CHAPTER V

STATE PROGRAMS

Overview

The decade of the 1970s was one of growth and redirection in state floodplain management. Arizona, Colorado, Maryland, New York, Oklahoma, Pennsylvania, and Vermont adopted new statutes. Massachusetts and Rhode Island strengthened floodplain regulations by amending wetland protection acts to include the 100-year floodplain. California, Massachusetts, North Carolina, Rhode Island, and Washington incorporated coastal hazard mitigation provisions into state coastal zone management programs.

Prior to 1970, 24 states had adopted statutes authorizing either direct state regulation of flood hazard areas or state standard-setting for local regulation. By 1980, with the addition of the seven mentioned above, the number had reached 31, although some programs were limited to selected floodplains. Of the remaining 19 states, at least 10 provided technical assistance to local floodplain regulatory programs. All 50 states appointed coordinators for the National Flood Insurance Program. Under its State Assistance Program, FEMA now provides funds to 48 states to increase state administrative capabilities.

Principal state floodplain management activities during the last decade were varied.

The NFIP

States aided FEMA in implementing the NFIP. The rapid growth of the NFIP and resultant redirection of state programs has led to the appointment of NFIP state coordinators within each state, and to a shift in program priorities. Prior to 1970, programs in California, Iowa, Minnesota, Washington, and Wisconsin emphasized state regulation and mapping. During the last five years, state program staffs have spent

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STATE PROGRAM ACTIVITIES

	Ordinances				Hydrology Hydraulics						Enforcement of Violations	
	Prepare model	Assist in Adoption	Assist in Adm.	Training local Officials	Review	Approval	Insurance Activities	Training Lenders & Agents	Information Distribution	Monitoring Administration	Assist Locals	State Action
ALABAMA				x	x		x		x			
ALASKA	x			x			x					x
ARIZONA	x			x	x	x	x		x	x	x	
ARKANSAS	x	x	x				x		x	x	x	x
CALIFORNIA		x	x	x					x	x	x	x
COLORADO	x			x	x	x			x		x	
CONNECTICUT									x			
DELAWARE									x	x		
FLORIDA		x		x			x		x			
GEORGIA		x	x	x					x	x		
HAWAII					x				x			
IDAHO	x						x		x	x	x	
ILLINOIS	x	x	x	x	x	x	x		x	x	x	x
INDIANA	x	x	x		x	x	x		x		x	x
IOWA	x	x	x	x	x	x			x	x	x	x
KANSAS	x		x	x	x	x		x	x		x	x
KENTUCKY				x	x	x	x	x	x		x	x
LOUSIANA	x			x	x		x		x	x	x	
MAINE	x	x		x			x		x			
MARYLAND	x		x	x		x	x	x	x	x	x	x
MASSACHUSETTS		x							x			
MICHIGAN	x		x		x	x			x	x	x	x
MINNESOTA	x	x	x	x	x	x	x	x	x	x	x	x
MISSISSIPPI	x			x			x		x		x	
MISSOURI	x								x			
MONTANA	x	x		x	x				x		x	
NEBRASKA	x	x	x	x	x	x	x	x	x	x	x	x
NEVADA								x	x			
NEW HAMPSHIRE	x	x	x	x					x	x	x	
NEW JERSEY	x			x	x	x	x		x	x	x	x
NEW MEXICO	x								x			
NEW YORK	x	x	x	x	x	x	x	x	x	x	x	x
NORTH CAROLINA	x	x	x	x	x			x	x	x	x	
NORTH DAKOTA		x	x	x	x		x		x	x	x	
OHIO	x	x		x	x		x	x	x	x		
OKLAHOMA				x	x		x		x	x	x	
OREGON												
PENNSYLVANIA	x	x	x	x			x		x	x	x	x
RHODE ISLAND	x	x	x	x					x	x		x
SOUTH CAROLINA		x	x						x	x		
SOUTH DAKOTA				x					x			
TENNESSEE	x			x					x	x		
TEXAS	x	x	x	x					x			
UTAH		x							x			
VERMONT	x		x							x		
VIRGINIA		x							x			
WEST VERGINIA				x				x	x	x		
WASHINGTON				x					x			
WISCONSIN	x	x	x	x	x	x	x		x	x	x	x
WYOMING	x			x					x			
DIST. COLUMBIA		x	x	x	x	x			x			x
PUERTO RICO				x			x	x	x	x	x	

much of their time assisting or acting as contractors for FEMA mapping, distributing literature, answering questions on the NFIP, reviewing ordinances adopted by communities to qualify for the program, preparing manuals, and, in some instances, assisting FEMA in monitoring community performance.

