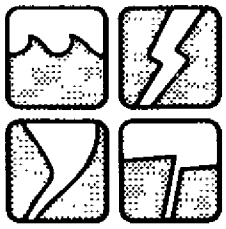
# REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES VOLUME 3

**Jon A. Kusler**
**Attorney at Law**



Natural Hazards Research and Applications Information Center
Special Publication 2

Program on Environment and Behavior
Institute of Behavioral Science
University of Colorado
1982

REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES, VOLUME 3

Prepared for


The U.S. Water Resources Council
Washington, D.C.

The opinions contained herein are those of the author and do not necessarily reflect the views of the U.S. Water Resources Council or its member agencies.

This version is subject to revision.

Available from the Natural Hazards Research and Applications
Information Center
Institute of Behavioral Science
University of Colorado
Boulder, Colorado 80309
$ 8.00

FOREWORD

The U.S. Water Resources Council contracted for this report to update and supplement Volumes 1 and 2 of Regulation of Flood Hazard Areas to Reduce Flood Losses which were prepared and published by the Council between 1968 and 1971. Volume 3 reviews accomplishments and problems of the decade of the 1970s in the use of floodplain regulations as one element of floodplain management. It suggests strategies for the 1980s for improving the quality of regulations and for combining regulations with other management tools to serve multipurpose state and local goals.

As a supplement to Volumes 1 and 2, this report does not repeat earlier materials. The reader is assumed to be familiar with basic floodplain management concepts. Emphasis in this volume is on conclusions drawn from the experience of the 1970s and new directions for the 1980s.

The report was prepared for the Council by Dr. Jon A. Kusler, an attorney and specialist in water resources systems, working under the guidance of an interagency task force. He is uniquely qualified to carry out this task, having been principally responsible for the research and writing of Volumes 1 and 2, and as the author of many studies on floodplain management during the last decade. The opinions expressed herein are those of Dr. Kusler.

We hope you find the report useful and interesting.

Frank Thomas
Acting Director,
U.S. Water Resources Council

# PREFACE

Volume 3 documents progress and problems with floodplain regulations in the 1970s and suggests strategies for the use of regulations as part of broader floodplain management efforts in the 1980s. Its focus is on state and local programs, including innovations that can serve as examples for effective flood loss reduction in the 1980s.

Preparation of Volume 3 began with surveys of state and local floodplain regulations and court decisions during the 1970s to document progress and to identify problems. The surveys revealed that the materials contained in Volumes 1 and 2 of Regulation of Flood Hazard Areas to Reduce Flood Losses including model statutes and ordinances and legal analyses, are generally applicable to the 1980s. Volume 3, therefore, is designed to supplement and update rather than replace earlier materials, with an emphasis on increasingly effective floodplain management.

Material from the two surveys has been assembled and published as two separate appendices: Strengthening State Floodplain Management and Innovation in Local Floodplain Management. Volume 3 cites and draws upon both.

The report and appendices are based upon both primary and secondary sources of information. Preparation began with the review of papers and presentations from a series of eight floodplain and wetland seminars conducted by the U.S. Water Resources Council during the winter of 1978 and the spring of 1979. The seminars dealt with problems, issues and opportunities in floodplain and wetland management. See Kusler (1979). This assimilation was followed by a review of other publications issued since 1970 dealing with floodplain management. (See the bibliography of this report and the appendices for a partial listing.) Contacts were also made with other studies underway including one conducted by the National Science Foundation for Congress in 1980 which produced an excellent

document, A Report on Flood Hazard Mitigation. Since the goal of the present report was to distill a decade of research and experience concerning the status, problems and possible new approaches for floodplain regulations, considerable use was made of this and other studies. Not surprisingly, conclusions of the present study closely parallel those of the National Science Foundation.

After completing the literature review, several independent surveys were conducted. These included (1) a survey of all state floodplain programs, carried out by the Association of State Floodplain Managers; (2) interviews with approximately 300 local government officials, state program personnel, regional personnel of FEMA, and the Corps of Engineers; (3) a search and analysis of court cases since 1970 which have litigated federal, state and local floodplain regulations; and (4) preparation of case study profiles for 150 communities with innovative floodplain management programs.

These surveys helped test conclusions and recommendations from other studies and provided new information concerning innovative approaches but fell short of field documentation of flood hazard mitigation approaches. Limited data concerning the type and characteristics of new and existing floodplain structures; flood losses to unprotected, partially protected structures; the effectiveness of specific types of flood mitigation measures; and compliance of new structures with regulations prevented a thorough analysis of regulations. It is hoped that the Federal Emergency Management Agency, the U.S. Army Corps of Engineers, the National Science Foundation, the states, and other organizations will help gather such data over the next decade to test the conclusions of this and other reports.

In the synthesis of material, several conclusions were particularly compelling:

1) The overall floodplain mapping, regulatory, acquisition, insurance, and other management approaches applied at the state and federal levels during the 1970s have stimulated large numbers of strong community floodplain management programs. Now the challenge is to address the more unique flood problems which face thousands of additional communities.

2) Flooding will continue to be a major national problem with periodic losses of hundreds of lives and billions of dollars in property damage when major hurricanes and inland storms occur. Despite the substantial progress in nonstructural floodplain management made during the 1970s, full implementation of flood loss mitigation measures is still far away, particularly for existing uses. Implementation will require continued federal leadership through partially subsidized insurance, disaster assistance conditioned upon mitigation measures, and floodplain acquisition and flood control measures on a cost-sharing basis. This should take place within a framework of consistent overall federal standards. States, communities and the private sector may bear a larger burden but the shift from total federal responsibility to greater state, local and private responsibility will take time. A careful system of incentives and disincentives is needed.

3) Floodplain management has become a technical subject as the approaches for floodproofing, flood warning systems, postdisaster mitigation, specialized regulation, and acquisition and relocation have been perfected. Increased expertise and education at all levels of government and in the private sector are needed to apply the lessons of the 1970s to the 1980s and to develop still more new approaches.

ACKNOWLEDGMENTS

Appreciation is expressed to all who participated in these efforts with particular attention to Pat Bloomgren, Larry Larson, and Marguerite Whilden, who provided information on state programs; Rutherford Platt for the excellent overall advice and discussion of legal issues; Frank Thomas and Tim Maywalt of the U.S. Water Resources Council for their help and guidance throughout the study; and Jacquelyn Monday of the Natural Hazards Research and Applications Information Center, University of Colorado, for her editorial assistance and patience in supervising publication of the manuscript. Special thanks is also due the Water Resources Council Work Group which provided able guidance throughout the project, including:

Karl Klingelhofer, U.S. Department of Agriculture,
Jerome Peterson, U.S. Army Corps of Engineers,
Phillip Thompson, Department of Transportation,
Ross MacKay, Federal Emergency Management Agency,
James Wright, Tennessee Valley Authority, and
Patricia Bloomgren, Minnesota Department of Natural Resources.

Jon A. Kusler
Attorney at Law

TABLE OF CONTENTS

LIST OF TABLES

# EXECUTIVE SUMMARY

## Progress in Floodplain Management

During the 1970s, many factors contributed to the growth and testing of floodplain management at all levels of government. Record floods took over two thousand lives and cost billions of dollars in property damage and government flood relief. Inflation soared and tax revenues dwindled. Courts increasingly held landowners, developers, subdividers and local governments liable for flood damages. This combination of losses, diminished revenues, and growing liability prompted Congress, the states and local governments to develop a federal/state/local partnership to cost-effectively reduce flood losses. Floodplain management took its lead from the fiscally sound recommendation of the 1966 Federal Flood Control Task Force: "Those who occupy the floodplain should be responsible for the results of their actions." Federal, state, and local governments strengthened their programs to assist disaster victims while redoubling their efforts to break the cycle of loss, repair, and subsequent loss. Programs were redirected to prevent losses from future uses of the floodplain and to reduce the flood damage potential of existing uses after the disaster.

