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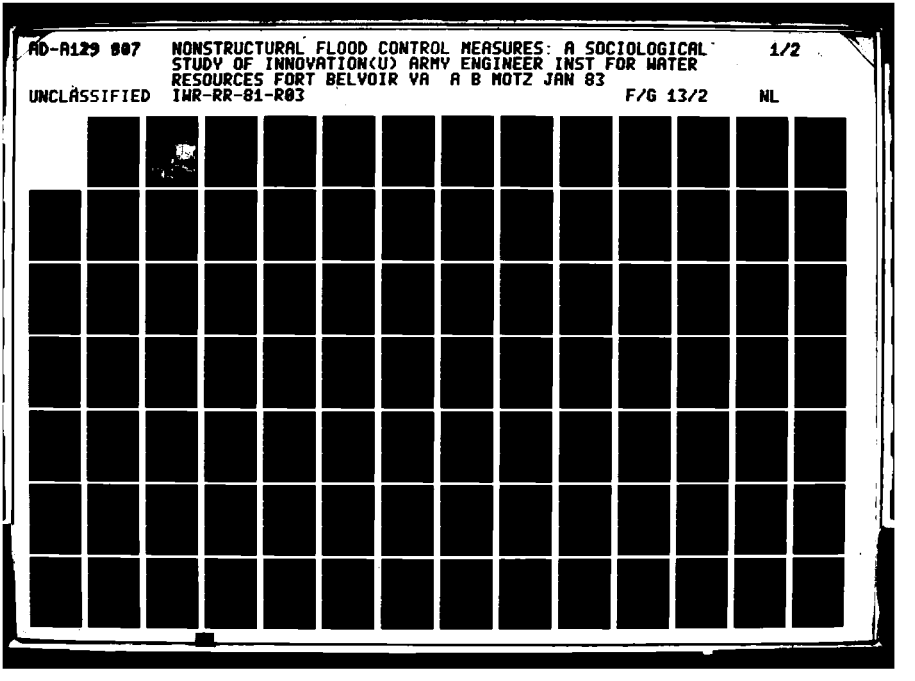

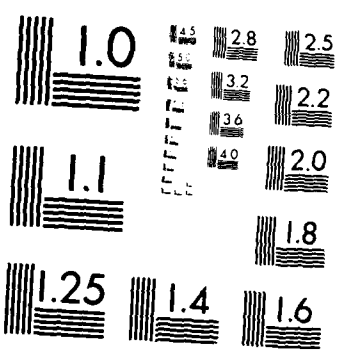

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US Army Corps
of Engineers
Engineer Institute for
Water Resources

Nonstructural Flood Control Measures: A Sociological Study Of Innovation

NONSTRUCTURAL FLOOD CONTROL MEASURES:

A SOCIOLOGICAL STUDY OF INNOVATION

by

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FOREWORD

This document was written by Dr. Annabelle Bender Motz in 1978 when she was a visiting scholar at the U.S. Army Corps of Engineers, Institute for Water Resources. The critical issues identified in this document are particularly timely because nonstructural measures have become increasingly important to the Corps in recent years. In November 1982, the Corps of Engineers held a major policy seminar on nonstructural flood reduction measures which was an important part of a study to evaluate the Corps' role in the implementation of these measures. The Corps of Engineers, St. Paul (Minnesota) District recently completed the post-audit of a landmark relocation project in Prairie du Chien, Wisconsin. Interest in flood warning has been furthered by the publication of three Institute for Water Resources reports on the evaluation and implementation of flood warning. Nonstructural flood control measures are also being given closer attention as financial limitations make structural projects increasingly difficult to implement. Therefore, publication of this report contributes an important orientation to the subject. IWR welcomes any comments or questions regarding this document.

ABSTRACT

Four of the major flood plain management measures--insurance, zoning, floodproofing, and warning systems--are discussed from the social interactionist perspective of the sociologist. The objective is to provide an overview of causes and effects of the various measures on three groups of actors: policy agents (persons who make policy or implement it), flood plain occupants, and the general community. Posited in an orientation that considers the relationships of these actors as an ongoing, dynamic process in varied settings, the changes that they experience and induce are identified. Each measure is described and the involvement of each group of actors with it is presented. The information was obtained from a review of the literature and interviewing. The chapters are organized in terms of the relationship of the given measure to three sets of actors and conclude with appropriate recommendations.

The flood insurance program--the most comprehensive of the measures--produces a new set of relationships within the Federal Government and between it and local communities. For the authority that the Flood Insurance Act vested in HUD makes it a co-equal with the Corps in flood protection work, the former as "lead" agency in terms of nonstructural measures; the latter, in terms of structural. Although it appears that most communities have entered the program (as emergency participants) thereby enabling their flood plain occupants to obtain insurance at subsidized rates, few communities have enlisted in the regular program. A reason is the zoning requirement of the regular program. Always a sensitive issue, zoning is even more so when made obligatory. Local decision-makers, responsible for it, frequently find themselves caught between various interest groups. Evidence of community conflict is cited. Floodproofing is another action which the insurance program requires for future compliance. In this instance the fulfillment of the regulations is entirely up to the individual with no form of subsidy. The policy agents have not actively promoted it, nor have property owners been attracted to it. There are questions of its cost and effectiveness. The report suggests that insurance, zoning and floodproofing, by and large, benefit the middle class. An extremely important measure, in terms of protecting lives and one to which little attention has been paid, is development of an adequate warning system. A discussion is presented of the various roles policy agents play in collecting information and alerting the public to an impending flood. The responses of the population to warnings and the willingness of the community to invest in such systems are also examined. The final chapter presents an overview and recommendations specific to the Corps.

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Introduction

It is a truism to say that life is a process, a process in which society must always perform a kind of balancing act. It must balance the needs and interests of one individual vis-a-vis another individual, of individual against group, or a group face-to-face with another group. In the dynamic interplay of individuals and groups, interests and needs are sometimes complementary, sometimes in opposition. What is evaluated positively at one point in time may later lose favor in the eyes of the same individual or group.

The process is further complicated by the fact that individuals are constantly influencing themselves and others and being influenced by them. The simple notion that a stimulus evokes a response may be tested in laboratory situations, but in real life situations there is an ongoing, dynamic interactive process wherein each individual influences and is influenced. Responses may be stimuli and vice versa. Nothing is static.

Yet in our striving for objectivity as scientists we frequently attempt to capture a point in time as if it were static. And people of practical affairs, people faced with getting something done within an allotted time with an allotted amount of money are strapped to the calendar as if nothing exists prior to an initiation date or after the closing date. Our attempts to draw boundary lines in terms of time and space apply, too, to our inquiries into flood plain management. For the flood plain is perceived as a spatial area that can be bounded on a map, as if those lines are more or less constant through time. And the concepts of "impact" or "effects" are treated as if they too can be neatly circumscribed. But, both boundary lines and concepts are figments of the human mind. They are tools that help us order and control the world around us.

Flood plain management, a term that is replacing the more usual reference to "structural measures," has been broadened to emphasize its "nonstructural" component. Whereas the earlier meaning stressed building of dams and reservoirs, channelization, and levees, more recent usages include relocation, floodproofing, zoning, flood insurance and warning systems. This redefinition has taken place within a relatively short period of time. Since the sixties, societal values and governmental policies and regulations have been dramatically changed. There has been a shift in policy emphasis from attempting to control the flow of water to attempting to control the behavior of people. Thus, flood plain management today moves in both directions.

The idea of planning for coping with flood potential in a flood plain and minimizing flood effect in a flood plain has attracted the attention of a broad spectrum of the nation - legislators, environmentalists, community leaders, water resource planners and flood plain occupants. Reflecting the impact of the new philosophy of flood plain management, a plethora of changes has taken place. Local, state, and national organizations have been established. New occupational roles have come into being. Existing institutions have adopted new functions and new institutions have developed. The lives of many individual flood plain residents have been affected. Evidence of the widespread acceptance of flood plain management is concretely manifested by:

- a body of literature on the subject;
- legislation and implementation of the National Flood Insurance Act;
- responsiveness to flood plain programs on the part of flood plain occupants;
- widespread usage of a "special language," e.g., "floodproofing," "flood resistance," and "nonstructural measures."

The objective of this report is to identify effects (impacts)[1] of the flood insurance program, zoning, floodproofing and warning systems.[2] The study of effects will be couched in the social interaction approach that views society as a network (system) of interdependent people whose interactions produce continuous changes in their behavior. In keeping with this perspective, four assumptions are made. The first is that every effect has one or more causes. Secondly, that an effect may be a cause of something else and a cause may be an effect. Thirdly, the human mind makes the distinction between causes and effects and abstracts and labels activities as one or the other. And, fourthly, it is left to outsiders to identify the five "w's" and the "how" of effects and causes. (Individuals themselves may not be aware of an effect upon them or the fact that they may have an effect on others.)

The difference between the social interaction perspective and the more traditional stimulus response, one of causes and effects as applied to flood plain management is shown schematically in Figure 1. In this report each of the nonstructural measures is conceived of as an "effect," i.e., an outgrowth of the policy decision-making process, and as a "cause," i.e., something that leads people to take actions like buying flood insurance. The proverbial chicken-and-egg problem applies. With full cognition of the circularity of the process, we will resolve the riddle of which comes first by treating observable changes in behavior as both causes and effects we will be fully cognizant of the arbitrariness of the distinction.

Accordingly, the report that follows is bounded by the concept "flood plain management" and has three sets of actors who play out their roles on varied stages. After identifying the dramatis personnae,

I. TRADITIONAL BEHAVIORIST PERSPECTIVE

CAUSE	EFFECT
FLOOD PLAIN MANAGEMENT PROGRAM (E.G., INSURANCE)	FLOOD PLAIN RESIDENT (E.G., BUYS INSURANCE)

II. SOCIAL INTERACTIONIST PERSPECTIVE

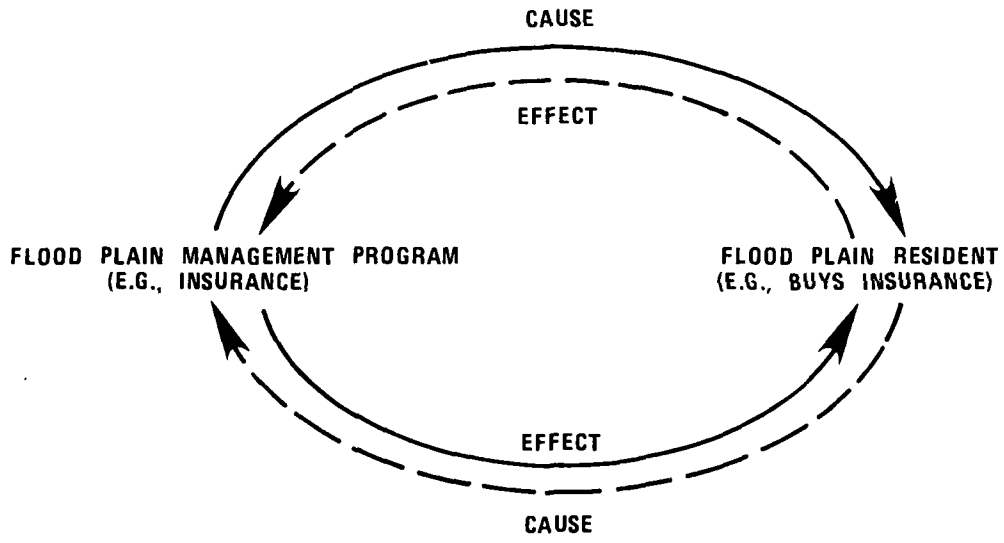

FIGURE 1: TWO PERSPECTIVES ON CAUSE/EFFECT RELATIONS

details about the varied stage settings are discussed below. They must be borne in mind as the reader's attention is directed to flood insurance, zoning, floodproofing, and warning systems.

The Actors

The effects of flood plain management programs are on all those people who are vitally involved with the program and those who may be brought into an involvement with it. Three major groups of actors are identified in this report. (See Figure 2.) Among those most involved are the people engaged in establishing or implementing the program at the national or local level. By and large, these people are located in the executive branch of the government at the Federal level, the gubernatorial and legislative offices at the state level, and in the mayoralty and councils at the local level. Many of these same people (along with others) may be implementors of the program, i.e., the ones who see that the program is carried out. Then in addition, there are the functionaries who do the necessary tasks - the planners, movers, insurance agents, building code inspectors, and the like. All of these people who have to do with the origination or implementation of a flood plain program - from government officials to inspectors - are referred to as policy agents.[3]

The second group of people who are affected by nonstructural programs are the flood plain occupants themselves. Although many people in flood plains are not aware of their location or are minimally concerned about it, nonstructural measures are designed to have important effects on them. And their presence (regardless of their awareness) plays an important part in determining, i.e., causing, the actions of other policy agents and members of their own group. In a sense, the flood plain occupants are the "cause" of the nonstructural programs. At the same time, the programs may be a "cause" of their behavior.

In the text, flood plain occupants are identified as "residents" and "businesses."

The third category of people who are an integral part of any discussion of flood plain management are members of that amorphous mass - the general community. This concept refers to the population of the local community rather than the state or national populations. It is the group that may be unaware of the existence of a flood plain. (Even should they be aware, they play no significant part in expressing their views or taking action.) Yet, they may feel the brunt of flood plain regulation indirectly. For example, land throughout the community may become scarce for housing because of flood plain regulations. Members of the general community may find it more difficult to locate housing or they may note that its costs have risen. They may not be aware of the relationship between flood plain regulation and housing costs in the rest of the community.

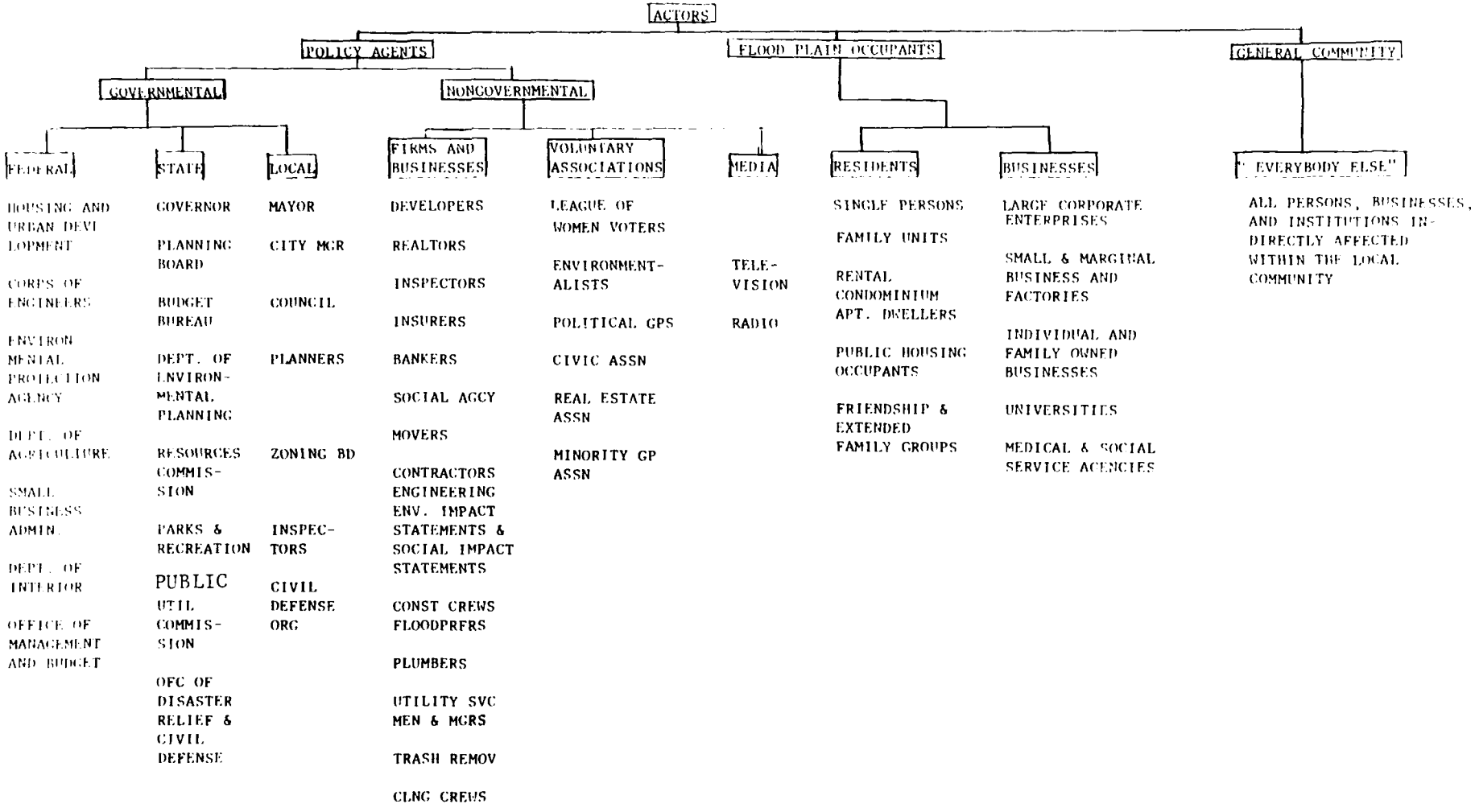

FIGURE 2: KEY FACTORS INVOLVED IN FLOOD PLAIN PROGRAMS

The members of the general community have the potential to become policy agents or flood plain occupants. They become the former when they perform a service or do chores in connection with policy agents or local residents. If they move into the flood plain or are associated with it through their work they become flood plain occupants. The reverse process takes place in the case of policy agents and flood plain occupants as they dissociate themselves from flood problems.

It is this backdrop of social interaction theory in which policy agents, flood plain occupants, and the general community act and react that underlies the discussion of nonstructural measures.

The Varied Settings

Demographers use the term "ecological fallacy" to refer to the danger of depicting any given area on the basis of the characteristics of a total area. I would like to coin the term "floodplain fallacy" to refer to the danger of perceiving any given flood plain as possessing the attributes of other flood plains. For although a surplus of water is the ultimate sufficient cause of flooding, the necessary conditions contributing to that surplus vary in terms of time, space and other factors. The literature commonly identifies "riverine" and "coastal" flooding; flash floods and those of slower onset, and flood probability. These and other circumstances that need to be reckoned with in trying to understand variations in ways of coping with flooding are:

(1) Flood conditions: Flooding occurs in flat plains and in mountain gorges, along rivers or coastlines. It may be associated with natural characteristics or with the effects of human actions, e.g., the elimination of natural run-off possibilities because of pavement or the accumulation of waste-products associated with mining. There are variations in frequency and in predictability.

(a) Frequency: Some communities may experience floods virtually every year, e.g., along the Mississippi River, whereas others may rarely have them. The situation in Baytown, Texas, where underground water absorption is poor, has what might be considered chronic flooding with heavy rains. Various private and governmental agencies (including the Corps) have identified neighborhoods and/or communities that have a one percent chance in any given year to experience extreme flooding as well as 10-year, 20-year, 50-year, 100-year and 500-year floods.

(b) Predictability: Floods may be anticipated for several weeks, e.g., following heavy snows. Or, they may take place with such rapidity that people are caught unaware. Improved technology which has been associated with increased understanding of weather conditions makes it possible to predict precipitation with greater accuracy today than formerly. Sometimes long-time residents of given flood-prone locales are able to identify the cues of potential flooding. Weather prediction

frequently depends upon the cooperation of local observers and meteorologists in distant weather stations.

(2) Causes: The obvious cause of any flood is too much water which usually results from a heavy rain. In reality, flooding is a social definition. Conceivably, an open space area that is seasonally wet or dry would not be flooded. It is only because people define a given natural space as one that should not have a great deal of water in it that we refer to the space as being flooded when it has more water than usual. (Lakes which are defined as normally consisting of large amounts of water are not referred to as flood lands.)

Rainstorms may precipitate flooding. Or, they may contribute to flooding when they are accompanied by large amounts of snow and ice melting. Then again, they may swell rivers and produce flooding because of mining which has destroyed the earth's protective covering that ordinarily absorbs the waters or which has narrowed the passage of water by accumulating sludge and debris from the mines. Similarly, drainage problems created by overbuilding and pavement narrow water passageways so that the rainwater cannot be absorbed.

In brief, then, natural phenomena coupled with human activities may be responsible for the onset of a disaster.

(3) The Social Context: It is important to recognize that there are likely to be differences in the effectiveness of nonstructural alternatives in relationship to population characteristics. Flooding in a densely urbanized area requires a different set of actions than in rural agricultural areas or in mining communities. The alternatives must be recognized as having different potential impacts upon flood plains in the younger cities of the West in contrast to the older cities of the Northeast.

The socio-economic attributes of the total community and of the flood plain occupants are important considerations (Dynes, 1974). A city characterized by few economic resources, an aging population and the out-mobility of the young cannot be considered in the same way as one which is economically thriving, attracting new people, possessing dynamic leadership, and maintaining its low-income population in the flood plain.

No less important than the population density of the flood plain and the socio-economic characteristics of its inhabitants is the socio-political organization of the community. A long established city with a strong centralized leadership group and a clearly defined relationship between it and the body politic may respond differently to crises than one with part-time officials and little political organization. Such differences are important in terms of the assumption of responsibility for learning about and implementing different types of Flood Plain Management Programs. Nonstructural alternatives rely on the

controllability of human beings, directing them and their choices of action in ways which may minimize flood damages to themselves and their property. Only if there is a leadership and/or public committed to self-regulation in relation to flood plain activities will nonstructural controls be initiated and effectual.

Sources of Information

The information for this analysis covered a broad range of substantive areas: governmental policies and programs, community studies, natural hazards, and social change and innovation.

The primary sources of information for this study were:

1. Social science literature on relevant topics;

2. Government reports and documents (both in-house and contracted); and

3. Interviews.

To date there has been relatively little empirical social research on any of the nonstructural measures. Economic studies concentrating on flood insurance have been undertaken by Kunreuther, et. al. (1977), Major (1977), Sheaffer (unpublished), and Schwartz (in progress). The Corps has published a number of reports on responses of specific communities to flooding and flood control recommendations (e.g., 1975, 1977 b). The most comprehensive coverage of nonstructural approaches to date is found in Mack's work (1976), which is rich in social implications of each of the measures.

An invaluable resource has been the extensive body of literature produced by the Ohio State University Disaster Research Center and the University of Colorado Institute of Behavioral Science. The names of White, Dynes, Haas, Drabek and Mileti are among the leaders in this area. They provided information on how people behaved in response to crises and in planning damage reduction programs. The Institute of Behavioral Science's Assessment of Research on Natural Hazards: Bibliography of Published Works on Natural Hazards Contributing to Social Scientific Knowledge (1973) provided useful leads.

And finally, interviews were conducted with governmental agency personnel (Corps, FIA, Agriculture and Interior), researchers and contractors, and several flood plain residents in the course of site visits.

Comment

In this report an overview of the nonstructural flood control measures that are generally included in discussions of flood plain

management is presented. The underlying orientation is that of the social interactionist who sees behavior associated with flooding as a constant process of actions and reactions which are given fluid meanings by human actors in varied environmental settings.

As a nonstructural tool, flood insurance is discussed in Chapter II. It is followed by an overview of zoning and floodproofing in Chapters III and IV since both are incorporated into the current Federal flood insurance program - although each also occurs independently of the program. Flood warning systems are appraised in Chapter V. The final chapter of the report provides a summary and recommendations for approaching flood control problems.

FOOTNOTES

[1]I prefer usage of the traditional term "effects," to the term "impacts" which has gained currency today. Therefore, the two terms will be used interchangeably.

[2]Relocation, a very important nonstructural measure, is discussed in my paper, "Relocation as Process: A Social Psychological Perspective" (1977). Because of the completeness with which the subject was covered in the report, reference to relocation is excluded in these pages.

[3]This report includes little information on the role of state governments as policy agents and more peripherally involved functionaries, e.g., construction firms, movers, partisan organizations and the like. Further research is needed to include these people.

CHAPTER II: FLOOD INSURANCE

Introduction

The flood insurance program may be viewed as the most comprehensive of the Federal programs dealing with flood plain management. It is comprehensive in that it involves all levels of government, community, and individual compliance, and other nonstructural measures; i.e., zoning, relocation and floodproofing. Legislated by Congress in 1968 as part of the National Flood Insurance Act, it provides property owners with federally subsidized insurance for property damages. The intent of the program is to:

a. make people aware of the risks involved in living in a flood plain,

b. have the property owner contribute to the costs of his own protection, and

c. involve the local community in regulation of flood plains in order to dissuade their utilization.

The latter point underlies the philosophy of the Task Force of 1966 chaired by Gilbert White. The 1968 Act reflecting the work of the Task Force states that one of its purposes is:

> To encourage state and local governments to make appropriate land use adjustments to constrict the development of land which is exposed to flood damage and minimize damage caused by flood losses (i.e., floods) and to guide the development of proposed future construction, where practicable, away from locations that are threatened by flood hazards. (See P.L. 90-448, Title XIII, Section 1302(e)(1) and (2).)

The administration has repeatedly "made clear that the expanded flood insurance program is specifically intended as a substitute and eventual replacement for Federal disaster relief for flood occurrences, so that property owners not only will be more aware of flood hazards and will be permitted to contribute to their own protection, but also so that they will be more fully indemnified (without having to repay a Federal disaster loan) when the inevitable flood loss actually occurs." (See HUD, 1974, p. 10.)

With an estimated 7% of the U.S. lying within flood plains and 22,000 communities subject to flooding (U.S. Water Resources Council, 1976, p. II-2), the flood insurance program is designed to reduce the risk of flood damage--and, hopefully, the costs.[1] Persons in flood

plains are encouraged to contribute to their own protection by purchasing insurance at very low rates for their property.

To implement these objectives, the law provides both carrots and sticks. For the flood plain business or residential occupant, the carrot is in the form of the subsidized insurance. For the community, three carrots are offered. One is a citizenry that is less dependent on local government assistance in case of emergencies. The second is a reduction in the need for personnel and services that drain community revenues when floods occur. And a third is the mapping of the community's flood plain by the Corps of Engineers and others. The major stick held over the property owner or renter is, in most instances, an inability of a prospective property buyer to get mortgage money from banks with Federal connections. Further, the flood plain occupant cannot obtain governmental loans, e.g., Small Business Adminstration loans.[2] In addition, limited improvements may be made on existing property. And, new property has to be floodproofed and meet certain building requirements established by the community.

There also are several sticks held over the community. Zoning is required which restricts new structures in the flood plain solely to usages that can withstand overflows. All proposed development requires building permits. And, individual residents or businesses may not obtain insurance unless the community participates.

Despite the inducements to communities to participate in the program, few signed up during its first years. Therefore, in 1973, Congress passed the Flood Disaster Protection Act which amended the Flood Insurance Act, making it mandatory for flood prone areas to participate. However, legislative action in the form of the so-called "Eagleton Amendment" eliminated one of the "sticks" that the program had. (See p. 15.)

Cochrane (1975) estimated that 2,940 communities had enrolled by January, 1974. According to FIA figures for May, 1977, 15,516 communities were then in the program.[3] Of these, 1,081[4] were in the regular program, and 14,435 in the emergency program. As of January, 1978, FIA shows that there are now 15,738 communities in the program, 14,227 in the emergency and 1,511 in the regular program.[5]

It is obvious from these figures that the majority of communities have not joined the regular program. Unfortunately, the figures themselves do not tell us the reasons why they have not. Nor do these figures reveal how many communities in the U.S. are exposed to flooding and optimally, could be expected to enroll in the flood insurance program.

Policy Agents and Flood Insurance

As the broadest program involving the Federal Government in the promotion of nonstructural flood control measures, the services of a wide spectrum of policy agents is necessitated. Participation in the

program on the part of policy agents requires cooperation of lending agencies, construction companies, and government offices at all levels. Figure 3 is suggestive of the numerous governmental and quasi-governmental groups that are directly and indirectly involved in implementing the program. In addition, there are innumerable public and private groups that take a stand on the program.

The Federal Government is primarily represented by FIA, which administers the program and is responsible for it, and by the Corps and the others which map the communities. But, in addition, lending organizations like the Federal Home Loan Bank Board and the Small Business Administration are vitally involved. Since participation in the program is dependent upon zoning and that is a function of local governments under the aegis of the state governments, the latter two play very important roles. Their roles tend to be complicated by the fact that zoning is a sensitive issue in most communities. Other policy agents--developers, realtors, and some of the flood plain occupants--invariably try to influence the policies that the officially designated policy makers propose.

Federal Policy Agents:

The Corps of Engineers: Over the generations, the Corps of Engineers has established working relationships with a number of Federal agencies. By and large, it has developed a modus vivendi regarding jurisdictional responsibility for waterways with the Departments of Agriculture and Interior and with the Coast Guard. However, since it is the primary agency authorized to conduct civil works projects for Congress, the Corps has generally been viewed as the "senior partner" with the greatest amount of authority and money in relationship to projects. Whereas other forms of and other Corps ventures have modified the leadership role that the Corps takes in flood control,[6] the National Flood Insurance Act and its implementation in the Federal Insurance Administration at HUD epitomizes a most dramatic change in the Corps relationship with other policy agents. It marks a dramatic change because:

a. nationwide flood control, an area which has traditionally been the responsibility of the Corps, is increasingly shared with another Federal agency;

b. it places many nonstructural measures under the aegis of HUD;

c. nonstructural measures appear to have greater favor with the public than structural measures at the present time; and

d. the Corps is cast into the role of advisor and technical expert.

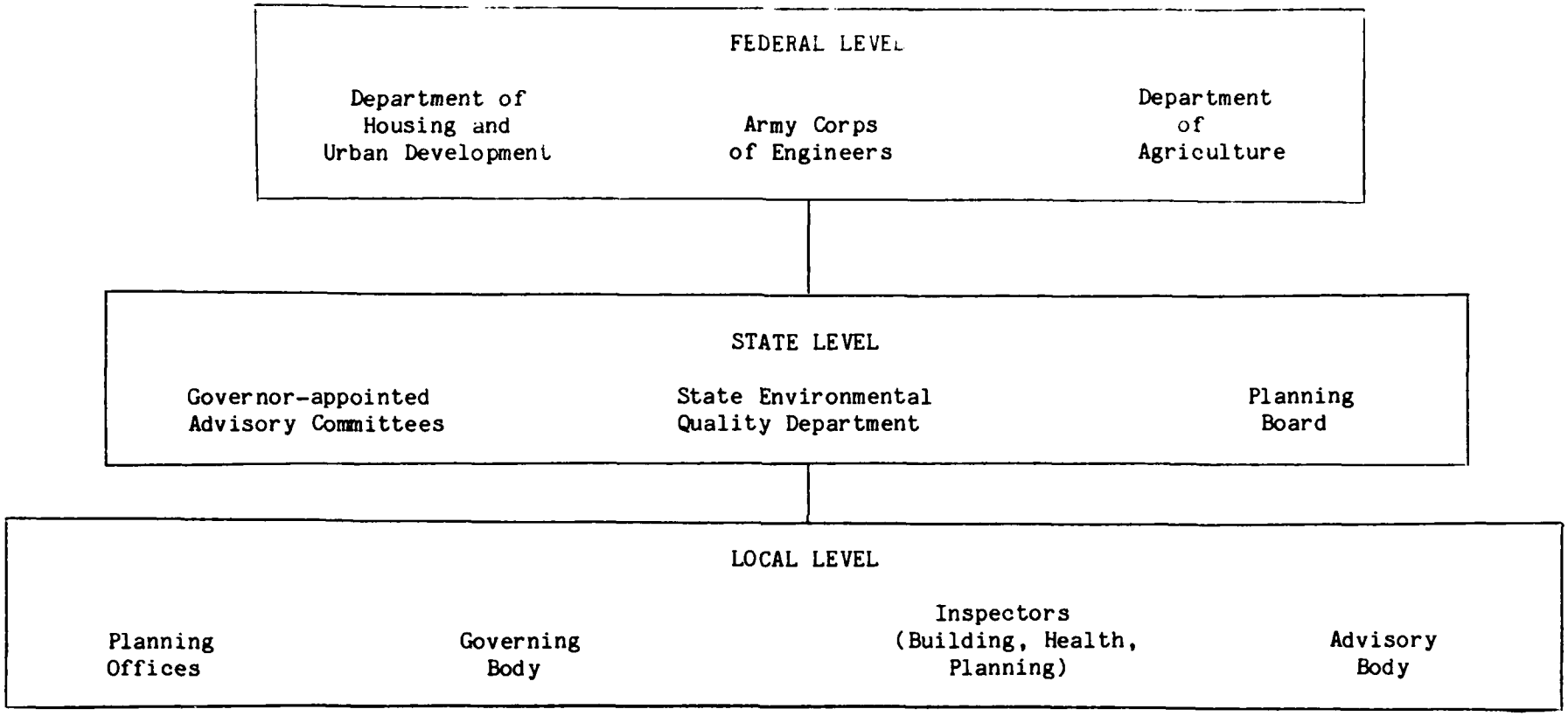

Figure 3: Samples of Government Agencies Coordinating Activities for the Flood Insurance Program

Whatever the above may mean to the future of the Corps involvement with flood plain management, as of present the role of the Corps is primarily--if not solely--one of providing the necessary hydrologic information for the identification of flood hazard areas community by community. The mapping service is a very important part of the program. It is a responsibility originally vested in the Corps and other Federal agencies. At present, private contractors are also engaged in performing this service. These organizations and the Corps designate communities with flood plains and identify flood parameters. On the basis of preliminary maps, communities enter the emergency program which enables residents to take out insurance. The more detailed mapping required for the regular program is essential for the community in order to engage in zoning and building restrictions. The Corps has become party to community conflict as people challenge the inclusion of their property in the flood area. Thus, the Corps role is essentially that of providing a technical product. It has little or no input into policy, administration, or the distribution of funds.

HUD: Congress's passage of the Flood Insurance Act has had different effects on the Department of Housing and Urban Development (HUD). First of all, it vested the insurance program in the Department under the Federal Insurance Administration. This office has a large staff of people including administrators, hydrologists, lawyers and contracting officers who invite studies of the program. Secondly, it identified the Secretary of HUD as the person responsible for the borrowing of Treasury funds for the insurance program. This in itself makes HUD the "lead" agency, i.e., the organization with major responsibility and authority for the program. Thirdly, as the lead organization, HUD has had to handle the implementation of the program - identify eligible communities, select insurance agents, determine rates, define regulations, and oversee the program's implementation. All of these activities have had a fourth effect on HUD - they have placed HUD in the position of being the bête noire of the program's opposition!

Program Changes: Several occurrences illustrate reactions that have had national impacts on the program. One was the inclusion of a clause in the Flood Disaster Protection Act of 1973 making it mandatory for communities that experience flooding to join the program. Despite this law, many communities have not joined nor do those in the emergency program show an eagerness to enroll in the regular one (Kunreuther, et al., 1977). The fact that there is so much foot-dragging suggests resistance to the program.

Other evidence of how the program is received is the passage of the Eagleton Amendment in the fall, 1977. The revision enables federally-insured banking agencies to lend money to people in nonparticipating commmunities. (The original requirement that Federal Savings and Loan Insurance Corporation [FSLIC] lending agencies could not conduct their usual business unless the community enrolled in the national insurance program had been assumed to be a major inducement.) However, the lender must inform the purchaser whether the property is in a flood-prone area and whether it would qualify for Federal Flood Disaster Assistance if flooded

As this is being written, the program is again under fire. The case of "The Texas Landowners Rights Association, the City of Cape Girardeau, State of Missouri, the Pacific Legal Foundation et al. versus Patricia R. Harris, Secretary, Department of Housing and Urban Development; J. Robert Hunter, Acting Administrator of the Federal Insurance Administration; and Richard W. Krimm, Assistant Administrator for Flood Insurance" is currently in the U.S. District Court for the District of Columbia (Civil Action 77-1962). The plaintiffs requested a preliminary injunction in November, 1977. It was denied one month later. The request for a summary injunction was filed January 23, 1978. Among the issues in the suit are the role of the Federal Government with regard to zoning land usage and to state and local rights. The Fifth and Tenth Amendments of the U.S. Constitution are being invoked.

Administrative Changes: Whereas the above suggest some of the problems HUD has faced in terms of dissemination of the program, they are not the only type of problems. A shift in the handling of the insurance itself provides evidence of other problems in implementation of the program. For when the act was passed, HUD supervised the formation of the National Flood Insurers Association, an organization composed of 132 insurance companies that in turn made arrangements with local companies regarding insurance policies. Thus, the private sector conducted business with the assurance that the Federal Government would subsidize it when necessary. However, as of December, 1977 the Association was relieved of its responsibilities. The Electronic Data Service (EDS) was contracted to handle the insurance program for the government.[7] This change is in the direction of greater centralization of the program. (Previously the agent turned the policy over to his insurance company which then transmitted it to the Insurers Association. Currently, policies are sent by the agent directly to EDS).

The foregoing account, then, provides evidence of how an innovation - in this case a nonstructural measure - has an impact on the social relationships within and between organizations. HUD has expanded its mission, has increased its personnel, and broadened the scope of its authority and decision-making power. In doing so, it becomes a partner with the Corps in coping with flood plain management. The Corps, on the other hand, serves HUD by providing the necessary technical assistance.

Research and Development Organizations: The Federal organizations involve another group that should be considered among the policy agents: the research and development companies and individuals. The Flood Insurance Program has had an effect on their existence--it helps to maintain them through its funding activities.[8] Thus, it is that private companies like Sheaffer and Roland, Dames and Moore, and Abeles, Schwartz and Associates are conducting studies for FIA. (The first named has been engaged in a study of 21 cities, forecasting their responses to three different scenarios. The second has been involved in hydrological research; and the third, in a study of the application (or lack of application) of Section 1362 of P.L. 90-448 (which authorizes the Government to purchase nonusable flood-damaged property). In

addition, there are a number of individual consultants or contractors researching specific aspects of flood insurance.

Local Policy Agents:

The requirement that the local community regulate flood plain occupancy in order for its citizens to take advantage of the insurance program means that the local governing body is obliged to give special attention to the flood plain. This means discussion of the politically sensitive subject of zoning. It means code enforcement. It means knowledge of how to work with the state and Federal Government. Despite the fact that the 1973 amendment to the FIA made enlistment in the program construction mandatory for several years, there is evidence that a sizeable number of communities have not entered. (See p. 12.) Which communities, then, are most likely to join the program?

Obviously, they are communities that know about the program. They are likely to be the larger municipalities or communities that have contact with large places. They have personnel knowledgeable about Federal legislation. Ergo, they are informed, know the program's implications, and know how to join it. Further, they are experienced with zoning, a basic requirement of the program. The importance of this experience is illustrated by the situation in New York state where zoned communities were not only more likely to join the program, but initiated action to join before it was made mandatory. (Although communities that had experienced flooding were more likely to participate than those that had not, the relationship was lower than that between joining and zoning experience (Moore and Cantrell, 1976). Then, too, they see flooding as requiring other antidotes in addition to engineering techniques (Emmer, 1976).

But knowledge of the program is not the only requisite for participation. The communities must consider flood plain management important and within their scope of authority. And they must be willing to run the risk of engendering conflict over zoning. Thus, in a New York state locality, leaders provide minimual information on how the community could participate in the program in order to delay it (Kunreuther et al., 1977). Further, there must be understanding. Emmer (1976, p. 68) contends that decision-makers do not "fully understand what is expected by the prerequisites for insurance"...four standards are most commonly omitted when instituting such a program:

1. Section 1910.3d6 on fill in the floodway;

2. Section 1910.3b7ii on raising utilities above the 100-year flood level;

3. Section 1910.3b7iii on adequate drainage; and

4. Section 1910.3b1 on considering neighboring flood plain programs.

Testimony before the Senate Committee on Banking, Housing and Urban Affairs also illustrates misunderstandings about the program. Some witnesses felt that all development in flood-prone communities would be required to stop. Others incorrectly believed that flood insurance was unavailable to structures constructed in a flood plain. (See HUD, 1974, p. 10.) And finally,[9] a community must be able to get its citizenry to agree to participate. The case of Tulsa discussed in the next chapter (p. 45) exemplifies the struggle to resolve flood plain zoning issues by accommodating local interest groups.

In answer to the question, then, as to which communities are likely to participate in the program, it can be said that they will be ones that:

- know about the program;
- consider flood plain management their responsibility;
- have had experience in zoning;
- recognize the importance of nonstructural flood-water measures;
- are willing to cope with community conflict;
- understand the specifics of the program; and
- are able to generate community consensus.

Besides the local governing and zoning board, another group of important policy agents are the insurance company representatives. Until January 1978, the National Flood Insurers Association was an umbrella organization for 132 companies. It was responsible for disseminating information to the public and to insurance agents about the program, its implementation, and the determination of rates and adjustment of claims. However, neither the public nor the local agents are knowledgeable. Kunreuther, et al. (1977) attribute this to the fact that the premiums are so low that the insurance agents' low commissions do not make policy promotion worth the agents' while. (This suggests the hypothesis that in new housing developments in flood plains the insurance agents would be more ready to take an active part since actual rates would be in effect.) Information available to date indicates that the insurance companies have not played an active part in encouraging the public to purchase flood insurance.[10]

Despite this relative passivity, the companies have paid out sizeable sums of money in damages.[11] However, reports from interviewers indicated that the companies varied in their procedures. The variability is illustrated in the following account:

Two houses are jointly owned in the flood area. On one of the houses, five claims were filed for insurance and an amount of $19,800 was obtained. The original owner of that property had filed seven claims on the same property, five of which paid $12,600. The house was last occupied in 1970. The second house had three claims paid for $10,000. The original owner had filed nine claims under the same policy and received $26,000 for eight of them. Three adjoining houses owned by different individuals - for two of them no claims were paid, even though they were standing in water a good part of the time, and for the third, one claim was paid for $9,000. It appears that the houses that were owned jointly were bought as a commercial investment. The information about this situation was obtained from a Houston insurance company and forwarded to Congressman Eckhardt.

A Federal official stated that some companies immediately settled the claims and others dragged the procedure for months. Early settlement is frequently adopted by insurance companies so that no further claims can be made. For example, home owners are not likely to be cognizant of damage to winter clothing or to the furnace if the storm occurred in late spring. As time goes on they resettle in their homes, they note further claims. The companies want to avoid this. Several flood plain residents contended that their insurance company told them that:

1. They had to pay a $200 deductible, or a standard 2% of loss,

2. Furniture which they could have moved out of the way was not covered, and

3. Long forms had to be filled out.

Months passed before they received anything. These people became disenchanted with the flood insurance program and subsequently dropped it.

The overall picture is one in which the insurance companies have not placed high priority on the promotion of the program nor on standardized procedures for claim settlement. Their stance undoubtedly has something to do with the responses to the program of persons in the flood plain.

The effects of transference of the program from the National Flood Insurers Association to EDS and the greater involvement of HUD in its implementation remain to be seen.

Flood Plain Occupants and Flood Insurance

A 1966 study stated that the raison d'etre for the flood insurance program is to have occupants of hazardous areas assume responsibility for the risks they are taking without having to be burdened by flood disaster loans at times of crises. It viewed the situation as one in which the "general public bears most of the costs of flood-protection works while individual members primarily receive the gains." (See HUD, 1974, p. 44.) While recognizing that many factors contributed to occupancy in flood-prone areas, it appears that little attention was given to the flood plain fallacy (see p. 6). It overlooked the fact that housing policies fostered suburban sprawl and the American norm that each family should have an individual home. It ignored the increasing concentration of low-income groups in inner cities which frequently are the flood-prone areas. Both the study and the subsequent Act unwittingly make a number of questionable assumptions about flood plain occupants:

1. They are aware of flood-risks in their area;

2. They are future-oriented, i.e., concerned about the future sufficiently to make sacrifices in the present for it;

3. They are knowledgeable about alternative places for their residences or businesses but knowingly chose to live in the flood plain;

4. They place a high value on protection of their property (whether real estate or personal and household);

5. They are primarily concerned about economic losses, ergo, it is these losses that need to be the major focus of legislation;

6. They are knowledgeable about insurance from experience with other forms of insurance; and

7. They can psychologically identify themselves as persons whom a flood might affect.

In more recent years, several studies have been undertaken to examine not only whether or not flood plain occupants would acquire insurance but who actually has.

Flood Plain Residents:

To date, the flood insurance program has met with limited success in inducing people to take out insurance. There were approximately 1,250,400 one- to four-family structures in the 1,081 communities participating in the regular program (as of May, 1977). However, the total number of policies as of December 31, 1976, was 861,541 or 69 percent of

the above structures.[12] Figures recently received indicate that the number of communities participating in the regular program has increased to 1,511. The number of policies issued is 1,033,161 or almost a 20 percent increase.[13] (The unknowns in interpreting these figures are the total number of insurable structures in the flood plains[14] and whether the policies include businesses, manufacturing concerns, and other enterprises as well as residences in the flood area.) This represents a very slow rate of growth from the 739,000 figure for residential owners of policies in September, 1973 that Kunreuther et al. (1977) cite.

Kunreuther et al. have provided the most recent and extensive study of the public's response to the insurance program. Two thousand and fifty-five people in 43 areas subject to coastal or riverine flooding in 13 states were interviewed. Half had purchased flood insurance. Most people knew that it existed, primarily because of media presentations. Among the uninsured over 60 percent were unaware that they were eligible for it and they knew little about the terms or costs of it. They also did not expect flooding to occur. (This is a reaffirmation of the widespread belief that "it cannot happen to me.") Studies of smaller populations provide evidence of similar responses to the program (Mills, 1977; Emmer, 1976; Mack, March, 1976).

Interestingly, in 33 communities in the Connecticut River Basin, Mack (March, 1976) found that the median number of structures insured was 9.5 with far fewer nonresidential structures (3.8) insured than residential (13.1). An explanation for the small number of policies purchased by businesses, factories, and the like is offered by Powell and Leman (1975). It is that the insurance provides minimal coverage to such establishments since it places a dollar limit on protection.[15] The subsidized rates are the same regardless of the differences in risk element. Similarly, the same maximum limits apply irrespective of property values under both the emergency and regular programs. The home owner or businessman in a high risk area is much more likely to benefit from an investment in the insurance than someone in a low risk area. Lesser benefits are also realized by structures of lesser value.

To participate or not?: This question is not even raised by the majority of household residents since, as pointed out, they are unaware that they are eligible for the program. Sometimes this is because they do not know that they live in a flood plain; sometimes it is because no one has informed them about the program. (They are also ignorant of flood plain regulations and the Federal role in regard to it and sources of loans for repairs after flooding.) And, like those who have heard of insurance and even purchased it, they do not think about flooding if they have not experienced it or if their experience is fading into memory.

The field survey and laboratory experiments conducted by the University of Pennsylvania (Kunreuther et al., 1977) revealed several factors that appear to influence whether or not insurance is purchased.[16] The findings suggest that:

- People are more likely to consider buying insurance if they think that there is the probability of severe flooding entailing heavy losses.

- People who bought insurance not only considered the hazard serious, but they knew someone who had purchased insurance.

- Those who bought insurance tended to be older, richer, and more educated than those who did not purchase it. If they were home owners along rivers, they were long time residents; not so in coastal areas.

- The key finding of the study is that most people refuse to worry about future losses from disasters which they perceive as having a small chance of occurring. (See p. 10.)

Although no figures are available on the number of policy holders who have cancelled their insurance, occasional references to this have been found. In the preceeding discussion of the insurance agents, dissatisfactions that citizens voiced are presented. (See p. 19.) Among them were the $200 deductible or 2 percent of loss, delays in payment, the numerous forms to be filed, and the inequities in payment of claims and the restriction on structural repairs of buildings whose damages total more than 50 percent of their market value.

The Flood Insurance Act has insurance provisions for renters and mobile home dwellers. The former may take out insurance on the contents of their units. The more valuable they are, the more advantageous for the renter to do so. The latter, when located in mobile home parks, must meet certain requirements, e.g., anchorage or insurance, if loans are to be taken out (P.L. 90-448). The writer would hypothesize that most renters and mobile home occupants:

1. Would not know of the insurance;

2. Would not be interested in it; and

3. Would not believe it to be worth the additional outlay of money.

One of the reasons many people live in mobile homes is because of their economy relative to the housing market. The additional expenditures place a burden on a segment of the population that is struggling to survive in today's inflationary market. Interestingly, location of mobile home parks in flood plains may be attributed to the shortage of property in other locations and zoning stipulations that relegate them to particular areas. (See p. 57.)

Nonresidential Structures:

Nonresidential structures in the flood plain range from old, established factories to marginal shops serving local residents. However, only piecemeal information is available at present.[17] Even less is known about enrollment in insurance programs.

As of November 1, 1977 only 158,048 policies with a face value of approximately $7 billion have been purchased. Who holds them and for what kinds of structures is not known. However, a few isolated examples are suggestive of the kinds of establishments that will or will not take out insurance:

- Successful businesses with costly equipment are likely to flood-proof their structures rather than take out insurance because of the limited protection it provides for the contents. (See p. 21.)

- Smaller businesses and marginal ones are unlikely to be aware of the insurance program.

- Low cost structures that house services producing quick profits, e.g., fast-food services, may view insurance as economically unfeasible.

- Businesses located in frequently flooded areas may not be repairable under the program; ergo, insurance is useless.

The last-cited reason for not taking out flood insurance is illustrated by a University of Wisconsin study of Soldier's Grove, Wisconsin (Odegard, Wilkening, and Hirsch, 1976). This community of 600 people is located almost wholly in a flood plain. The central business district which has suffered much damage over the years, but which constitutes the social and economic center of life for the aging population, is beyond repair in terms of the insurance act.[18] The effect of the restrictions is to hinder any incentive to develop the community. The researchers state:

> For a village such as Soldiers Grove in which virtually all the commercial structures have been seriously weakened by past floods, the effect of flood plain zoning restrictions is disastrous. In order to reduce the cost of disaster relief programs for the nation, Congress has forced communities to forego future benefits which, in the case of Soldiers Grove, are vital to their continued economic stability.

Although the law is intended to encourage people to vacate their property when it is irreparable, the net effect is to make life harder on those businesses that can least afford to relocate. They cannot

afford to move because comparable structures outside of the flood plain may be too costly or because they would lose their clientele. Nor can they afford to meet building code standards. It becomes a "Catch 22" situation.

The fact that the District Court in Washington, D.C. is currently hearing a case citing three officials at HUD as defendents, suggests that there are business or industrial groups that strongly oppose the flood insurance program. This action, like the Eagleton Amendment, appears on the surface to be directed to the lending and zoning aspects of the law. It also suggests that not only are the marginal enterprises negatively affected by the program, but also the more affluent business groups that are in a position to carry their case to the higher courts.

The General Community and Flood Insurance

There are two ways of looking at the effects of the flood insurance program on the general community. One is in terms of effects on individuals; the other, in terms of the broader impacts it may have. It could hardly be expected that most people in the community at large would be aware of the flood insurance program when most in the flood plain are not. Therefore, their awareness of any flood plain regulation is likely to be occasioned by zoning notices or a zoning issue. However, few people understand or care to become involved with zoning unless their property is affected. Two studies of community reaction to passage of flood plain regulations and community zoning have found the program to be noncontroversial (Moore and Cantrell, 1976; and Preston, et al., 1976 cited in Moor and Cantrell, 1976). Since the evidence points to the fact that people outside of the flood plain are little concerned by the flood problem unless there is a crisis, it is unlikely they would find land control that they assume does not affect them controversially. At the time of crisis there is likely to be an outpouring of sympathy and good will toward the victims (White, 1975; Mack, 1976; Dynes, 1974).

It is probable that the effects of the insurance program on individuals are only felt when there is a personal experience. The person who lives outside of the flood plain in his community may be affected if:

a. He believes that he is being denied the usage of tax monies because they are being used in connection with some aspect of the flood insurance program;

b. He shops, works, or has acquaintances in the flood plain and finds that his activities are affected by the rulings;

c. The value of his property goes up or down;

d. The community-wide zoning becomes a public issue that he feels impinges upon his well-being;

e. Persons displaced by the regulations move into his neighborhood, schools, and recreation areas and he is aware of their presence; and

f. He is required to take out a permit, e.g., for construction, when his community had not required it previously.

Undoubtedly, the major impact of the flood insurance program on the total community is in terms of land use regulation. The zoning affects the market value of property by taking some of it off the market (floodway property) and restricting the usage of the flood plain. The value of nonflood plain land may rise - especially in those communities which have restrictions on construction due to sewage moratoria and the like and a shortage of available land. However, property abutting the flood area may have lower value than comparable flood-free locations.[19] What the effect of full enforcement of the regulations will do in the future remains to be seen.

It is in the future too that the impacts of the zoning ordinances will have a bearing on the layout of cities. Assuming success of the program in restricting flood plain usage to protected and insured structures would mean that those who could not meet the codes would have to relocate. Would the zoning force them into segregated areas? Would they be dispersed throughout the community? How would those in the community react to the relocatees? What would the effects of the population shifts be on the tax structure and political process within the community? The answers will depend upon the success of the implementation of the program.

And speaking of taxes, that limited segment of the general community that is aware of flood insurance may appreciate the fact that people in the flood plains are contributing to their own protection through insurance. Presumably, this reduces the amount that their taxes contribute to the costs of damages. (Whether the insurance program makes for a more equitable usage of tax funds is a question for the economist.)

There is a general tendency for outsiders to stereotype flood plain occupants as if they have chosen to live in the flood plain from among a range of other alternatives, as if they are impoverished persons, and as if they are responsible for flooding. People who have safely-located housing forget that there is a tremendous shortage of housing in many communities, especially moderately priced housing. They forget too that services that local businesses in the flood plains provide are necessary or that community zoning ordinances restrict selection of alternative locations, making some areas unavailable to many people. Few people are cognizant of the role that development outside of the flood plain plays in the causation of flooding damages in some locales. Nor do they think of the beautiful homes in suburban areas with their creeks increasing the aesthetic value of their community as occupied by people who may incur substantial flood damages on occasion.

The amount of time that is spent in cooperation by the local policy agents with one another and with state and Federal officials in connection with the insurance program is sizeable. This is frequently done at the expense of the general community, both in terms of tax money and in terms of distraction from other community works. Whether this is a plus or minus for the community as a whole would require other analyses.

So it is that for the population at large the effects of the Federal program may be imperceptible and not associated with stereotypes, housing shortages, tax income and expenditures, and zoning. Yet in the larger picture, all of these factors represent partial effects of the flood insurance program.

Summation

In this chapter a broad picture of a very complex and comprehensive program has been provided. We now are in a position to look at the overall effects of this program on the three major groups.

Let us arbitrarily select as the initial cause of the passage of the Flood Insurance Act the expressed desire of a combination of interest groups to (a) reduce taxpayers' contributions to recovery from flood damages, (b) to protect people from the trauma of flood losses and (c) to control human behavior rather than nature's behavior for environmental protection. By vesting authority for implementing the Act in a Federal agency, the Government has been given the right to indirectly control the use of lands in local communities. (Constitutionally, in terms of direct control, this right has been interpreted as belonging to lower levels of government.) In the discussion of carrots and sticks (p. 12), it was pointed out that although program participation is voluntary, there are definite penalties for not participating. Ergo, one of the major effects of this Act is the entry of the Federal Government into land use regulation at the local level. The actual zoning is left to the local community; but the principle to guide the community's actions is stipulated by the Act: control development of the flood plain and of areas that will lead to changes in susceptibility to flooding. (The close tie in between zoning and this Act is discussed in Chapter III.)

A second major impact of the Act is the empowerment of HUD to serve as the central agency in charge of the implementation of the Act. This has meant the development of a large office in Washington, networks of associations nationally, and control over funds. As the "lead" governmental agency, HUD has acquired a whole new set of rights and responsibilities commensurate with its position. Further, now that HUD plays the lead role in relation to the Act, the Corps is no longer the sole institutionalized structure responsible for flood-related problems.

A third major impact of the program is a correlate of the second, namely, the pervasiveness of the power accorded HUD through zoning

requirements has legitimized the sphere of power over the whole community that HUD commands. Thus, a very significant effect of the FIA is its impact on the relationships of agencies to local communities and to each other. (See p. 13.)

Turning our attention to the impacts on the local communities, we first note that a degree of community cooperation is required in order to meet the benefit eligibility stipulations of the Act. Over and over, we have pointed out that the local people in many communities do not place a high priority on flood plain problems. The effect of this legislation is that they have to corral their efforts and work out a plan. Large cities or communities close to large cities have more of the know-how to handle the situation. But smaller communities have serious problems, lacking planning departments, having part-time or unpaid governmental officials, and the like. For some, the issue becomes one of community growth and development versus nongrowth. Protagonists may rally on both sides as in the case of Tulsa where the struggle for resolution or mitigation of flood problems has been stretching over years. For others, the question may become one of whether Federal legislation should facilitate the survival of a dying community in a flood plain or whether the occupants should be left alone until the end. The following excerpts from a letter written about Soldiers Grove, Wisconsin speak for themselves.

> That users should pay the costs of the programs by which they benefit is a responsible policy, but under the guise that flood protection costs are to be borne solely by flood plain users, the insurance program has put all its costs onto the flood plain owners, but in reality use extends far beyond owners to all those who patronize flood plain commercial facilities, and enjoy flood plain natural resources...Only economic sophistry assures that the rules of the disaster relief game be drastically altered for the benefit of the urban taxpayer at the expense of - and over the objections of - predominantly small, rural communities...the flood insurance program is, for small, rural communities like Soldiers Grove, more of a disaster than any flood. The flood insurance program provides too little, too late; paying only after the catastrophic fact, meanwhile legislating the physical and socio-economic deterioriation of the community (Hirsch, 1977).

So the impacts of the FIA on communities as a whole may be to engender community conflict - particularly around the zoning issue - or to create tremendous anxiety in situations where the residents of a small community are poor people who perceive the price to outweigh the rewards of participating in the program.

Two other points with regard to the impacts on the communities as a whole are worth mentioning. One is that although about three fourths of the communities eligible for enrolling in the program have signed up, the great majority are in the emergency program. Although this may in part be due to the time needed for completion of accurate delineation of flood plains and flood ways, the evidence suggests that to a very great extent it is attributable to the reluctance of communities to engage in the required zoning. This, coupled with the relatively small number of businesses that have purchased insurance suggest that economic interest groups are resisting taking out the insurance. (Since there are so many unknowns regarding the kinds of businesses located in flood plains and the proportion that have taken out insurance and their reasons for not doing so, we can only suggest that this problem should be studied and an effort made to find out the reasons why they do not participate.)

The significance of business interests vis-á-vis community participation and the impacts of the program is further highlighted by the passage of the Eagleton Amendment and the current court case challenging the program. Both signify the efforts of pressure groups in resisting regulation of local land usage. The fact that the interest groups are in a position to take their arguments to legislators or the courts raises the question as to just who these interests are and why their opposition. A separate study would be needed to ascertain that. Nevertheless, the effect of these two steps is to remove the clout of the program - at least until the courts decide it in the second instance.

As of this writing there appears to be limited participation in the program - simply on the basis of the number of policies sold. However, since we do not know how many people live in flood plains and who they are (in terms of type of dwelling units, flood hazards, and occupants' socio-economic characteristics) it is difficult to ascertain the potential market for flood insurance. Three points are constantly cited in the literature: (a) most people do not know about flood insurance, (b) people in most communities are not purchasing it, and (c) insurance companies have not actively promoted its sale. Therefore, the effects in terms of the reduction of Federal expenditures for flood damages are difficult to calculate. (And of course, the calculation is further complicated by the unpredictability of amount of damage per year.) Therefore, whether a lack of knowledge about the program or an actual decision not to participate in it accounts for the number of policies held cannot be ascertained. Mr. John Carling, Chief of the Disaster Project Division, reports what appears to be an exceptional situation: communities and individuals in Pennsylvania where annual flood damages are very great are enthusiastic participants of the program.

The circular nature of cause-effect relationships is brought out by the FIA in several ways. Within a few years after program initiation so few communities had responded that Congress amended the original act by making participation compulsory. Subsequently, however, group pressure required Congress to amend the act once again in order to remove one of the sticks held over communities, i.e., the constraint on local banks

from making loans if the community is not participating in the program. Then again, the centralization of the insurance program under FIA with EDS is evidence that there was a need to alter an unsatisfactory situation. The recent court case is another example of the interest groups attempting to influence and effect changes in the program which will affect HUD's role. If the plaintiffs win the case, FIA may be emasculated; if they lose, the agency may become stronger.

All of these instances serve to illuminate the dynamic, on-going nature of social change wherein causes and effects are transposable.

Recommendations: Flood Insurance

The flood insurance program is so broad and intricate that only the barest suggestions of what might be done are presented here. Further, I do not consider such "reality constraints" as legislative requirements, political expediency, and funding problems associated with the recommendations. My proposals are presented with the idea that others may more knowledgeably modify, interpret, and implement them.

The recommendations that follow are based on several premises. In the first place, the societal setting must be taken into account. As I see the situation, American society cannot be expected to move from a situation in which there are virtually no land usage regulations (except for a few states that have developed programs on their own initiative) to one in which a comprehensive land use program is strongly induced by the Federal Government. Either controversial issues like zoning or Federal/local relations have to be dealt with first or the societal climate must be supportive of comprehensive land use regulation if it were to have a degree of success nationally. If the time comes when the socio-political setting is "ripe" for land controls, then a multifaceted program might be implementable.

Even more, there is a need for an educational program designed to acquaint people with an understanding of the relationship of flood damages to flood insurance. Not only do people have to learn of flood insurance and how it would benefit them, but community leaders (who may not be flood plain occupants) have to be apprised of the benefits for the total community. Although the educational process is very slow, it is possible to speed it up - especially through personal communication and a language that people understand. People need to have an opportunity to learn about the options and to choose between alternatives. Then, they can make their own decisions - or think that they are doing so.

Another premise is that different people have different needs. Ergo, not all individuals in a flood plain may "need" insurance nor may all communities consider insurance one of their needs. (For example, the unemployed may need jobs more than insurance.) To attempt to reach everyone is expensive and futile. The chances for successful adoption

are more likely if people seek out a program or learn about it through personal channels in conjunction with an educational program.

Given these premises, the recommendations are:

1. The current flood insurance program should be offered to communities on a voluntary basis with enhanced inducements to the policy holders and community at large for such participation. These "demonstration cities or counties" that voluntarily participate might receive benefits that make the comprehensive program attractive to other communities. Instead of trying to reach every community, an economically and socially justifiable approach might be to concentrate on those communities which are willing to cooperate, i.e., have worked out an agreement among the various local interests. This method holds the greatest hope for the success of any comprehensive program.

2. Flood insurance should be offered independently of any other flood control measures. Any individual who wants to purchase a policy should be able to do so at actuarial rates (possibly reduced through some Federal subsidization). There should be extensive promotion of flood insurance. (Governmental inducement may be considered under certain circumstances.)

3. Every effort should be made to reach communities immediately after a serious flood to encourage voluntary purchase of insurance by individuals or community admittance into the program.

4. Insurance should be required for all new construction in a flood plain and for remodeled or improved structures with adjustments made for special cases. (Accommodations should be made so that low- or moderate-income home owners who want to repair their dwellings in order to continue living in them can do so.)

FOOTNOTES

[1]Current annual flood damages average about $1.25 billion. Without the flood insurance program, the damages are estimated to reach $3.2 billion by the year 2000. Implementation of the program is anticipated to limit the increase to approximately $1.3 billion by 2000. (See HUD, 1977, p. 10.)

[2]This provision is contained in a later amendment to the Act, the Flood Disaster Protection Act of 1973.

[3]Personal Communication from Kurt Chandler of the Federal Insurance Administration, May, 1977.

[4]Communities that are enlisted in the regular program have had the necessary mapping completed which provides detailed engineering data reflecting the 100-year flood. This information is the basis for determining the actuarial or non-subsidized premium rates. Until the study for regular program participation is completed, communities may be enrolled in the emergency program after preliminary mapping has been completed.

[5]Personal Communications from George Phippen, Flood Plain Management Services Branch, Office of the Chief of Engineers, January, 1978.

[6]In 1970, the Corps undertook an "Urban Studies Program" wherein it worked with local communities in the development of comprehensive water usage policies (sewage disposal, water availability, flooding, etc.). This program has been found to be very costly (amounting to an estimated $1 million dollars per community) and time consuming. The Corps has tapered off its activities in this area (although as of January, 1978, it was working with approximately 40 communities). It will continue the program to the extent that it will recommend alternative comprehensive management programs to the communities. Thus, it will essentially serve in an advisory capacity and leave the bulk of the responsibility for selection of plans and implementation to the local decision-makers (IWR, Personal Communication, 1978).

[7]Personal Communication with Mr. John Schiebel, Office of the General Counsel, HUD, January 24, 1978 and February 8, 1978.

[8]Although research groups have been involved in connection with flood warning systems, relocation, floodproofing and zoning, extensive contractual work is primarily with the FIA according to the information available.

[9]The views of local policy agents regarding flood problems are illustrated by case studies of the political decision-making process in two Texas communities that participate in the flood insurance program

(Baumann, 1976).* Fifteen key influentials who opposed and supported the program filled out schedules. These are the pertinent findings:

-- Council members were not strongly for the program; however the occurence of a 1972 flood (15 lives lost; $10 million in property damages) stimulated passage of the program.

— Real estate and insurance leaders were opposed to the program.

-- Slight differences in perception of flood risk by opposition and supporters.

— The majority of the influentials did not consider flood hazards very important in land development or in a listing of the top three community problems.

— Whether for or against flood plain regulation, the influentials said that the arguments against the program included lowering of land values, interference with personal property rights, unreasonable Federal coercion, problems associated with slum areas, and no need for the program.

— Public hearings attracted interest groups, e.g., insurance and real estate people.

— Council passage took place within three months of the hearings.

[10]A survey of 29 insurance agents in Larimer and Weld Counties, Colorado, confirms the impression that the sellers of insurance are basically uninformed about the national insurance program. Most of them did not actively promote the sale of flood policies, but waited for the public to come to them. Two interesting points were brought out in the study: the majority of the agents (83%) felt that they received a fair commission for the sale of a policy and the major reason cited for lack of participation on the part of homeowners was an attitude that "it won't happen to me." The authors suggest a two-fold educational program to reach both the sellers and the buyers. A sample brochure and newspaper advertisement which had been run were given as examples of what could be done on a broader scale (James, et al., 1977).

[11]By September, 1975, $96 million in claims had been paid (K. Chandler, Personal Communication, May, 1977). This figure had grown to $220 million in June of 1977 (see Natural Hazards Observer, December, 1977, p. 9) and to $266 million by November 1, 1977. (See G. Phippen, Personal Communication, January, 1978.)

[12]Kurt Chandler, Personal Communication, May, 1977.

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*The problem raised and the approach of this study are excellent. However, the findings must be viewed as suggestive in light of the methodological shortcomings.

[13]George Phippen, Personal Communication, January, 1978.

[14]Cochrane (1975, p. 86) uses several sources to come up with a guesstimate of 2.8 million residential structures. One author had estimated that in 1966 there were 1.2 million structures. He was using 1000 as the number of communities with inland flood problems. Later, rural areas were added to the estimate, raising the numbers to 6000 communities and 1.6 million structures. If the approximately 1.2 million coastline homes are included in the estimate, one arrives at the 2.8 million Cochrane uses.

[15]The contents and structure may be insured up to $100,000 each under the emergency program. The total limits of coverage under the regular program involving actuarial rates are $200,000 each (HUD, 1977).

[16]The limited studies of Mills (1977) and Emmer (1976) support these findings.

[17]Sheaffer's study of 21 communities will provide information on the types of non-residential structures located in the flood plains of the sample communities. This study is not available to the public as yet.

[18]An interviewee in Soldier's Grove told me that the law is forcing people to break the law. The roof of the home of an elderly woman leaked. What was she to do if not have it repaired? He himself said that he earns his livelihood in the village and would take whatever steps necessary to maintain his buildings in order to keep them in usable condition.

[19]Professor John Bedford of the University of North Carolina, Charlotte, has collected preliminary data for a proposed study hypothesizing reduced value of non-flood plain property depending on proximity to the flood plain.

CHAPTER III: ZONING AS A NONSTRUCTURAL ALTERNATIVE

Introduction

In "Relocation as Process: A Social Psychological Perspective," (Motz, 1977), the point was made that what benefits one segment of society may adversely affect another and what may be good for the individual may not be good for the society. The opposite of course holds true, i.e., what is good for the society may be bad for the individual. The balance of the interests of both appears virtually impossible to achieve. Rather, there is a constant see-sawing in the tug of war for satisfying societal and individual needs. Nowhere does this appear more vividly than in land management through zoning. Here the self-interests of the individual frequently run counter to those of the larger society at the given time and to consideration for future generations.

In addition to the Scylla-Charybdis dilemma of individual/society, there are several underlying themes in American life that must be borne in mind. Briefly, they are:

1. Risk-taking is a crucial tenet of both the Protestant and capitalistic ethos embedded in the very fiber of this society. It is considered to be something with which individuals should be able to cope. Ergo, governments should not intervene. This is manifested in the myth that each is free to do his thing and in oft-expressed phrases like "If one is foolish enough to live in a flood-prone area, then it's his problem," and "Let the buyer beware."

2. Conversely, although not publicly verbalized to any great extent, virtually every group in American society seeks to minimize the risks it has to take. Large corporate enterprises, farmers, union members, welfare clients, doctors--all want subsidization from the body politic so that they may pursue their special interests--even though, in capitalistic theory--those who cannot make it on their own should expect to be eliminated from the marketplace. In other words, government must protect people--for the common good.

3. There is a clinging belief--though held with increasing skepticism--that the natural resources of this country are infinite.

4. The public has a pre-occupation with the here-and-now. Most people are concerned with obtaining their daily needs. (What is a need depends, of course, on social definitions.) Only those who want to avoid facing up to the problems of today or who have the luxury to afford to think about tommorrow rather than today are likely to focus on the morrow.

These are but a few of the themes that run through our society. It is apparent that they may be contradictory; that they are not held by everyone to the same extent and in the same way. Yet, when we talk about flood plain management, one must bear in mind that they underlie the varying perspectives that people have. It is because what people say and what they do frequently are at variance that it is difficult to ascertain in advance of an event how people might act when it occurs. Therefore, it is important to recognize in the discussion that follows that generalizations must be recognized as such; that how people respond depends on many different factors entering into the given situation.

Zoning and Its Components

Ecologists sometimes use the words "land use management" to refer to land husbandry, i.e., land use consistent with the ecosystem or in ways that do not damage it. Geographers may refer to "the productive use of hazardous areas" (Baker and McPhee, 1975). In this chapter "land use management" will refer to politically instituted controls on who may use what land for what purposes and in which ways. Control is exercised through zoning, subdividing and building codes. "Nuisance laws" also are regulatory.

Zoning: Zoning refers to regulations spelled out legally that designate the functional usages of land, e.g., residential, industrial, recreational. Generally "zoning" refers to local requirements; "land use planning" is, for political purposes, used to refer to statewide zoning (Linowes and Allensworth, 1975). The latter is more in the form of recommendations than requirements. "Zoning" is frequently used to include both subdividing and building codes.

Subdividing: Subdividing is the process whereby land areas are designated for particular types of structures or the location of structures in relation to utilities, sewage lines and roads. These regulations are more specific in defining the type of lots and buildings than are zoning laws. In Houston, Texas, there is no zoning. However, restrictive covenants and subdivision rules perform a similar function. (Restrictive covenants tend to be made between property owners without governmental intercession.)

Building Codes: These codes are designed to regulate the nature of the structures themselves--to see that they are maintained or built in accordance with stipulations that provide for proper sanitation, electrical wiring, fire protection and the like. To date no building codes have been established to the writer's knowledge with regard to floodproofing.

Nuisance Laws: These are rulings that prohibit the use of land for purposes that are considered contrary to the community's interests. They effectively curtail how an area may be used.

Again, it should be remembered that these types of controls over the use of land and the kinds of manmade structures placed on it are dependent upon local definitions. This means that the people who are in a position to influence local legislative bodies will define the terms in accordance with their value systems and perceptions of a good community.

Authority for Zoning

> The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.
>
> The U.S. Constitution, Amendment X

The above quote forms the basis for what has become a common practice in American society--the zoning of lands. Most cities in the U.S. today are zoned so that only certain kinds of activities may take place in certain places. This practice has become so widespread within the last 50 years that very few places are free from land usage controls.

The authority for zoning resides in the local governmental units which claim it in light of the above Constitutional Amendment. However, it is only within the last few years that zoning has gained significance in relationship to flood control procedures. The National Flood Insurance Act of 1968 and its various modifications provide for the local community's delineation of flood prone areas and the kinds of structures that may be built in them and those that may be maintained. Further, it restricts loans from Federal or Federally insured lending institutions (SBA, FSLIC, etc.) for construction of or on government property unless the community participates in the program. Another aspect of the Act, Section 1362, authorizes the government to acquire flood damaged property. President Carter's Executive Order 11988, May 1977, restricts the disposal and usage of Federal lands in flood plains, as well as grants, loans, etc.

Undoubtedly, it is the Flood Insurance Act that has given greatest impetus to zoning of flood plains. But prior to its passage, communities frequently limited the usage of flood plains to particular kinds of structures through zoning laws, subdividing and building codes. Not only have these regulations restricted usage, but they also have justified the taking of property for public use.

The "power of eminent domain," iterated in state constitutions, authorizes the procurement of property by local governments for the public good. The Fifth Amendment to the U.S. Constitution provides that private property shall not be taken for use by the Federal Government without just compensation. The Fourteenth Amendment extends this provision to the states. The owner is required to give up his property for a price considered to be fair in terms of current market values. The owner may appeal through the courts. (See p. 42.)

Policy Agents and Zoning

Although, as pointed out earlier, zoning is a matter vested in local governments, Federal and state agencies play an important part with regard to it. Offices of planning, taxation, real estate development and/or environmental protection, among others, either regulate or recommend policies that impact upon land usage at the community level. In addition, the state courts and (on very limited occasions) the Supreme Court have adjudicated land use cases.

Federal Policy Agents:

The decision-makers and implementers at the Federal level generally function in two capacities. They advise and recommend and they dispense rewards. (Frequently the two are interrelated.) Thus, the Department of Agriculture, in an effort to preserve farmlands, including those in flood plains, from further development in New York State recommends zoning of the land. When that is accomplished the community is rewarded with certain tax benefits (Economic Research Service, July, 1972).

Other Federal groups involved with zoning are HUD, EPA, Interior, NOAA, and the Corps. Various divisions within these are directly involved, e.g., the Federal Insurance Administration, the Soil Conservation Service, and the Park Service. And these in turn may have specialists dealing with zoning. At present, FIA's role with regard to zoning is particularly significant.

As stated earlier, the availability of flood insurance to individual subscribers is contingent upon the local government's adoption of flood plain regulations. FIA defines the minimum standards required for community participation. (The community and the state may have additional restrictions on flood plain usage.) FIA has policy agents responsible for contacting communities and admitting them to the emergency and/or the regular program. The determination of the appropriate program is dependent upon the community's zoning and delineation of the flood plain.

Basic to the program is the identification of a community's flood prone area. At one time, a major portion of the work was assigned to the Corps. However, FIA policy changed: mapping is now done by several agencies and private contractors. Initially, these policy agents send a "Flood Hazard Boundary Map," (FHBM) to the community. Later, the more carefully detailed "Flood Insurance Rate Map" (FIRM) is provided. This map, posited on the 100-year flood is a preliminary step to participation in the regular program. It identifies the areas of a community that are subject to risk premium rates for new construction and substantial improvements in existing structures. The mapping of the flood plain calls for a great deal of expertise. Such factors as velocity, frequency, quantity of flowing water and variations due to extraneous

factors complicate the analyses and mapping procedures. The identification of risk premium rate zones involves perceptions of hydrologic factors, land usages, and anticipated conditions. The Federal employee who serves as "Consultation Coordination Officer" for the community confers with appropriate local officials to determine the community's role in the development of the FIRM. (See Federal Register, October 26, 1976, pp. 46987-46989.) These are mentioned here to highlight the fact that throughout the mapping process decisions have to be made. And, although they may be made on the basis of presumed objective criteria, decision-making ultimately rests on subjective perceptions, interpretations and values (Kuhn, 1970).

Another indicator of the social considerations that enter the roles of Federal policy agents in relationship to the flood insurance program is the selection of the 100-year flood in the decision-making process. It appears that this criterion was the result of a general consensus among experts in the field.[1] It, like the definition of the flood plain, tends to be reified by policy-makers and administrators and challenged by persons subjected to the regulations.

Thus, although flood plain zoning is a local responsibility, it is done under the aegis of flood insurance administrators and the given state's personnel with the cooperation of the Corps and others. The involvement of Federal agencies assures that there is a minimal degree of uniformity throughout the nation.

State Policy Agents:

At the state level, there is a great deal of variation in the roles played. Many states have regulations for one or more hazardous areas.[2] Maine and Hawaii define permissible land uses on a statewide basis. Wisconsin and Nebraska have the authority to zone if the local community fails to do so. Vermont is the only state that has a planning program which is law (see Linowes and Allensworth, 1975).

Within the past few years, the number of states that have introduced flood plain management programs has markedly increased according to figures drawn from several sources. Linowes and Allensworth, 1975, report that in January 1974, only 15 states had flood plain regulation programs. In their 1975 book, Baker and McPhee report that 41 states mandate that localities have flood plain policies. Jon Kusler, in a phone conversation in November, 1977, said 24 states have control over floodways and of those, 15 have control over the whole flood plain. In every instance the state sets the criteria for regulation. It may identify compatible usages of the area or define the type of structures that may be built.

Minnesota's policy is quite strict. It necessitates the approval of any flood plain zoning ordinance by the commissioner of conservation.

At the opposite extreme is Texas, where it is left entirely to local political subdivisions to adopt and enforce permanent land use and control measures consistent with FIA regulations (Economic Research Service, July, 1972). These variations in policies held by the states are suggestive of the innumerable differences that exist from community to community.

To this point the discussion of policy agents has focused on the sacred attitude toward the separation of Federal and local control over zoning. The result is tremendous variation ranging from no regulation to extensive land control from one community to another. The important roles of local policy agents--governing bodies, developers, planners, courts, and vested interest groups--are discussed in the next section.

Local Policy Agents:

Since zoning is a local activity, the relationship between the owners of property and the city officials may revolve around their status similarities and differences. Sometimes they are one and the same individual. In such instances, the personal relationship that the official has with others in the governing body may place him at an advantage in protecting his interests. Or, because he is in a position of public trust, he may have to extend himself to abide by the letter of the law and to actively enforce it (building and health codes and flood plain regulations). He cannot afford to embarrass his peers or discredit his position. In either case, however, the fact that he is in the community's government suggests that he may be in a socio-economic position that would enable him to protect his own concerns. Zoning decision-makers play a leading role in securing the position of middle class groups that are interested in questions of land usage. Therefore, policy agents may find themselves caught between competing middle class interest groups, middle class and other groups, and their own personal desires.

The ramifications of these situations depend upon the nature of flooding, the size of city, the professional staff, the form of local government, and the nature of the politicians' interest and investments.[3] If water problems have low priority in the governing body's work schedule, then personal interests may be irrelevent (Dynes and Wenger, 1971). (Of course, conceivably it may be because of personal interests that politicians give them low priority!)

Depending upon the size of the city and the governmental organization, there may be specialists who are responsible for zoning, e.g., planners. Within a relatively short period of time the planner has become an integral associate of the governing team of hundreds of American communities. (Of course, there are additional thousands of localities which not only lack a planner on their staffs, but operate with a part-time mayor and a governing board composed of volunteers.) Wherever professional planners are employed, there is a great deal of similarity in the pattern of zoning (Siegan, 1973). This is due to the fact that planners owe their positions to the persons who employ them. It

therefore behooves the former to please the latter. The result is that the plans reflect the interest groups which hire the planners--or else the plans would not adopted. Proposed or adopted plans are subject to alteration at the behest of people who are able to wield influence. Thus, whether a given piece of land lies in the flood plain or not may be crucial to a developer--and to the local officials who see a source of tax money if development takes place. Since planners throughout the country are subject to these same pressures, they tend to response in much the same way. For after all, a degree of arbitrariness is inevitably involved in the interpretation of the hydrologic data--a lesson they probably learned if they attended similar graduate schools.

In addition to the officially identifiable local policy decision-makers, there is another group that wields a great deal of influence in many communities: the implementers, i.e., the people on whom the day-to-day task of enforcing or activizing zoning codes fall. They are the office personnel who issue permits, the building inspectors, the union representatives or the workers, movers, real estate agents and the like. They are the ones who (a) put into effect the regulation, (b) oversee performance, or (c) do the necessary work. They are included in this discussion of local policy agents because each, in the conduct of his job, is in a position to knowingly abide by, re-interpret, avoid, or evade carrying out the flood plain regulations.

The following situation illustrates how the combined activities of a variety of local policy agents resulted in the abrogation of zoning:

> A state university wanted to expand its facilities. The most convenient location in relationship to other campus buildings was in the flooo plain. The city fathers condoned the University's request, providing that certain precautions would be followed: the utility cell was to be on the roof, apertures would be raised and the like. The architect drew plans to meet these requirements; appropriate advisory committees approved them. However, at another meeting attended by persons who apparently had not been present when the previous decisions had been made expressed a concern for the aesthetics of the structure. The decisions formerly made were reversed and the building was constructed with the utilities located at the lowest level. Other flood-proofing measures were ignored (Dougal, 1977).

Several common practices of by-passing ordinances have been reported to the writer. They include: real estate salespersons failing to tell potential buyers that a dwelling is in the flood plain or minimizing the potential hazards with comments like, "The 100-year flood took place two years ago, so you don't have to worry;" building code inspectors being bribed, threatened, or otherwise induced to ignore code violations; and union personnel urging construction or other job-creating activities whether in flood plains or not.

> regulations that prohibited all new residential construction on private land along a beach. Manhattan Beach was a highly developed coastal community, near Los Angeles, in reality a suburb. The community wanted the area next to the beach to be free for public use but it did not have the money to buy it outright, so they rezoned the land to prevent any real development in an area that extended 175 feet back from the shore. The ordinance permitted limited commercial uses, such as concessions, but allowed no permanent development or construction of any kind. Nearby land was developed in single-family houses, and some of these were used only for recreational purposes.
>
> The court upheld the regulations largely on grounds of public safety, arguing that they would serve to protect otherwise inhabited property and the residents from storms and high water, but there was also some mention of "morals," which is quite unusual in zoning cases, the idea being that zoning has to be consistent with the health, safety, welfare and morals of the community--the four conditions of the police powers (the morals part is frequently dropped). Here the court suggested that if the ordinance was overruled and development along the waterfront permitted, this would require houses to be built on stilts, making it possible for immoral activity to take place under these houses. (See Linowes and Allensworth, 1976, pp. 113-114.)

An important distinction should be made about whether property is acquired by eminent domain or under the police powers. When the land is taken to prevent harm to the public, as in the above case, this is an exercise of the police powers and there is no requirement for compensation. However, if the property is taken because it is useful to the public, this is eminent domain and the owner has a right to just compensation. The property owner cannot wait to obtain a price that he considers to be fair, but must give up the property and is compensated in terms of market value. The government has no obligation to pay for the costs of moving, loss of good will or other expenses incurred by the taking (Advisory Commission on Intergovernmental Relations, 1965). Therefore, in regard to flood plain zoning regulations the question constantly brought before the courts is one of definition, does the taking benefit the public or merely prevent harm to them. Most statutes preventing all economic uses of land have been struck down in the courts as an improper use of the police power. It appears that the more uses permitted by a statute, the more likely it is that the regulation will be upheld and the uses allowed (Cook, 1975).

In connection with court decisions, it should be noted that the issues generally involve a local community and some interest group. The local community may be part of a larger metropolitan area which may experience the same kind of problems as the groups going to court. But the ruling applies only to the given political jurisdiction. Whereas this may be adequate to resolve disputes regarding flood plain management in the small isolated rural community, it hardly can be considered feasible in places where an entire region may be involved. The larger the area, the greater is the need to take into account the public interest while yet considering the individual interest.

Linowes and Allensworth (1975) note a shift in recent years in the nature of the litigating parties. Whereas in the past a given interest group would try to keep out another group from the area, today there is an increasing confrontation in the courts between two interest groups over the potential usage of the land. They believe that the issues are between competing publics to an increasing extent. Although most places may still attempt to keep out certain groups, they see the beginnings of a change. Evidently, if such a change is taking place, it is in its infancy. For a recent article in the Washington Post (Brown, January 8, 1978) states that the "ABA's (American Bar Association) Advisory Commission on Housing and Urban Growth charges that government at all levels has engaged in overt and covert discrimination--'on the basis of race or income disparities'--in setting housing policies."

In terms of flood plain regulation, whether intended or not, court cases are likely to work to the disadvantage of those who are not organized into interest groups or who cannot afford to take their grievances to court. The former may be attributed to the middle class value system that dominates much of America's thinking; the latter, at least in part, to a lack of funds and/or know-how for court legal confrontations.

Developers and Other Interest Groups: "Growth" has been one of the most favored words used in our society. Until recently, population growth was equated with economic and political growth. Today there is a constant tug-of-water between groups favoring growth, no-growth, and controlled growth. Zoning, by and large, reflects the power of the latter groups. In contrast, developers tend to favor growth. However, that is not to say that they oppose zoning. They favor it when they perceive it to be to their advantage.

The expansion of housing into flood plains may to a large extent be attributed to the work of developers following World War II. With the help of the Federal Government in the form of lending policies favorable to builders and developers and prospective buyers among veterans, millions of homes were built in farmlands. The presence of a waterway enhanced the aesthetics of the property. No one cared whether the new structure was in a flood plain or not, or whether it would increase flooding downstream or not. Returning veterans needed housing; the peacetime economy needed industry. Housing development satisfied these needs. The pattern of "suburbanization" was set. And what ordinances

there were did not apply to the new developments beyond the city limits. The writer was told of a development in a flood plain outside of the city limits of Atlanta where the purchaser found his house flooded right after settlement and before he had an opportunity to move in! (Interviewee #1) County-wide planning has generally viewed growth as desirable and development as a source of tax revenues.

Scarcity of land, coupled with the deterioration of housing in the inner city, creates a demand on the part of the public and a temptation on the part of developers to build wherever there is space. The result is that the flood plain is needed and one finds both luxury apartments and low-income housing projects in flood plains. In Soldiers Grove, Wisconsin, a new housing project for the elderly is being built in the flood plain; an Army medical center also is located there. In Charlotte, North Carolina, there is a large public housing project in the flood area. These same occurrences are found elsewhere in the country. They provide silent evidence of the fact that zoning ordinances, even the minimum ones required for FIA programs, have apparently been exempted by local policy agents.

"Local governments," says Schaenman (1976), "also increasingly are using bonus systems for developers, whereby minimum requirements for developments are waived in return for obtaining other public benefits. One of the most common types of trading arrangements is to allow a developer to build more intensely--more square feet or building height than is normally allowed for the site--in return for providing public amenities such as plazas or shopping arcades." (See p. 63.)

With this as the prevailing attitude, it is especially hard for local policy agents to resist the temptation of allowing development in places which rarely flood--especially if they have not flooded in recent years. The evidence is that communities respond after major calamity; interest in land usage controls ebbs with the passage of time (White, 1975).

The case of Tulsa, Oklahoma, provides a vivid example of the problems involved in coping with contradictory goals in a community:

> Starting in the 1950s, Tulsa entered an era of large-scale what I would call low-density development--sometimes referred to as the "urban sprawl" or "suburbanization" of the rural area....It was the type of development that, for one thing, was not financially intensive enough to really try to deal with potential flood problems. And it was also the type of development that occurred in such large scale that the city really had no means of dealing with it. In fact, much of this development actually occurred outside the city limits during this period of the 50's and 60's, and was not, in fact, a part of the city until the mass annexation in 1966...The

> skies opened again on Mother's Day, 1970, and victims along Joe and Mingo creeks suffered more than $1 million in flood damages, only days after Tulsa's new mayor, Robert J. LaFortune was sworn into office. He declared the city's intent to join the new Federal program that would allow victims to buy subsidized insurance to cover future losses--if Tulsa adopted controls on future flood plain development. The new controls were attacked from all sides.... They (flood victims) organized citizen lobbying groups and, spurred by lesser floods in 1974, demanded a halt to development that could aggravate flooding problems. But city attorneys said development couldn't be stopped without an "emergency"--and that periodic flooding didn't really qualify....victims continued to plead that new building shouldn't be allowed to compound flooding problems. ...What is sometimes called "Tulsa's Great Drainage War" was waged in scores of meetings in 1974 and 1975. Forces polarized, and opponents of the firmer controls--including development interests and those who believed in controlling water, not land use--accused the victims and their sympathizers of "over-reaction" to a "freak" flood. The inertia of bureaucracy also worked against changes, and debates ensued over many months, first in flood plain policy and technical committees, then among officials of Tulsa, city and county, and area towns. (See Patton, et al., in Filipovitch, 1976, pp. 190-193.)

But developers are not the only ones who place great pressure on growth at the expense of increasing flood potentials. Industries are another potent force. In one-industry towns the major company is a powerful force. It always can threaten to move out. (However, many large industries--especially those located in or near flood plains are eager to protect their investments and so may support flood control measures quite readily.) A community may be willing to take the risk of flooding in order to preserve jobs for its citizens. Many cities whether one industry or larger, entice companies and offer tax relief and exceptions to them.

In contrast, environmentalists tend to be very active proponents of restrictions on the usage of flood plains and activities that will interfere with natural run-offs. Not only are some of the more avid ones proponents of no-growth, but they also would like to see people get out of the flood plains. A summary of notes taken with several dedicated environmentalists reads:

> This organization is run by extremely dedicated women who devote innumerable hours developing programs, writing a newsletter and distributing it,

> button-holing top business and corporation leaders to support their programs and contribute funds. They do in-depth study of environmental problems. (I believe the emphasis is on the natural habitat of flora and fauna--not pollution and health-related problems.)
>
> They seem to believe that through education people will realize that they should move out of flood areas. When I asked where the poor would go since there is a housing shortage, the response was that they had not thought about that.
>
> The board members of this organization are very well-known and influential persons in the city. The spokespersons were proud of the clout they carried in the community (A. B. Motz records).

As among other groups that have been discussed, there is a danger in generalizing from the specific instance. Developers, corporations, environmentalists, civic associations--all include within the category individuals and groups that take different stances depending on situations and many other factors. So what is likely to be a community's experience with efforts to introduce or implement its zoning ordinances may very well reflect (a) domination by one or a few groups on any given occasion; (b) majority rule--of the members of the decision-making body in the community, or (c) a consensus reached through some kind of gamesmanship. The last perspective is supported by Linowes and Allensworth (1976):

> There is little doubt in our minds that developers have power in this country, but public officials may be hard pressed to legitimize decisions made in developer interests. In other words, developers do not as a rule have enough power to force such decisions. This fact, plus the power of organized citizen groups and environmental groups, has caused many officials including those in the courts, to make decisions in the interests of the latter....Many officials would seem to prefer going with developers on key land-use decisions, but they are afraid to, partly because they could not explain their actions to citizens groups and others of more liberal and democratic persuasion.

The net effect of the role of the courts when coupled with that of planners and the nationally applicable stipulations of the FIA is to lead to a general overall uniformity in zoning practices and procedures throughout the country. For the middle class value system that dominates the courts reinforces a common standard of interpretation and enforcement of zoning. By providing minimal requirements, the FIA induces

a degree of uniformity among local communities. Planners who have probably had similar training in schools offering kindred perspectives and who operate within the constraints imposed by middle class governing bodies produce similar plans. Thus, despite the domination of zoning by local power groups, the nation acquires a similar orientation and set of regulations in the vital area of land use.

The study of Xenia, Ohio, provides a fitting synoptic conclusion to this section on zoning and local policy agents for it points out the interplay of economic, political and social forces and the great importance of a social psychological phenomena--perception.

> The tornado of April 3, 1974, which destroyed a large portion of Xenia, Ohio, gave the local policy agents the opportunity to rebuild and avoid many of the mistakes of the past. The city commission issued a building moratorium for the downtown area. The Miami Valley Regional Planning Commission (MVRPC) immediately undertook a study to recommend a redevelopment strategy. During the two-month study period, two factions developed in the community over the best way to go about redeveloping. One group favored the local private sector and the other supported government assistance and outside expertise. The local Burger Chef and Colonel Sanders demanded to be allowed to rebuild downtown during the moratorium by threatening to leave town altogether.
>
> The recommended MVRPC proposal which was approved in June, 1974, had three major components which ideally would avoid the old errors. The plan called for a pedestrian-oriented retail area integrated with the old CBD; a diversity of housing in which to place the varied homeless population; and a greenbelt along the river to separate the strip development from the CBD, provide recreation and keep the flood plain clear.
>
> Some feel the plan never had a chance for success because of the fast food rebuilding which had taken place during the moratorium and the fact that a provision for permission of appeal for variance was approved with the MVRPC plan. The provision was intended to assure that the plan was not a hindrance to appropriate redevelopment and to speed the process along. The actual effect was to provide a vehicle for the predisaster forces to reassert themselves and to circumvent the zoning map.
>
> A year and a half later, after much division and debate, a development plan was approved incorporating

some of the MVRPC's* proposals. However, the old orientations were still preserved and few of the MVRPC's goals were accomplished. Instead of a pedestrian-oriented mall, the CBD was still dominated by the automobile with the fast food establishments and heavily traveled secondary arteries encouraging commercial development in residential areas. The MVRPC plan was to establish new housing in what had been the poor section of town so that it would be a vital part of the community. What happened was the old, established "good" neighborhoods were heavily insured, rapidly rebuilt and are still considered good places to live. The people in the heavily damaged declining area carried little insurance and in an effort to recoup some of their losses banded together and had their lots rezoned commercial. The result has been piecemeal commercial development and huge vacant lots. The third goal of the MVRPC had been to avoid future development in the flood plain. The destruction in this area had been almost total and it appeared that the community had a perfect opportunity. But within four months after the tornado, there was a new McDonald's in the area and within two months after that enough rezoning had occurred to permanently reestablish the highway commercial strip across the creek. Residential relocation into the flood plain occurred rapidly and the only stipulation the city government made for compliance with the flood insurance program was that new buildings have foundations that allow them to stand clear of floodwater.

Why did the same old forces reassert themselves in the redevelopment? The predisaster policy agents were the same people who made the postdisaster decisions. Even though the physical structures were gone the people kept their impressions of the areas. One woman expressed a feeling in that even if mansions were to be built in the low-income area, they would revert to "Tobacco Road" because the area was inherently stigmatized. So between the old policy agents and the established images, Xenia is reemerging as it had been prior to the tornado.

Flood Plain Occupants and Zoning

What is the impact of the zoning process on the flood plain population? The zoned flood plain area may reflect the total composition of an urban community. Let us look at it in terms of residential populations first. We will classify them as the affluent, e.g., the residents

*Miami Valley Regional Planning Commission

of Charlotte's "Museum area" or along Atlanta's Peach Tree Creek; the working class; and the poor. (No attempt is being made to be exact--merely to be suggestive of what possible impacts may take place.)

The Affluent and Zoning:

The literature on zoning points out quite emphatically that most zoning is done in accordance with the wishes of the middle and upper classes--they are the ones who are in a position to influence councils, city managers, and planners. Therefore, when it comes to defining the area which is to be included in the flood plain, they are likely to be in a position to make known their wishes. They are likely to be persons who want zoning to protect their property from the presence of neighborhood nuisances, threats to their land values, and changes in the character of the structures or community. When they find themselves subject to restrictions because of the fact that their neighborhood has been defined as a flood plain, they may--perhaps as individual units--seek to have the maps altered to exclude their particular piece of property. Linowes and Allensworth (1976) raise the disturbing thought:

> Perhaps the key question is whether the interests of the poor or of blacks can ever be served by government in a political and governmental arrangement dominated by the upper-middle class. Zoning is largely a suburban issue in this country; it is most effective and has greatest impact in upper-middle class suburbs, giving land use controls a highly upper-middle class flavor. The effect, as suggested above, is not limited to upper-middle class areas, but extends to the rest of the metropolitan region as well.
>
> The upper-middle class suburbs have a great deal of influence with state legislatures, state executives, the Federal Government, and the courts at both levels. As long as the upper-middle class controls the land use system, it is not clear how other classes can gain. (See pp. 13-14.)

Not only are the affluent better able to influence the political structure than others, but they are in a better position to protect themselves from flood dangers. If they find the flooding situation a burden, persons in the upper income brackets can more easily afford to relocate. They might want the government to take some action to buy their property from them because they are eager to move out of the flood area and would like to take advantage of Federal assistance. This appears to be the case with regard to some of the families living in Baytown, Texas. They would like the government to enter into relocating them. (See Motz, 1977, p. 79.)

On the other hand, there may be some residents among the affluent who desire to remain in the flood plain and can more readily meet the zoning requirements than the working class and poor--by floodproofing their homes, insuring them and the like. They accept having the area defined as a flood plain so that they may obtain the relatively low rates of the flood insurance program. (It is among this group of people that one is likely to find the greatest awareness of the flood insurance program and the greatest receptivity to it [Kunreuther et al., 1977]). They may be willing to pay the additional cost that the insurance imposes because they may feel that the risk is minimal, that the neighborhood or house is worth the expenditure, and that they are not concerned about selling the house in the near future.

Flood plain regulations may actually benefit the more affluent persons who live in the flood zone. Conceivably, their property taxes may be lower than comparable residences outside of the flood plain. If they move into a new development in the flood plain, the houses may be floodproofed in accordance with FIA regulations. Considering the total cost of the house on today's market, the extra amount which is paid for the necessary flood protection may be but a very small percentage of the total price. Therefore, at a time when land is increasingly scarce in many communities, they may be able to obtain a part of that rare resource. They accept the risks in exchange for location, costs, and perhaps aesthetics.

In other words, depending upon perceptions and experience with flooding, members of this socio-economic group may be quite willing to have the area zoned as a flood plain because they believe that they themselves will not lose from such a zoning regulation and that a government may assist them in protecting their property.

However, there are people in this category who may take a quite different point of view. They may feel that the people on the zoning board or council are exercising undue power. For they may deny the existence of threats of flooding--maybe they had a 100-year flood recently and so are prone to contend that there will not be another for at least 99 years or they may feel secure in the belief that nothing major has happened so why anticipate the worst. Then again, they may not know about the area's flood hazard potential and not want to hear that there is one. Knowledge that the area is zoned makes them anxious. They do not know what to do. Perhaps they had planned to stay in the place but a few years; suddenly they become concerned because they have heard that it is harder to sell in a flood plain and negative publicity may reduce their getting what they consider to be a fair price.

Renters in this socio-economic group may be indifferent to the zoning requirements--unless the landlord decides to convert the building into condominiums. In that case, the condominium association or the individual homeowners would become responsible for floodproofing and/or insurance. This would certainly be an additional important consideration for a multiple dwelling occupant in determining whether he wants to

remain in the building. On the other hand, depending upon the situation of the market for housing in the particular community, he may enjoy a better dwelling than he could get elsewhere for the price. If he is a renter, the zoning ordinance is likely to be meaningful only if his unit is situated where flooding is a real possibility.

In some communities there undoubtedly will be many people unaware that their house is within a flood area. It may come as quite a shock to them to learn that it is when a flood occurs or when they try to sell.

It is highly possible that in some places individuals will try to sell their houses as soon as they get wind of the possibility that zoning may take place. Some may feel trapped because they may want to move but feel that would be unfair to their neighbors. Others may try to influence the zoning board to define the area in a way which excludes their property. They may unite with members of the local civic association to call in engineering experts to contest the criteria of a flood plain used by the zoning board.[5] They may do their best to have the decision drag over time. A schism may develop in the community between the pro-zoning and anti-zoning groups. Community conflict may develop around the zoning issue so that a redistribution of power takes place or the group in power is weakened, replaced, or entrenched.

Thus, among the more affluent residents in a community there will be a variety of responses depending on how the particular resident believes that zoning will help him protect his interests. It would be fallacious to assume that there is unanimity in the reactions of the affluent to flood plain regulations.

The Working Class and Zoning:

Probably constituting the largest percentage of flood plain occupants, particularly in cities, the working class population will also be composed of persons with varying reactions to the zoning rules. There may be some who have contended with flooding a number of times and to whom public identification of the area as a flood plain would not make a difference. They plan to stay in their homes regardless--because of finances, convenience of location and friends, habit. (This essentially has been the attitude of people who do not want to be relocated in Prairie du Chien, Wisconsin.) Others will take the same point of view as the middle and upper classes. They may want to move if they receive Federal assistance in the process or, they may wish to stay because they do not see the flood hazard or are willing to take the necessary risks involved.

The chances are great that it is this group of people who will feel that zoning works a hardship against them. First of all, the FIA requirements may preclude major improvement of the property once the house is identified as being in a flood zone. For example, a permit is required. That means that the house is subject to scrutiny. Not only

will the object to be replaced be noted, but also other things that may be inadequate or defective. However, the family may only have money for repairing one thing. The investigator may report the house's deficiencies. Since the repairs might cost more than 50% of the market value of the structure, the homeowner may not receive a permit for the desired improvement. The house--carrying the example to an extreme--may be condemned. Secondly, they may be wary about what may happen when the time comes to sell their houses. Even if they get an inflated price for their houses, they may have real difficulty finding a "safe, sanitary and decent" house without an additional investment at higher interest rates. Further, they may have increased maintenance, taxes and transportation expenditures. Both husbands and wives may be working in order to maintain what they have. The uncertainties associated with living in a flood plain plus financial fears may be very upsetting to them when they learn that flood plain regulations are in effect.

Subdivision rulings and building codes also may work a hardship on the working class. Thus, the latter may prevent individuals from improving their existing buildings by additions or changes. (Although persons in upper income groups may find it more costly to remodel their structures, the chances are greater that they will be able to meet local regulations regarding accessibility, structural features, and the like since they may be able to afford the additional expense that improvement in a flood plain may require.) The subdivision requirement, for example, may necessitate a certain number of feet between buildings or between house and street. This ruling, if implemented, may be used to condemn a piece of property.

Those who attempt to enforce building codes may do so with less trepidation in a working class neighborhood than among professionals and executives. Personal status differences affect the willingness of a building code inspector to be insistent upon the letter of the law. Building codes, like all forms of zoning, reflect middle class standards of health and safety. The costs of meeting these standards, the inconveniences that they may cause in the process of getting the work done, and the low priorities they have among working class people need to be taken into account. To maintain a home in accordance with local building codes may make homeownership an undue burden among the working classes.

The Poor and Zoning:

Poor people living in the flood plain frequently are unaware that the area is zoned as such. For one thing, of the many problems which they face, flooding may be one that is of relatively minor importance in their lives unless they have recently experienced it. Coping with daily needs tends to be all-absorbing. If they are renters, the poor may simply move if flooding becomes a major problem--move from one low-income dwelling to another, following what for a segment of the poor is a usual pattern. (Interviewee #2 said that it is estimated that two years is the average length of residency in Charlotte, North Carolina in

a public housing project in a flood plain.) Secondly, if they own the place in which they live, there is little opportunity to find another low-income dwelling since their price range is the one in which there is the greatest housing shortage in the U.S. Further, the chances are that they may be most reluctant to look for other housing. For studies show that people whose lives are pretty much circumscribed by their neighborhoods are more likely to be reluctant to leave them. The community is as much a part of their being as anything can be. Outside of the neighborhood with the familiar faces, streets and buildings they are lost (Fried, 1963). (There is probably an inverse relationship between this sense of identity and socio-economic position in American society.)

Interestingly, for the poor (and maybe for the working class) to be identified and labeled as living in a flood plain means one more stigma attached to their status. For the affluent, no such stigma applies for the image conjured is one of a creek that enhances the beauty of the environment!

Non-Residential Structures and Zoning:

Several factors have led to the location of non-residential structures in flood plains. First and foremost is the fact that historically, location on a waterway was essential when waterways provided an important mode of transportation. Major cities--Chicago, St. Louis, Cleveland, Boston--had their business and industrial districts along the waterfront. To this day the districts are close to the central business area with its office buildings, theaters, hotels and stores.

Secondly, the passage of zoning ordinances assures the perpetuation of non-residential structures in the flood plain of many cities. Chicago's first zoning law in 1923 stipulated that land adjacent to a navigable waterway automatically be zoned for general or heavy industrial use. To this day the area is used intensely and extensively for businesses and industries that no longer use or need the waterway. (See Solzman, 1966, p. 121.)

Even in communities that were not historically dependent upon water transportation, the lower value of property in flood plains attracted warehouses, factories and marginal businesses. Zoning ordinances, conceived of by middle class persons, then restricted such establishments to the area. For generally, as cities grow in older industrialized areas, the population fans itself outward from the original location. The central business and industrial section tends to expand into the immediately adjoining areas which have been deserted by higher status residences and taken over by newcomers to the city who represent a different social stratum. With growth in population, land use restrictions have limited the amount of space within cities for industrial development; ergo the less desired areas (in terms of other usages) are assigned to industries. Over time, these areas invariably develop the services that are needed for the maintenance of the flood plain

enterprises, e.g., railroads, warehouses and the like, so that industries and businesses that need them are desirous of locating there. Thus, the process becomes circular: businesses are attracted because of what the area has to offer them; the area may be zoned so that is where they have to go.

The higher status communities protect themselves from commercial and industrial infringement through zoning ordinances. Rezoning, which does permit some dispersion, takes place if the non-residential structures meet a need of the area's residents, i.e., if they are considered compatible with the middle class planner's and zoning officials's conceptions of the neighborhood. Thus it is that shopping centers have grown up in suburban areas, frequently in anticipation of the development of middle class and upper class residences within short distances from them. The presence of these "malls" with their seas of parking spaces (and the housing developments surrounding them) have frequently contributed to runoff responsible for flooding in other parts of the community.

Just as shopping centers in middle class neighborhoods service the needs of the people around, so, too, do the businesses in other residential sections. In many lower-income neighborhoods, it is the marginal or minority group businessman who caters to the clientele of the flood plain area. Building code restrictions--including health, wiring, plumbing, etc.--work a hardship on him if there are attempts to enforce them. (A former building inspection official reported numerous problems with code enforcement. The codes force some people out of business causing tremendous personal problems for them; others have to use subterfuge and illegalities in order to continue.) The requirements of FIA, while offering him protection in case of flooding, seem to be an added burden on him if his place has withstood many floods (and is virtually beyond repair according to local codes) or if he is in an area that rarely experiences flooding. On the other hand, today small businessmen--particularly minority group members--may be able to get Small Business Loans from the Federal Government if the community is participating in the flood insurance program. With this assistance, they can meet the requirements for construction in the flood plain and provide needed services for the residents or already existing industries or businesses. (At the same time, they may compete with the already existing businesses.)

Conflict over zoning in the flood plain frequently occurs between the no-growth and the pro-growth people. The first see regulation of industrial and commercial development as a way of preserving the community "as is." The second perceive growth as bringing in jobs and taxes. And business people who believe that they can profit by locating in the flood plain are not averse to doing so, particularly if their original investment is low and profits depend on volume (as in the case of fast food chains).

Summarily stated, it appears that within the flood plain, most business people and others who utilize non-residential structures favor flood plain locations despite the risks involved. They are willing to take the risks because of limited opportunities to earn their livelihoods elsewhere or because of convenience of the location in relation to its costs.

The General Community and Zoning

Although more and more writers are referring to land as a natural resource to be preserved and protected (Baker and McPhee, 1975), land is treated by most people in a community as something to which individuals and groups have a right. It is "private property." By and large, court rulings have supported that contention. (See p. 42.) Zoning, intended to restrict the usage of land as private property, is often opposed both by the citizenry and be governing groups. The basis for the public attitude frequently revolves around a concern for taxes, employment opportunities and housing. Therefore, zoning which is assumed to promote these ends is favored.

> Zoning is something upper-middle class conservatives just naturally want; the possibiltiy of its being a government control often does not enter their minds. Zoning is linked with a particular set of social values, a particular class level, particular racial identities, and particular ethnic or religious backgrounds; it ensures not only that groups that do not possess those characteristics will not get into your community, but it also protects property values. This gives zoning an appeal on social and economic grounds to the conservatives and liberals who are served by it.
>
> To explain their political stands to others and, we guess, to themselves, and to make it appear that there is some value higher than the pursuit of power for social class and economic interests, many conservatives insist on clothing their philosophy in broad terms such as "freedom from government controls," "fear of bureaucratic domination," "the virtues of private enterprise," "opposition to socialism," and similar phrases. This is not to say that all conservatives fall in this category, but certainly most of them living in upper-middle class suburbs do. Liberals are, of course, no different and insist that they are "promoting a clean environment," "helping the poor," "giving power to the black," or "enhancing the social welfare of minorities." (See Linowes and Allensworth, 1976, pp. 54-55.)

What Linowes and Allensworth wrote in the above quotation concerning zoning in general is most apropos to flood plain regulation. It, then, is approved to the extent that people see their own interests furthered by it. But it must be borne in mind that most people, since they do no live in a flood area, have little awareness or concern about the problem--unless there is a major catastrophe (which, when over, is quickly forgotten). And since the probability is that in most communities, politicians are not dependent upon the votes of those to whom flooding is a problem, they are rarely likely to make it a political issue. W. Joseph Shoemaker, a politician concerned about water resources, has said that a politician who is mainly interested in being reelected should avoid drainage matters. By becoming involved, he is more likely to lose votes because of unpopular actions than gain votes because of taking a stand. (See Filipovitch, 1976, p. 170.)

The general community frequently approves of regulations that will create additional parkland. Americans value parks for aesthetic and recreational (and more recently, environmental) reasons. But in addition to manifesting this ideological commitment, parks are seen as having the potential of serving other functions. In the first place, zoning an area for parkland is a way of eliminating what many consider to be eyesores--shabby businesses, houses, vacant lots. Thus, regulation of the flood plain may not only remove structures, but also people who are considered "undesirable."

For example, the trailer population that is situated in the path of a potential dam overflow is being urged to relocate (Interviewee #3). Parts of the general community nearby are pleased to hear that the area may be converted into parkland. Mobile homes are considered "undesirable" and restricted by more recent zoning ordinances to a particular location. Thus, flood plain regulation is coincidentally serving to segregate another segment of the population by disrupting a community that has been established for approximately 20 years. And a park will reduce danger and beautify the community.

History suggests that in the process three things are likely to result from such zoning: (1) a beautiful park may be developed which is largely enjoyed by middle class members of the general community (since park usage tends to be a middle class activity); (2) the community will not have sufficient funds to develop the park and so the land will lie vacant; or (3) the land will be turned over to developers (or businesses or industries) who agree to abide by flood plain regulations or to work out a "mutually satisfactory arrangement" with the city. (The latter is illustrated by a large tract of privately-owned Maryland land including a portion of a flood plain. The owners sold the property to a developer who made an agreement with the local government to develop cluster homes and donate the flood plain to the government as parkland.)

A second latent function that zoning an area for a park may perform is to serve as a buffer zone separating two distinctive population

groups. In this case it provides a natural barrier limiting contact between different ethnic or social class groups.

And finally, although parks tend to be used by a limited segment of the population of a community, they are viewed as contributing to the common good. Therefore, publicly-collected funds serve to maintain them for the enjoyment of the users.[6]

Rather than pressuring for flood plain regulation, the general community is more likely to apply pressure on housing issues. Some will want increased development in order to reduce housing shortages. Therefore, they are likely to oppose flood plain controls. If they are aware of flood plain zoning as a problem, they may see it negatively--something that is driving up the cost of housing by limiting its availability. (Few are likely to think of the cost of housing being increased by the need for flood insurance or floodproofing.)

A lack of knowledge about flooding, zoning, the role of development in increasing hazards and the like tend to characterize the general community. This may be attributed to a number of factors in addition to what has already been cited. One is that the whole subject of zoning is minimally understood and discussed in the general population (Linowes and Allensworth, 1976). Secondly, people are concerned with their own immediate problems--and flooding is not likely to be one of them. Thirdly, the language that is used in connection with flood control programs is not readily understood--especially the concept of the "100-year flood." (If it occurs just once in 100 years, why should they be worried about it?) And finally, the high degree of specialization in American society leads people to assume that there are specialists who know what to do. They trust that the city council has made a wise decision when a flood plain area zoned for low and moderate income housing is to be rezoned as parkland--"parks are nice." They forget for the moment that there is a housing shortage and people have to go someplace--possibly into their neighborhoods and schools! Each one is busy directing his energies to what he considers important and trusts that public officials and others will take care of other areas of life that need attention.

Summation

Zoning is one of the most significant regulatory processes in American society. It empowers the local community to control usages of land under the aegis of the state government. First we will look at the effects of zoning without the FIA; then, we will identify some of the broad impacts as a result of the passage of the Flood Insurance Act.

Zoning, whether of flood plain areas or any others, generally has the effect of restricting land usage in terms of middle class values. Citizens' groups, developers and selective vested interest groups are the key proponents of zoning. Since they frequently count some of their

members on the local policy boards or have access to the boards involved with zoning, they are in a position to make their wishes known. Often their wishes are to keep out people unlike themselves or to get rid of those who are already located where they would like to be. Their interests may include those of environmentalists. Together they make a strong pitch to convert flood plain land into parkland and recreational land (as in Scottsdale, Arizona). The net effect is to remove poorer people (generally) from the area. The demand for houses on the part of buyers and the eagerness to build on the part of developers has made both groups indifferent to the flood potentials. The concept of "cluster housing" has made it possible for developers to take advantage of flood plains by converting the flood prone area into a park and putting middle or upper-priced houses closer than regular zoning in the area might allow. Local policy agents under the influence of the responsive segments of the citizenry approve such plans.

In brief, it appears that zoning of flood plains is most effective in placing restraints on the development of lower income priced housing development, on poorer people living in flood plains, and on the marginal businessses and industries. This is the general situation because zoning is dependent upon public pressure--and only certain groups in the society are prone to pressure for it.

Turning our attention now to the Federal program, we find that the Flood Insurance Act makes flood plain zoning a prerequisite for participation in the program. It attempts to constrain flood plain development by requiring owners to insure or floodproof their property. Not only is HUD involved but also the Corps with its mapmaking responsibilities. Although participation in the program is voluntary, the carrots and sticks offered and the 1973 amendment making enrollment a prerequisite for disaster assistance are interpreted as coercive by some. The effect of this sense of coersion is that the power that the Act has bestowed on HUD in relationship to local groups is being challenged in the courts at present. An argument of the plaintiffs is that the Act violates the constitutional right of the local community to zone without Federal interference.

A second important effect of the Act is that Federal approval of local flood plain legitimizes what local officials have enacted. It gives a stamp of national approval to local zoning as long as it restricts flood plain usage. But because local officials abide by flood plain policies does not mean that they are looking out for the common good. For zoning represents a way in which those who can assert themselves vie for control of the land--and the right to use it as they see fit. We have already noted that zoning boards tend to be middle class. The property uses that win their approval reflect their values. The result is that zoning, like highway relocation and urban renewal, can become a way of removing the "undesirable" (whether persons, industries, or businesses) in order for middle class approved usages to take their place in the flood plain--and this with Federal approval A net effect of this may be that the "undesirables" are zoned out of virtually every

area of the city and/or become segregated (as they may have been in the flood plain). This has been the experience in 30 metropolitan areas where social segregation and "clustering" was increased by land use regulation, according to a study cited by Linowes and Allensworth (1976). What makes the situation unique in the case of flood plain zoning is that HUD approves the zoning of the entire community, not just the flood plain. Thus, a city could have Federal condonement of highly restrictive practices.

There is another facet of zoning that is closely related to the above effect. It takes place when there is limited space outside of the flood plain and within a city. People who would like to move away and into the suburbs may be restricted by suburban zoning. And because they are not residents of the suburbs, they cannot vote to change the zoning laws which exclude them. In controlling growth and its direction, the ordinances protect the way of life of some people while endangering that of others.

Another important effect of zoning is that it very frequently engenders community conflict, conflict between differing interest groups that want to impose their own versions of zoning. The net result is schism, delays, and an inability to agree on regulations. The case of Tulsa is illustrative of this process. (See p. 45.)

The foregoing provide several broad, general effects of zoning--new powers to the Federal Government at the local level, national legitimization of local policies, lack of voting rights in some places so that the excluded cannot express themselves at the ballot box, and community conflicts.

From another standpoint, zoning, by attempting to restrict flood plain usage to activities and structures that can best withstand damage, provides a medium for reducing the costs of damages in terms of lives and property. It enables land to be productively utilized; it protects one of America's most important resources.

Zoning does something else that has been pointed out: it serves to homogenize American society. FIA, the work of planners, and the interpretations of the courts tend to produce similarities from one community to another. This enhances the blending of communities in terms of values, goals, spatial arrangements, and land usages so that the thousands of communities within the confines of the U.S. become increasingly alike.

Since each community has different sets of problems, it is up to the policy makers to determine whether the risk of flooding is a greater danger to people than the practice of zoning which also has the potential for damaging people's lives. It becomes a question of equity.

Recommendations: Zoning

Since zoning is a local matter and there is such great variation from community to community, the major responsibilities for implementing flood plain regulations must be left to the local governments. My recommendations are:

1. An education program. The program would be a steady stream of information over several years' time addressed to local policy agents (primarily) and state officials explaining flood plain problems, local costs in terms of property and lives, and the need for controlled growth and development. The Corps, conceivably, could be the responsible agency.

2. The Federal Government. A monetary incentive to those communities that engage in comprehensive flood plain zoning to control flood plain occupancy and to change conditions that might cause future overflows and expansions of the flood plain.

3. Additional Federal funding to communities that provide a comprehensive program improving the housing conditions of the lower income population--particularly if in a flood plain--and reducing unemployment rates to a particular level.

4. A relationship between Federal funding and the level of protection that the local regulatory agency incorporates in its local flood control program. (The Federal Government might set up several levels of standards for flood control programs with differing amounts provided at each level.)

FOOTNOTES

[1]At the Floodproofing and Flood Plain Management Conference at Asilomar, California, in May, 1977, a discussion broke out as to the feasibility of the 50-year versus the 100-year flood as the criterion for the flood plain. It appeared to the writer that the discussion became uncomfortable for many of the participants and was terminated with several comments to the effect "we've been using the 100-year flood as the criterion so let's not talk about changing it at this point."

[2]Fourteen states have laws and program regulating coastal zones. Interestingly, the Coastal Zone Management Act of 1972 granted funds for zoning. This was the first Federal law which provided monies for it rather than for advising or planning (Linowes and Allensworth, 1975).

[3]An interesting discussion of the complex way in which many of these factors may be associated with decision-making is contained in M. Aiken and R. R. Alford, "Community Structures and Innovation: The Case of Urban Renewal," in J. Walton and D. E. Carns, Cities in Change: Studies on the Urban Condition, Allyn and Bacon, 1973, pp. 369-388.

[4]"28 McCarthy v. City of Manhattan Beach, 257 P. 2d 679 (1953), revd. 41 Cal. 2d 879, 264 P. 2d 932 (1953), cert den. 348 U.S. 817 (1954)." (See Linowes and Allensworth, 1976, p. 113.)

[5]The criteria were probably recommended by the Corps or other agencies.

[6]NEPA has emphasized the need to consider the recreational value of projects. Interestingly, cost benefit ratios include projections of user days and dollars. Writers of an EIS may show what percentage of the people using the facilities are resident as opposed to non-resident. However, they fail to take into account the total number of people whose taxes support the parkland and what percentage of them are likely to use the facility. For example, one report (see U.S. Army Corps of Engineers, 1977, pp. 2-60, 2-70 and 4-43) indicated that presently there are 1,100 people participating in day activities (e.g., hiking, picnicking and sightseeing) in the project area. Of these, 70% are county residents, 9% are other residents of the state and the remaining 21% are non-residents. The demand for day activities is anticipated to rise to 3,200 by the year 2000 without the project, but would increase to 33,800 if the project is implemented with full recreational facilities. Nowhere is the total population given to indicate how many people are not using the recreational facilities, so one cannot determine what percentage of the general community is benefiting from this aspect of the project.

CHAPTER IV: FLOODPROOFING

Introduction

A concept that has gained importance in the language of flood plain management is "floodproofing." Like the term "nonstructural measures," it only in part conveys the meaning intended. For though the word implies "impermeability to water," in reality what it refers to is water resistance or repellance of water. Nevertheless, it has been accepted as common currency in flood plain language; ergo, it will be used in this discussion. As it suggests, the concept refers to taking specified steps to keep flood waters from doing damage to a physical plant in whole or in part, thereby providing a degree of protection to building occupants and their possessions. The floodproofing steps can range from major structural alterations, e.g., elevation, to "common sense" measures such as placing damageable items on the second floor, above the flood level. These protective measures may be classified in terms of duration or locus of control. (See Figure 4.) The duration of some measures is permanent, e.g., elevating a building on "stilts" or on ground fill. Some may be emergency measures, e.g., moving furniture to a second story when there is a flood threat or taking actions on the spur of the moment. Others are contingency measures: they are preplanned measures that can be put into effect or taken when the threat of a flood is apparent, e.g., covering windows or doors with protective shields; turning off valves (Cheney, et al., 1974). In addition to classifying floodproofing measures in terms of duration, they may also be differentiated in terms of flood water control. "Wet-proofing" - an approach favored by Mr. John Carling[1] - would let nature take its course whereas occupants would have to be responsible for keeping damageable goods out of the flood's path; "flood-proofing" would attempt to keep the water out of a structure.

At the present time not too much is known about the effectiveness of floodproofing. White (1975) estimates that damages could be reduced about ten percent over a 20-year period. The Corps of Engineers has been conducting tests to assess damage reduction. However, since floodproofing is site-specific, many varied intervening factors have to be taken into account in terms of any given structure. Further, the literature not only attests to the impracticality of floodproofing, but to diverse perspectives as to where and when it is successful. A 1966 HUD report states that it is most protective of existing properties exposed to flood damage and impractical for new single family units and similarly constructed commercial buildings. A report on Lock Haven (U.S. Army Corps of Engineers 1974) contends that frame houses cannot be effectively floodproofed. A study of the Boulder flood plain analyzed data on a computer model and found that neither complete nor partial floodproofing was economically feasible for existing residential structures. However, commercial structures did benefit (B. Olson, et al., 1975). In one of the most recent studies, Dexter (1977, p. 152) states that "Floodproofing is an appropriate technology to apply in small urban watersheds

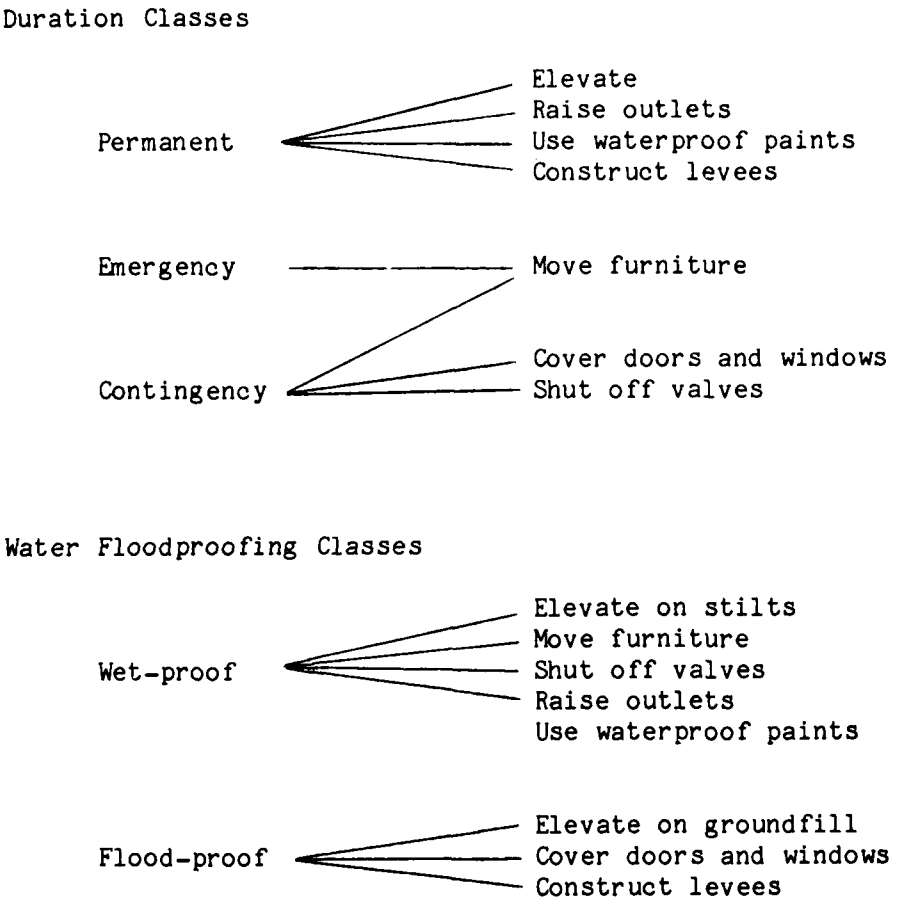

Figure 4: Examples of Floodproofing Measures and Classificatory Approaches

because real estate costs are high for structural measures, buildings are already constructed in the flood plain, adverse effects (channelization) spillover on more residents, and the severity of flooding is often less than experienced in larger river basins." A Sheaffer and Roland report for HUD (1977) found that floodproofing of new commercial structures could be economically justified on at least three grounds: "reduction in insurance premiums, reduction in flood damage potential, and reduction in business interruption costs."

At the aforementioned Asilomar Conference on Floodproofing and Flood Plain Management, a number of serious questions were raised regarding the techniques, effectiveness, costs, and legality of floodproofing. The following brief statements taken from my records are a sampling suggestive of the nature of the discussions that took place and the range of problems associated with floodproofing:

- Technical knowledge needed to relate flood characteristics and damages requires a great deal of work. This is attributable to variations in hydrologic and economic factors. The result is innumerable problems because of the site-specific nature of the measure.

- The willingness of a homeowner to floodproof his property is associated with his concern for his neighbors. His impressions of their attitudes may affect his actions.

- Since the government pays insurance and disaster assistance, there is the question as to whether it would be cheaper for the government to raise buildings instead. There is a lack of information on costs, benefits, and techniques used for floodproofing and the relationship of these to insurance rates.

- Two recurrent questions were: "Is inadequate floodproofing more damaging than none?" "Should the 100-year flood rather than the 50-year flood be used as the norm?"

- A variety of models were presented. For example, one dealt with the relationship of flood characteristics and cost assessment; another with the types of factors that must be considered, e.g., mitigating political, and social; and yet a third with quantitative decision analysis.

- There were reports on specific communities and their success or failure in implementing flood plain management programs, including the encouragement of floodproofing.

- Zoning laws may preclude floodproofing.

From the foregoing it is obvious that floodproofing is a technique of protection that provides no simple solution for reducing the costs of flood damages to the nation and to the individual. Its usage is

complicated by its site-specific nature and the questionable value of many of the permanent structural techniques recommended. It places the burden of responsibility for action and expenditures on the flood plain occupant who has to do something to protect himself and his property, particularly if he wants to participate in the flood insurance program. Yet it differs from the other programs of nonstructural protection in that it is not subsidized by any governmental organization to date. However, the Flood Insurance Act requires community regulation of new buildings; they must be floodproofed. Therefore, the communities are confronted with a challenge to add the floodproofing of individual new structures in the flood plain to their lists of community responsibilities!

Policy Agents and Floodproofing

The relationship of policy agents to floodproofing is most aptly described by the work "loose." That is because at this time there are no well-developed programs under the sponsorship of any of the levels of government.

Federal Policy Agents:

As one of the Flood Insurance Act's requirements for community participation in its regular program, floodproofing is mandatory for all new structures and substantially improved structures. The Corps' responsibility, along with that of contractors, is to do the mapping for the communities, thereby identifying which structures are above the flood level. Although HUD is the identified lead agency authorized to oversee the enactment of the Act's charges, it has had no direct involvement in the implementation of floodproofing requisites to date. The requirements are placed on the structure's owner. The lowest floor must be elevated above the flood level. Utilities and sanitary facilities that may be below the flood level must be in a watertight area, as impermeable to water as possible. A registered engineer or architect must approve the floodproofing and records must be maintained in a community office. Thus, the structure's owner is responsible for hiring the professional and protecting his interests. But he receives no subsidization for meeting the requirements. It is probably this lack of monetary involvement coupled with the local responsibility for approval of floodproofing that minimizes the Federal roles. At this point in time, it appears that neither the small number of communities in the regular program nor HUD have considered floodproofing worthy of vigorous promotion.

Local Policy Agents:

As mentioned above, the local officials are responsible for keeping the records and determining that the minimal standards have been met.

The local government is responsible for zoning which may restrict certain kinds of structures to the flood plain, automatically requiring that they meet the additional expenses connected with floodproofing. The slow entry of many communities into the regular FIA program suggests that floodproofing, like zoning, may be an area to which local officials are sensitive, one which they would prefer avoiding. Or, it may be that since there is no Federal pressure to floodproof nor particular local interest, it has low priority among their activities. It is up to the local community to stipulate standards and procedures for floodproofing implementation. Although several communities have under consideration proposals for financially assisting persons who undertake floodproofing, none are known to have actually passed them and provided funding. (One suggested alternative is for the local community to pay for the materials and let the home dweller do the work; another is to pay for labor and let the dweller buy the materials.) Despite best intentions, implementation of regulations is difficult. This was illustrated in Merwin Dougal's report at the Asilomar Conference on what happened despite available expertise at Iowa State University when plans were made to build a flood protected structure in the flood plain. (See p. 41.)

Carling, et al. (1976) discussed some of the basic problems in enforcing standards of floodproofing in Pennsylvania. Developers do not try to floodproof so as to keep all of the water out of the structure, and local officials do not try to force them to do so. The building inspectors lack the capability to examine structures to see whether the workmanship meets standards. Further, there is no guarantee that the proposed methods will actually protect the property. In addition to the technical knowledge that communities require to enforce floodproofing regulations, they need legal information and guidance concerning existing or future standards set by FIA.

Flood Plain Occupants and Floodproofing

Floodproofing is undertaken by individual firms or households on their own initiative. Outside agencies (state, local, or Federal) neither do the work nor supervise what is done. Thus, whether or not floodproofing is performed depends on:

a. The individual's perception of the threat of flooding;

b. The individual's values regarding property protection and maintenance;

c. The individual's scheme of priorities regarding flood protection including a belief that floodproofing is protection; and

d. The individual's perception of the economic value of floodproofing and his economic capabilities.

This series of subjective steps means exchanging the time, money and effort of floodproofing for psychological security, "feeling safer" for some people. For others, it means economic protection of an investment. For all, it means assessing the relative merits of investment in floodproofing in relationship to other expenditures.

Flood Plain Residents:

Flooding is an unreal phenomenon for persons who have not experienced it, particularly if they believe that the likelihood of its occurrence is once in a hundred years. Therefore, pressed by the crunch of daily living, they may not take seriously the threat that exists. (They may not even be aware that they are living in a flood plain and may be completely unfamiliar with the idea of floodproofing.) Individuals who

a. Do not own the property,

b. Consider the location a temporary one, or

c. View flood protection as low among their priorities

are not likely to do anything about floodproofing. And unless they are educated to consider keeping flood areas empty or only for storage of things that water will not damage or that are easily movable, they will not take the simplest precautionary measures to protect the building's contents - and themselves.

There is no way of knowing to what extent individual households take these precautionary measures of "safe" placement of objects and contingency planning. (Social psychologists are well aware of how "uncommon" "common-sense" is!) The literature on the subject (Cheney, et al., 1974; Kerns, 1976) focuses on the "structural" measures, e.g., elevation. Unless surveys are made, it is difficult to assess what householders do. Fortunately, we do have some information on household practices thanks to Dexter's (1977) comprehensive survey of floodproofing practices among flood plain occupants of selected watersheds in Atlanta and Charlotte. Sixty-six percent of the 92 respondents in Atlanta and 29 percent of the 65 respondents in Charlotte had employed some sort of floodproofing measure.[2]

In his study of the two population groups, Dexter found the following:

1. "Adopters of floodproofing experienced greater depths of flooding and greater economic loss...both in terms of dollar amounts and type of damage." (See p. 91.)

2. "Almost all floodproofers in Atlanta (90 percent) predicted future flooding would occur in their neighborhood. This was true for those not flooded as well. A few more floodproofers

were uncertain about future conditions in Charlotte." (See pp. 91-95.)

3. "The number of house floods, and to a lesser extent, the number of yard floods per year were strongly associated with the propensity to floodproof." (See p. 95.)

4. "Among those making floodproofing adjustments, the concerns are even clearer. Over 60 percent of those making structural modifications ranked damage and cleanup nuisance as their first concern. For those making internal adjustments, about 40 percent mentioned damage and nuisance first, but an increased amount (20 percent) mentioned loss of property value. Finally, those moving or rearranging contents indicated the primary concern was the nuisance aspect...The tentative implication of these results is to suggest that people concerned with damage and cleanup nuisance are more likely to adopt structural modifications. Adjustments such as walls, levees, house raising and flood shields offer a substantial reduction in the cost and effort incurred by flooding." (See pp. 103-105.)

5. "In both samples, people felt that individual action was appropriate. They cited the long lead time for government action or the feeling that individuals should share in the responsibility for resolving flood problems." (See p. 110.)

6. "Some people felt that it was inappropriate for them to take individual action because only a specialized person (engineer) could propose solutions. They felt inadequate in the role of an innovator because they believe solutions to flooding are traditionally developed by trained engineers and planners." (See p. 110.)

7. "An adopter was more likely to have used an adjustment similar to one he observed rather than a different one. Examples of neighbors discussing the attributes of their adjustments were seen in both samples. Structural modifications were the most easily observed adjustments." (See p. 116.)

In addition to the attitudinal factors involved in the determination to floodproof one's dwelling, there is the very real matter of costs. The cost may be prohibitive for people in older homes, ranging from 1 to 100 percent of the cost of an old structure. On the other hand, the cost may be but 5 percent of a new building (Flack, 1976). Among most people, homeowners in relatively moderate priced homes, the cost may be too much or not worthwhile. Whether and to what extent it is worthwhile may depend upon the nature of flooding in the area and the type of dwelling one has. Flack (in Kerns, 1976) cites two studies:

> In a sample of residences in Boulder Creek Flood Plain in Boulder, Colorado, only 33 percent of the residences exhibited positive net benefits from floodproofing (Olson et al., 1975). In a parallel study, the Corps of Engineers could identify only 24 homes out of 700 for which floodproofing was economically justified. (See p. 40.)

While the above focuses on the apparent lack of economic justification for floodproofing, Dexter (1977) examined the issue from the point of Federal versus private implementation. He believes that floodproofing as a public project would result in higher costs than the same project being undertaken by the private sector. He found in a survey of Atlanta that nonpublic financing of a house elevation averaged $10,000. A Corps of Engineers study in the same area had estimated their costs of elevating a house to be $22,600.

It is doubtful whether many homeowners would believe that they can afford even the lesser figure. Further, there is the serious question as to how much good the floodproofing would actually do since so much depends upon the specific combination of events at the time of flooding in the given locale. Besides, floodproofing may engender an unwarranted sense of security. The occupant may overestimate the amount of protection afforded by whatever measure(s) he has taken and stay in the structure during a flood, only to find that the water depth is higher than had been predicted and there are no longer passable roads for leaving the area. Or, he may only have done structural modifications to keep water out of the home and not taken any "common sense" measures e.g., moving things to a higher floor. If the modifications prove to be ineffective, he will than suffer greater damage than if he had only moved things out of the way and not depended on the more elaborate measure.

Nonresidential Structures:

Undoubtedly, the nonresidential occupant in a flood plain has as great a need to be aware and to subjectively evaluate the desirability of floodproofing as the residential occupant. Unfortunately, though, there are no known studies of the responses that these occupants make to floodproofing. The many businesses and factories located in flood plains because of historical factors or zoning ordinances are faced with a real problem. Since floodproofing is site-specific and has no guarantees, the amount to be expended on it involves a large element of risk. We can only suspect that the individual owner who is not able to afford to take any major steps probably does some small things to protect his investment. The more successful enterprise is likely to calculate at what point investment in floodproofing would be economically feasible.

We can hypothesize for future study that those who are aware of their flood plain location will:

Take "common sense measures" to protect their inventories and equipment if they believe that flooding is a likelihood;

Believe that their investment in floodproofing will secure their insurance coverage;

Floodproof if they need to do any construction work requiring permits;

And, like home dwellers, may have an unwarranted confidence in the level of protection that floodproofing provides.

Undoubtedly, business people will seek to follow the most economical courses - and meet minimal community requirements. In the case of new structures, architects, if alerted, may provide floodproofing that involves minimal, if any, additional costs. For example, the location of utility cells or their floodproofing might be done in the design stage so as to reduce potential damages without increasing the costs of the structure. Or, raising the entry to a building and providing a roadway made up of fill more than likely will meet a requirement for elevated accessibility. One of the problems is a lack of knowledge of actual costs. Architects and owners are likely to assume a high figure until they calculate what is involved and needed (Carling, 1978). Spatial logistics (the arrangement of contents to avoid flood damage) which may involve no cost require an awareness, thought and planning to make them feasible. Business people are likely to learn quickly how to protect their equipment and inventories if they have experienced a flood. (However, some may take the attitude that flooding will not happen to them, or that if it did, it will not happen again.) Of course, there are likely to be people who count on gaining more than they have lost by collecting insurance.

It is important to remember that floodproofing is an individual responsibility which depends on the economic sector's perception of structure location, hazard potential, and costs and benefits. One cannot help but wonder why so few occupants of nonresidential structures are policy holders in the flood plains.

The General Community and Floodproofing

Because of the limited knowledge about the responsiveness of the general community to floodproofing, this section is brief and speculative. I suspect that few if any of the general community are aware of floodproofing. If they are aware, they might respond with "it's a fine thing." (And of course, it probably would be for construction workers, architects, and others who gain employment.) An indirect effect felt by the general community might be that the cost of new development in the flood plain would go up to be passed on to the buyer; this in turn might raise the value of housing outside of the flood plain so that it too

would rise in cost. On the other hand, it might have a stabilizing effect by making more housing available to compete with the nonflood plain sales.

The real benefits to the community at large would arise if the floodproofing helped to protect homes so that they are minimally damaged in the case of flooding. In this way the trauma and expenses associated with major floods might be reduced. However, the effectiveness of floodproofing depends on the nature of the flood and the appropriateness of the measure as protection from the given type of flood.

Summation

Floodproofing is perhaps the oldest and the newest form of flood protection. Historically, many early settlers realized that they should raise their homes against flood waters in an agricultural setting. People use good "common sense" to place their possessions out of the reach of the water. (It is difficult to know how extensively "common sense" location of household furnishings is done.) Yet, it is a new approach in the sense that the Federal Government has incorporated it into the Flood Insurance Act. As a requirement for participation in the insurance program, new structures and older ones that are extensively remodeled must have the lowest floor above flood level and utilities have to be watertight. Since the majority of communities are enrolled only in the emergency program, floodproofing probably has been undertaken in a very limited way. Even where new communities are being built, it is questionable whether the ruling is being enforced. Much will depend on the local government's concern and the strength of its enforcement staffs.

The Corps has been working on and published information on floodproofing structures, but since each case tends to be different, the recommendations have to be adapted to the individual site, building and type of flooding situation that may occur. Further, there is little unanimity among policy agents as to what kinds of structures may benefit from floodproofing. (This may be partially attributed to the range of activities that are referred to as "floodproofing.")

It appears that local policy agents have done little to promote and implement floodproofing. Some places are considering forms of monetary assistance to persons who will floodproof their homes, but by and large neither local administrators nor engineers, planners, or architects have become involved to any extent. And this lack of involvement seemingly is reflected on the part of the citizenry in flood plains, according to Dexter's study.

Floodproofing, being dependent on the individual householder or developer must take into account subjective orientations. People have to perceive a need, believe it to be worth the expenditures, have the money

for it, and know how to go about it. Dexter, (1977), who has written most extensively on the subject, has pointed out that only a particular group of people are likely to floodproof. They are the ones who have heard about it by word of mouth, are able to do the work themselves or have friends to help them, have experienced losses and expect more, and want to protect their investments through their own actions.

Many people may find the cost prohibitive. But, in some instances, new structures can have floodproofing incorporated into their design at little additional cost. Floodproofing can have an indirect effect on the cost of housing in the community if the expenses of floodproofing the home are passed on to the buyer. However, whether floodproofing is done to new or older structures depends upon the acumen of the owner, his knowledge of the threat of floods in his area, and/or his willingness to bear the additional expense.

Recommendations: Floodproofing

Floodproofing, in its broadest sense, has probably been utilized since time immemorial. The problem is that it is not being implemented as widely as it could be. Two major recommendations are:

1. Education - There are four important groups that need to be informed: planners, architects, developers, and flood plain occupants. Although the literature (Dexter, 1977; White, 1975) stresses the responsibility of the individual home dweller, it is perhaps the first three who could have the greater impact.

I would recommend that planners and architects have, as part of their formal education, instruction in design of buildings for protection against flooding. (This could be incorporated in designing and planning for hazard protection.) For those who are already in the professions, national conferences and meetings should have sessions devoted to the subject. A short course could be offered to Corps planners as well as those in many other governmental agencies. These people would then be in a position to publicize what could be done and to make recommendations at the local level. As proponents of floodproofing, they would accomplish (a) legitimizing the technique, i.e., giving it the "stamp" of official approval as a worthwhile measure, and (b) reaching people who are developers, construction personnel and residents.

The developers, of course, could implement floodproofing in new structures at costs that might be far less than in existing structures. They could provide information to new home owners. (Of course, this may be considered unrealistic, since both realtors and developers have been known to be silent about or minimize potential hazards.)

People should be informed of ways in which they could protect themselves through "common sense" measures. Suggestions should be published as to how possessions may be permanently located to minimize damage and

as to what contingency and emergency plans might be formulated. In order to be most effective, specific instructions should be given about what to move where rather than relying totally on the occupants to come up with adequate plans just because they are convinced of the need for such measures. Occupants could learn about elevation and what Carling calls "flood-proofing" (in contrast to spatial logistics or "wetproofing") from hardware and building material stores that cater to home improvements undertaken by the home owner and from building permit offices. The aspect of property value improvement should be emphasized.

With a little creative imagination, many diverse sources for disseminating the "word" about floodproofing could be identified by community leaders and organizations interested in its promotion.

2. Financial Assistance - Two approaches have already been suggested (See p. 67.) One is to provide labor costs for floodproofing an individual's dwelling; the individual provides the materials. The other is the reverse: provide materials and the individual does the labor or pays for it himself. Other arrangements or variations of these may be developed to meet local needs and the requirements of the funding organizations.

FOOTNOTES

[1]Mr. Carling is Chief of the Disaster Project Division of the Pennsylvania Department of Community Affairs. He promoted this approach at the Flood Proofing and Flood Plain Management Conference, Asilomar, California, March, 1977. In communication with him on February 16, 1978, he reiterated his stance. One of his arguments is that there is insufficient knowledge of the durability and resistance of any given structure to flood waters of different velocities. For example, one cannot predict that keeping water out of a structure will not create a force that could topple the structure's walls.

[2]The survey samples were drawn from occupants of the 100-year flood plain. There were 1,118 homes in the flood plain in Atlanta and 687 in Charlotte. Of these, 617 and 195, respectively, had actually been flooded. Dexter determined that a sample size of 107 was needed for Atlanta and 82 for Charlotte. The questionnaire was administered by telephone survey and interviews were completed with 92 residents in Atlanta and 65 in Charlotte.

CHAPTER V: FLOOD WARNING SYSTEMS

Introduction

Warning systems are essential for all kinds of hazards and near hazards.[1] Of the various forms of nonstructural measures designed to reduce damages to people and property in a flood plain, only warning systems are fully dependent upon responses at the time of an anticipated disaster. They are intended to alert people to the need for temporarily relocating themselves.

Any discussion of flood warning systems must take into account (a) type of flooding, (b) type of locale, (c) equipment and (d) organization.

(a) Type of flooding: Some flooding is of the kind that can be anticipated over a period of time. For example, springtime floods due to snow melting may be predicted as much as several weeks in advance of inundating any given place. On the other hand, flash floods occur with such rapidity that there is little opportunity to anticipate them or to warn the population. However, sometimes the later can be anticipated if flood-producing precipitation, ice jam break-up, or the failure of a dam or levee are noted.

(b) Type of locale: Warning procedures in highly populated communities may be of a different nature than those in sparsely populated areas. The situation may be different, too, for those places that are mountainous and those that are flat lands.

(c) Equipment: Essentially two types of equipment are required for effective flood warning. One is weather information collecting equipment. By and large, this is the type of equipment that is available at a number of Federal and state facilities. The Corps, the Weather Service Forecast Offices and the Federal Aviation Administration Flight Service Stations gather data for weather forecasting. The second is the technology essential for disseminating the information about the weather conditions. Telephone, teletype, and computer networks are utilized extensively. Accessible roads are important.

(d) Organization: The National Oceanic and Atmospheric Administration (NOAA)* is the major coordinator of weather collecting and communicating services in the

* Specify the National Weather Service

> U.S. A great deal of cooperation between it and other Federal agencies has developed over the years. These in turn are closely integrated with the activities of states, counties, and some local communities. A formal chart would provide an impressive display of the comprehensive network that serves to forewarn the nation of weather conditions.[2]

Warning as a Communication Process

In viewing the social factors associated with flood warnings, the key concept is communication: who tells what to whom, when, where, and how - and with what effect. Naturally, the "why" is to protect people from potential damage due to flood waters. Three stages may be identified with regard to communication process (Susquehanna River Basin Commission, 1976). First, there is the need for preliminary notification. This is the period when the National Weather Service notifies Federal, state and local officials to be on the watch. At this point in time, only officials are made cognizant of the possible occurrence. Then there is the watch stage. This is when the public is notified of the potential threatening condition. Local people are alerted to keep watch and be prepared to take action. Finally, there is the warning stage. People must take action at that point because the flood is imminent or in process. In the pages that follow, the communication process involving policy agents, the target population, and the general community will be discussed.

The success or failure of a warning system depends to a very large extent upon knowledge of the on-coming disaster. If there is little time between awarene.. and the event, then it is questionable whether effective communication can take place. There may not be time to identify responsible persons to provide leadership. (See Dynes, 1974, p. 53.) Television, radio and newspapers may play an important part. Most radio and TV stations have auxillary power resources. As long as the power lines are in operation, and as long as people have radios and TVs they can be kept informed of what is taking place.

Policy Agents and Warning Systems

Whereas flood insurance is under the aegis of HUD and zoning is within the province of local zoning boards (variously named), warning systems cannot be identified with any one group of policy agents. The evidence suggests that there is a great deal of variation as to which policy agents are responsible for them. In some communities, the sheriff assumes the responsibility; in others, the civil defense organization, and in still others, it may be the local governing body or power companies. At the Federal level, several policy agents are involved - the Corps, NOAA, Civil Defense - but no one appears to be the "lead" organization with responsibility and authority for a nation-wide system. Figure 5 suggests the range of policy agents involved with warning systems and the kinds of activities which they provide.

POLICY AGENT	EXAMPLE	LOCUS	ACTIVIES	COMMUNICATION CHANNELS
National and State Organizations	NOAA Public Utilities Corps	External to Community	Weather Data Maintain and Repair Utilties	Technical
Local Organizations	Police & Fire Dept. Civil Defense Political Offices Mass Media	Local	Warn People; Respond to Calls Coordinate Activities Inform Residents	Technical & Personal
Individuals	Police Sheriff Civil Defense Workers Red Cross Personnel Salvation Army Personnel	Local	Inform & Assist Residents	Personal

Figure 5: Policy Agents Involved in Warning Flood Plain Occupants

How Policy Agents Learn About a Potential Hazard

There appear to be three sources of information. Climatological experts are a crucial source. Personnel at such major weather centers as NOAA have the latest equipment available in order to keep tabs on atmospheric conditions. Therefore, they are able to estimate the probability of precipitation with a high degree of accuracy. But, whenever matters of probability are involved, prediction is accurate within a certain range only. Further, the forecasts are for areas that do not necessarily coincide with population concentrations. So, between the matter of chance and the vagueness of parameters, human beings have to make subjective decisions. Conceivably, whether the weather station observer considers it worthwhile to issue a preliminary notice or not may depend upon any number of factors ranging from other time demands to irresponsibility. Hurricane Diane in 1955 is an example of an instance where a warning was issued, then subsequently it was prematurely decided that the danger had passed.

> Hurricane warnings were issued to the state of Connecticut on August 15, 1955. But two days later, the state Civil Defense Department stated that the storm was passing to the west, and there would be no danger. However, Hurricane Diane did cause heavy rains throughout the state, with 5.22 inches falling on the first day. The U.S. Weather Bureau Station at Windsor Locks recorded 9.41 inches by the second day. These rains caused damaging floods. Transportation and communications were hampered, roads and bridges were washed out, homes and stores were demolished, and cellars were filled with water. One hundred and seventeen people were reported dead or missing, and financial losses totaled one billion dollars. (See Dynes, 1974, p. 31.)

The officially designated agencies send out reports from weather stations by teletype or other means of rapid communication. Not all flood prone communities have the necessary equipment to receive the information. Sometimes the person who should be at the receiving end is not around; in many communities public officials are volunteers or part-time employees. Since the reports are in terms of probabilities and cover a general area, the recipient has to interpret them in the light of local conditions. Not only must he know how to interpret them, but he must also know what steps to take and proceed to act on this knowledge. The following excerpts from a report on the Virginia floods exemplify problems with warning systems (U.S. Department of Commerce, 1969):

> Many of the stations, particularly in the Tye and Rockfish River Basins, did not report. Subsequent surveys by Weather Bureau personnel revealed that most of the reports were missing because the

> equipment had been damaged or destroyed, telephone lines were out, or observers couldn't get to the gages. This survey also brought to light the fact that available reports did not describe adequately the rainfall in the area. (See p. 8.)
>
> At about this time, the (experienced 81 year old) cooperative observer at Kerrs Creek, Virginia, called Lynchburg an hour early because his rainfall was 6-8 inches, the river was high and rising rapidly, and things looked bad. He regretted not having called in during the night, but his wife wouldn't let him go out in the storm to the gages. (See p. 16.)

A second source of information is via telephone or personal contact with someone locally or in another community who notices signs of impending danger and alerts an official. Frequently these are people who know the area well and can detect signs of change in the weather conditions. Sometimes local residents call the police department and inform it of the possible dangers developing. Whether or not the local authority gives credence to these calls depends on the perceptions of the reliability of the sources.

Whereas the technology for forecasting may be excellent at national and regional headquarters, effective warning relies to a great extent on the presence of local observers. A study of their role in the Thompson Canyon flash flood of July 31-August 1, 1976 is indicative of the great dependence of communities upon them and what happens when there is a lack of communication (U.S. Department of Commerce, 1976):

> The last face-to-face contact that personnel at WSFO (Weather Service Forecast Office) Denver had with local officials in Larimer County occurred in April 1974. The April 1975 annual visit to recruit and train storm spotters for the upcoming severe thunderstorm season did not take place due to a severe travel fund restriction then in effect. A telephone call from WSFO Denver was made to the Larimer County Sheriff's office eliciting a map of county storm spotters. There was no contact with county officials in 1976. The reasons for this situation given by the Meteorologist-in-Charge at WSFO Denver was a lack of travel funds and a personnel shortage. The survey team found that there were fiscal year 1976 travel funds available which were not spent as of August 1, 1976, and that there were extra scheduled shifts available in WSFO Denver which could have been used for the purpose of travel in disaster preparedness and recruiting of cooperative observers.

> The survey team found that the cooperative observer and spotter networks in the disaster area had not received adequate attention over the past two years and that potential sources of rainfall and river conditions which had been in existence for long periods of time had not been contacted by WSFO Denver or other NWS personnel to obtain cooperative reports. (See p. 11.)

And, what happened was:

> During the next hour the lead forecaster was unsuccessful in his attempts to determine what rainfall amounts were in the storm area. He called the only rain gage observation points he knew or thought about. At one of these, on the Cache la Poudre River, the observer was not at home. He called Fort Collins police station and found that it wasn't raining there and that the Poudre River level was low. The radar continued to show the echoes with high tops over the Estes park area with the storms moving northward about 10 mph. Accordingly, the lead forecaster decided to issue a special statement. ...PERSONS NEAR THE THUNDERSHOWERS SHOULD BE ON THE ALERT FOR THE HEAVY THUNDERSHOWERS. THE RAIN COULD BE HEAVY UNTIL ABOUT MIDNIGHT.
>
> This statement is essentially a flash flood watch but is not so designated. Because he was uncertain as to what was happening on the ground, he issued this statement to keep some warning in effect until he could get reports from ground observers. (See pp. 33-34.)

However, a number of radio stations maintained a steady stream of information about weather conditions that were reported from various sources. A local TV station continued to report a sports event at the same time as having interruptions for weather reports.

And finally, an individual authority may recognize signs of changing conditions, interpret them as potentially hazardous, and proceed to warn the population.

After the tragic flooding that accompanied Hurricane Carla in 1969, a Virginia official explained the lack of organized community flash flood programs as follows:

1. Flash flooding beyond that associated with normal thunderstorms in the mountainous area is very rare and it is difficult to convince public officials of the need to finance such programs.

2. Because of job demands he, the official, does not have the necessary time to go around to the towns and convince them of the need for, and then plan and supervise, community flash flood programs.

3. A state-wide flash flood program has not received the priority for travel that is needed. (See U.S. Department of Commerce, 1969, p. 5.)

Responses of Policy Agents to Initial Information:

The following account illustrates how policy agents learned about impending flooding:

> The event has its beginnings in the high mountains to the south of Denver. At 1:45 p.m., the Douglas County Sheriff received reports of tornado damage about 40 miles south of Denver. Torrential rains followed the tornado and in a few hours time released three to five inches of water throughout the area. This water swiftly rolled down the mountains and emptied into streams and creeks that were already overflowing because of unusually heavy rains that had occurred during the previous three days. About an hour after receiving the tornado report, the Sheriff witnessed the destruction of a massive concrete bridge by a "wall of water" that carried large trees, house trailers, and similar debris. Realizing that this enormous body of water would greatly increase in size since additional streams would empty into it as it moved toward the plains, he radioed the Colorado State Patrol and advised them that a 30-foot wall of water was headed toward the Denver metropolitan area, which is bisected by the South Platte River. (See Drabek and Stephenson, 1971, p. 188.)

Although an authoritative agent may communicate the information to other policy agents, the latter may receive it with disbelief, as in the case of Denver officials upon hearing from the sheriff. Or, they may proceed to determine the appropriate actions to be taken. This may take place by informing the mass media and providing them with up-to-the minute information or by using public address systems in police cruisers throughout the hazardous area. Drabek and Stephenson (1971) report that some of the stations continue their regular programs with sporadic reportage and others devoted a good deal of their time to the potential flooding. Television stations were more likely to continue their usual schedules than radio stations.

In some communities, the officials whose responsibility it would be to communicate the information are not available. Thus, Drabek and

Stephenson (1971), found that a number of them were out of town, on vacation, or inaccessible for other reasons. In places that have only part-time officials, there may be no local police force or the part-time personnel may not be on duty at the time of the occurrence. The larger the community, the greater the likelihood that it will have a staff of people whose specialized task it is to handle emergencies. They are also more likely to have the necessary technology and the expertise to cope with crises. