Chapter 3
Hurricane Disaster

The nation’s history of hurricane experience is not a happy one. Before mid-century, problems of forecasting and tracking as well as the limits of meteorological study and technology limited hurricane preparedness and response efforts. Haphazard, uncontrolled, and inadequate development and construction booms along coastlines increased the nation’s hurricane vulnerability. In recent years, owing to devastation from Andrew and other hurricanes, there has been a more concerted effort to improve zoning policy as well as building design and regulation. Retrofitting existing structures and relocating others has become part of the lexicon of hurricane preparedness and mitigation policy.

This chapter reviews America’s experience with hurricane disaster. It examines hurricane-related laws and programs aimed at each stage of the disaster cycle. It considers the frequency, extent and federal disaster relief costs of hurricanes from 1953 to 1997. At the local level in the pre-disaster period, hurricane-related policies involve decision making regarding zoning, building regulation for hurricane mitigation, setback rules, beach preservation and dune protection, open space requirements, and a host of other concerns which affect a community’s degree of protection and vulnerability to hurricane. As a hurricane looms, authorities must decide whether or not to call for an evacuation of threatened areas, and whether evacuation will be voluntary or compulsory. These decisions embody dramatic economic and political implications.

At the state level, authorities must promote and disseminate hurricane forecast and tracking information, help (along with localities) effect evacuation and sheltering when needed, maintain state utility infrastructures, conduct damage assessment, and facilitate post-hurricane reconstruction.

The federal government supplements state and local duties under the federal response plan before, during and after hurricane landfalls. Legislative officials engage in post-disaster oversight of responding public agencies.

The Disaster Relief Act of 1969 coordinates hurricane recovery programs. The Disaster Assistance Act of 1970 provides grants, loans, and temporary housing to victims of hurricane devastation. The chief laws applying to hurricane are the National Flood Insurance Act of 1968
and the Flood Disaster Protection Act of 1973. The latter sets out penalties for local
governments that do not participate in, or comply with, the National Flood Insurance Program.

Waugh's article on "Hurricanes" defines the phenomenon as huge, cyclonic, low pressure
storms in the Atlantic and Caribbean. The western Pacific refers to them as TYPHOONS and in
the Indian Ocean they are called CYCLONES (Waugh and Hy, 1990, pp. 61-80).

Table 1 is Coastal vs. Non-Coastal States by Type of Disaster Incident, Number of
(Presidential) Declarations and Federal Disaster Relief Spending in constant 1994 dollars from
May 1953 to May 1997. There are 30 coastal states and 20 inland states. Therefore, coastal
states represent 3/5ths of the total states. If territories and the District of Columbia are included,
coastal jurisdictions jump to 39 and inland to 21. Presidential disaster declarations run from the
first in May 1953 to a total 1299 in June 1997 with major disasters and emergencies included
together. Remember, emergencies are very similar to major disasters except their relief spending
is capped at $5 million in federal expenditures. Constant dollar base year of 1994 was used since
this was the last year of data in the original data set supplied by FEMA. Deflators were used for
federal spending in the years 1995, 1996 and 1997 in order to incorporate cost data up to June
1997. Remember that federal relief spending is for FEMA and predecessor agencies only and
excludes other federal disaster relief programs not funded by the President's Disaster Relief
Fund (i.e., Small Business Administration disaster loans, U.S. Department of Agriculture crop
insurance, Housing and Urban Development disaster aid, Department of Transportation disaster
aid, etc.)

One would expect coastal states to experience hurricanes more frequently than inland states.
Consequently it is no surprise that the 39 coastal jurisdictions secured 92 declarations for
hurricane to only 2 for inland states. What is remarkable is that more than $7.3 billion in federal
relief went to coastal jurisdictions representing about 27% of the $27.6 billion total constant
dollars spent by the federal government for all coastal state disaster relief over the interval
1953-1997. Correspondingly, that $7.3 billion is 23% of the $31.8 billion spent on all
presidentially declared disasters in the interval. About half of the $7.3 billion was for Hurricane
Andrew's devastation alone. Remember, Hurricane Andrew relief spending continues well
beyond June 1997 and continues at this writing. Only $14 million went to inland states for
post-hurricane disaster relief from mid-1953 to mid-1997.
Moreover, hurricane and typhoon declarations together bring the 44 year total of these primary incident declarations to 131 (129 coastal and 2 inland) or about 10 percent of all declarations for major disaster and emergency. If the 37 declarations for typhoon are added to the hurricane totals, federal relief spending for hurricane/typhoon declarations jumps to over $8 billion or nearly 30% of all coastal state constant dollar federal disaster relief and 25% of all constant dollar federal disaster relief.

An extraordinary share of the nation’s disaster declarations and federal disaster relief spending flow from hurricanes and typhoons. It is worth emphasizing that for the 44 year period, 30% of all coastal state constant dollar federal relief spending is for hurricane/typhoon and 25% or a quarter of the constant dollar federal relief spending is for hurricane/typhoon. Admittedly, about half of each of these percentages is attributable to hurricane Andrew alone. However, should the nation again suffer Andrew scale hurricane damage, the percentages of post-hurricane/typhoon relief will be skewed even more dramatically upward.

Table 2 depicts Presidential Disaster Declarations by primary incident type by state, maximums only. That table reveals that Florida, Louisiana, and Texas have won the greatest number of declarations for hurricane. The Trust Territories in the Pacific, including Micronesia, possess the largest number of typhoon declarations.

The Carolinas

Schneider examines a wide range of federal, state, and local government responses to hurricanes and the public's reaction to federal government efforts (Schneider, 1995). The public's general impression of how well the government handles disasters and emergencies is important and often has political consequences. How they vote in local, state or national elections may be influenced by whether they believe emergency management is poorly handled or effectively operated. It may also affect legislators in their decisions about how emergency management is authorized and funded. Schneider's review of Hurricane Hugo in the Caribbean, South Carolina, and North Carolina shows successes and failures in the governments' handling of response and recovery operations as well as different levels of political involvement. Schneider also elaborates on the response efforts and public impressions which stemmed from Hurricane Andrew's destruction in southern Florida and Louisiana.

North Carolinians seemed to react positively to how Hurricane Hugo's recovery was managed
in their state. In that state, emergency response procedures worked as planned (bottom-up approach) with FEMA and other federal agencies supplementing local and state efforts, and the state government acting as the liaison between the federal and local level. The state had engaged in extensive emergency management training before the disaster, had full-time professionals trained in emergency management, and allocated more state money for disaster management when compared with other state jurisdictions affected by the hurricane. In North Carolina, state politicians did not criticize FEMA or other federal efforts and procedures were followed smoothly.

South Carolina’s experience was not as positive. The state allocated proportionally less money to disaster preparedness procedures and staffing. Confusion on procedures and duties resulted. The Governor (aware of the state emergency management team’s lack of knowledge) appointed an ad hoc state emergency management team shortly before Hugo made landfall in South Carolina. This created confusion about who to contact at the state level and proved frustrating for local and federal emergency personnel. South Carolina’s local authorities lacked a knowledge of emergency management procedures. Consequently, some localities improperly reported damage and this seriously delayed their assistance. The dual state emergency groups caused overlap in duties and actions and communication confusion. The bottom-up emergency response plan failed and state and city officials and the public started placing blame, primarily on the federal government’s level of emergency response. In this case, if local and state officials were better prepared, less confusion would have resulted and the bottom-up approach may have worked better.

Hugo caused massive devastation in the U.S. Virgin Islands and Puerto Rico. Virtually all transportation and communication systems were destroyed or disabled and life-threatening dangers abounded (contaminated drinking water, lack of food, and as islands, these jurisdictions could not easily go to adjacent jurisdictions for help). Here, a bottom-up emergency response, in which the federal government supplements local and state efforts, was not really possible.

U.S.V.I. and Puerto Rico’s residents, local leaders, and territorial leaders alike were disoriented and somewhat powerless in coping with the disaster. Officials were unprepared and ill-equipped to provide guidance or assistance to their own jurisdictions. During the first 24 hours, most emergency personnel could not even be located, let alone mobilized to help relief efforts.
By U.S. law, only the governor of a territory or state can request federal assistance, and the federal government in this case was unwilling to bend this rule no matter how extreme the circumstances. This was problematic since the governor of the U.S. Virgin Islands could not be contacted. He was on the island of St. Thomas with no means of communicating from that island to the mainland. Eventually, the governor gained access to a HAM radio and made a verbal request for federal aid, which President Bush then granted. The governor of Puerto Rico submitted a verbal request for aid in a similar fashion, and President Bush approved it. The federal government could now officially initiate a full-scale response.

Emergency relief was not administered quickly or efficiently throughout all disaster-stricken areas in the Caribbean. In Puerto Rico, several thousand displaced residents were living in makeshift shelters six weeks after the storm. It took several months for some hurricane victims in U.S.V.I. to receive safe drinking water and appropriate medical supplies. Electrical power and communication systems were not repaired in some areas for almost a year.

In the end, FEMA did play a critical role in facilitating recovery efforts in the Virgin Islands and Puerto Rico. It distributed an immense amount of financial aid to private businesses and governmental institutions, and helped over 200,000 victims obtain essential disaster assistance.

The public’s perception of the government’s response to Hurricane Hugo was not favorable. Most reports on Hugo focused on the outbreaks of civil disobedience (looting and domestic violence), the total failures of communication linkages with the U.S. mainland, and the massive breakdown in electrical power systems on the islands. In addition, there were serious issues surrounding the government’s handling of this crisis, such as why local and territorial governments were completely unprepared, why the federal government seemed caught off guard, and why emergency management response was so slow in some areas. In sum, the federal government seemed to be tremendously unprepared for this disaster in this region (US GAO 1991).

It should be noted that Puerto Rico and the U.S. Virgin Island’s have no electoral votes in American presidential elections, though they are accorded limited participation in American political party convention activity and until 1995 held limited voting status for committee votes only (or observer status) for their sole representatives to Congress. This infers that Puerto Rico
and the U.S. Virgin Islands have little political influence within the U.S. government, especially at the presidential level. This may have been a contributing factor in poor interchanges between those island governments and the federal government.

Political factors surrounded both preparedness and response in the Hurricane Hugo disaster. When the political leadership of a state or territorial jurisdiction supports, funds, and engages in pre-disaster emergency management, outcomes seem to be more favorable. Moreover, response activities seem to be managed better as well when elected political leaders support disaster management.

Political intervention in emergency management, as when South Carolina's governor felt the need to create ad hoc emergency management during the disaster itself, is sometimes paralleled at the federal level. President Bush appointed his Transportation Secretary as the lead emergency manager in addressing Hurricane Andrew. When political officials make extraordinary changes in emergency management leadership during or shortly after a major disaster, this is often an indication of a breakdown in normal emergency management operating procedure.

Waugh says that American hurricanes pose several political dilemmas. The death and injury toll from hurricanes is, in historical terms, diminishing. Americans are becoming more informed about proper land-use and building techniques & practices which afford greater mitigation against wind and storm surge. Yet, coastal populations in hurricane prone areas continue to increase and public knowledge and experience with hurricanes is relatively low. The political salience of hurricane disaster mitigation and preparedness is also low, especially in areas which have not been hit by hurricanes for a great many years.

States sometimes undermine sound hurricane mitigation through policies which encourage coastal development, usually in the interest of increasing tax revenue and employment. Waugh observes that some states actually provide tax credits to coastal property owners in order to relieve some of the high insurance cost burdens they bear for owning structures along vulnerable shorelines.

Hurricane mitigation efforts for hurricane prone communities can make a tremendous difference in the impact of such extreme climatic events. Waugh details three categories of mitigation efforts that coastal communities could adopt.
1. Hard engineering
2. Soft engineering
3. Passive

The first three mitigation efforts need the support of public officials to be implemented. Issues like new setback requirements, changing zoning laws, creating or strengthening building codes, can be political “hot cakes.” What may be good for the community and provide more of a buffer to a hurricane’s force may be opposed by voters because they feel it infringes on their individual, or business, property rights, or affects tourism. Resort developers oppose setbacks because it gives them less usable property. Other considerations, like having suitable evacuation routes able to handle an entire population, can be overlooked in the face of development. Equally poor is when state, regional and local politicians create tax incentives to encourage further development into areas subject to hurricanes, especially when this increased development overwhelms evacuation abilities. Godschalk describes just such actions in the recovery efforts of Pleasure Island and Gulf Shores, Alabama following Hurricane Frederic in 1979 (Goldschalk, 1988, pp. 199-212).

Relocating a town or certain structures may also be challenged politically. After a hurricane it may be prudent to relocate communities or certain structures further inland, but people’s desire to immediately "get back to normal" may encourage officials to disregard building codes or relocation options in exchange for returning to business as usual.

Goldschalk explains and reviews the political and economic forces which complicate hurricane mitigation, particularly at the local level. It illustrates these complications through the example of Gulf Shores, Alabama, a community racked by Hurricane Frederick in 1979 and a town devoid of national flood insurance at the time of the disaster. The case reveals that town officials feared that the disaster had permanently damaged the community’s tax base. On top of this, owing to pre-disaster flaws in the town’s preparedness planning and bungled evacuation efforts, the community’s mayor and city council were voted out of office during the months after the disaster. The local civil defense director resigned and the building inspector and town clerk were replaced. This case clearly shows that disasters may carry local political consequences.
The case also demonstrates official local ambivalence regarding how far to push hurricane mitigation during rebuilding. The town's new leadership group promoted better development regulations, zoning and subdivision ordinances, building codes and local plans. But in their quest to capitalize on HURRICANE RENEWAL (a term coined by Godschalk), the town did not relocate utilities far enough back from the beach, imposed a temporary and uneven building moratorium, and ran into legal challenges in pressing for a deeper setback line for reconstruction of beach front structures. What is valuable in this case is the generalizability of Godschalk's findings to the experience of many other coastal communities. With the exception of efforts like meteorological experiments, most mitigation techniques are the responsibility of state and local governments and subject to economic and political considerations.

Today, as in other catastrophic natural disasters, the costs of hurricane recovery efforts may be in the billions. Federal government monies may be allotted once a presidential declaration has been issued. FEMA, as lead federal agency, has its regional offices play a major part in its hurricane program. Those offices provide guidance to states eligible to participate in the program. In FY 1994, FEMA reallocated $2 million of its funds to that program. Up to that time and since 1980, FEMA's annual expenditures for hurricane preparedness totaled less than $900,000. The agency received $2,896,000 in FY1995 & FY1996 and $5,896,000 in FY1997 for the Hurricane Program (Bipartisan Task Force Report, 1995, pp. 147-149).

Researchers examining recent hurricanes have confirmed that many simple and inexpensive mitigation and preparedness measures taken by homeowners, apartment dwellers, and business people hold the potential to dramatically reduce hurricane damage and subsequent disaster assistance costs.

The insurance industry also plays a role in the politics of paying for hurricanes. Insured losses from hurricanes are 20 times more costly now than in the 1960s. With this in mind, the insurance industry and its lobbying arm are becoming more political. The extent of insured losses has pushed some insurance companies into insolvency and caused others to terminate coverage in high risk areas. The federal government has deemed this act as discriminatory and has insisted that insurance companies continue insuring against hurricane damage in hurricane-prone areas. In return, the insurance industry has demanded stronger hurricane mitigation efforts (i.e., stricter building codes and more suitable zoning of insured structures) in these high risk
areas. Thus, special interests may also play a political role in who pays the costs of a hurricane disaster.

The federal Hurricane Program's legislative authority resides in the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (P.L. 93-288, as amended in 1994). The program is subject to annual appropriations and FEMA is the administering agency.

The Hurricane Preparedness Grant Program, as it was known before fiscal year 1994, consisted mainly of efforts to conduct studies for coastal areas to help state and local emergency management agencies in evacuation planning. The U.S. Army Corps of Engineers played a role by managing and funding some studies, while the National Weather Service (NWS) supported the development of hurricane storm surge models for coastal areas. Overall, the major emphasis was on protecting the at-risk population from storm surge and coastal flooding, forces which had historically produced the most hurricane-related deaths (until Hurricane Andrew).

