CHAPTER I

THE 1970s: ACCOMPLISHMENTS AND PROBLEMS

A Decade of Continuing Flood Losses

The 1970s were a decade of major floods and more than $25 billion in public and private flood losses in the United States. Almost 80% of the 1970s disaster losses were flood-related.[1] The average annual death toll from flash floods rose to about 200. This was more than double the rate of the 1960s and more than three times the rate of the 1940s.[2] It was also a decade of federal, state, and local cost-conscious efforts to reduce flood damages by guiding future uses away from flood-prone areas or requiring individual flood protection. Efforts were made to reduce flood losses to existing uses through relocation and floodproofing to break the cycle of damage, repair, damage, and further repair for damage-prone uses.

The decade was a period of reduced energy supplies and skyrocketing costs for aggregate, concrete, steel, and labor needed for construction of flood control structures such as dikes, dams and levees.[3] It was a period of broadened environmental awareness and of tightened federal, state, and local budgets. It was a decade of experimentation and testing for various combinations of less expensive nonstructural means for reducing flood damages, with regulations playing a central role.

Major floods were a catalyst for flood loss reduction. The 1960s ended with the most intense hurricane in modern U.S. history--Hurricane Camille, which struck the Mississippi coast August 17-18, 1969, with up to a 24-foot storm surge and 230 mile-per-hour winds. It killed 255 people and left 68 missing. Destruction was widespread in Mississippi, Louisiana, Alabama, Virginia, and West Virginia.

Some major floods in the 1970s were:[4]

July 23-August 5, 1970. Hurricane Celia struck the Texas coast, causing 11 deaths and widespread damage.

June 9, 1972. A cloudburst in the mountains above Rapid City, South Dakota broke an earthen dam. Two hundred thirty-six were killed and 2,000 houses were damaged or destroyed. After the flood, Rapid City acquired much of its floodplain with $45 million in federal funding. This event focused national attention upon flash flood problems and the vulnerability of dams.

June 14-23, 1972. Tropical Storm Agnes swept the Atlantic seaboard from Florida to New York with torrential rains and winds up to 70 miles per hour, causing 122 deaths and widespread property damage. Inland flooding was particularly severe in Maryland, Pennsylvania, and New Jersey. Over 300,000 structures were destroyed or damaged, with total property damage exceeding $3.5 billion ($5.8 billion in 1979 dollars).

In response to Agnes, Congress adopted the Flood Disaster Protection Act of 1973,[5] which amended the National Flood Insurance Act of 1968. The 1973 act made flood insurance virtually mandatory as a condition for federal investment or disaster relief in the floodplain. New Jersey and Maryland adopted or amended floodplain regulatory statutes to broaden state programs. In addition, many thousands of communities enrolled in the National Flood Insurance Program (NFIP) and adopted regulations meeting minimum NFIP standards.

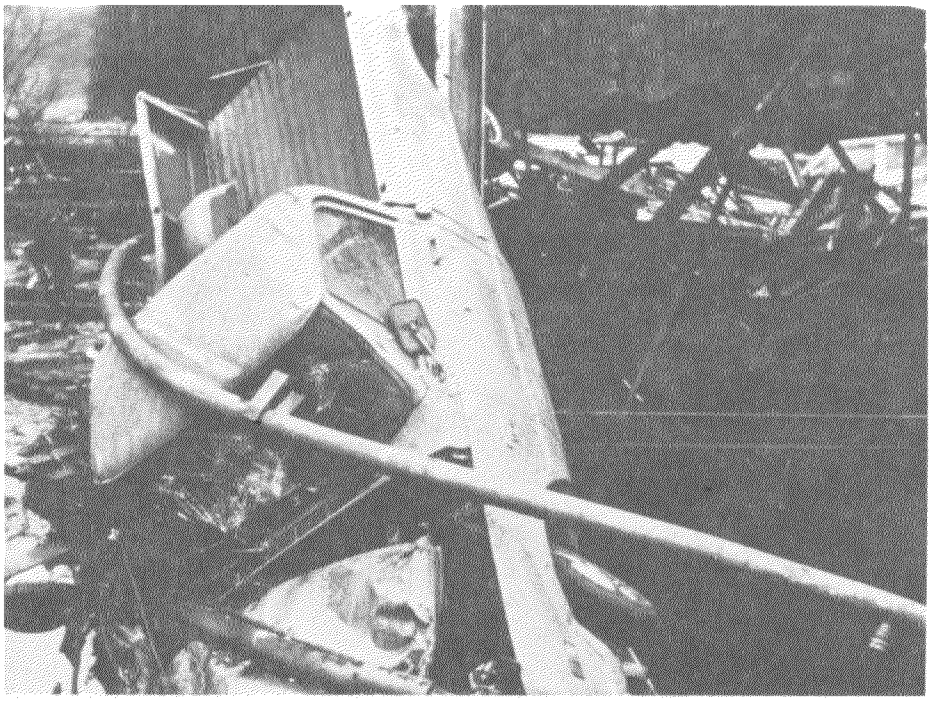
August 29, 1974. Hurricane Carmen struck the Louisiana coast with 90 mile-per-hour winds, causing damage to sugar cane crops, offshore oil installations, and the shrimping industry.