Mapping

During the 1970s, states assisted federal floodplain mapping programs by establishing technical map standards (which often exceeded federal standards), and by aiding the NFIP and its contractors in acquiring topographic maps, flood flow information, and other flood-related data. Some states mapped floodplain areas independently at greater scales and higher levels of accuracy than required by FEMA. For example, New Jersey mapped floodplains and floodways at a scale of 1"=400'. Maryland placed NFIP flood boundaries on tax maps at a scale of 1"=600'. Colorado mapped some urban areas at a scale of 1"=200'. Florida, Michigan, and New Jersey defined coastal setback lines that accounted for erosion, something not considered in FEMA mapping. Maryland, Minnesota, New Jersey, and Wisconsin formed their own depositories for storage and distribution of flood data.

Regulation

By 1980, 31 states had established programs that either directly regulated all or a portion of their floodplains, or established standards for local regulation. State regulations were often more restrictive than those of the NFIP. More restrictive standards for delineation of floodway areas were adopted by New Jersey (0.2-foot rise), Maryland (no rise in many circumstances), Wisconsin (zero-rise in most circumstances), Minnesota (variable rise of 0.0- to 0.5-foot), Illinois (0.1-foot rise in rural areas, 0.5-foot rise in urban areas), and Indiana (0.1-foot rise). In addition, many states added freeboard requirements to the

100-year base flood elevation. For example, Wisconsin incorporated one foot of freeboard in mapping the 100-year floodplain.

Model Ordinances

At least 31 states developed model zoning or subdivision ordinances tailored to state laws and special needs to help localities develop their own regulations. Many models followed the overall framework suggested in Volumes 1 and 2, Regulation of Flood Hazard Areas. Minnesota and Wisconsin developed a whole series of model ordinances to be used with flood data of various types.

Procedural Manuals

At least 18 states adopted procedural manuals to assist local governments in regulation. Manuals addressed adoption and administration of regulations, flood insurance, postdisaster response, and other aspects of floodplain management.

Public Project Review

Most state programs reviewed state and federal projects in the floodplain through state regulatory permit requirements, state executive order requirements (e.g., California, Wisconsin), A-95 review procedures, or National Environmental Policy Act (NEPA) procedures.

Training and Education

At least 36 states conducted workshops and training sessions for local government officials, lenders, landowners, lawyers, and others. Training and education also took place on a one-to-one basis for local government officials and landowners.

Permit Review

Many states assisted local governments in evaluating proposed permits and subdivision plats. These evaluations were particularly

important for counties and smaller communities without technical staff or those which had only approximate flood maps with no 100-year flood elevations or floodways delineated.

Coordination

Some state floodplain management programs (e.g., Minnesota and Wisconsin) were closely coordinated with shoreland zoning programs. Other states (e.g., North Carolina and Massachusetts) tied theirs to coastal zone or wetland programs. Coordination with other land and water planning and management programs (such as pollution control) was an increasingly important function in many states.

Nonregulatory Techniques

Many state programs combined regulatory and nonregulatory floodplain management techniques. For example, New Jersey appropriated $22 million for a cost-sharing program with local governments to construct flood control works; Pennsylvania allocated money to acquire flood-damaged properties; Maryland supported a cost-sharing program that stressed acquisition and relocation through a $7,500,000 bonding authority; and Wisconsin provided money to local units to upgrade floodplain mapping. Using money from Title II of the Water Resources Planning Act of 1965,[1] several states initiated pilot studies on various floodplain management options. Other innovations to supplement regulations are outlined below:

- Flood Warning Systems

  Pennsylvania has completed a pilot project to use flood insurance studies and maps for flood warning and evacuation.

  Minnesota used money from the Water Resources Planning Act of 1965 to assess the usefulness of various types of flood warning systems in different parts of the state.

- Training and Education

  Louisiana is preparing curriculum materials for university planning schools that stress floodplain management and hazard mitigation.

Illinois has developed manuals on state regulatory programs and the NFIP for local governments. It has also developed a homeowners' self-help manual to deal with flood problems. Plans are under way to develop an extension course on floodplain management for local officials who administer the program.

- Public Awareness

Maryland has promoted the use of signs to identify the 100-year floodplain or historical high water marks. Anne Arundel and Montgomery Counties have installed such signs.

Minnesota assisted the City of Crookston to place floodplain signs identifying 100-year flood elevations on street corners.

Colorado has placed signs in Big Thompson Canyon saying, "In case of flash flood, climb to safety." Signs have also been placed in other high-risk canyons in the Front Range of the Rockies.

California presented awards to five communities for wise use of floodplains.

- Hazard Mitigation Planning and Implementation

After a 1979 flood disaster in Indiana, the state assisted two communities in demolishing and relocating severely damaged residences and businesses. The state also helped the communities secure HUD Block Grants to rehabilitate structures.

Illinois assisted the City of Wilmington in preflood hazard mitigation planning. Several alternatives have been identified and discussed.

Minnesota is supporting preflood hazard mitigation planning in cities threatened by the failure of emergency levees.

- Floodproofing

Massachusetts has developed a state floodproofing program in response to the 1978 "northeaster" which destroyed many coastal residences.

Several states, including Massachusetts, Minnesota, and Virginia, have incorporated floodproofing regulations into their state building codes.