Through 15 years, the Hurricane Preparedness Grant Program has completed hurricane evacuation studies for most of the nation's coastal areas vulnerable to hurricanes, though many of these need to be updated to take into account population growth and new development. Such studies were in place and used in South Carolina when Hurricane Hugo struck in September 1989 and in Florida for Hurricane Andrew in August 1992. Public awareness materials and videos have been produced and distributed. Week-long training courses sponsored by FEMA and conducted at the NWS National Hurricane Center, now in Coral Gables, Florida, have provided valuable information to state and local emergency management officials. Various decision assistance tools have been developed and made available to coastal states. These and other activities have protected people vulnerable to hurricane storm surge but they did not fully address the issue of reducing property damage associated with hurricanes.

Since fiscal year 1994, FEMA has reconstituted the old program and now has in place its improved Hurricane Program. This enhanced program seeks to significantly reduce the loss of life, property, economic disruption, and disaster assistance costs resulting from hurricanes. It embodies new mitigation programs. It has three components:

1. state and local assistance to improve preparedness and mitigation capabilities,
2. evacuation studies, including hazard analysis, transportation analysis, shelter
analysis behavioral analysis, and post-storm analysis aimed at measuring the effectiveness of mitigation efforts and response activities.

3. Funding programs for training and exercises to fine-tune mitigation and operations planning, public awareness and education to improve public warning capabilities, public cognizance, and state and local public information materials.

This program must be promoted in the political environment of state and local governments. Public education is important, but it will take more than that to change the decision making of state and local building regulators, zoning authorities, homebuilders, home buyers, and development interests.
Chapter 4
Flood Disasters

America is no stranger to flood disaster. Some allege that no less than 75% of all presidential declarations of major disaster and emergency are for flood (as either the primary or secondary incident type). Flood damages are often expensive and there has been a political ground-swell of opposition to federal disaster relief for "recurring" flood damages. In response, the nation has endorsed national flood mitigation and has enacted flood disaster laws. Of particular significance are structural and non-structural flood hazard mitigation efforts. The Great Midwest floods of 1993 served as a catalyst for modern flood policy reform.

Too few Americans understand that the private sector does not offer flood insurance to homeowners and businesses. Instead, the U.S. maintains a National Flood Insurance Program under which private insurers market, sell and service residential and commercial flood insurance but with the federal government collecting the premiums and controlling rules of claims payouts. This chapter examines aspects of this program and discusses relevance for coastal and inland states.

History of Flood Policy

Floods are America's most frequently occurring agent of natural disaster. More than half of all presidential declarations of major disaster are for floods (Sylves study of FEMA DARIS database 1997 unpublished). Owing to more than 100 years of dissension, confusion, political intrusion, inadequate infrastructure, high cost, unavailability of flood insurance, and more, the federal government decided to basically direct and subsidize flood insurance and re-orient flood hazard mitigation from exclusively building dams and other flood works to a combination of structural and non-structural efforts. Political challenges in flood disaster involve, zoning for floodplain usage, building regulation decisions, planning and funding flood control projects—including relocation actions—, and coordination of effort from locality to locality and from state to state.

Shortly after its creation in 1979, FEMA assumed flood management responsibilities from the U.S. Department of Housing and Urban Development. FEMA is the lead agency in implementation of national flood disaster policy, but shares responsibility with several other federal agencies.
A short history of American flood management is necessary. Also, there are several other federal agencies besides FEMA involved in flood control, among them, the U.S. Army Corps of Engineers, the U.S. Department of Agriculture’s Agricultural Stabilization and Conservation Service, the U.S. Department of the Interior’s Bureau of Reclamation and Bureau of Land Management, the U.S. Department of Commerce’s National Weather Service, and the U.S. Environmental Protection Agency, to name a few.

A FLOOD or FLOODING is defined as the temporary inundation of normally dry land areas from the overflow of inland or tidal waters, or from the unusual and rapid accumulation or runoff of surface waters from any source. The rise in water may be caused by excessive rainfall, snow melt, natural stream blockages, wind storms over a lake, or any combination of such conditions. A FLASH FLOOD is a flood that crests in a short period of time and is often characterized by high velocity flow. It is often the result of heavy rainfall in a local area.

Cigler and others advocate better floodplain management through a combination of structural and non-structural approaches. NON-STRUCTURAL approaches entail restricting development in flood-prone areas as well as use of natural buffers, such as wetlands which help absorb flood waters. They modify the exposure of buildings to floods through flood-proofing, land-use planning, setback rules, warning measures, and insurance. STRUCTURAL approaches include elements of building design and construction aimed at reducing flood vulnerability. One practice involves ELEVATION of structures located in V-ZONES (vulnerability zones), that is, areas prone to flooding or coastal storm surge. Elevation means raising a structure to place it above flood waters on an extended support structure.

FLOODPLAINS are normally dry land susceptible to being inundated by water from any natural source. These areas are usually low land adjacent to a river, stream, watercourse, ocean or lake. Flood frequency studies and flood hazard boundary mapping have been used to calculate a "100-YEAR FLOOD," which means a flood of magnitude expected to be equaled or exceeded on the average of once every hundred years. Such a flood has a one-percent chance of being equaled or exceeded in any given year. The general public often mistakenly believes that such 100-year floodplain areas are only subject to flooding every 100 years. Meteorological and natural forces may produce 100-year magnitude floods at any time.
Among structural floodplain management measures has been the highly controversial construction of "hard" engineered public works projects such as dams, dikes, LEVEES, channel enlargements, diversions, and along coastlines - seawalls, jetties, sea groins, and other physical structures. These actions are taken to modify the way floods behave. Owing to a mixed record of performance, high cost, negative environmental side-effects, and the realization that such structures often inadvertently contribute to over-development in flood-prone areas, national policy has begun to back away from heavy reliance on "hard" engineered flood mitigation works.