September 13-24, 1975. Hurricane Eloise hit the Florida and Alabama coasts with 100 mile-per-hour winds that severely damaged crops and structures and caused four deaths. Heavy rains over the Northeast also caused major flooding in eastern states, particularly Pennsylvania and Maryland.

July 31, 1976. Heavy rains at the headwaters of the Big Thompson River in Colorado sent a wall of water, in some instances 15 feet high, surging down the canyon, killing 136 and causing $26 million in damages to public property and $16 million to private property. U.S. Highway 34, which ran the length of the canyon, was essentially destroyed.

Larimer County adopted floodplain regulations for the area after the disaster, beginning with a six-month moratorium on rebuilding. Some of the damage-prone structures have been acquired at a cost of approximately $3 million. This event gave impetus to the Floodplain Management Executive Order (11988) and to federal funding of an acquisition program within FEMA under Section 1362 of the Flood Insurance Act of 1968.[6]

February 6-7, 1978. The most severe winter flood of the decade occurred along the New England coast. A two-day "northeaster," with winds up to 90 miles per hour raised combined tides and storm surge elevations to 14 to 16 feet, and wave elevations up



Heavy rains caused the rupture of an earthen dam at Buffalo Creek, West Virginia, in September 1972. One hundred twenty-six people were killed in the disaster.

Photo source: Federal Emergency Management Agency

Severe damage in Scituate, Massachusetts, caused by the February 1978 "Northeaster."

Photo by Rutherford Platt.

to nine feet. Over 2,000 homes were destroyed with another 9,000 damaged and 29 lives lost in Massachusetts alone.

After the storm, Massachusetts adopted a building code requiring wave protection in coastal construction and reconstruction. The governor issued an executive order tightly controlling further state investment in the floodplain. The communities of Scituate and Hull strengthened their floodplain regulations to reflect wave heights. Rhode Island also strengthened its coastal floodplain restrictions to require an elevation of six feet above minimum NFIP standards for structures. To help states avoid future losses, FEMA funded the Section 1362 floodplain acquisition program.

April 1978. Rains caused water levels to rise along Lake Elsinore, California, severely flooding 600 properties. After this event local, state, and federal agencies developed new procedures for postdisaster planning, with relocation as one component.

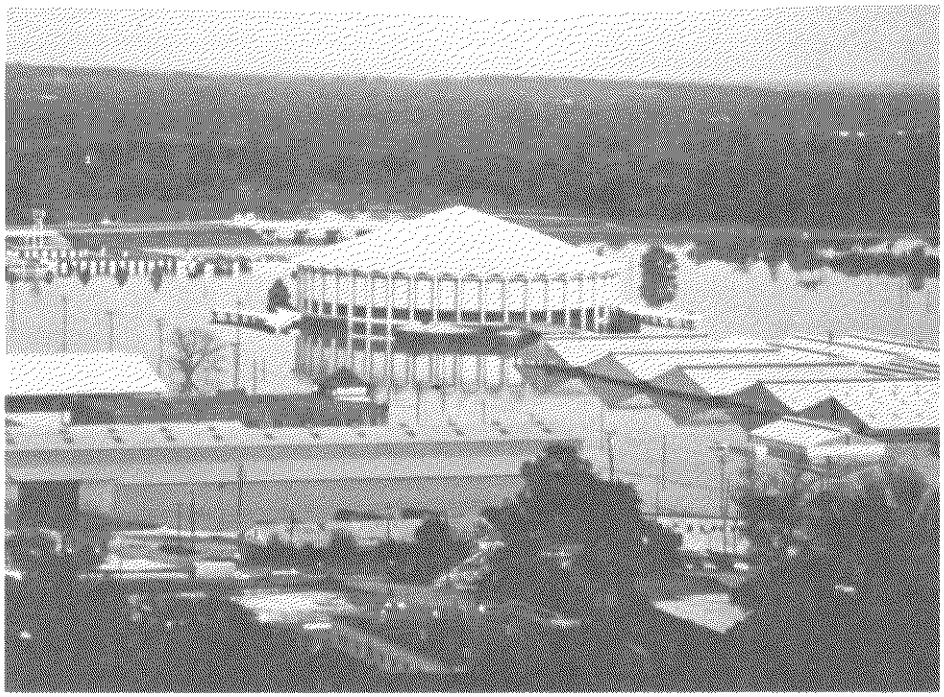
December 1978. Severe flooding in central Arizona killed 12 persons and destroyed 700 properties in Allenville, Hollywood, Duncan, and other towns. Arizona responded by adopting a relocation program that used federal and state funds to acquire and relocate an estimated 800 homes in 12 towns. The state also obtained federal funding for acquisition.

April 16, 1979. Heavy rain caused the Pearl River to top levees in Jackson, Mississippi, and severely inundate Jackson and other areas along the river. Over 1,900 residences, 298 businesses, and many public facilities were destroyed and/or damaged in Jackson alone. Total federal expenditures for the disaster were over $375 million.

FEMA sent teams into the area after the disaster to assess flood hazard mitigation potential. Inadequate federal coordination during the disaster contributed to a July 1980 OMB directive requiring federal agencies to create postdisaster hazard mitigation teams under the leadership of FEMA and to improve postdisaster recovery procedures.[7]

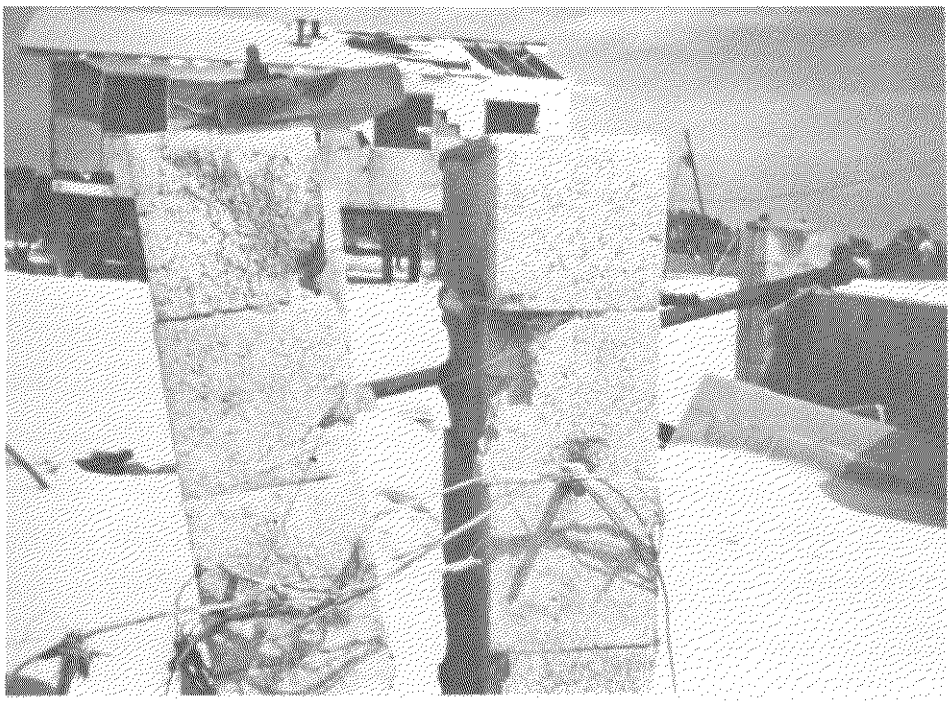
September 12, 1979. Hurricane Frederic struck the Alabama, Mississippi, and Florida coasts with storm tides of 10 to 12 feet and winds approaching 150 miles per hour. Estimated total damages exceeded $2 billion. Over 1,500 structures were damaged or destroyed by flooding in the hardest hit areas, including Gulf Shores, Alabama (500 structures), Dauphin Island, Alabama (200 structures), and Fort Morgan, Alabama and vicinity (500 structures). Many damaged structures had been elevated to the 100-year flood elevation but without consideration of wave heights. Gulf Shores revised its regulations to reflect wave heights.

After this event, FEMA revised recommendations for coastal construction and focused attention on the severe erosion and flood threats to structures in rapidly developing barrier islands.