- Acquisition and Relocation

Pennsylvania provided flood disaster bond money to communities to aid them in acquiring flood damaged properties for open space use.

Maryland's new bonding authority authorizes funds for flood damage mitigation measures that stress acquisition and relocation and planning for floodplain management on a watershed basis.

Mississippi used HUD Section 407 funds to relocate 292 low-income family units; 84 units are being rehabilitated and floodproofed.

Rhode Island has under way a feasibility study for acquisition and relocation of flood-prone properties in several areas.

In cooperation with the Corps, Arizona is relocating a portion of Allenville and several other flood-prone communities.

Wisconsin has assisted Soldiers Grove to get funding for relocating its entire business section to a flood-free site.

The Kansas State Floodplain Coordinator's office has been relocated to higher ground from its previous location in the floodplain.

Program Emphasis

Program emphasis varied during the 1970s, depending on state legislation, budgets, and needs. Well-conceived and specific legislation did not necessarily mean strong programs. For example, a highly specific Connecticut statute authorized the State Water Resources Commission to adopt encroachment lines for rivers and streams. Because of budgetary and political considerations, however, none were delineated during the 1971-1980 period. On the other hand, Massachusetts successfully encouraged the adoption of many local floodplain regulations as part of wetland protection programs, despite its lack of clear floodplain regulatory powers. Other programs with small budgets and weak legislation reviewed public projects and provided technical assistance to local governments.

During the first year of a new program, states usually adopt administrative regulations, establish map priorities, and develop procedural manuals for local governments. After a program is well established (e.g., Iowa, Minnesota, New Jersey, and Wisconsin), emphasis shifts to implementation: evaluation of development proposals (permits submitted directly to the state or referred to the state by local governments), more specific mapping, review of local ordinances, and technical assistance to localities. States typically emphasize cooperation and coordin-

ation with other state and local programs such as coastal zone management, shoreland, wild and scenic river, and "critical area" programs.

Funding

State program performance varied from state to state, depending on staffing, funding, leadership, support from the governor, frequency of flood disasters, and other similar influences. Examples of staff and funding levels follow:

New Mexico - 1 part-time person, $5,000 budget.

Texas - 3 full-time people, $80,000 budget.

California - 3 full-time people, 1 part-time person, $164,400 budget.

Rhode Island - 3 part-time people, $14,000 budget.

Iowa - 10 full-time, 16 part-time people, $400,000 budget.

Problems

Major impediments to the implementation of state programs are much the same for each state.

- Lack of staff--Some states do not have a single full-time staff person assigned to floodplain management. Others have one or two. Only a dozen have more than two, and only five states have more than 10.

- Lack of funds--Funds for salaries, travel, conducting workshops, mapping, computer analysis of permits, and dissemination of materials are often inadequate.

- Lack of expertise--Staff in most states lack expertise in one or more of the subjects important in floodplain management such as floodproofing, regulations, insurance, relocation, and natural areas evaluation. Even where engineering expertise is available, other biological, cartographic, or planning expertise is often lacking.

- Inadequate statutory authority--Many state regulatory statutes are inadequate in one or more respects. Some lack sufficiently

broad powers (e.g., statutes applied only to floodways) or are handicapped by exemptions. Enabling authority is totally lacking in some states, particularly in the South and parts of the West.

- Inadequate flood data--Lack of detailed flood maps has been a serious constraint on most programs but most seriously where statutes require detailed mapping prior to direct state regulation or state standard-setting for local regulation. Because of budgetary restraints, most states rely primarily on NFIP maps, even though the state staff considers map scales only partially satisfactory for regulatory purposes.

- Conflicts between state and federal policies--Although many federal programs have aided state floodplain regulations, in some instances federal programs have undercut state policies. NFIP policies are often less stringent than state policies in coastal erosion areas. Subsidized federal flood control policies also undercut regulations, and federal disaster assistance has encouraged in situ rebuilding after a disaster. In the past, federal grants-in-aid policies for sewers, roads, low-income housing, and other projects did not adequately account for flood hazards. As a result, public floodplain uses or public infrastructure were located in floodplain areas, attracting unprotected private uses.

- Fragmented statutory authority--In many states floodplain management authority is split among several agencies, creating conflicts and leadership questions. Fragmentation of local regulatory authority has also been a problem.

- Problems with existing uses--Existing structures in flood-prone areas are often a major impediment to effective regulations, as discussed in Chapter III.

- State-local political conflicts--Larger cities often oppose state intervention, contending that they have sufficient expertise and personnel to deal with flood problems.

- Lack of landowner awareness--Landowner ignorance of flooding is a serious problem in many communities, particularly along the Florida and Atlantic Coasts, which have not experienced a major hurricane for more than 20 years. Landowner awareness of flood problems is high after a flood, but often falls off sharply in a few months.

Variations in State Regulations

There are three principal state floodplain management approaches: state standard-setting for local floodplain regulation, direct state regulation of flood hazard areas, and state standard-setting and/or direct regulation of flood hazard areas as part of broader resource protection programs.