A LEVEE is a man-made structure, usually an earthen embankment, designed and constructed in accordance with accepted engineering practices, to contain, control, or divert the flow of water so as to provide protection from temporary flooding. A LEVEE SYSTEM is a flood protection system comprised of a levee, or levees, and associated structures, such as enclosure and drainage devices.

Floods, like many other disasters, are low probability, high consequence events. From a national government perspective, such disasters are a major problem. Floods are responsible for the majority of presidentially declared disasters. For officials at the state and local level, however, flood disasters are experienced with relatively less frequency than they are on a national level. In other words, flood disasters perceived nationally are more common than flood disasters perceived from any single state or locality.

Cigler explains that local officials are less likely (than state and federal officials) to perceive the flood problem as important and so, they tend to give the topic low priority on their policy agendas. She defines this as an "intergovernmental paradox," in that local government officials are unlikely to judge flood or other disasters as a major problem, but it is local authorities who must assume center-stage as the first responders and emergency managers when floods or other disasters occur. Whether it is first line emergency response, or land use planning and implementation activities associated with the mitigation of hazards, local governments have cardinal responsibilities.

The first national flood control law was the Flood Control Act of 1936. Its central premise was that floods could be controlled or averted through the building of engineered structures such as levees, dikes, spillways, channels, jetties, reservoirs, dams, flood walls, etc. The principal
federal agency involved in the construction of flood and erosion control projects is the U.S. Army Corps of Engineers, although other agencies have major roles. The federal water resources development projects traditionally have multiple purposes and often include a flood- or erosion-control element. The U.S. Congress selects the Corps’ projects through a 2-phase authorization and construction appropriations process which is highly political. In the authorization phase, members of Congress vote collectively on a group of water projects in an "omnibus" rivers and harbors bill. Congress then selects many of the authorized projects for appropriations.

Many flood control projects (i.e., dams and levee building) have embodied "PORK BARRELING," under which federal resources were concentrated in a way which over-benefited certain areas at the expense of the national taxpayer. Various legislators may insist that their state needs a costly structural flood control project (regardless of actual necessity), so as to generate substantial federal funds for their jurisdiction. Congressional, state and local officials derive tremendous political gain from infrastructure projects and facilities, heavily subsidized by the national taxpayer, which they claim credit for securing. In effect, they are often said to be "bringing home the bacon" or "porkbarreling" on behalf of their constituencies.

Cigler indicates that structural flood control projects are often very costly, have limited utility, and routinely come with undesirable environmental side-effects. National reforms were needed to curtail costly and confused individual state flood control efforts.

**Coastal States and Flood Disaster**

Table 1 is Coastal vs. Non-Coastal States by Type of Disaster Incident, Number of (Presidential) Declarations and Federal Disaster Relief Spending in constant 1994 dollars from May 1953 to May 1997. There are 30 coastal states and 20 inland states. Therefore, coastal states represent 3/5ths of the total states. If territories and the District of Columbia are included, coastal jurisdictions jump to 39 and inland to 21. Presidential disaster declarations run from the first in May 1953 to a total 1299 in June 1997 with major disasters and emergencies included together. Remember, emergencies are very similar to major disasters except their relief spending is capped at $5 million in federal expenditures. "Emergencies" are approximately 10% of the 1299 declaration pool with "major disaster" representing about 90%. Constant dollar base year of 1994 was used since this was the last year of data in the original data set supplied by FEMA. Deflators were used for federal spending in the years 1995, 1996 and 1997. Remember that
federal relief spending is for FEMA and predecessor agencies only and excludes other federal disaster relief programs not funded by the President’s Disaster Relief Fund (i.e., Small Business Administration disaster loans, U.S. Department of Agriculture crop insurance, Housing and Urban Development disaster aid, Department of Transportation disaster aid, etc.)

Inland and coastal states frequently experience flooding. It is important to remember that Table 1 data is for presidential declarations of major disaster and emergency. Not all floods win such designations. Consequently the data used in this study are not a meteorological record, but instead constitute a political-administrative record of presidential declarations in which flood is the primary incident in the declaration. The Tornado and Severe Storm chapter employs a category FEMA labels "Flood and Tornado." Consequently, there are about 104 "Flood and Tornado" declarations excluded in this flood focused chapter which are taken up in the next. Moreover, the table is based on "primary" incident frequency not on second or third order incidents. For example, floods are often a consequence of hurricanes and typhoons, as well as coastal storms. However, this chapter only concerns the narrow category in which "Flood" is the primary incident. Therefore, a great number of other primary incidents beside "flood" include flood devastation.

In spite of these qualifications, the number and constant dollar 44 year damage totals for floods is incredibly high. No less than 628 of the 1299 declarations in Table 1, are for primary incident "flood." With 3/5ths of the states in the coastal category, 59% of the declarations are directed to coastal states. Consequently, coastal states do not win a disproportionately large number of declarations for "flood" primary incident disasters. Coastal states do secure 70% of the federal disaster relief constant dollar funding for primary incident "flood" declarations in the 44 year interval. This again, is not disproportionately large, especially when one considers that the territories, all coastal jurisdictions, are included in the coastal state set.