Flooding behind levees along the Pearl River in Jackson, Mississippi, caused $500 million in damages.

Photo by Rutherford Platt.



Severe wave and water damage along the Alabama coast. Hurricane Frederic destroyed structures that had been raised enough to protect them from the 100-year storm surge but not from wave heights.

Photo source: Federal Emergency Management Agency

TABLE 1

DWELLINGS DESTROYED AND DAMAGED BY HURRICANES AND FLOODS (1969-1976)

Fiscal Year	Hurricanes	Floods
1969-70		
Destroyed	6,046	77
Damaged	48,734	32,080
1970-71		
Destroyed	1,059	43
Damaged	33,964	5,136
1971-72		
Destroyed	17	4,772
Damaged	24,218	127,802
1972-73		
Destroyed	---	2,181
Damaged	---	69,298
1973-74		
Destroyed	---	1,108
Damaged	---	28,969
1974-75		
Destroyed	14	407
Damaged	1,817	17,834
1975-76		
Destroyed	3,516	913
Damaged	27,497	20,423

Source: Data provided by the Federal Emergency Management Agency.

May 18, 1980. Mount St. Helens' eruption caused not only widespread destruction from the impact of the eruption and ash fall, but also severe flooding along the debris-clogged Cowlitz and Toutle Rivers. After the event, state and federal authorities shifted attention to broader-based disaster planning and response. Cowlitz County adopted strict regulations for these areas, including plans for relocating some properties.

The 1970s thus ended as they had begun--with a series of catastrophic events.

During the period from July 1, 1973, to June 30, 1979, outlays from the Presidential disaster fund amounted to $1.6 billion.[8] Total mean annual losses approached $4 billion by the end of the decade.[9]

Progress and New Directions

Flood damages and loss of life during the 1970s prompted the piecemeal adoption of many flood loss reduction measures which, by the end of the decade, formed a surprisingly comprehensive and well integrated federal, state, and local floodplain management program for public and private uses in preflood and postflood situations. Nonstructural measures such as regulations, disaster assistance, flood insurance, and flood warning systems were combined with structural measures not only to reduce flood losses but also to promote urban renewal and provide recreation opportunities, preserve wildlife, and meet other goals.

Congressional and executive initiatives to reduce flood losses through nonstructural measures in the 1970s were largely based upon the recommendations of a 1965 Presidential Task Force on Federal Flood Control Policy which concluded[10] that

> Principles of national economic efficiency require...that the benefits of floodplain occupance exceed all associated costs, not merely those borne by the individual or enterprise which so locates. Total associated, or full social, costs include--
>
> Immediate expenses of development,
>
> Damages to be endured by the occupant or the expense of protective measures undertaken to reduce the frequency and extent of flood damage,
>
> Damages forced on others as a result of encroachment, and public costs involved in disaster relief and rehabilitation.

> Flood plain occupation in which benefits do not exceed the estimated total costs, or which yields lower returns than other uses such as recreation and wildlife conservation, is undesirable, because it causes an eventual net loss to society. Any public policy which encourages submarginal development adds to those losses.

The task force further concluded that[11]

> Despite substantial [flood control] efforts, flood losses are mounting and uneconomic uses of the Nation's flood plains are inadvertently encouraged. The country is faced with a continuing sequence of losses, protection, and more losses. While flood protection of existing property should receive public support, supplemental measures should assure that future developments in the flood plains yield benefits in excess of their costs to the Nation. This would require a new set of initiatives by established Federal agencies with the aid of State agencies to stimulate and support sound planning at the local government and citizen level.

Specific Progress in the 1970s

Growth of the National Flood Insurance Program (NFIP) conditioned upon land use regulations. In 1970, 3,800 property owners had enrolled in the NFIP. Total policy coverage was $1.5 billion. By January 1, 1980, the NFIP had grown to almost 2 million policies with $100 billion in coverage.

The program was designed to serve two principal objectives: to provide to state and local government a federally subsidized insurance (up to 90%) for existing floodplain uses as an incentive for them to adopt regulations guiding new development away from the floodplain; and to provide a mechanism whereby floodplain occupants eventually would help pay for flood losses. Although the program was voluntary at its 1968 inception, in 1973[12] it became partially mandatory when Congress adopted the Flood Disaster Protection Act which required that communities enter the program or lose federal disaster assistance and other benefits for activities in the floodplain. From 1974 to 1977, about 13,000 communities joined the program, in part because of these requirements, but more importantly, because communities were becoming aware of the program's benefits. Communities had to state their intent to adopt land use regu-