State Standard-setting for Local Regulation

Many states authorize state standard-setting for local regulation of flood hazard areas. Direct state regulation of uses is usually authorized only if local governments fail to adopt and administer regulations meeting minimum state standards. States using this approach are Arizona, Arkansas, California, Colorado, Michigan, Minnesota, Montana, Nebraska, New York, Vermont, and Wisconsin. Some states, such as California and Nebraska, have standards for or directly regulate only floodway areas.

Several variations on this approach are illustrated below. Wisconsin required communities to adopt regulations by a specified date (January 1, 1968). Minnesota, in a more common approach, requires that communities adopt regulations within a specified time after adequate flood maps become available. California illustrates a third approach, which involves state cost-sharing for flood control measures where communities adopt regulations meeting state standards.

Wisconsin. Wisconsin has under way one of the oldest and most comprehensive floodplain management programs in the nation. The program was established in 1966 by a statute requiring that all communities adopt floodplain zoning by January 1, 1968.[2] The statute was prompted by severe flood problems along the Mississippi River and many smaller rivers such as the Fox and Chippewa. The shores of Lake Michigan and Lake Superior have flooding and erosion problems. Of the approximately 550 flood-prone communities, more than 300 have now adopted zoning ordinances.

The 1966 statute authorized the state to adopt regulations in the event of local inaction. Beginning with two people, the state program staff has grown to 11 headquarters positions and 17 part-time positions in six district offices, with a total 1980 budget of $4 million.

During the 1966-1972 period, the program performed various tasks. First, communities with serious flooding were identified. Administrative regulations with minimum standards for local regulations were then developed. Several model ordinances and procedural manuals linked to available flood data were developed. Workshops with county boards and local governments were held throughout the state. Assistance in carrying out mapping was sought from the Corps of Engineers, the U.S. Geological Survey, and the Soil Conservation Service.

The Wisconsin floodplain management statute was adopted in conjunction with a shoreland zoning statute that required counties to zone shorelands (defined to include floodplains) to achieve broad, multipurpose objectives such as pollution control and protection of recreation values.[3] Early training sessions, manuals, and other materials addressed shoreland as well as floodplain issues.

The floodplain program at first favored detailed floodplain and floodway mapping for the entire state--some 33,000 miles of rivers and streams--but cost and the prospect of changing watershed conditions discouraged such an ambitious effort. The program staff then recommended, and subsequently implemented, a revised approach relying on two types of maps: approximate flood maps for rural areas, and more detailed ones for urban areas. Approximate flood maps and the regulations linked to them were to be based on historic flood data and soil maps; more detailed maps were to be based on new engineering studies that defined flood profiles and, in some instances, floodways.

Wisconsin has promoted implementation of the NFIP although it has had difficulties with it (as have many other states) since the state standards on freeboard, floodway delineation, and other matters exceed the NFIP's. The Wisconsin program has come to rely on a "natural" floodway concept that allows no appreciable increases in flood heights.

However, the NFIP definition of a floodway allows a one-foot rise in flood heights. Moreover, map scales of the NFIP were often too small for effective community or state use. Consequently, the state legislature adopted a cost-sharing program to assist local governments in developing more detailed topographic maps.

The program staff has focused efforts on technical assistance and training and education for rural areas and small communities that lack personnel and expertise. It has assisted communities such as Prairie du Chien and Soldiers Grove in supplementing regulations with acquisition and relocation. The Southeastern Wisconsin Regional Planning Commission has played the principal role in technical assistance and mapping for urban Wisconsin in the seven southeastern counties near Milwaukee.

Community regulations resemble state models in most areas. However, a significant number of communities exclude all development from wetland and floodplain areas. Southeastern Wisconsin communities have adopted "environmental corridors" to protect not only floodplains but also wetlands, slopes, and bluffs within river corridors.

Problems with the Wisconsin program are insufficient staff and funds, inadequate flood data, and ambiguous enabling authority.

Minnesota. Flooding in the 87 Minnesota counties has been severe along the Mississippi River, the Red River of the North, the St. Croix, and many tributary streams. Floods in 1965 and 1969 caused $160 million in damages. Lakeshore flooding caused by short- and long-term water level fluctuations was also a problem along many lakes in western and northern Minnesota. Approximately 645 Minnesota communities are flood-prone.

To reduce future flood losses, the Minnesota legislature adopted in 1969 a state floodplain management program in conjunction with a shore-

land zoning program much like Wisconsin's.[4] This program now operates with an annual budget of $200,000, two full-time headquarters staff people, and a part-time field staff of 25. At the local level, 210 communities have adopted ordinances; another 100 communities are under study and will be adopting ordinances in the near future.

The Minnesota statute, like Wisconsin's, authorizes the state Department of Natural Resources to establish standards for local regulation of floodplain areas. Most communities were required to adopt regulations within six months of receiving technical flood data and maps from the state. State regulation was to take place only in the event of local inaction. Basing the deadline on the availability of maps added another step to regulation and reinforced the need for mapping. Nebraska and Montana statutes have similar deadlines.

