adjacent floodplain. Flooding that occurs along a channel is called riverine flooding.

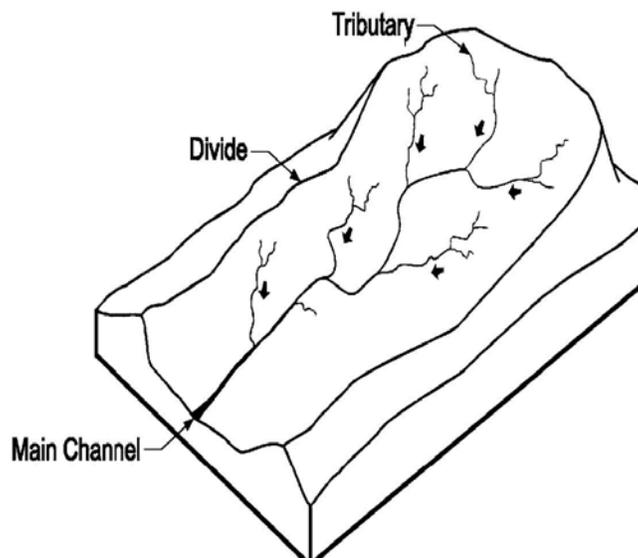


Figure 1-2. Riverine Watershed and Floodplain

What happens in a watershed will affect events and conditions downstream. Terrain helps determine the dynamics of riverine flooding. In relatively flat areas, shallow, slow-moving floodwater may cover the land for days or even weeks.

In hilly and mountainous areas, a flood may come scant minutes after a heavy rain. Such a flash flood gives short notice and moves so fast that it is particularly dangerous to people and property in its path.

Overbank flooding

The most common type of flooding in the United States is called overbank flooding (Figure 1-3).

Overbank flooding occurs when downstream channels receive more rain or snowmelt from their watershed than normal, or a channel is blocked by an ice jam or debris. For either reason, excess water overloads the channels and flows out onto the floodplain.

Overbank flooding varies with the watershed's size and terrain. One measure of a flood is the speed of its moving water, which is called velocity. Velocity is measured in feet per second.

Hilly and mountainous areas have faster moving water, so velocity can pose a serious hazard. In flat areas, the flood may move slowly, making its velocity less of a hazard.

Terrain may affect how much warning people have that a flood is building. Conditions on a river that drains a large watershed may warn of a pending flood hours or even days before actual flooding. On the other hand, streams in hilly areas may give no warning that a flash flood is about to strike.

Flood depths vary, as do flood durations. Generally, the larger the river, the deeper the flood and the longer it will last. However, in hilly or mountainous areas with narrow valleys, flooding can be very deep in small watersheds.

Depending on the size of the river and terrain of its floodplain, flooding can last for days and cover wide areas.

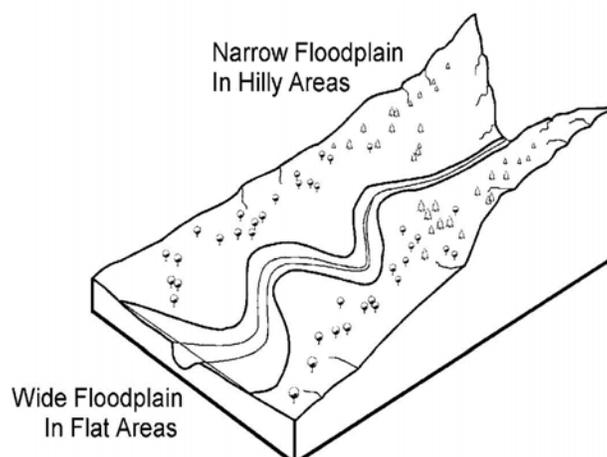


Figure 1-3. Riverine floodplain

Flash flooding

A severe storm that drops much rainfall in a short time can generate a flash flood. All flash floods strike quickly and end swiftly.

While flash floods occur in all fifty states, areas with steep slopes and narrow stream valleys are particularly vulnerable, as are the banks of small tributary streams. In hilly areas, the high-velocity flows and short warning time make flash floods hazardous and very destructive.

In urban areas, flash flooding can occur where impervious surfaces, gutters and storm sewers speed runoff. Flash floods also can be caused by dam failure, the release of ice-jam flooding, or collapse of debris dams.

Flash floods rank first as the cause of flood-related deaths in the United States. In the 1970s, four flash floods in a five-year period killed 570 people. Death tolls associated with the 1993 Mississippi River flood or hurricanes are in another category because such events build over several days, giving people enough time to evacuate safely.

- In 1972, 118 people died along Buffalo Creek in West Virginia when an embankment made of coal refuse washed out, destroying 546 houses and damaging as many more.
- Weeks later, 236 people died when heavy rain and a dam failure inundated the area near Rapid City, South Dakota. Property damage exceeded \$100 million.
- In 1976, heavy rains spawned floods in Colorado's Big Thompson Canyon, killing 139 people.
- The next year, 77 people died in Johnstown, Pennsylvania, when heavy rain overwhelmed a dam, causing \$200 million in damage.

Riverine erosion

River channels change as water moves downstream, acting on the channel banks and on the channel bottom (the thalweg). This force is made more potent during a flood, when the river's velocity increases.

Several features along a river are affected by this flow of water in different ways. A meander is a curve in a channel. On the outside of a meander, the banks are subject to erosion as the water scours against them (**Figure 1-4**). On the other hand, areas on the inside of meanders receive deposits of sand and sediment transferred from the eroded sites.

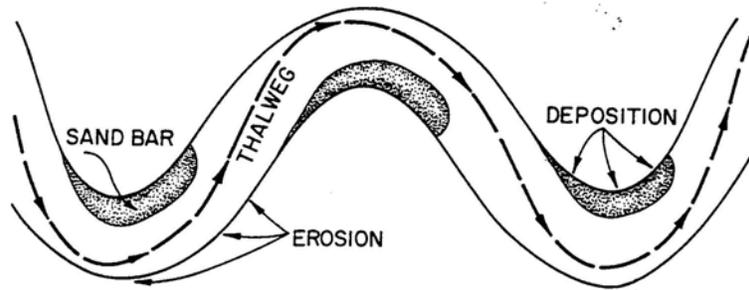


Figure 1-4. Erosion changes the shape of channels

Properties on the outside of curves face a double threat of inundation and undercutting from riverine erosion during floods (**Figure 1- 5**).

In addition, meanders do not stay in the same place—they migrate slowly downstream and across the floodplain, reworking the shape of the channel within the floodplain.



Figure 1-5. Riverine erosion can undercut structures

SHALLOW FLOODING

Shallow flooding occurs in flat areas where a lack of channels means water cannot drain away easily. Shallow flood problems fall into three categories: sheet flow, ponding and urban drainage.

Sheet flow

Where there are inadequate or no defined channels, floodwater spreads out over a large area at a somewhat uniform depth in what's called sheet flow.

Sheet flows occur after an intense or prolonged rainfall during which the rain cannot soak into the ground. During sheet flow, the floodwaters move downhill and cover a wide area.

Ponding

In some flat areas, runoff collects in depressions and cannot drain out, creating a ponding effect. Ponding floodwaters do not move or flow away. Floodwaters will remain in the temporary ponds until they infiltrate into the soil, evaporate or are pumped out.

Ponding is especially a problem in glaciated areas, where glaciers carved out depressions; in areas where caves and sinkholes are common, and in other areas where man-made features, such as roads and railroad embankments, have blocked outlets.

Urban drainage

An urban drainage system comprises the ditches, storm sewers, retention ponds and other facilities constructed to store runoff or carry it to a receiving stream, lake or the ocean. Other man-made features in such a system include yards and swales that collect runoff and direct it to the sewers and ditches.

When most of these systems were built, they were typically designed to handle the amount of water expected during a 10-year storm. Larger storms overload them, and the resulting backed-up sewers and overloaded ditches produce shallow flooding.

Another urban drainage problem occurs in the areas protected by levees. Being in floodplains, they are flat and don't drain naturally, especially when a levee blocks the flow to the river.

To drain these areas, channels have been built and pumps installed to mechanically move the water past the levee. Often, these man-made systems do not have the capacity to handle heavy rains or intense storms.

SPECIAL FLOOD HAZARDS

The flooding types described so far are associated with riverine flooding found in the United States. There are many special local situations in which flooding or flood-related problems do not fit the national norm or are not found in Arkansas. In Arkansas, there are hundreds of dams which have the potential for causing considerable property damage and loss of life.

Dam breaks

A break in a dam can produce an extremely dangerous flood situation because of the high velocities and large volumes of water released by such a break. Sometimes they can occur with little or no warning on clear days when people are not expecting rain, much less a flood.



Dam in northern Arkansas

Breaching often occurs within hours after the first visible signs of dam failure, leaving little or no time for evacuation. (As noted in the earlier section on flash flooding, three of the four top killer floods in the 1970s were related to the failure of a dam or dam-like structure.)

