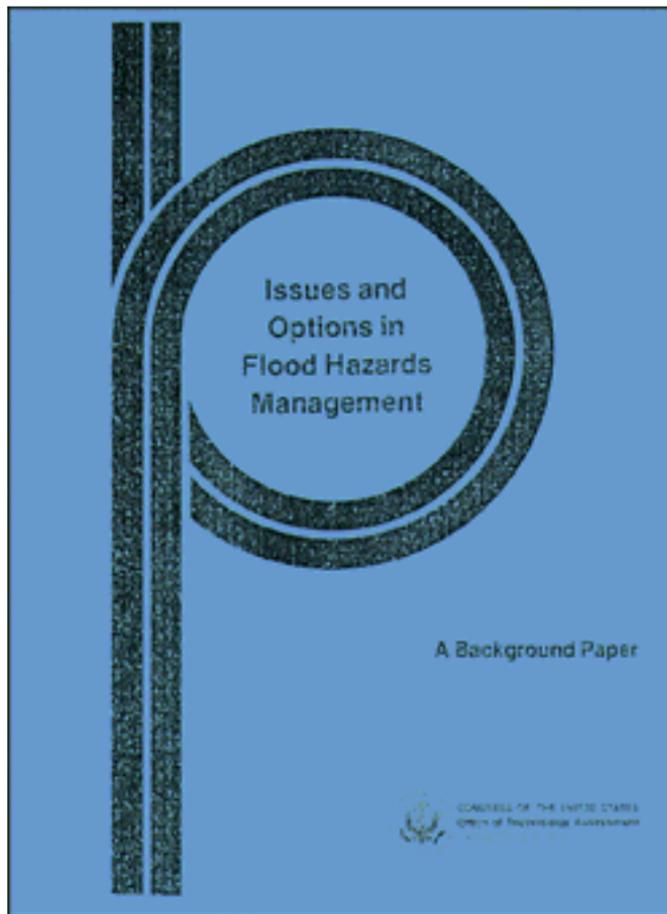


*Issues and Options in Flood Hazards
Management*

February 1980

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Preface

Congressman Thomas L. Ashley, Chairman of the House Committee on Banking, Housing, and Urban Affairs and Senator William Proxmire, Chairman of the Senate Committee on Banking, Housing, and Urban Affairs and member of the Senate Committee on Appropriations, requested that the Office of Technology Assessment (OTA) undertake a study in the area of natural hazards. In response, OTA initiated a preliminary analysis to define what issues are or would be of congressional concern and where further study could be useful.

This Background Paper, "Issues and Options in Flood Hazards Management," is one product of that analysis.

For this study, a working paper was prepared as the basis for a workshop that included a broad representation of interested parties in both the public and the private sectors, scholars concerned with the field, and members of various congressional committee staffs. On the basis of that workshop's recommendations, a revised working paper was prepared and sent to all participants, and to numerous other experts, for extensive review and comment. This paper is the responsibility of OTA, not of those who so ably advised us on its preparation.

An earlier draft of this Background Paper was made available to the staffs of the requesting committees in the winter of 1978-79. Aside from editorial revisions, the principal updating is in chapters VII, VIII, and IX. The basic analysis of information, study, and research needs to assist Congress in policy formulation, legislation, and oversight remains unchanged.

The OTA staff wishes to acknowledge the contribution of the workshop attendees and the subsequent reviewers to "Issues and Options in Flood Hazards Management." Special appreciation is due Gilbert White of the University of Colorado for his invaluable assistance in the preparation of this paper.



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Acronyms

CZMP	—coastal zone management program	IWR	— Institute of Water Resources (U.S. Army Corps of Engineers)
DOT	– Department of Transportation	NFIA	—National Flood Insurers Association --
EDS	— Electronic Data Services	NFIP	—National Flood Insurance Program
FEMA	—Federal Emergency Management Agency	OCZM	—Office of Coastal Zone Management
FHA	— Federal Housing Administration	P&s	— principles and standards
FIA	— Federal Insurance Administration	TA	— technology assessment
FIRM	– flood insurance rate map	VA	— Veterans Administration
HEW	— U.S. Department of Health, Education, and Welfare	WRC	– Water Resources Council
HUD	– Department of Housing and Urban Development		

Glossary

common use open space: lands set aside for public use and management by acquisition, as contrasted to those held open by ordinance provision (e.g., a floodway) that remain in private ownership.

cost-benefit analysis: a systematic economic comparison of alternative ways to achieve an objective.

enabling statute: a State law that transfers some of the police power residing in the State to localities within it for the purposes of zoning, subdivision, regulations, building codes, and the like.

encroachment: the occupancy of areas subject to flooding, especially where such occupancy includes landfills and buildings.

flood: an overflow of lands not normally covered by water and that are used or usable by man. Floods have two essential characteristics. These are: 1) the inundation of land is temporary, and 2) the land is adjacent to and inundated by overflow from a river or stream or an ocean, lake, or other body of standing water.

flash **flood**: a flood that follows the causative event (this might be excessive rains, a dam failure, etc.) within a few hours. The rise in runoff and stream levels is spectacular and produces hydrography traces that reflect an extreme jump in discharge volume.

100-year **flood**: a flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the general region of the watershed. This term is used in the National Flood Insurance Program to indicate the minimum level of flooding to be used by a community in its floodplain management regulations.

hazard adjustment: see structural and non-structural flood plain management measures.

flood insurance rate map (FIRM): an official map of a community on which the Federal Insurance Administration has delineated both

the special hazards areas and the risk premium zones applicable to the community.

floodplain: an area adjoining a river, stream, arroyo, or other watercourse, ocean or lake, or other body of standing water that has been or may be covered by floodwater. It includes, at a minimum, that area subject to a 1 percent or greater chance of flooding in any given year.

floodway: the channel of a river or other watercourse, and the adjacent land areas, required to carry and discharge a flood of a given magnitude without increasing the water surface elevation at any point more than a specified amount and without producing hazardous velocities. The floodway component of a flood insurance study indicates the portions of a floodplain that could be obstructed without increasing the water-surface elevation of the 100-year flood more than 1 foot at any point.

flood profile: a graph showing the relationship of water surface elevation to location. It is generally drawn to show surface elevation for the crest of a specific flood but may be prepared for conditions at a given time or stage.

fringe (or flood fringe): is normally considered to be that portion of the floodplain between the floodway and the natural outline of the selected flood.

hazard adjustment: see structural and nonstructural floodplain management measures.

institutional question: one that arises from the body of rules, procedures, and authorities under which governmental institutions function.

National Flood Insurance Program: the program under which communities may be eligible for federally subsidized flood insurance on the condition that the communities enact satisfactory floodplain management regulations.

Emergency Program: the program as implemented on an emergency basis in accordance with section 1336 of the Act. It is intended as a program to provide a first layer amount of insurance on all insurable structures before the effective date of the initial flood insurance rate map (FIRM).

Regular **Program:** the program authorized by the Act under which risk premium rates are required for the first half of available coverage (also known as “first layer” coverage) for all-new construction and substantial improvements started on or after the effective date of the FIRM, or after December 31, 1974, for FIRM’s effective on or before that date. All buildings, the construction of which started before the effective date of the FIRM, or before January 1, 1975, for FIRM’s effective before that date, are eligible for first layer coverage at either subsidized rates or risk premiums rates, whichever are lower. Regardless of date of construction, risk premium rates are always required for the second layer coverage and such coverage is offered only after the Administrator has completed a risk study for the community.

natural disaster: an extreme case of the realization of a risk.

natural hazard: an environmental or natural circumstance that is a source of danger.

nonstructural floodplain management measures: the nonphysical measures employed to modify the exposure of people to floods, i.e., land use planning, warning schemes, and insurance.

opportunity cost: monetary or other advantage surrendered from something in order to acquire it in competition with other potential users.

risk: the works of man (and man himself) that are endangered as a consequence of their exposure to a natural hazard.

riverine: relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

seiche: a standing wave oscillation of an enclosed water body that continues, pendulum fashion, after the cessation of the originating force, which may have been either seismic or atmospheric. Tides are now considered to be seiches induced primarily by the periodic forces caused by the sun and moon. In the Great Lakes area, any sudden rise in the water of a harbor or a lake, whether or not it is oscillatory is a seiche.

storm:

storm surge: a super elevation of water surface by storm pressure as in a hurricane, i.e., the height above the expected level in the absence of storm conditions.

30-year **storm:** (meteorological) an artifact of -- the statistical averaging of storm experience. This should not be confused with a 30-year flood, which could come about as a result of lesser or greater storms.

structural floodplain management measures: those physical or engineering measures employed to modify the way floods behave, e.g., dams, dikes, levees, channel enlargements and diversions.

taking issue: a possible basis for suit when an individual asks to be recompensed for lost property value resulting from governmental action as is his right under the Constitution. Government cannot take property without just compensation. However, a mere diminution of value is not necessarily a taking. Courts have upheld ordinances in cases where the governmental action resulted in substantially lower market values, and even some cases where all the recognizable economic values disappeared because the only economic uses remaining would be regarded legally as a nuisance or threat to public health and safety.

tsunami: is a system of free-surface gravity waves generated by a submarine earthquake or volcanic eruption. Although the term “seismic sea wave” adequately describes such an event, the Japanese word “tsunami” is now almost universally accepted in the scientific community. Its literal translation is “harbor (‘tsun’) wave (‘nami’).”

velocity zone: the portion of a coastal floodplain having special flood hazards, which is subject to high velocity waters especially waves—from hurricanes, tsunamis, and extratropical storms.

watershed: all the area contributing runoff to the flow of a river or draining into a body of water. Also sometimes, the margins of this area.

wetlands: land containing much soil moisture, such as tidal flats or swamps.