In 1973, Minnesota amended its floodplain management statute to require flood-prone communities identified by the Department of Natural Resources to qualify for the NFIP by adopting regulations.[5] The intent of the statute was multipurpose: to afford floodplain occupants the opportunity to purchase flood insurance, to accelerate floodplain mapping, and to require some form of local floodplain regulation.

The history of Minnesota's program is similar to Wisconsin's. It began with drafting of administrative regulations, model ordinances, and manuals. Workshops were held throughout the state. Standards for local regulations were adopted in 1970 and a state floodproofing code was adopted as part of the state building codes in 1975. The state also continued its active training, education, and technical assistance programs. It is presently assisting local governments to supplement regulations with land acquisition, relocation, and flood warning signs.

Problems with the Minnesota program include conflicts between state and less restrictive federal standards and insufficient personnel and funds.

California. California has had a wide variety of flooding, mudslide, and erosion problems. Although much of the coast consists of bluffs and is subject primarily to erosion hazards, flooding from tsunamis and coastal storms is severe in Humboldt Bay and some other areas. Inland flooding occurs along the Sacramento and other major rivers. Flooding from rainfall and snowmelt in the mountains along dry channels is a serious problem in southern California. Approximately 435 communities are subject to significant flooding.

To address these problems, the California legislature adopted a variety of programs to establish standards for state or local regulation of flood hazard areas.[6] A floodplain management law (the Colby-Alquist Act) was adopted in 1965. This statute authorized the Department of Natural Resources to map floodway areas and to establish minimum standards for local regulations. The state will share the cost of land acquisition for flood control if local governments adopt and administer satisfactory regulations. The 1980 funding for the program was $164,600, with three full-time and one half-time staff members for each of the four district offices.

During its early phases, the program emphasized mapping. Later, emphasis shifted to training and education, permit evaluation, and technical assistance. Approximately 200 communities have adopted regulations on their own initiative to comply with state law or to qualify for the NFIP. Through onsite visits, the staff monitors community compliance with regulatory standards.

Other programs also address flooding problems. The State Department of Real Estate and affected local governments must approve residential land subdivision.[7] Subdividers must investigate flood potential: development of unsafe sites is prohibited.

The 1972 state wild and scenic river program also reduces development in some flood-prone areas.[8] This program requires that counties with designated rivers develop management plans for the watershed areas in cooperation with the state.

Coastal communities are required to adopt hazard regulations by still another statute--the Coastal Zone Management Act of 1972.[9] The Coastal Commission issues the guidelines for local regulations. Pursuant to this program, communities such as Santa Barbara have adopted building setbacks for bluff areas.

Problems in the California program are fragmentation of authority, severe development pressures, lack of detailed flood maps, and insufficient personnel and funding.

Direct State Regulation

Ten states have directly regulated flood hazard areas. Washington regulates selected floodways, Michigan and Montana regulate floodplains and floodways throughout the state, Illinois regulates selected floodways and floodplains, Indiana, Kentucky and New Jersey regulate floodways, Maryland and Rhode Island regulate floodways and inland floodplains, and Florida, Maine, and Vermont regulate large-scale development in floodplains and floodways. The last three states also authorize optional local regulations.

Three types of direct state regulation are discussed below: direct state regulation of floodway areas with optional local regulation of other areas (Washington State), direct state regulation of floodways with mandatory local regulation of flood fringe areas (New Jersey), and direct state regulation of both floodway and flood fringe areas (Maryland).

Washington. Washington is subject to severe flooding along the Columbia, Cowlitz, and other rivers. In addition, its coast is peri-

odically flooded by storms and tsunamis. Approximately 270 communities have flood problems; of these, 85 have adopted floodplain zoning ordinances.

Washington adopted one of the first state floodway regulatory programs in 1935, when the legislature adopted a channel encroachment law in response to severe flooding. In 1936, the state adopted a broader Flood Control Zone Act that authorized the Department of Water Resources to identify and regulate flood hazard zones.[10] Between 1936 and 1970, the state identified hazard zones in 93 communities along 18 streams: state permits are required for development in these zones. No new hazard zones have been identified since 1970.

The Washington legislature also authorized local zoning of floodplain areas and authorized the Department of Water Resources to delegate permit powers for state-identified zones to communities. To date, only four localities have permit powers--King, Clark, and Cowlitz Counties, and the City of Kelso.

The state program is staffed by five professionals and has funding of $100,000 annually. Its principal duties are to process permits for proposals in state flood control zones, monitor development proposals, assist FEMA in mapping floodplains, and provide technical assistance to communities.

As in Wisconsin and Minnesota, the 1971 Washington legislature also authorized cooperative state/local shoreland zoning.[11] Shorelands were defined to include all areas within 2,000 feet of coastal or estuarine waters, 200 feet of lakes, and 200 feet of streams. Floodplains were also included. All local governments were required to adopt "master programs" for these areas. State standards require that protection against flooding be included as one element of the programs. Particularly strong emphasis has been placed on flood and erosion along the

2,400 miles of coast in 15 counties. The state has prepared a coastal atlas showing the 100-year frequency tide level, wave action and erosion areas, and geologically unstable zones.

Problems with the program include its small staff, insufficient funds, and inadequate flood data.

New Jersey. New Jersey is subject to severe inland and coastal flood problems. A 1954 hurricane caused extensive loss of life and property damage along 127 miles of beach. Winter storms such as the severe Ash Wednesday storm of 1962 are also a source of damage. Approximately 550 communities are flood-prone.

In 1929, New Jersey became one of the first states to regulate channel encroachments. In 1962, the legislature broadened floodplain management to include the delineation and marking of flood hazard areas. In 1972, the legislature adopted a comprehensive regulatory statute authorizing the State Water Resources Board to map floodplain areas, directly regulate floodways, and establish standards for local regulation of flood fringe areas.[12] The Board is authorized to regulate flood fringe areas directly if local governments fail to regulate these areas according to minimum state standards within 12 months of receiving the state maps. The statute also requires local tax assessors to reduce property taxes in state-delineated floodplain areas.

A staff of 10 people is implementing the program. Mapping is a principal activity. Working as a contractor to FEMA, the state has prepared maps at a scale of 1"=200' with five-foot contour intervals. Over 1,000 miles of stream have been mapped with floodways reflecting no greater than a 0.2-foot rise in surface water elevation. Monitoring is also emphasized. The staff plans to visit all of its flood-prone communities in 1981. Other program activities include permit processing, development of model ordinances, and training and education.

Floodplain regulations are supplemented by nonregulatory measures. A 1978 Emergency Flood Control Bond Act established a three-year program providing the New Jersey Department of Environmental Protection with $22 million in matching funds to assist local governments to construct flood control works on a 50-50 basis and $3 million to prepare a statewide flood control master plan and assist with development of regional flood control plans.[13]

New Jersey has not adopted floodplain regulations for coastal areas; however, the 1970 legislature adopted a coastal wetland protection act that requires permits from a regulatory agency for fill or dredging.[14] Very little development is permitted in wetlands. In addition, the legislature adopted the Coastal Area Facility Review Act of 1973 that authorizes the division of coastal resources to regulate residential development of more than 25 units and major public and industrial facilities.[15] A 1980 coastal zone management plan emphasizes flood hazard reduction.

Maryland. Maryland has storm surge and wave problems along its 5,000 miles of coast and the Chesapeake Bay, inland flooding along major rivers, and flash flooding along mountain streams in the west. Approximately 115 communities are flood-prone; 51 of these have adopted floodplain regulations in compliance with the regular phase of the NFIP.

In 1967, the state first adopted regulations for the 50-year floodplain as part of its state water pollution control program. Expanded legislation in 1976 required state permits for development within the 100-year inland floodplain.[16] The State Water Resources Administration was also directed to map and mark floodplains. Communities were authorized to regulate floodplain areas and to adopt comprehensive floodplain management plans.[17]

Pursuant to this statute, the state has established a very active implementation program with a staff of 35 in the floodplain management and watershed permit divisions and a yearly budget of $550,000. Principal activities include evaluation of 800 floodplain permits each year, mapping technical assistance, coordination of state, federal, and local programs, and monitoring of floodplain activities. The state has prepared maps at a scale of 1"=600' with tax maps as a base. Rather than using the NFIP encroachment standard, Maryland has developed a "tractive force" floodway which has taken into consideration the velocity and erosive force of water.

Because direct state regulations apply to all inland areas, the NFIP has permitted Maryland communities with nontidal streams and floodplains to enforce state floodplain regulations through adoption by reference. Both state and local approval is required for permits. Many communities such as Baltimore, Howard County, and Prince Georges County have adopted regulations exceeding NFIP standards, including prohibition of development within the 100-year floodplain and stormwater management regulations.

The state is also assisting communities with nonregulatory measures such as floodproofing and comprehensive stormwater management. It has begun comprehensive watershed management plans. The legislature adopted a $7.5 million bond issue in 1980 to assist communities in implementing flood hazard mitigation projects. Communities are to emphasize acquisition and relocation. In 1981, the legislature approved use of those funds for watershed and hazard reduction planning.

State floodplain regulations do not apply to coastal areas, but Maryland has adopted a statute that requires permits for filling and construction in coastal wetlands from its Water Resources Administration.[18] Flooding is one consideration used in evaluating permits. In

addition, the Maryland Tidewater Administration provides grants-in-aid and technical assistance on flood hazard mitigation to coastal communities.

Problems with the program are lack of regulatory powers for coastal areas, lack of maps for some areas, and insufficient personnel for monitoring.