Dam breaks occur for one of three reasons:

- The foundation fails due to seepage, settling or earthquake.
- The design, construction, materials or operation were deficient.
- Flooding exceeds the capacity of the dam's spillway.

Proper design can prevent dam breaks. While dam safety programs can ensure that new dams are properly designed, there are still many private or locally built dams that were poorly designed and maintained.

NATURAL AND BENEFICIAL FLOODPLAIN FUNCTIONS

Floodplain lands and adjacent waters combine to form a complex, dynamic physical and biological system found nowhere else. When portions of floodplains are preserved in their natural state, or restored to it, they provide many benefits to both human and natural systems.

Some are static conditions - such as providing aesthetic pleasure - and some are active processes, such as reducing the number and severity of floods, helping handle stormwater runoff and minimizing non-point water pollution. For example, by allowing floodwater to slow down, sediments settle out, thus maintaining water quality. The natural vegetation filters out impurities and uses excess nutrients.

Such natural processes cost far less money than it would take to build facilities to correct flood, stormwater, water quality and other community problems.

Natural resources of floodplains fall into three categories: water resources, living resources and societal resources. The following sections describe each category's natural and beneficial functions.

Natural flood and erosion control

Over the years, floodplains develop their own ways to handle flooding and erosion with natural features that provide floodwater storage and conveyance, reduce flood velocities and flood peaks, and curb sedimentation.

Natural controls on flooding and erosion help to maintain water quality by filtering nutrients and impurities from runoff, processing organic wastes and moderating temperature fluctuations.

These natural controls also contribute to recharging groundwater by promoting infiltration and refreshing aquifers, and by reducing the frequency and duration of low surface flows.

Biologic resources and functions

Floodplains enhance biological productivity by supporting a high rate of plant growth. This helps to maintain biodiversity and the integrity of ecosystems.

Floodplains also provide excellent habitats for fish and wildlife by serving as breeding and feeding grounds. They also create and enhance waterfowl habitats, and help to protect habitats for rare and endangered species.

Societal resources and functions

People benefit from floodplains through the food they provide, the recreational opportunities they afford and the scientific knowledge gained in studying them.

Wild and cultivated products are harvested in floodplains, which are enhanced agricultural land made rich by sediment deposits. They provide open space, which may be used to restore and enhance forest lands, or for recreational opportunities or simple enjoyment of their aesthetic beauty.

Floodplains provide areas for scientific study and outdoor education. They contain cultural resources such as historic or archaeological sites, and thus provide opportunities for environmental and other kinds of studies.

These natural resources and functions can increase a community's overall quality of life, a role that often has been undervalued. By transforming stream and river floodplains from problem areas into value-added assets, the community can improve its quality of life.

Parks, bike paths, open spaces, wildlife conservation areas and aesthetic features are important to citizens. Assets like these make the community more appealing to potential employers, investors, residents, property owners and tourists.



Goose Pond Natural Area

B. FLOODPLAIN DEVELOPMENT

Throughout time, floods have altered the floodplain landscape. These areas are continuously shaped by the forces of water—either eroded or built up through deposit of sediment. More recently, the landscape has been altered by human development, affecting both the immediate floodplain and events downstream.

Historically, people have been attracted to bodies of water as places for living, industry, commerce and recreation. During the early settlement of the United States, locations near water provided necessary access to transportation, a water supply and water power. In addition, these areas had fertile soils, making them prime agricultural lands.

This pattern of development continued as communities grew. In recent decades, development along waterways and shorelines has been spurred by the aesthetic and recreational value of these sites.

Because floodplains have attracted people and industry, a substantial portion of this country's development is now subject to flooding. Floodplains account for only seven percent of the nation's total land area. However, they contain a tremendous amount of property value. It is estimated that there are 8 – 10 million households in our floodplains.

Two problems result from floodplain development:

- Development alters the floodplain and the dynamics of flooding.
- Buildings and infrastructure are damaged by periodic flooding.

FLOODPLAIN DEVELOPMENT DYNAMICS

Human development can have an adverse impact on floods and floodplains. Three types of problems are reviewed here.

Riverine floodplains

The most obvious impact of development on riverine flooding comes with moving or altering channels or constructing bridges and culverts with small openings. Construction and regrading of the floodplain can obstruct or divert water to other areas. Levees and dikes are the best known examples of this, but even small construction projects have an impact (**Figure 1-6**).

Filling obstructs flood flows, backing up floodwaters onto upstream and adjacent properties. It also reduces the floodplain's ability to store excess water, sending more water downstream and causing floods to rise to higher levels. This also increases floodwater velocity.

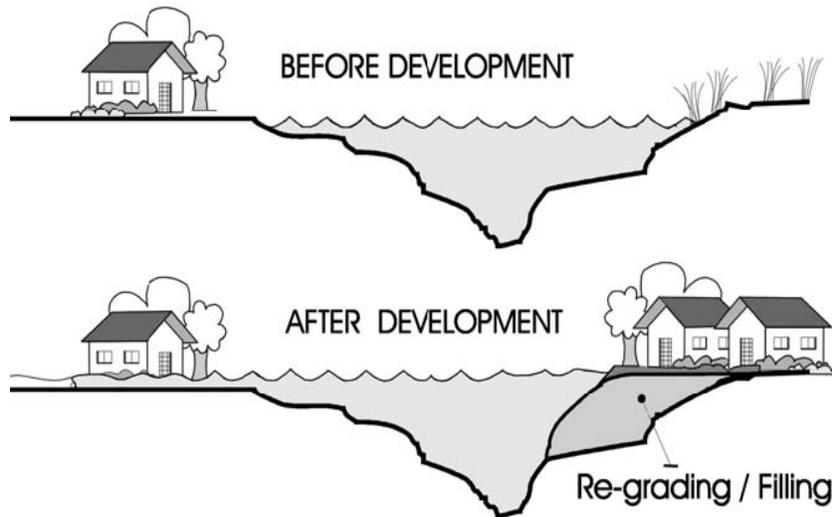


Figure 1-6 Effects of development on a riverine floodplain

Watersheds

Development in riverine watersheds affects the runoff of stormwater and snowmelt. Buildings and parking lots replace the natural vegetation which used to absorb water. When rain falls in a natural setting, as much as ninety percent of it will infiltrate the ground; in an urbanized area, as much as ninety percent of it will run off (**Figure 1-7**).

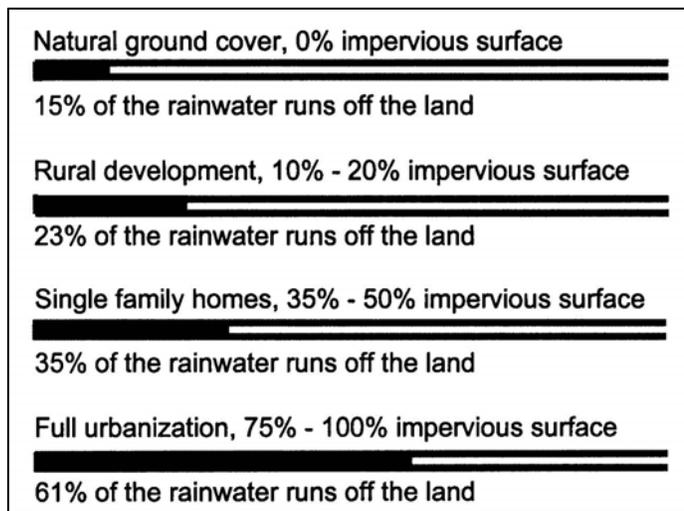


Figure 1-7 Effects of development on Stormwater runoff. (Data for Northeast Illinois)

Urban features alter flood dynamics as well. Storm sewers and more efficient ditches that come with urban drainage systems speed flood flows. The result of urbanization is that there is more runoff in the watershed and it moves faster, increasing flooding downstream. Thus, a 10-year storm may produce the runoff equivalent of a 25-year storm, overloading the man-made drainage system.

Urbanization also changes the timing of flows along the tributaries. If one subwatershed develops faster than another, the flood will leave sooner than it used to, possibly arriving at the main channel at the same time as the peak arrives from another tributary, causing increased flooding downstream.



Channelization project reduces flooding to adjacent properties but increases flows downstream



Detention pond (under construction) reduces flows

FLOOD DAMAGE

Floodplains are home to between 8 and 10 million households. In an average year, floods kill 150 people and cause over \$6 billion in property damage. Nationally, average annual flood losses continue to increase.

Floods can hurt or kill people, and damage property, in several ways. Knowing the impact of a potential hazard - and guarding against it - is integral to administering a floodplain management program.