Governments made substantial progress in establishing coordinated minimum flood standards for new development in floodplains and for redevelopment in damaged areas. The 100-year flood standard helped to coordinate federal, state and local mapping, standard-setting, flood-proofing, regulation, and other programs. Floodplain management programs were designed in many instances not only to reduce flood losses within the 100-year floodplain but also to serve broader goals. Implementation was often achieved through a combination of public education, regulation, acquisition, public facilities planning, and flood insurance. Regulations

were adopted to prevent floodplain occupants from increasing flood heights and velocities on other lands, victimizing unwary buyers, or constructing damage-prone structures. The reduction of public expenditures for federal and state disaster assistance and flood control measures was another goal. These regulations were overwhelmingly endorsed by the courts.

## Federal Actions

Congress and federal agencies such as the Water Resources Council (WRC), the Federal Emergency Management Agency (FEMA), and the Office of Management and the Budget (OMB) made considerable progress in developing a coordinated federal policy to reduce future flood losses to public and private land uses. Nonstructural solutions were one component of that policy. Important federal actions during the decade were:

- The National Flood Insurance Program was expanded to almost two million policies and its coordination with disaster assistance programs was improved. Local governments were required to adopt land use control measures to reduce potential flood losses as a condition to obtaining federally subsidized flood insurance.

- Planning for disaster preparedness and postdisaster response increased. Disaster assistance benefits were increased, on condition that the recipients apply for flood insurance and adopt flood hazard mitigation measures.

- Guidelines for public uses and coordination of federal floodplain management were strengthened by adoption of the Floodplain Management and Wetland Protection Executive Orders (E.O. 11988 and 11990). These require that federal and federally sponsored projects avoid floodplains unless no alternative exists.

- Approximate flood hazard maps were developed for the entire nation. More detailed maps were developed (or are being developed) for 11,000 of approximately 20,000 flood-prone communities.

- The U.S. Army Corps of Engineers, the Soil Conservation Service, FEMA, and other agencies enhanced their provision of technical assistance to states, localities, and private landowners.

- State floodplain management was strengthened by financial and technical assistance from FEMA and WRC and through the Coastal Zone Management Program.

- Congress adopted new resource management programs with hazard reduction as a part of broader goals. The Coastal Zone Management Act of 1972 includes a system of grants-in-aid to the states. Section 404 of the Water Pollution Control Act Amendments of 1972 and 1977 provided more comprehensive federal control of discharges into rivers, lakes, and streams, including adjacent wetlands. Other resource protection measures that include hazard reduction components are grants in aid to states and communities for open space protection, wetland acquisition, and urban renewal.

- Congress and the agencies placed greater emphasis on nonstructural solutions including acquisition, regulations, floodproofing, and flood warning systems. More consistent cost-sharing policies were also developed.

State Programs

States assumed a pivotal role in coordination, education, technical assistance, and setting standards in the 1970s.

- All 50 states appointed a flood insurance program coordinator to help communities enroll in the NFIP and to provide technical assistance on flood loss reduction.

- Seven states adopted new floodplain regulation programs, adding to the 24 states that had regulatory statutes in 1970. Others strengthened existing programs to establish standards for local regulations or to regulate directly flood hazard areas through permit systems, subdivision review requirements, or building codes.

- State legislatures increased the staff size and budgets of some state programs to accelerate mapping, increase technical assistance, and facilitate evaluation of permits.

- Many states adopted resource conservation statutes with hazard reduction as one objective. Four inland states and 11 coastal states adopted wetland protection legislation. Most coastal states established coastal zone management programs, some stressing hazard mitigation. Hazard mitigation was emphasized also in some wild and scenic river and subdivision review programs.

- Many states combined regulatory and nonregulatory floodplain management measures to serve multipurpose goals, including urban renewal and resource management as well as flood loss reduction. These measures included acquisition, flood warning systems, marking of flood hazard areas, and education.

Local Programs

In one sense, the most important nonstructural floodplain management programs of the 1970s were adopted by cities, counties, villages,

and towns. Most nonstructural measures were implemented at the local level.