Flood Hazard Regulation as Part of Broader Resource Management

Many states either directly regulate selected floodplain areas or establish standards for local regulation pursuant to planning or resource protection statutes. California, Oregon, and Nevada mandate local planning and regulation with natural hazards protection as one component. Many coastal and some inland states directly regulate or establish standards for local regulation of wetland areas. Other states include floodplain management as part of coastal zone management programs.

Three ways in which flood hazards are regulated through broader resource management programs are illustrated below: regulation of inland and coastal flood hazard areas through a combination of wetland and coastal zone management (Massachusetts), regulation of inland floodplains through a combination of state encroachment lines and wetland regulations defined by soil type (Connecticut), and regulation of coastal flood hazard areas through a coastal zone management statute (North Carolina).

Massachusetts. Much of the 1,200 miles of Massachusetts coast is subject to severe hurricane and "northeaster" flood problems. Flooding is also a problem along rivers in the central portions of the state and in the central and western mountains. A coastal storm in February of 1978 killed 29 and destroyed or damaged 11,000 structures.

Massachusetts has not adopted a comprehensive floodplain management statute, but does have a number of specific statutes that provide con-

siderable state and local control over both inland and coastal floodplains. In 1961, the legislature authorized state encroachment lines for the Assabet River, but not for other rivers. It also authorized a state permit system for coastal wetlands in 1963,[19] the first such system in the country. From 1965 to 1980, the state made considerable progress in adopting coastal wetland protection orders pursuant to this and later statutes. The orders apply to many of the most seriously flooded coastal areas. Restrictions are recorded on deeds, and permits for structures and fill within these areas must consider flooding.

In 1973, the legislature authorized local conservation commissions to regulate coastal and inland wetlands.[20] The real strength of the Massachusetts program for inland areas lies in this statute. In a 1975 amendment, wetlands were defined to include the 100-year floodplain.[21] Local regulation of wetlands is supervised by conservation commissions in each Massachusetts town. These appointed commissions are often highly conscientious and function with much greater expertise in evaluating wetlands permits than do traditional zoning boards. Denial or issuance of local permits may be appealed to a state appeal board.

In evaluating permits, local commissions consider how a proposed use will affect flooding. In general, local commissions deny permits in wetland or floodplain areas. In addition to wetland regulations, many flood-prone Massachusetts communities have adopted floodplain regulations with standards equaling or exceeding those of the NFIP.

The Massachusetts Coastal Zone Program has also addressed flood and erosion hazards. All coastal wetlands and barrier islands have been mapped. Through this program, the state provides community assistance grants (totalling $241,000 in fiscal 1981) to coastal communities. Technical assistance is also provided.

Other state hazard reduction initiatives resulted from the severe winter storm of 1978. After this storm, a disaster task force was formed to guide recovery efforts. Floodproofing standards accounting for wave heights were incorporated into the state building code. The state adopted a bond issue to provide funds to local governments for acquisition of floodplain lands. In August 1980, the governor issued an executive order declaring a general state protection policy for coastal beaches and prohibiting the use of state funds for development in beach areas.[22]

The fragmentation of regulatory powers has complicated floodplain management in Massachusetts; nevertheless, the resulting "package" of programs appears to be quite effective. Other problems are inadequate maps, lack of expertise, and strong development pressures. The NFIP is also viewed as a mixed blessing because FEMA standards are less restrictive than those of most communities and because subsidized insurance creates pressures for development.

Connecticut. Hurricanes caused severe loss of life and property damage along the Connecticut coast during 1938 and 1954. There is inland flooding along the Connecticut and other major rivers. Approximately 170 communities are subject to flooding.

Connecticut was one of the first states to implement a floodway encroachment statute when the legislature in 1955 authorized the Water Resources Commission to identify and require permits for development in floodway areas.[23] The state has identified approximately 300 miles of floodway.

Although some measure of direct control over floodplains continues under this statute, staffing (two person-years) and budget ($35,000) are small. The most extensive state program for inland floodplains is the Wetland Regulation Program, authorized by the state legislature in 1972.

Wetlands are defined by statute to include alluvial, poorly drained, and very poorly drained soils. Between 20%-25% of the state, including much of the floodplain, is encompassed by this broad definition. Wetlands throughout the state have been mapped with the help of the Soil Conservation Service.

The 1972 Inland Wetland Law requires that local governments regulate inland areas according to state standards.[24] The Department of Environmental Protection is authorized to regulate directly wetland areas in the event of local inaction. To date, 116 communities have complied with state standards. The Department directly regulates wetlands in the remaining 53 towns. Under this statute, development or filling is strongly discouraged. Many towns also adopted separate floodplain regulations in order to qualify for the NFIP. Combined wetland and floodplain standards are usually more restrictive than those required by the NFIP.

The state also directly regulates coastal wetlands under a coastal wetland statute adopted by the legislature in 1971. Flooding threats are considered in permit evaluation.[25]

To facilitate wetland, floodplain, and other land management efforts, the state has established a centralized natural resource data gathering and mapping program. This program coordinates topographic, floodplain, wetland, and other mapping elements and supplies maps and interpretive materials to localities. Detailed air photos, soils maps, and topographic maps (7.5-minute quadrangles) are now available for the entire state. Separate pamphlets listing data sources have been compiled for each community.

Problems with the Connecticut program are fragmented enabling authority, lack of direct state floodplain regulatory powers for coastal areas, and inadequate staffing and funding.

North Carolina. Hurricane and storm flooding and associated erosion along the "outer banks" and behind barrier islands affect the entire North Carolina coast. Flooding occurs along rivers in the coastal plain, and flash floods and other high velocity floods are a problem in the western mountains. Approximately 410 communities are subject to flooding.

In 1971, the legislature adopted a statute authorizing and directing local governments to regulate the 100-year floodplain.[26] The Board of Water and Air Resources was authorized to map floodplain areas and assist local governments in mapping. However, the Board was not granted regulatory powers.

Although the state inland floodplain management program has no regulatory powers, it has assisted communities and FEMA in developing flood insurance study maps and encouraged communities to enroll in the NFIP. A nine-person field staff provides technical assistance.

More floodplain management has been implemented along the coast. In 1968, the legislature adopted a dune protection statute that required counties to adopt regulations to control vegetation removal in dune areas.[27] All six coastal counties have adopted dune protection ordinances. In 1969, the legislature adopted a state-administered coastal wetland protection act regulating dredging or filling activities in coastal areas.[28]

In 1973, the legislature adopted a comprehensive coastal zone management act that required local governments to identify coastal areas of environmental concern and to adopt regulatory standards consistent with state criteria.[29] Areas of environmental concern are defined to include (but are not limited to) sand dunes, beaches, floodplains, and erosion areas. The program formulated coastal hazard mitigation standards that required not only elevation to the 100-year flood protection

level plus freeboard, but also erosion setbacks and protection for dune systems.[30] Flood and erosion maps are being prepared for the entire coast, as is an erosion control manual.

Problems in North Carolina's program are inadequate enabling authority, the lack of detailed flood and erosion data, federal standards that fail to account for erosion, inadequate monitoring and extensive existing development. The state, like most others, needs strengthened implementation. To accomplish this continued federal mapping is desirable if not essential.

Footnotes

1. Title III of the Water Resources Planning Act of 1965, P.L. 89-80, (codified at 42 U.S.C.A. § 1962d-1 (West 1981)).

2. Wis. Stat. Ann. § 87.30 (West 1975).

3. Wis. Stat. Ann. §§ 59.97(1), 144.26 (West 1975).

4. Minn. Stat. Ann. §§ 104.01 to 104.07 (West 1978).

5. Minn. Stat. Ann. § 104.08 (West 1978).

6. Cal. Water Code § 8400 to 8415 (West 1971).

7. Cal. Bus. & Prof. Code § 11000 *et seq.* (West 1964). See particularly §§ 11018.4 and 11025.

8. Cal. Pub. Res. Code §§ 5093.50 *et seq.* (West Supp. 1982).

9. Cal. Pub. Res. Code §§ 30300 *et seq.* (West 1977).

10. Wash. Rev. Code Ann. § 86.16.010 *et seq.* (1981).

11. Wash. Rev. Code Ann. §§ 90.58.010 *et seq.* (1981).

12. N.J. Stat. Ann. §§ 58:16A-50 *et seq.* (1982).

13. N.J. Stat. Ann. § 58:16A-55.4 (1982). See also 1978 N.J. Laws ch. 78, "Emergency Flood Control Bond Act".

14. N.J. Stat. Ann. §§ 13:9A-1 *et seq.* (1979).

15. N.J. Stat. Ann. §§ 13.19-4 *et seq.* (1979).

16. Md. Nat. Res. Code Ann. § 8-9A-01 *et seq.* (Supp. 1981).

17. *Id.*

18. Md. Nat. Res. Code Ann. § 9-102 *et seq.* (1974).

19. Mass. Ann. Laws ch. 130, § 105 (Michie/Law Co-op 1981).

20. Mass. Ann. Laws ch. 131, § (Michie/Law Co-op 1981).

21. Mass. Ann. Laws ch. 131 § 40 (Michie Law Co-op 1981).

22. Commonwealth of Massachusetts Executive Order No. 181, August 13, 1980.

23. Conn. Gen. Stat. §§ 25-4a *et seq.* (1981).

24. Conn. Gen. Stat. §§ 22a-36 *et seq.* (1981).

25. Conn. Gen. Stat. §§ 22a-28 *et seq.* (1981).

26. N.C. Gen. Stat. §§ 143-215.51 *et seq.* (1978).

27. N.C. Gen. Stat. §§ 1048-3 (repealed 1979 N.C. Sess. Laws ch. 141, § 1.

28. N.C. Gen. Stat. §§ 113-229 *et seq.* (1978).

29. N.C. Gen. Stat. §§ 113A-100 *et seq.* (1978).

30. N.C. Gen. Stat. §§ 113A-113 (1978).