As a floodplain management administrator, you need to be knowledgeable about the five main causes of flood damage:

- Hydrodynamic forces
- Debris impact
- Hydrostatic forces
- Soaking
- Sediment and contaminants

Hydrodynamic forces

Moving water creates a hydrodynamic force which can damage a building's walls in three ways (see **Figure 1-8**):

- ◆ Frontal impact, as water strikes the structure.
- ◆ Drag effect, as water runs along the sides of a structure.
- ◆ Eddies or negative pressures, created as water passes the downstream side.

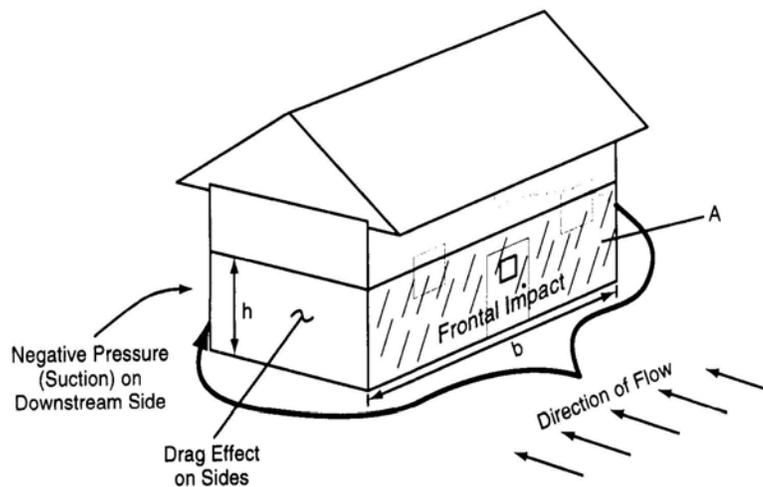


Figure 1-8. Hydrodynamic forces on a building

The speed of moving water is called velocity, a force that is measured in feet per second. The faster water moves, the more pressure it puts on a structure and the more it will erode stream banks and scour the earth around a building's foundation (**Figure 1-9**).

Floodwaters moving faster than 5 feet per second comprise a high-velocity flood, requiring special design considerations for buildings, roads, bridges and other manmade structures in its path.



Figure 1-9 Undermined foundation due to velocity flows

While velocity is one factor in determining the potential harm of a flood, the total impact of moving water is related to the depth of the flooding. Studies have shown that deep water and low velocities can cause as much damage as shallow water and high velocities.

People are more susceptible to damage than buildings: Studies have shown that it doesn't take much depth or velocity to knock a person over. Thus, no areas with moving floodwater can be considered safe for walking (**Figure 1-10**).

A car will float in only two feet of moving water, which is one reason floods kill more people trapped in vehicles than anywhere else. Often victims put themselves in perilous situations by ignoring warnings about travel or mistakenly thinking that a washed-out bridge is still open.



**Figure 1-10. Even shallow floodwaters can stop cars
And wash people off their feet**

Debris impact

Debris also increases the hazard posed by moving water. Floodwaters can and will pick up anything that will float—logs, lumber, ice, even propane tanks and vehicles (**Figure 1-11**). Moving water will also drag or roll objects that don't float. All of this debris acts as battering rams that can knock holes in walls.



Figure 1-11. Ice floes and other large items of debris can crush a house

Hydrostatic forces

The weight of standing water puts hydrostatic pressure on a structure. The deeper the water, the more it weighs and the greater the hydrostatic pressure.

Because water is fluid, it exerts the same amount of pressure sideways (lateral pressure) as it does downward. As water gets deeper, it exerts more lateral pressure than shallow water.

Most walls are not built to withstand lateral pressure. Studies and tests have shown that the lateral force presented by three feet of standing water can be enough to collapse the walls of a typical frame house.

Basement walls and floors are particularly susceptible to damage by hydrostatic pressure. Not only is the water deeper, a basement is subjected to the combined weight of water and saturated earth. Water in the ground underneath a flooded building will seek its own level – resulting in uplift forces that can break a concrete basement floor (**Figure 1-12**).



Figure 1-12. This basement floor broke from hydrostatic pressure

Hydrostatic pressure can also cause damage due to floatation or buoyancy. Improperly anchored buildings can float off their foundations and empty in-ground storage tanks can pop out of the ground even forcing their way through several inches on concrete.

Soaking

When soaked, many materials change their composition or shape.

Wet wood will swell, and if it is dried too fast it will crack, split or warp. Plywood can come apart. Gypsum wallboard will fall apart if it is bumped before it dries out. The longer these materials are wet, the more moisture they will absorb.

Soaking can cause extensive damage to household goods. Wooden furniture may get so badly warped that it can't be used. Other furnishings, such as upholstery, carpeting, mattresses and books, usually are not worth drying out and restoring. Electrical appliances and gasoline engines won't work safely until they are professionally dried and cleaned.

Sediment and contaminants

Many materials, including wood and fiberglass or cellulose insulation, absorb floodwater and its sediment. Even if allowed to dry out, the materials will still hold the sediment, salt and contaminants brought by the flood. Simply letting a flooded house dry out will not render it clean - and it certainly will not be as healthy a place as it was before the flood.

Few floods, especially those that strike inland, have clear floodwater, and so they leave a mess made of natural and man-made debris. Stormwater, snowmelt and river water pick up whatever was on the ground, such as soil, road oil, and farm and lawn chemicals. If a wastewater treatment plant upstream was inundated, the floodwaters will likely include untreated sewage.

Especially in the arid west and coastal areas, flooding can leave large amounts of sand, sediment and debris (**Figure 1-23**) that require major cleanup efforts. After the water recedes or evaporates, these sediments are left on and in a building, and its contents.



Figure 1-13. Debris flows can completely fill a house with sediment

SAFETY AND HEALTH HAZARDS

Floods pose a variety of hazards as they build, crest and subside. At different points in the life of a flood, people are displaced, damage occurs and finally a cleanup can begin. Disruption of normal public utilities and the presence of flood debris and damage can produce safety and health hazards.

When utilities are damaged, hazards arise. Electrocutation is the second most frequent cause of flood deaths, claiming lives in a flooded area that is carrying a live current created when electrical components short. Floods also can damage gas lines, floors and stairs, creating secondary hazards such as gas leaks and unsafe structures. If the water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

Fire can be a result of too much water: floods can break gas lines, extinguish pilot lights, and short circuit electrical wiring – causing conditions ripe for a fire. Fire equipment may not be able reach a burning building during high water.

Floods bring and leave health hazards in the form of animal carcasses, garbage and ponds that can become breeding grounds for germs and mosquitoes. Any flooded items that come in close contact with people must be thrown out, including such things as food, cosmetics, medicines, stuffed animals and baby toys. Clothes and dishes need to be washed thoroughly.

Mold, mildew and bacteria grow in damp, flooded areas. One health hazard occurs when heating ducts in a forced-air system are not properly cleaned following inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants.

Flooding, especially repetitive flooding, takes a toll on people's mental health. Stress comes from facing the loss of time, money, property and personal possessions such as heirlooms. This is aggravated by fatigue during cleanup and anxiety over lost income, health risks and damage to irreplaceable items.

Children and the elderly are especially susceptible to stress from the disruption of their daily routines.

C. FLOODPLAIN MANAGEMENT

The strategies and tools available to prevent problems and protect people and development from flooding have been developed over many years. A short history of U.S. policy on floodplain management will help explain their evolution.

EVOLUTION

The federal government got involved in floodplain management in the 1800s, when it had an interest in maintaining the navigability of rivers to facilitate interstate commerce. The great Mississippi River flood of 1927 led the federal government to become a major player in flood control.

As defined by the Flood Control Acts of 1928 and 1936, the role of government agencies was to build massive flood control structures to control the great rivers, protect coastal areas and prevent flash flooding. The 1936 act alone authorized construction of some 250 projects for both flood control and relief work.

Until the 1960's, such structural flood control projects were seen as the primary way to reduce flood losses. Public policy emphasized that flood losses could be curbed by controlling floodwater with structures, such as dams, levees and floodwalls. But people began to question the effectiveness of this single solution. Disaster relief expenses were going up, making all taxpayers pay more to provide relief to those with property in floodplains. Studies during the 1960s concluded that flood losses were increasing, in spite of the number of flood control structures that had been built.

One of the main reasons structural flood control projects failed to reduce flood losses was that people continued to build in floodplains. In response, federal, state and local agencies began to develop policies and programs with a “non-structural” emphasis, ones that did not prescribe projects to control or redirect the path of floods. Since the 1960s, floodplain management has evolved from heavy reliance on flood control, or structural measures, to one using a combination of many tools.

The creation of the National Flood Insurance Program in 1968 was a landmark step in this evolution. The NFIP:

- Established an insurance program as an alternative to disaster relief.
- Distributed responsibility for floodplain management to all levels of government and the private sector.
- Set a national standard for regulating new development in floodplains.
- Began a comprehensive floodplain mapping program.