- At least 17,000 communities adopted floodplain regulations or expressed the intent to adopt such regulations in order to enroll in the National Flood Insurance Program. Most local programs were consistent with minimum NFIP standards, and some went beyond them. Community awareness of flood problems and expertise to deal with the problems generally increased, although some communities are still deficient in both.

- Several thousand communities adopted wetland protection regulations, shoreland zoning, coastal zone management, prime agricultural land zoning, or other water and land resource management programs incorporating flood loss reduction as one objective.

- Many communities combined regulations with acquisition, flood warning systems, public education, and flood control works to reduce losses to both existing and new uses and to serve broader community objectives. Communities often adopted these innovative programs as part of multipurpose land management programs.

## Problems with Implementation

Despite progress in guiding new structures to flood-free sites and establishing standards for new and existing structures in hazard areas, problems in implementing consistent flood loss reduction policies occurred at all levels of government. Few measures initiated in the 1970s were used to their full potential.

Major problems included:

- Regulations were only partially effective in many of the 12,000 "emergency program communities" that adopted or stated the intent to adopt regulations to qualify for the NFIP. The problem was due to lack of maps showing 100-year flood elevations, of ordinances that were legally enforceable, and of administrative staff in numbers sufficient to enforce compliance. These problems were particularly severe in rural areas.

- NFIP flood studies and map scales, levels of accuracy, and types of data were often partially inadequate for regulation, acquisition, and other site-specific floodplain management because they were developed to meet insurance rather than land use management needs. Maps failed to account for waves, water velocities, erosion, and watershed development, thereby showing underestimated hazards. Flood studies identifying the 100-year flood elevation were available for only one-half of the communities. Moreover, flood maps showing floodways and

coastal wave impact areas were available for a smaller number. Procedures for storing map data were thoroughly inadequate and, unless revised, threaten much of the federal investment of over $500 million in mapping.

- Local governments and some state agencies lacked staff expertise to evaluate how individual permits would affect flood flows. Neither were agency personnel able to monitor or enforce state and local floodplain regulations.

- State and local regulations were relatively ineffective in reducing losses to existing uses except immediately after flood disasters.

- Some floodplain regulations were insufficiently tailored to flood characteristics such as fluctuations of water levels along lakes, high velocity flow areas in mountains, and combined storm surge and wave action in coastal areas.

- Floodplain regulations were often poorly coordinated with other resource protection regulations and comprehensive zoning and planning.

- Federal subsidies for flood control works, disaster assistance, flood insurance, and public works sometimes encouraged continued floodplain development or discouraged local government control of floodplain development and private damage reduction measures such as floodproofing.

- Court challenges to regulations continued, although very few were successful.

## Strategies for the 1980s

The challenge for the 1980s will be the cost-effective implementation of flood loss reduction measures tailored to specific facts and circumstances within a continued overall set of national standards such as the 100-year flood standard. These measures should include preflood and postflood planning and incorporate regulations as one component. Implementation will require a federal and state political and financial climate that encourages local government and landowners to assume responsibility for flood loss reduction, and provides incentives for hazard mitigation tailored to local problems and needs. In addition to flood loss reduction, program emphasis, for cost effectiveness, should be on the protection of the quality and quantity of the nation's waters

and on conservation of critical floodplain resources such as farm lands. Tight budgets at all levels of government will complicate implementation, but by careful allocation of resources, state and local groups can innovatively combine regulation, acquisition, flood warning systems, and other measures to serve multipurpose community goals. The federal government should continue to point the way, support, and assist state and local governments to develop or to continue and strengthen the programs they have already initiated.

Major strategies should include:

(1) All levels of government should implement a carefully tailored combination of floodplain management incentives and disincentives initiated in the 1970s to encourage individual responsibility in floodplain use. These include partially subsidized insurance, regulations, disaster assistance conditioned on mitigation measures, flood control measures constructed on a cost-share basis, and selective acquisition. Governments should remedy gaps and deficiencies in existing programs to make them effective and equitable. Floodplain regulations should be simplified, better quantified, and carefully coordinated with other techniques for land and water management. Local governments should upgrade interim regulations. The federal government should support the strengthening of state, local and private roles in floodplain management.

(2) Increased specificity is needed in federal, state, and local mapping, standard-setting, and technical assistance to deal with special flood problems such as wave heights, combined erosion and flood hazards, high velocity flows, sheet flows, flash flooding, and long-term fluctuations in ground and surface water levels. Local conditions and the particular

needs of rural, urban, and metropolitan areas must also be addressed.

(3) All levels of government should put greater emphasis on predisaster planning and postdisaster response for areas threatened by severe flooding. Coastal barrier islands and high velocity beach zones should have special consideration because flood and erosion threats are severe, development pressures are great, and maps are often inadequate. Greater emphasis should also be placed on inland areas subject to flash flooding.

(4) Federal agencies (FEMA, SCS, the U.S. Geological Survey, the Corps, and the National Oceanic and Atmospheric Administration) should cooperate with states and localities to selectively upgrade 100-year flood definition criteria for areas with special problems to reflect wave heights, watershed urbanization, sediment (alluvial fans), high velocity flows and special characteristics. Upgraded maps should be at a scale and level of accuracy suitable for land use management.

(5) The criteria used by states and localities to evaluate permits should reflect upgraded flood data and be expanded to serve multipurpose resource management goals. Staffs should be expanded and better trained to evaluate how a proposed activity will affect resource values and whether it is consistent with broad community goals. Procedures for determining 100-year flood elevations also need improvement, especially at the local level.

(6) Federal, state, and local agencies should integrate floodplain regulations into wetland protection, coastal zone management, shoreland management, public works, and comprehensive land management programs through amendment of policies, plans and

regulations. Local agencies should coordinate floodplain management and stormwater management through comprehensive watershed management and combined or closely coordinated ordinances.

(7) State legislatures should strengthen floodplain management by adopting or amending statutes, by enlarging staffs and by increasing management budgets. States should work more closely with local programs, particularly in rural areas to provide help in coordination of their programs, permit evaluation, mapping, monitoring, training, and education.

(8) FEMA, the Corps, states, and local governments should tighten monitoring and enforcement of regulations. State monitoring with FEMA state assistance funds may be particularly effective.

(9) FEMA, the Corps, SCS, states, and localities should stress innovative, multipurpose local floodplain management both before and after flood disasters. Floodplain management should be encouraged as an opportunity to meet multipurpose goals and correct past mistakes through a combination of techniques and approaches.

(10) FEMA, states, and localities should conduct major training and education programs for floodplain decision makers such as landowners, engineers, architects, bankers and planners, on the nature and seriousness of floods and on ways to implement flood loss reduction measures such as elevation on fill or open works, floodproofing, flood warning systems, evacuation, relocation, and flood control works.

(11) In cooperation with states and localities, NSF, FEMA, NOAA, the Corps, and other federal agencies should conduct research to systematically document flood losses by type, condition and

design of structures or uses, the causes of those losses, and the effectiveness of various flood reduction measures; to classify communities by type of flood problem; to further document effective management of special flood situations; and to improve the quality and cost effectiveness of flood studies.

(12) OMB, FEMA, and Congress should reevaluate the framework of federal subsidies and incentives to ensure that they support the principle that "those occupying the floodplain should be responsible for the results of their actions." Continued efforts should be made to upgrade flood insurance rates to reflect actual risk. Cost-sharing requirements for state, local and private structural works should be enforced with larger nonfederal shares.

Frequent reference is made in this document to the National Flood Insurance Program (NFIP) and its administering agencies. Usually the Federal Emergency Management Agency (FEMA) is identified as the agency responsible for its administration. Occasionally, reference is made to the Federal Insurance Administration (FIA), which, as a part of the Department of Housing and Urban Development, had responsibility for administering the NFIP from its inception through the formation of FEMA in 1979.