All references to federal relief spending below are in constant 1994 dollars and percentages were calculated from Table 1. It is remarkable that for coastal states, primary incident flood declaration federal relief spending is 24.6% of all coastal federal disaster relief from 1953 to 1997. Primary incident flood declarations for coastal states yields 21.3% of all federal disaster relief over the same period. By contrast, inland states primary incident flood declaration federal disaster relief is a mammoth 69.6% of all inland federal disaster relief from 1953 to 1997.
However, non-coastal (inland) state primary incident flood declaration disaster relief is only 9.2% of all federal disaster relief for the 44 year era.

These findings suggest that flood disasters (in terms of primary incident declarations) generate a substantial but modest share of coastal state constant dollar federal disaster relief. Table 1 reveals that hurricane and earthquake generate higher sums of constant dollar federal disaster relief for coastal states than do floods. However, for coastal states, the combined "flood" and "flood and tornado" primary incident categories produce a constant dollar relief amount greater than the individual quake and hurricane categories. The main point is that flood is a paramount form of disaster damage for coastal states, but in the aggregate, hurricane and earthquake rival and exceed flood in terms of constant dollar federal relief expenditures for the 44 year interval. For inland states, flood is far and away the most costly disaster agent if share of constant dollar federal disaster relief spending is considered.

It is somewhat surprising that in the interval covered, according to Table 2, California and Washington State (both coastal states) have the largest number of primary incident flood federal disaster declarations. One might have assumed that inland states along major river systems (i.e., Mississippi, Ohio, Missouri, Red, etc.) would have the most flood declarations.

The National Flood Insurance Program

Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968. The act was broadened and modified later with passage of the Flood Disaster Protection Act of 1973 and other measures. The NFIP is administered by the Federal Insurance Administration (FIA) and is a component of FEMA.

The national response to flood disasters in the decades before NFIP consisted of building flood control works such as dams, levees, and the like and providing disaster relief to flood victims. Disaster relief did not reduce losses or discourage unwise development. Moreover, the public could not buy flood insurance from insurance companies, and building techniques to reduce flood damage were overlooked. Owing to mounting flood losses and escalating costs of flood disaster relief, Congress created the NFIP. "The intent was to mitigate future damage and provide protection for property owners against potential losses through an insurance mechanism that allows a premium to be paid for the protection by those most in need of it" (FEMA,
FIA2/August 1987, p. 1). The NFIP is based on an agreement between local communities and the federal government which states that if a community will implement measures to reduce future flood risks to new construction in Special Flood Hazard Areas, the federal government will make flood insurance available within the community as a financial protection against flood losses which do occur.

If a local government adopts building codes and zoning regulations which limit development in floodplains and promotes flood mitigation, residents (homeowners and business owners) become eligible to purchase relatively low-cost national flood insurance (private flood insurance is unavailable). The National Flood Insurance Program provides policyholders SUBSIDIZED RATES, meaning that the federal government encourages the purchase of national flood insurance on existing structures at "reasonable and affordable" rates, though these determinations are themselves a political issue. Unlike private insurers, the federal government does not need to make a profit on the sale of the insurance its sells.

Over the years about 90 percent of America's flood-prone jurisdictions have enrolled in the NFIP. Local governments remain principal providers of flood mitigation while FEMA's role is one of information support and coordination. With approximately 18,500 of the 20,000 U.S. flood-prone communities currently participating in NFIP, the federal government's role is to build the commitment of local governments to floodplain management and to develop local governments' capacities to design, enact, and enforce the required floodplain regulations.

The state role in NFIP continues to evolve. However, Cigler and Burby disclose that state officials view the states as appropriate vehicles for providing flood abatement local technical assistance, planning and coordination activities. This is surprising given that in their survey, only 52 percent of local officials were aware of their state's NFIP assistance program (Cigler and Burby, 1991, p. 95).

Federal flood laws which called for a combination of structural and non-structural methods have been a mandate for state and local governments. But, as Cigler and Burby claim, little attention in floodplain management has been paid to developing the political will of the nation's elected local and state officials, the authorities who must deal with the flood hazard problem first.
Flood Mitigation

It is the role of local governments to determine the kind of flood mitigation efforts they use to protect their communities and the options they choose. The choices made, the process of deciding, and the ultimate decisions made, all involve politics. Historically, structural flood control measures, like building levees and dams, were popular since they created jobs and were financed largely by the federal government.

Over time, flood prone areas protected by structural means have been heavily developed. Even if non-structural means would be more suitable for an area today, they are harder for elected officials to adopt because people already in the affected areas do not want to relocate, do not want to adopt more floodproof building code requirements, and do not want future development limited. As with land use planning efforts for other natural disasters (hurricane, earthquake), local elected officials face similar opponents to non-structural mitigation efforts. Non-structural methods often conflict with private property rights for homeowners, farmers, and developers alike.

Non-structural mitigation options include regulations, education, and a variety of financial incentives, as well as technical assistance or capacity-building tools. Examples include zoning and other land use regulations (restricting development in flood basins), elevation and other floodproofing of buildings, flood insurance, flood warning systems, land acquisition, permanent property relocation, and disaster preparedness and response planning.

**A Unified National Program for Floodplain Management** was prepared independently of the Galloway Report in 1993 (see below) and provided a conceptual framework that calls for managing floodplains as integrated systems of both human activities and natural functions. It has been highly praised by environmentalists and harshly criticized by property rights advocates, including many farmers. A growing property rights movement in the U.S. is attempting to end nearly all forms of land use regulation. Thus, the goals and objectives of the report may be difficult to implement.

Non-structural flood mitigation efforts also have complicated intergovernmental considerations. There is a clear mandate for a federal regulatory role in floodplain management, but under the U.S. constitutional system, the management of private land-use is the responsibility
of state and especially local governments. Local and state elected officials may decide not to implement floodplain management measures for several reasons.

1. They may feel that the federal government has no right to infringe on their governmental responsibilities.

2. They assume it conflicts with their constituents' beliefs (i.e., private property advocates).

3. They want to continue only structural flood mitigation measures which the federal government used to provide most of the funding for.

4. They may obey the spirit of the NFIP by enacting appropriate floodplain management measures, but may fail to enforce those measures believing their non-compliance may go undetected as they bow to pressures to develop in flood hazard areas of their communities.

Non-structural mitigation efforts have produced politically controversial debates at the federal level also. Cigler offers an example from 1994. A Senate bill, which incorporated the Unified National Program for Floodplain Management proposals, was blocked by Republican-led resistance in the summer of 1994. The defeated bill was a casualty of Republican efforts to derail Democratic-supported legislation in conjunction with advocates of property rights who view any measure to protect wetlands in general as a first step in taking additional farm land out of cultivation through unreasonable regulations. The kinds of buyouts used after the 1993 Midwestern floods were not made part of national flood policy in 1994 because there was great opposition to placing restraints on new flood control dams and levees. In addition, some federal lawmakers led opposition to the measure on behalf of some farmers who opposed adding new wetlands as a flood control measure.

Economic growth and the great political influence of development interests have combined to increase demand for more building within floodplains. The interests promoting sound disaster mitigation land management at the local level are, in relative terms, very weak. Overhead governments, such as the state and federal government, must add a counterweight to the development interests, but this is not easy for a variety of reasons (resistance to non-local, outside pressures; preservation of local land-use authority; political interference at higher levels of government by development interests, etc.)

Many protective land-use regulations are not enacted or enforced due to unresolved conflicts
between private property rights and local, state, and national interests in the flood problem. Attempts to resolve conflicts lead to costly litigation for all parties, including suits by FEMA’s Federal Insurance Administration (FIA) against localities for not complying with NFIP.

Flood policy’s future challenges involve harmonizing city-county relations; getting communities which share a watershed to cooperate and coordinate; moving functionally distinct municipal departments to promote flood mitigation (water, sewer, environment, public health, public safety, police, fire, permits & inspections, etc.). Inconsistency among state flood control programs remains a problem.

Even though floods are the most frequent type of natural disaster, each year, there tends to be less political intervention in the response and recovery process for flooding than for other natural disasters. This is in part because many floods are not considered major disasters. Schneider classifies floods as "normal" disasters, giving several reasons.

- The magnitude of the event (normal disasters usually do not produce severe or prolonged disruptions in the social or physical environments, i.e., communication and transportation accessibility);
- The frequency and recurrence of the event, which have made the American public more familiar and accustomed to normal disasters;
- Government officials are aware of and attuned to these events, and they have designed a response system with exactly these circumstances in mind.

Since the emergency management response process generally works as expected with floods, the need or desire for an elected official to intervene, or for media to criticize, is greatly diminished. An example is the flooding in South Carolina in 1990, as discussed Schneider.

Of course, not all floods are normal, and sometimes political intervention in the emergency management response to flooding does occur. An example is the 1993 flooding in the Midwest. The president appointed an ad hoc sub-group to his Floodplain Management Task Force to determine the major causes and consequences of the 1993 Midwest flood, to evaluate the performance of floodplain and watershed management programs; and to recommend changes in policies, programs and activities likely to achieve risk reduction, economic efficiency, and environmental enhancement in floodplains and watersheds. The Interagency Floodplain Management Review Committee released the report, "Sharing the Challenge: Floodplain
Management into the 21st Century," in July 1994. It was commonly referred to as the "Galloway Report."

The GALLOWAY REPORT examined the functionality of federal levees during the Great Midwest Flood of 1993. Its findings were controversial in that it praised the performance of federal levees during the flood but had little to add about the thousands of non-federal levees in the region, many of which failed during the flood. Federal levees are those built in whole or in part by the federal government. "Non-federal" includes state, local, special district government, or privately owned and managed levees which may be subject to federal regulation but are not owned by the federal government. By suspending judgment of the performance of non-federal levees, the Galloway committee seemed to be suggesting that "federal" structural flood mitigation works had performed well but that "private" structural flood control works had not, or at least were not worth reviewing.

The report recommended that many failed levees not be repaired so that they could buffer against future flooding. (This tactic proved beneficial when the areas flooded again in the 1995 Midwest floods.) This had important ramifications. Farmers (and others) whose properties had been protected from flooding up until the Great Midwest Flood of 1993 by private levees, now were left with no official guidance on whether or not to rebuild the failed private levees. A decision NOT to rebuild means that properties behind failed private levees would be exposed to much greater flood threat in the future. The Galloway committee left it up to the Army Corps of Engineers (in conjunction with the Soil Conservation Service) to decide which private levees warranted reconstruction.

In reviewing the aftermath of the Midwest floods of 1993, there was praise for FEMA’s effort to RELOCATE towns frequently flooded by their adjacent rivers. Completely relocating a town may be politically controversial for several reasons.

- Historic preservationists may oppose it because relocation destroys the history of the town (the buildings, town squares, main streets, etc.).
- Private property advocates may oppose being ordered to move from their land, homes and businesses, some of which have been passed down for generations.
- Some may believe that more flood mitigation measures like bigger dams and more levees are the better solution to flooding than relocation.
The dilemma of relocation was part of the aftermath of the Midwest floods of 1993. It was politically controversial at first, but there was increasing agreement that the damage-rebuild-damage-rebuild cycle should wherever possible be terminated.

Many have complained that too few communities participate in, and too few homeowners buy, national flood insurance. Presumably, if flooding occurs in a community which is not participating in NFIP, "no federal financial assistance can be provided for the permanent repair or reconstruction of insurable buildings in Special Flood Hazard Areas" (U.S. FEMA, FIA 2/August 1987). Once a community's Special Flood Hazard Areas have been identified on a Flood Hazard Boundary Map or Flood Insurance Rate Map, that community has up to a year to comply with and join the NFIP. Failure to do so may mean that those seeking to build in a Special Flood Hazard Area will be prohibited from receiving Veterans Administration loans or other mortgages from federally regulated banks.

However, there is huge political pressure exerted after every flood disaster not to penalize communities or residents, the former for failing to join or comply with the NFIP and the latter for failing to purchase national flood insurance when it was available.

FEMA and the Small Business Administration (SBA) analyzed some 2000 claims arising from the 1993 Midwest flood and found that about half of the applicants with mortgaged homes in the floodplain did not have flood insurance. In 1993, the National Performance Review recommended that FEMA enforce existing requirements for mandatory flood insurance and urged the administration and the Congress to explore incentives to expand insurance coverage against most natural hazards (NPR 1994, p. 17 and Bipartisan Task Force Report 1995, p. 64).

The Midwest floods of 1993 changed how governments would allocate the costs of future flood disasters. Several important policy and administrative reforms have been made since the Midwest floods of 1993. In January 1995, FEMA officials announced changes in regulations as part of the implementation of a new 1994 law. Among the changes were new rules that converted the existing five-day waiting period to a 30-day waiting period (with limited exceptions) before flood insurance coverage becomes effective under a standard flood insurance policy. The U.S. Army Corps of Engineers has also amended some of its rules governing construction cost sharing. Under congressional mandate to reduce the non-federal share of flood
mitigation projects based on "ability to pay," the Corps established criteria for reductions in the non-federal cost share.

The cost of damages and recovery efforts from a flood disaster may enter the billions of dollars. The brunt of these costs are borne by the federal government and the property/casualty insurance industry. Cigler states that direct losses from floods cost approximately $4 billion a year, and that at least 9.6 million households and $390 billion in property are at risk from floods.

After the extreme Midwestern floods in 1993, Congress allocated 15 percent of the disaster aid for relocating people out of the floodplain. More than 7000 have moved, including at least one entire town, making it the largest post-flood relocation in U.S. history. Before the Midwest floods in 1993, $4.5 million was budgeted for relocation; after the flood, another $350 million was added, making this a pivotal turning point in U.S. flood policy (Cigler, 1996, p. 204).

Some evidence suggests that NFIP has been very effective in mitigating damage from floods; FEMA estimates that the floodplain management strategies and building standards required under NFIP prevent $569 million in flood damages annually. However, there is no required special mitigative measures for properties that have incurred repeated flood damages of less than 50 percent of the value of the structure. As of 1993, repetitive loss structures, properties for which two or more insurance payments have been received above a specified amount, represented only about 2 percent of the properties covered by flood insurance policies but accounted for 52 percent of the claims paid and 47 percent of the dollars paid from the Flood Insurance Fund. If the NFIP fund runs empty, the fund may borrow up to $1 billion from the U.S. Treasury (Bipartisan Task Force Report, 1995, pp. 63-64).

The federal government is using financial incentives or disincentives to hasten state and local implementation of flood hazard mitigation methods. The Senate Bipartisan Task Force Report on Funding Disaster Relief (1995) emphasized hazard mitigation through the use of incentives. Examples include federal income tax credits for investments to upgrade existing facilities and federal matching grants for building retrofit. The Report also made a number of budgeting proposals, such as requiring a three-fifths majority to approve emergency supplemental spending and more detailed written justifications by the president and Congress when enacting emergency supplemental appropriations. Budgeting proposals, if passed, would
likely facilitate interest in mitigation tools for reducing the costs of flood and other disasters. By making it more difficult for state and local governments to receive federal monies after a flood disaster, these levels of government may embrace more comprehensive flood management plans sooner than they would without such federal budgeting tactics.

The Federal Insurance Administration has sought to promote wider sales of national flood insurance since 1981 under a "Write Your Own" program which reinvigorates private sector insurance company involvement in the NFIP. The program invites all licensed property and casualty companies to enter into an arrangement with FIA to sell and service flood insurance under their own names.

The U.S. Army Corps of Engineers has undergone dramatic change in its role as primary builder of dams, levees, dikes, and other "hard" engineering flood mitigation structures. Currently, the Corps spends $1.6 billion a year to maintain structures that it has built and $1.2 billion to erect new levees and dikes. Of its $41 billion budget, $13 billion is now allocated for environmental projects (Cigler, 1996, p. 209). Floodplain management efforts are receiving more attention and funding, in part as an outcome of the Midwest floods of 1993 and 1995. The Corps' fastest growing spending category is for environmental projects.

National leaders expect state governments to induce their localities to make greater investments in all phases of floodplain management. To date, most states have been slow to respond. Increasing state disaster costs and less favorable federal-state, post-disaster cost sharing constraints, may give states and their localities a greater financial incentive to engage in flood hazard mitigation.