Also during the 1960s and 1970s, interest increased in protecting and restoring the environment, including the natural resources and functions of floodplains. Coordinating flood-loss reduction programs with environmental protection and watershed management programs has since become a major goal of federal, state and local programs.

As a result of this evolution, we no longer depend solely on structural projects to control floodwater. U.S. floodplain policies are now multi-purpose and result in a mix of solutions to suit many situations. Consequently, administrators like you have several non-structural flood protection measures at their disposal. They include:

- Regulations to prohibit development in high-hazard areas.
- Building codes requiring flood-resistant construction for new buildings in floodprone areas.
- Acquisition and relocation of buildings in high hazard areas.
- Modifying or retrofitting existing buildings.
- Installing flood warning systems.
- Controlling stormwater runoff.
- Providing self-help advice to property owners.

THE UNIFIED NATIONAL PROGRAM FOR FLOODPLAIN MANAGEMENT

To coordinate the efforts of the many government programs that can affect flooding or floodplain development, Congress created the Unified National Program for Floodplain Management under the National Flood Insurance Act of 1968.

The Unified National Program sets forth a conceptual framework for coordinating the floodplain management efforts of federal, state and local agencies as well as private parties.

The program is coordinated by a Federal Interagency Floodplain Management Task Force made up of federal agencies that are involved in flooding, or with development that can be affected by flooding.

The Task Force defines “floodplain management” as “a decision-making process that aims to achieve the wise use of the nation’s floodplains.” “Wise use” means both reduced flood losses *and* protection of the natural resources and functions of floodplains.

Where floodplain development is permitted, floodplain management results in development and construction measures that minimize the risk to life and property from floods and the risk to the floodplain's natural functions posed by human development.

Strategies and tools

The Task Force has identified four floodplain management strategies for reducing the human economic losses from flooding as well as minimizing the losses of natural and beneficial floodplain resources. Each strategy is supported by an array of tools which are summarized in the rest of this section.

Many of the tools can be used in more than one strategy.

In most cases, a combination of these tools is needed to reduce risks and protect natural resources and functions. Because floodplain management is a process, there is no one "best" set of tools or one single "wise use" of the floodplain.

The important message from this definition of floodplain management is to consider all the options and account for both the hazard and the natural values before developing or implementing any action that will change the floodplain.

FLOODPLAIN MANAGEMENT STRATEGIES

Strategy 1: Modify human susceptibility to flood damage

Reduce disruption by avoiding hazardous, uneconomic or unwise use of floodplains.

Tools include:

- Regulating floodplain use by using zoning codes to steer development away from hazardous areas or natural areas deserving preservation, establishing rules for developing subdivisions, and rigorously following building, health and sanitary codes.
- Establishing development and redevelopment policies on the design and location of public services, utilities and critical facilities.
- Acquiring land in a floodplain in order to preserve open space and permanently relocate buildings.
- Elevating or floodproofing new buildings and retrofitting existing ones.
- Preparing people and property for flooding through forecasting, warning systems and emergency plans.
- Restoring and preserving the natural resources and functions of floodplains.

Strategy 2: Modify the impact of flooding

Assist individuals and communities to prepare for, respond to and recover from a flood.

Tools include:

- Providing information and education to assist self-help and protection measures.
- Following flood emergency measures during a flood to protect people and property.
- Reducing the financial impact of flooding through disaster assistance, flood insurance and tax adjustments.
- Preparing post-flood recovery plans and programs to help people rebuild and implement mitigation measures to protect against future floods

Strategy 3: Modify flooding itself

Develop projects that control floodwater.

Tools include:

- Building dams and reservoirs that store excess water upstream from developed areas.
- Building dikes, levees and floodwalls to keep water away from developed areas.
- Altering channels to make them more efficient, so overbank flooding will be less frequent.
- Diverting high flows around developed areas.
- Treating land to hold as much rain as possible where it falls, so it can infiltrate the soil instead of running off.
- Storing excess runoff with on-site detention measures.
- Protecting inland development with shoreline protection measures that account for the natural movement of shoreline features.
- Controlling runoff from areas under development outside the floodplain.

Strategy 4: Preserve and restore natural resources

Renew the vitality and purpose of floodplains by reestablishing and maintaining floodplain environments in their natural state.

Tools include:

- Floodplain, wetlands and coastal barrier resources or land use regulations, such as zoning, can be used to steer development away from sensitive or natural areas.
- Development and redevelopment policies on the design and location of public services, utilities and critical facilities.
- Land acquisition; open space preservation; permanent relocation of buildings; restoration of floodplains and wetlands, and preservation of natural functions and habitats.
- Information and education to make people aware of natural floodplain resources and functions and how to protect them.
- Tax adjustments to provide a financial initiative for preserving lands or restoring lands to their natural state.
- Beach nourishment and dune building to protect inland development by maintaining the natural flood protection features.

CHAPTER 2

THE NATIONAL FLOOD INSURANCE PROGRAM

A. HISTORY

Historically, people at risk from flooding could only hope for help from their neighbors and charitable organizations in the event of a flood.

Government assistance varied from community to community, and flood insurance was scarce. During the 1920s, the insurance industry concluded that flood insurance could not be a profitable venture because the only people who would want flood coverage would be those who lived in floodplains. Since they were sure to be flooded, the rates would be too high to attract customers.

During the 1960s, Congress became concerned with problems related to the traditional methods of dealing with floods and flood damage - construction of structural projects and federal disaster assistance. Both were proving to be quite expensive, with no end in sight.

Congress concluded that:

- Although Federal flood programs were funded by all taxpayers, they primarily helped only residents of floodplains.
- Flood protection structures were expensive and could not protect everyone.
- People continued to build and live in floodplains, thus still risking disaster.
- Disaster relief was both inadequate and expensive.
- The private insurance industry could not sell affordable flood insurance because only those at high risk would buy it.

In 1968, Congress passed the National Flood Insurance Act to correct some of the shortcomings of the traditional flood control and flood relief programs. The act created the National Flood Insurance Program (NFIP) to:

- Transfer the costs of private property flood losses from the taxpayers to floodplain property owners through flood insurance premiums.
- Provide floodplain residents and property owners with financial aid after floods, especially smaller floods that do not warrant federal disaster aid.
- Guide development away from flood hazard areas.
- Require that new and substantially improved buildings be constructed in ways that would minimize or prevent damage during a flood.

Congress charged the Federal Insurance Administration (which at that time was in the Department of Housing and Urban Development) with responsibility for the program. The program is currently administered by the Federal Emergency Management Agency (FEMA) within the Department of Homeland Security.

Participation in the NFIP grew slowly. In 1972, Hurricane Agnes devastated a wide area of the eastern United States. Disaster assistance costs were the highest ever, leading Congress to examine why the NFIP was so little used. Investigators found that few communities had joined the NFIP - there were fewer than 100,000 flood insurance policies in force nationwide. The availability of flood insurance alone had not been enough to motivate communities to join the NFIP or individuals to purchase flood insurance.

To remedy this, the Flood Disaster Protection Act was passed in 1973. The Act prohibited most types of Federal assistance for acquisition or construction of buildings in the floodplains of non-participating communities. It also required that buildings located in identified flood hazard areas have flood insurance coverage as a condition of receiving Federal financial assistance or loans from federally insured or regulated lenders, and as a condition for receiving federal disaster assistance. These “sanctions” for non-participation, which are detailed later in this chapter, make it hard for any community that wants federal assistance for properties in floodplains to avoid joining the NFIP.

The 1973 Act spurred participation in the program dramatically. By the end of the decade, more than 15,000 communities had signed on and about two million flood insurance policies were in effect.

In 1979, the Federal Insurance Administration (FIA) and the NFIP were transferred to the newly created Federal Emergency Management Agency (FEMA). During the early 1980's, FIA worked to reduce the program's dependence on its authority to borrow from the Federal Treasury. Through a series of rate increases and other adjustments, the program has been self-supporting since 1986. The NFIP is funded primarily through premium income, which pays nearly all administrative and mapping costs as well as claims. In recent years the NFIP has received supplemental funding from Congress to accelerate its Map Modernization program.

Since 1973, the program has been amended several times. The most important changes came under the National Flood Insurance Reform Act of 1994 which fine tuned various aspects of the program, such as authorizing the Community Rating System, increasing the maximum amount of flood insurance coverage, strengthening the mandatory purchase requirement, and establishing a grant program for mitigation plans and projects.

The Reform Act and the initiation of a flood insurance advertising campaigns boosted sales of flood insurance policies again. By the November of 2007, there were over 5.5 million flood insurance policies in force.

There are approximately 20,000 communities participating in the NFIP. As shown in Figure 2-1, the greatest growth in numbers of communities occurred in the late 1970's, after the provisions of the 1973 amendments took effect.

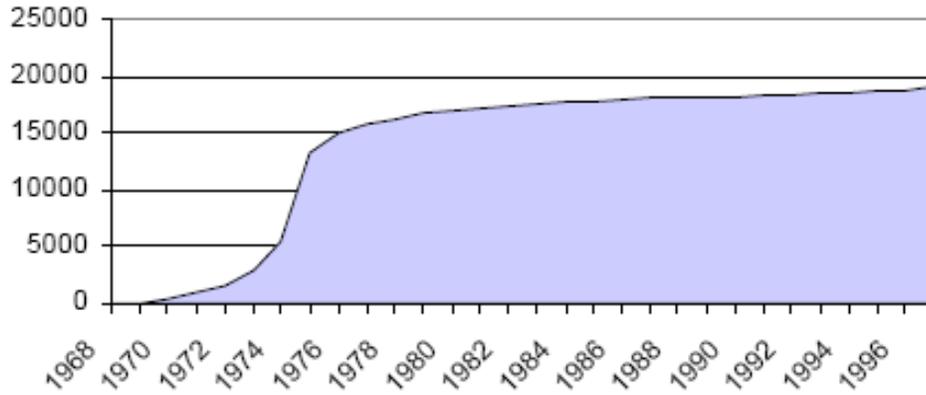


Figure 2-1. NFIP community participation

B. HOW THE NFIP WORKS

The NFIP is based on a mutual agreement between the Federal Government and the community. Federally backed flood insurance is made available in those communities that agree to regulate development in their mapped floodplains. If the communities do their part in making sure future floodplain development meets certain criteria, FEMA will provide flood insurance for properties in the community.

Because most communities with a known flood problem are in the NFIP, this reference guide does not cover how a community applies to join. However, it does explain the three basic parts to the NFIP - mapping, insurance, and regulations. As discussed below, these three parts are interconnected and mutually supportive.

MAPPING

FEMA has prepared a floodplain map and developed flood hazard data for most communities in the country. The maps and data are used for several purposes:

- Communities, states and Federal agencies use them as the basis for the regulating new floodprone construction,
- Insurance agents use them when rating flood insurance policies, and
- Lenders and Federal agencies used them to determine when flood insurance must be purchased as a condition of a loan or financial assistance.

FEMA has issued two kinds of maps:

- The first map received for most communities was called a Flood Hazard Boundary Map (FHBM). This just showed the boundaries of the flood plain using approximate methods.
- Most communities have had their FHBMs replaced by a Flood Insurance Rate Map, or FIRM. A FIRM usually is based on a Flood Insurance Study and includes flood elevations and other hazard information needed to better protect new construction from flood damage.

Buildings that pre-date the FIRM are treated differently than buildings built after the flood hazard was made public on the FIRM. These existing structures are called “pre-FIRM” buildings, while new construction is called “post-FIRM.”

The flood insurance rates for post-FIRM buildings are based on how protected they are from the mapped hazard. Therefore, both the NFIP’s regulations and insurance coverage depend on the accuracy and utility of the maps.

The NFIP's maps and flood studies are covered in depth in Chapters 3 and 4.

INSURANCE

Every building located in a participating community may be covered by a flood insurance policy - even buildings not located in a mapped floodplain. Coverage is for damage by a "flood."

A flood is defined by NFIP regulations as

A "general and temporary condition of partial or complete inundation of normally dry land areas from:

- (1) "The overflow of inland or tidal waters or
- (2) "The unusual and rapid accumulation or runoff of surface waters from any source."

The official definition also includes mudflows and erosion.

Flood insurance premiums for post-FIRM buildings are based on the degree of flood protection they are provided. Therefore, it is very important for communities to ensure that new buildings in the floodplain are constructed properly.

The flood insurance premium rates for pre-FIRM buildings are subsidized by the NFIP. Owners of these policies do not pay "actuarial" rates, i.e., rates based on the true risk the building is exposed to.

No matter whether a building is pre-FIRM or post-FIRM, with flood insurance, owners of floodprone properties pay more of their share toward flood relief. And, they get claims paid when needed.

For the first 37 years, the NFIP has paid out over \$12 billion in flood insurance claim payments for big and small floods (see Figure 2-2). **However, in 2005 over \$16 billion was paid for claims due to Hurricane Katrina alone.** Insurance provides relief for all floods, including those not large enough or severe enough to warrant federal disaster aid.

Flood insurance and its relation to construction regulations are discussed in more detail in Chapter 9.

Rank	Event	Date	Number of paid losses	Amount paid (\$ millions)	Average paid loss
1	Hurricane Katrina	Aug. 2005	166,210	\$15,959	\$96,016
2	Hurricane Ivan	Sep. 2004	27,557	1,567	56,865
3	Tropical Storm Allison	Jun. 2001	30,662	1,104	35,997
4	Louisiana Flood	May-95	31,343	585	18,667
5	Hurricane Isabel	Sep. 2003	19,844	491	24,736
6	Hurricane Floyd	Sep. 1999	20,439	462	22,617
7	Hurricane Rita	Sep. 2005	9,462	461	48,691
8	Hurricane Opal	Oct. 1995	10,343	406	39,208
9	Hurricane Hugo	Sep. 1989	12,843	376	29,315
10	Hurricane Wilma	Oct. 2005	9,591	362	37,700

Figure 2-2 Top Ten Flood Events, Ranked by National Flood Insurance Payouts

REGULATIONS

The NFIP underwrites flood insurance coverage only in those communities that adopt and enforce floodplain regulations that meet or exceed NFIP criteria. Buildings built in accordance with these regulations have a lower risk of flooding and can be insured at lower rates.

The community's floodplain regulations are designed to ensure that new buildings will be protected from the flood levels shown on the FIRM and that development will not make the flood hazard worse. Over time, exposure to flood damage should be reduced as the older pre-FIRM buildings are replaced by post-FIRM buildings that comply with the regulations. Eventually a community should have only post-FIRM buildings subject to little or no flood damage.

The NFIP construction regulations focus on protecting insurable buildings, but they also provide a degree of protection to other types of development. These criteria are detailed Chapter 5.

Floodplain regulations initially were controversial and difficult to enforce. Many people wanted the freedom to build what they want without government controls. In some areas, they still may not be aware they need a local permit to build. However, as time has passed the regulations have become increasingly accepted as necessary to reduce flood damages and protect citizens from loss.

As a result of public opposition, a community may be inclined to not fully enforce all of the provisions of its ordinance, which puts its participation in the NFIP in peril. If the community does not fulfill its NFIP obligations to the federal government and allows construction in violation of its regulations, three things can happen:

- New buildings will be built subject to flood damage
- Insurance on an improperly constructed building may be very expensive.
- FEMA can impose sanctions on the community, to encourage it to correct its floodplain management program. The sanctions are discussed in Section D.

C. ROLES AND RESPONSIBILITIES

The National Flood Insurance Program is founded on a mutual agreement between the federal government and each participating community. Local, state and federal governments, and private insurance companies must share roles and responsibilities to meet the goals and objectives of the NFIP.

The community's role is of paramount importance. Residents and property owners can get flood insurance only if the community carries out its responsibilities.

THE COMMUNITY ROLE

A community is a governmental body with the statutory authority to enact and enforce development regulations. These governmental bodies vary from state to state, but can include cities, towns, villages, townships, counties, parishes, special districts, states and Indian nations. See Arkansas Insert 1, State Floodplain Management Legislation, in this volume.

The community enacts and implements the floodplain regulations required for participation in the NFIP. The community's measures must meet regulations set by its state, as well as NFIP criteria. The NFIP requirements are covered in Chapter 5.

A participating community commits itself to:

- ◆ Issuing or denying floodplain development/building permits.
- ◆ Inspecting all development to assure compliance with the local ordinance.
- ◆ Maintaining records of floodplain development.
- ◆ Assisting in the preparation and revision of floodplain maps.
- ◆ Helping residents obtain information on flood hazards, floodplain map data, flood insurance and proper construction measures.

THE STATE ROLE

Each governor has selected a state coordinating agency for the NFIP. The Arkansas Natural Resources Commission is the State coordinating agency for Arkansas. Duties of the agency are contained in Arkansas Insert 1 later in this volume. The Arkansas Natural Resources Commission:

- ◆ Provides technical and specialized assistance to local governments.
- ◆ Coordinates the activities of various state agencies that affect the NFIP.

The Commission also participates in the Community Assistance Program (CAP). Under CAP, NFIP funds are available on a 75 percent / 25 percent cost share to help the state coordinating agency provide technical assistance to communities and to monitor and evaluate their work.

THE FEDERAL ROLE

The Federal Emergency Management Agency (FEMA) within the Department of Homeland Security (DHS) administers the NFIP through its Regional Offices and its Mitigation Division.

The ten FEMA *Regional Offices* each have a Mitigation Division that coordinates the NFIP with states and communities. Each FEMA regional office covers four to eight states and territories. Together they work with the nearly 20,000 participating communities. A list of the regional offices, their addresses and the states they cover appears in Appendix A.

The Regional Offices are responsible for:

- ◆ Assisting the state NFIP coordinating agencies.
- ◆ Assessing community compliance with the minimum NFIP criteria.
- ◆ Advising local officials responsible for administering the ordinance.
- ◆ Answering questions from design professionals and the public.
- ◆ Helping review and adopt new maps and data.
- ◆ Approving community floodplain management regulations.
- ◆ Providing information and training on the flood insurance purchase requirements.

The *FEMA Mitigation Division* in Washington, D.C., sets national policy for floodplain regulations, researches floodplain construction practices and administers the flood hazard mapping program. The Division has mapped more than 100 million acres of flood hazard areas nationwide and designated some six million acres of floodways along 40,000 stream and river miles.

The Mitigation Division also administers the insurance portion of the program. It sets flood insurance rates, establishes coverage, monitors applications and claims, and markets flood insurance.

The NFIP is operated as a self-supporting program. All NFIP expenses, including claims payments, floodplain management, and administration and, until recently, flood hazard mapping, are paid through insurance premiums, fees on insurance policies, and fees from map revision requests. Congress has recently provided supplemental funding to accelerate the NFIP's Map Modernization program.

Private insurance companies write and service most NFIP flood insurance policies through an arrangement with FEMA called the Write-Your-Own Program. The NFIP also contracts for agent training and other assistance through regional insurance offices. They can be reached through the FEMA Regional Offices.

Additional information regarding federal regulations is contained in Chapter 6.

D. COMMUNITY PARTICIPATION

The NFIP is based on a cooperative agreement between the community and FEMA. FEMA can only make flood insurance available in those communities that agree to regulate future development in the floodplain.

JOINING THE NFIP

Participation in the NFIP is voluntary. There is no Federal law that requires a community to join, although some states have requirements. However, as discussed later in this section, a nonparticipating community faces sanctions, such as loss of Federal aid for insurable buildings in the floodplain. These make participation a very important decision for many communities.

To join, a community must adopt a resolution of intent to participate and cooperate with FEMA. The community agrees to “maintain in force...adequate land use and control measures consistent with the [NFIP] criteria” and to:

- (I). Assist the Administrator in the delineation of the floodplain,
- (II). Provide information concerning present uses and occupancy of the floodplain,
- (III). Maintain for public inspection and furnish upon request, for the determination of applicable flood insurance risk premium rates within all areas having special flood hazards, elevation and floodproofing records on new construction,
- (IV). Cooperate with agencies and firms which undertake to study, survey, map, and identify flood plain areas, and cooperate with neighboring communities with respect to the management of adjoining floodplain areas in order to prevent aggravation of existing hazards;
- (V). Notify the Administrator whenever the boundaries of the community have been modified by annexation or the community has otherwise assumed or no longer has authority to adopt and enforce flood plain management regulations for a particular area.

The community must also adopt and submit a floodplain management ordinance that meets or exceeds the minimum NFIP criteria. These criteria are explained in Chapter 5 of this guide.

As shown in Figure 2-1, most communities joined in the 1970's. At that time they were provided with a Flood Hazard Boundary Map (FHBM) which showed only the approximate boundaries of the floodplain. Generally, they entered the "Emergency Phase" whereby their regulatory responsibilities were limited because of the limited flood hazard data provided on the map.

Participating communities receive a Flood Insurance Rate Map (FIRM) and most get a Flood Insurance Study (FIS) with more detailed flood hazard data. After a period to review and appeal the draft map and study, the community is given six months to adopt the new data in a more comprehensive ordinance.

The FIRM takes effect at the end of the six month period. If the ordinance has been adopted in time, the community is converted to the "Regular Phase" on that date. That is also the date that differentiates "pre-FIRM" buildings from "post-FIRM buildings."

If the ordinance is not adopted in time, the community is suspended from the NFIP. The FIRM still goes into effect on the same date and is used by lenders and Federal agencies for determining where loans can be issued and federal assistance can be provided.

Approximately 97% of the NFIP communities are in the Regular Phase.

COMPLIANCE

The community's floodplain management program and permit records are reviewed periodically by the FEMA Regional Office or state NFIP coordinating agency. Either agency may inspect records as part of a community assistance visit (CAV) or community assistance contact (CAC).

If a community doesn't uphold its part of the agreement and fails to adequately enforce its floodplain management regulations, FEMA has recourse through three approaches:

- ◆ Reclassification under the Community Rating System
- ◆ Probation
- ◆ Suspension from the program

Reclassification under the Community Rating System



The Community Rating System (CRS) provides a discount in the flood insurance premiums for properties in communities that participate in the CRS and implement floodplain management programs that exceed minimum NFIP requirements. The CRS is explained in Chapter 9, Section C. More than 1,000 communities participate in CRS. This represents approximately 2/3 of policies in force.

CRS Communities that are deemed to no longer be in full compliance with the NFIP requirements can be reclassified to Class 10. Should that happen, residents would lose their CRS flood insurance premium discounts.

Probation

Probation represents formal notification to the community that FEMA regards the community's floodplain management program as non-compliant with the NFIP criteria.

Prior to imposing probation, FEMA provides the community a 90-day written notice and lists specific deficiencies in its program and violations. FEMA also notifies all policy holders of the impending probation, telling them that an additional \$50 premium will be charged on policies sold or renewed during the probation period. The objective of this surcharge is to bring the policy holders' attention to the fact that their community is not compliant and failure to correct the problems may lead to suspension.

The community has 90 days to avoid this sanction by correcting the program deficiencies and remedying the identified violations. Probation may be continued for up to one year after the community corrects all program deficiencies. This ensures that the community has truly changed its ways and become compliant and that all policies holders are advised of the situation when their policies are renewed.

Suspension

If, after a period of probation, a community fails to remedy its violations and program deficiencies, it will be suspended from the NFIP for failure to enforce its floodplain management regulations. Suspension means the community is no longer in the NFIP. It is subject to the sanctions for non-participation that are explained in the next section.

FEMA grants a community 30 days to show why it should not be suspended and then sends it a 30-day suspension letter. FEMA may also conduct a written or oral hearing before suspension takes effect.

A community suspended under the NFIP may apply to the FEMA Regional Office for reinstatement by submitting the following:

- ◆ A local legislative or executive measure reaffirming the community's intent to comply with the NFIP criteria.
- ◆ Evidence that all program deficiencies have been corrected.
- ◆ Evidence that any violations have been remedied to the maximum extent possible.

FEMA may reinstate the community to full program status, bring it to a probationary status, or withhold reinstatement for up to one year after a satisfactory submission from the community.

A community will also be suspended if, following due notice, it fails to adopt revisions to its floodplain ordinance in response to flood map revisions or amended minimum NFIP criteria. Communities have a 6 month period after a new or revised map is issued to update their floodplain management regulations to incorporate the new data and make any other necessary changes. If at the end of the 6 months the community has not adopted a compliant ordinance, it is automatically be suspended.

It is not uncommon for communities to be suspended for failure to adopt compliant ordinances. Sometimes communities get a late start revising their ordinance and cannot complete the ordinance adoption process in the allotted 6 months. These communities are reinstated into the NFIP upon adoption of the ordinance provided no non-compliant development has taken place during the suspension.

SANCTIONS FOR NON-PARTICIPATION

A community that does not join the NFIP, has withdrawn from the program, or is suspended from it faces the following sanctions:

- ◆ Flood insurance will not be available. No resident will be able to purchase a flood insurance policy.
- ◆ If the community withdraws or is suspended, existing flood insurance policies will not be renewed.
- ◆ No Federal grants or loans for the acquisition or construction of buildings may be made in identified flood hazard areas under programs administered by Federal agencies such as HUD, EPA, and SBA.
- ◆ No Federal disaster assistance may be provided to repair insurable buildings located in identified flood hazard areas for damage caused by a flood.
- ◆ No Federal mortgage insurance or loan guarantees may be provided in identified flood hazard areas. This includes policies written by FHA, VA, and others.

- ◆ Federally insured or regulated lending institutions, such as banks and credit unions, must notify applicants seeking loans for insurable buildings in flood hazard areas that:
 - There is a flood hazard and
 - The property is not eligible for Federal disaster relief.

These sanctions can be severe on any community with a substantial number of buildings in the floodplain. Most communities with a flood problem have joined the NFIP and are in full compliance.

STATE FLOODPLAIN MANGEMENT LEGISLATION

In the following texts, the Arkansas Natural Resources Commission was formerly the Arkansas Soil and Water Conservation Commission.

A. LEGISLATION

CHAPTER 268. FLOOD LOSS PREVENTION.

Sections

14-268-101. Legislative determination.

It is found and declared:

- (1) That there are communities and areas in this state which have suffered from, and are threatened by, floods and the incidents and hazards of flooding;
- (2) That flooding in the areas causes destruction of life and property, contributes to the spread of disaster-related diseases, and constitutes a hindrance to the economic development of this state and to the health, safety, and welfare of the residents of this state;
- (3) That flood hazards in these flood-prone areas impair their economy and tax revenues;
- (4) That insurance with federal reinsurance or other federal assistance will not be available to property owners in these communities unless adequate land use and control measures, consistent with federal criteria, are adopted by the communities prior to June 30, 1970;
- (5) That it is the policy of this state to encourage and support all appropriate actions to prevent and lessen these flood hazards and losses;
- (6) That it is necessary to adopt state and local measures which, to the maximum extent feasible, will:
 - (A) Discourage the development of land by improvements which are exposed to flood damage;
 - (B) Guide the development of proposed construction away from locations which are threatened by flood hazards;

- (C) Assist in reducing damage caused by floods; and
 - (D) Otherwise improve long-range land management in, and use of, flood-prone areas; and
- (7) That the enactment of these measures by cities, towns, counties, or the state constitutes a public purpose necessary to the protection and promotion of the economic development of this state and to the health, safety, and welfare of the residents of this state.

History. Acts 1969, No. 629, § 1; A.S.A. 1947, § 21-1901.

14-268-102. Definitions.

As used in this chapter:

- (1) "Commission" means the Arkansas Soil and Water Conservation Commission;
- (2) "Floodplain administrator" means the person designated by a city, town, or county to administer and implement this chapter and other federal and state laws and local ordinances and regulations relating to the management of flood-prone areas; and
- (3) "Flood-prone areas" means areas that are subject to or are exposed to flooding and flood damage.

History. Acts 1969, No. 629, § 2; A.S.A. 1947, § 21-1902; Acts 2003, No. 745, § 1.

14-268-103. Penalty.

(a) Any person or corporation who violates any measure adopted under this chapter which prohibits the development of land by improvements that are exposed to flood damage or that are threatened by flood hazards may be fined not more than five hundred dollars (\$500) for each offense.

(b) Each day during which a violation exists is a separate offense.

History. Acts 1969, No. 629, § 4; A.S.A. 1947, § 21-1904; Acts 2003, No. 745, § 2.

14-268-104. Authority to adopt measures.

- (a) In addition to all other powers, and notwithstanding any provision of any other law, each city, town, or county in this state is authorized to enact, adopt, and enforce ordinances, building or zoning codes, or other appropriate measures regulating, restricting, or controlling the management and use of land, structures, and other developments in flood-prone areas.
- (b) The measures, in addition to all other matters, may:
 - (1) Restrict the development and use of land which is exposed to flood damage;
 - (2) To the extent possible, guide the development of proposed construction away from locations threatened by flood hazards;
 - (3) Prescribe assistance in reducing flood damage;
 - (4) Require flood-proofing of structures which are permitted to remain in, or are to be constructed in, flood-prone areas;
 - (5) Prescribe regulation of the types, purposes, and uses of structures, buildings, developments, or fills permitted to be erected or improved in flood-prone areas;
 - (6) Require drainage and such other action as is feasible to minimize flooding; and
 - (7) Assure the adequacy of sewerage and water systems that may be affected by flooding.

History. Acts 1969, No. 629, § 2; A.S.A. 1947, § 21-1902.

14-268-105. Public nuisance - Injunction or abatement.

Every structure, building, fill, or development placed or maintained within any flood-prone area in violation of measures enacted under the authority of this chapter is a public nuisance. The creation of any of these may be enjoined and the maintenance thereof may be abated by action or suit of any city, town, or county, the state, or any citizen of this state.

History. Acts 1969, No. 629, § 4; A.S.A. 1947, § 21-1904.

14-268-106. Floodplain administrator.

(a) Each county, city, or town ordinance adopted under this chapter shall designate a person to serve as the floodplain administrator to administer and implement the ordinance and any local codes and regulations relating to the management of flood-prone areas.

(b) Beginning July 1, 2004, each floodplain administrator shall become accredited by the Arkansas Soil and Water Conservation Commission under the commission's authority regarding flood control under §§ [15-24-102](#) and [15-24-109](#).

History. Acts 2003, No. 745, § 3.

15-24-102 Commission Powers and Duties General

(a) It shall be the duty of the Arkansas Soil and Water Conservation Commission to:

- (1) Study, consider, and determine upon a sound public policy with regard to flood prevention, flood control, and flood protection;
- (2) Compile figures and other information on current and previous flood damage and scientific data relative to the recurrence of floods such as rainfall, runoff, flowing channels, stream obstruction, existing facilities for storing surplus waters, and existing protection works; and
- (3) Accredit persons having requisite knowledge in floodplain management and in minimization and prevention of flood hazards and losses.

(b) The commission shall have the power to:

- (1) Clean out, widen, deepen, straighten, change, alter, divert, or eliminate in whole or in part the course or terminus of any natural or artificial water streams;
- (2) Shape or protect stream banks for the improvement of hydraulic efficiency in the discharge of flood waters;
- (3) Acquire lands necessary for reservoir dam sites and lines;
- (4) Construct, take over, maintain, and operate dams, reservoirs, holding or impounding basins, flood gates, revetments, or any other works and improvements deemed necessary to prevent floods and to control, preserve, and regulate the flow of rivers and streams;

- (5) Construct dikes, levees, or other artificial barriers to protect against inundation of property when deemed advisable by the commission; and
 - (6) As an incident to the foregoing, relocate or revise bridges, buildings, roads, streets, railroads, service lines and connections of public service utilities, and fences and do generally all things necessary for the fulfillment of the purposes of this subchapter.
- (c) The commission shall have the power to acquire by donation, lease, purchase, or condemnation and to hold or own in the name of the state real and personal property, easements, and the public works erected and constructed under the authority of this subchapter except that:
- (1) None of the work, improvements, or construction provided for in the preceding portion of this section or in any other portion of this subchapter shall be done, undertaken, or performed within the boundary limits of any levee or drainage district;
 - (2) This subchapter shall not confer upon the commission or other authority any jurisdiction, control, supervision, or authority whatsoever over the lands within the boundaries of any levee or drainage district now existing or hereafter organized; and
 - (3) Further, the commission shall not have any:
 - (A) Control, authority, or jurisdiction over any such levee or drainage district, nor over the directors or commissioners of any levee or drainage districts, nor lake lands within the boundaries of any levee or drainage district as aforesaid;
 - (B) Authority to affect the existence of any levee or drainage district in any manner; or
 - (C) Power to require reports from districts nor any supervision or control over them;
 - (4)
 - (A) However, any levee or drainage district shall have the option upon the voluntary action of its governing board to make contracts with the commission and to make compacts and contracts with the United States Government or any of its agencies and may thereby voluntarily grant to the commission general or special powers as drainage or levee districts may deem proper.
 - (B) The grant shall be limited specifically to the matters and things voluntarily agreed upon by the governing board of the districts.

(C) In order to become effective, the contract with the state commission shall be approved by the county court or judge in vacation, if the district is in one (1) county, and by the circuit court of the county of domicile or the judge thereof in vacation, if in more than one (1) county, and recorded on the court records.

History. Acts 1937, No. 212, §§ 10, 11; Pope's Dig., §§ 12185, 12186; A.S.A. 1947, §§ 9-801, 9-803; Acts 1995, No. 1296, § 53; 2003, No. 745, § 4.

15-24-109. Accreditation of floodplain administrators

- (a) (1) In determining accreditation standards for floodplain administrators, the Arkansas Soil and Water Conservation Commission may consider an applicant's knowledge, experience, skills, and training in floodplain management and in minimization and prevention of flood hazards and losses.
- (2) The accreditation standards may include:
- (A) Passage of an examination;
 - (B) Completion of approved training; or
 - (C) Certification by a nationally recognized floodplain management organization.
- (b) Continuing training may be required for persons who want continued accreditation.
- (c) The commission may charge accreditation fees in amounts up to the following:
- (1) Original accreditation, thirty dollars (\$30.00);
 - (2) Annual renewal of accreditation, twenty dollars (\$20.00); and
 - (3) Late fee for renewal after thirty (30) days, fifteen dollars (\$15.00).
- (d) (1) Accreditation fees collected are cash funds and shall not be deposited in the State Treasury.
- (2) The cash funds shall be held and applied by the commission solely for the uses under this subchapter.

(3) The cash funds shall not be deemed to be a part of the State Treasury for any purpose, including, without limitation, the provisions of:

- (1) Arkansas Constitution, Article 5, § 29;
- (2) Arkansas Constitution, Article 16, § 12;
- (3) Arkansas Constitution, Amendment 20; or
- (4) Any other constitutional or statutory provision.

History. Acts 2003, No. 745, § 5.

B. RULES

**RULES GOVERNING THE ARKANSAS NATURAL RESOURCES
COMMISSION'S FLOODPLAIN ADMINISTRATOR ACCREDITATION
PROGRAM**

TITLE XVIII

Effective Date: 11/29/03

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SUBTITLE I. GENERAL PROVISIONS

Section 1801.1 PURPOSE

The purpose of this program is to provide a procedure for accrediting floodplain administrators. Each county, city, or town shall designate a person to serve as the floodplain administrator to administer and implement the community Flood Damage Prevention Ordinance or Code pursuant to Ark. Code Ann. §14-268-104 and any local codes and regulations relating to the management of flood-prone areas. This program will assure that persons responsible for important economic decisions affecting health, safety, and welfare of the State receive annual training to assist them in managing development in floodplains.

Section 1801.2 ENABLING AND PERTINENT LEGISLATION

- A. Ark. Code Ann. §14-268-101 et seq., Flood Loss Prevention.
- B. Ark. Code Ann. §15-24-101 et seq., Flood Control.
- C. Ark. Code Ann. §15-20-201 et seq., Arkansas Soil and Water Conservation Commission.

Section 1801.3 DEFINITIONS

The following definitions shall apply to all parts of this title:

- A. "Accreditation" means that the floodplain administrator has met the education and training standards specified by the Arkansas Soil and Water Conservation Commission.
- B. "Accreditation year" means the time from July 1 to June 30. The accredited floodplain administrator must comply with continuing education requirements each year to maintain accreditation.
- C. "Commission" means the Arkansas Soil and Water Conservation Commission, as defined in Ark. Code Ann. §15-20-201 et seq.
- D. "Community" means town, city, county, or other unit of State government which has the authority to adopt, enact and enforce ordinances, building codes or zoning codes, or other appropriate measures restricting, or controlling the management and use of land, structures, and other developments in flood-prone areas.
- E. "Flood Damage Prevention Ordinance" means an ordinance adopted by a community in order to implement provisions of participation in the National Flood Insurance Program (NFIP).
- F. "Continuing education" means education designed to maintain and improve the ability to manage floodplains.
- G. "Executive Director" means Executive Director of the Commission.
- H. "Floodplain administrator" means the person designated by a city, town, or county, to administer and implement this chapter and other federal and state laws and local ordinances and regulations relating to the management of flood-prone areas.
- I. "Flood Damage Prevention Ordinance" refers to an ordinance adopted by a community in order to qualify for participation in the National Flood Insurance Program (NFIP).

- J. "Floodplain management measures" means an overall community program of corrective and preventive measures for reducing future flood damage. These measures take a variety of forms and generally include zoning, subdivision or building requirements, and special-purpose floodplain ordinances.
- K. "Flood-prone areas" means areas that are subject to, or are exposed to, flooding and flood damage.

Section 1801.4 DESIGNATION OF FLOODPLAIN ADMINISTRATOR

Each community ordinance adopted to restrict or control the management and use of land, structures, and other developments in flood-zone areas shall designate a person to serve as the floodplain administrator to administer and implement the ordinance and any local codes and regulations relating to the management of flood-prone areas. Each community may have its own exclusive floodplain administrator, or several communities may employ a single floodplain administrator to manage floodplain development in their communities. A floodplain administrator may be part-time, full-time, or contracted.

Section 1801.5 EFFECTIVE DATE

Unless otherwise provided, all designated floodplain administrators must be accredited by July 1, 2004.

Section 1801.6 REPLACING FLOODPLAIN ADMINISTRATOR

When the floodplain administrator position becomes vacant, the community shall notify the Commission within 30 days and provide a replacement within 60 days. The newly appointed floodplain administrator will have 60 days from the date of appointment to become accredited as described in SUBTITLE II.

SUBTITLE II. ELIGIBILITY REQUIREMENTS

Section 1802.1. AUTHORITY

- A. The Arkansas Soil and Water Conservation Commission is authorized to accredit persons having requisite knowledge in floodplain management and in minimization and prevention of flood hazards and losses pursuant to Ark. Code Ann. §§14-268-106 and 15-24-102.
- B. The Commission may consider an applicant's knowledge, experience, skills, and training in floodplain management.

- C. The Commission may require
 - 1. Passage of an examination;
 - 2. Completion of approved training; or
 - 3. Certification by a floodplain management organization approved by the Commission.

- D. The Commission may offer training courses to satisfy the “demonstration of basic knowledge of floodplain management” accreditation requirements.
 - 1. Training may be conducted by the Commission or any Commission approved educational institution, business entity or individual.
 - 2. Training may consist of formal courses, conferences, workshops, on-line courses, home study courses, or other training methods approved by the Commission.

Section 1802.2 REQUIREMENTS FOR ACCREDITATION

An applicant may obtain accreditation by satisfying all of the following requirements:

- 1. Satisfactorily completing and submitting to the Commission an application form provided by the Commission;
- 2. Demonstrating a basic knowledge of floodplain management acceptable to the Commission by one of the following:
 - (a) completion of a training course approved by the Commission,
 - (b) evidence of at least 2 years of sufficient experience in floodplain management,
 - (c) proof of current good standing as a certified floodplain manager in a certification program approved by the Commission, or
 - (d) passage of the Commission’s exam; and
- 3. Submitting a thirty dollar (\$30) accreditation fee.

Section 1802.3 REVIEW OF APPLICATION

- A. The application and supporting documentation to obtain accreditation will be reviewed by the Commission staff. Commission staff will inform the applicant in writing if the application is incomplete and will specify why the application is incomplete.
- B. When a completed application, supplemental application, or requested information is returned, the Executive Director will review the application.
- C. If all requirements are met, accreditation will be issued.

SUBTITLE III. MAINTAINING ACCREDITATION

Section 1803.1 RENEWAL OF ACCREDITATION

- A. Floodplain administrators shall submit the following each year prior to July 1 (when the new accreditation year begins) in order to renew their accreditation:
 - 1. Renewal application on a form provided by the Commission;
 - 2. Renewal fee; and
 - 3. Documentation of completing the required continuing education in the form of an attendance certificate or a letter from an approved course provider stating that the floodplain administrator attended the course.
- B. If the applicant does not provide the Commission with the items listed in Section 1003.1, Subsection A, the Executive Director will deny renewal of accreditation.

Section 1803.2 CONTINUING EDUCATION REQUIREMENTS

- A. Between July 1 and June 30 of each year, accredited floodplain administrators will be required to obtain continuing education to maintain and improve their ability to implement local floodplain regulations. Floodplain administrators must attend training provided by the Commission or provide documentation of attending courses approved by the Commission for accreditation.
- B. Floodplain administrators should submit continuing education proposed to meet the annual accreditation requirement to the Commission staff prior to taking a course. However, by supplying documentation of attending training which qualifies for continuing education (See Section 1003.3), credit may be approved after the fact.
- C. All floodplain administrators will be required to obtain at least eight (8) hours of continuing education during an accreditation year.
- D. For purposes of satisfying the continuing education requirement, one (1) hour of training will equal one hour of continuing education.
- E. No continuing education, apart from the initial accreditation requirement will be required of floodplain administrators accredited for less than a year on July 1. These administrators will still be expected to complete a renewal application and submit a renewal fee, but will not be required to meet the continuing education requirement until July 1 of the next year.

Section 1803.3 CONTINUING EDUCATION TOPICS

Continuing education topics approved for accreditation may include:

1. Floodplain management,
2. Floodplain mapping,
3. Floodplain management regulations,
4. Flood proofing,
5. Floodplain management ordinance administration,
6. Flooding and flood hazards,
7. Floodplains and ecosystems,
8. Flood hazard mitigation,
9. Multi-objective management,
10. The National Flood Insurance Program (NFIP),
11. Flood insurance,
12. Elevation certificates, and
13. Other topics approved by the Commission.

Section 1803.4 EXPIRATION

- A. Unless renewed, an accreditation certificate shall expire on July 1 following the issuance of the certificate.
- B. Following the expiration of accreditation, reinstatement may be accomplished only by reapplication and compliance with all eligibility requirements.
- C. An exception to expiration may be granted if, within a 30 day period following the expiration date, the accreditation holder can demonstrate that unavoidable circumstances acceptable to the Commission prevented scheduled renewal of accreditation. An example of such circumstances would be hospitalization due to an accident or illness.

SUBTITLE IV. FEES

Section 1804.1 FEE ASSESSMENT

A. In order to support the costs of operating the floodplain administrator accreditation program in the state of Arkansas, the Commission will assess the community the following fees:

1. Original accreditation, thirty dollars (\$30.00);
2. Annual renewal of accreditation, twenty dollars (\$20.00); and
3. Late fee for renewal thirty (30) days after expiration of accreditation certificate, fifteen dollars (\$15.00).

B. The Executive Director may establish fees for miscellaneous services provided by the Commission, including photocopying, handling and mailing, providing publications, presenting education programs, and processing dishonored checks. This list may be updated from time to time as the Executive Director determines necessary.

C. Fees are non-refundable and shall not be prorated.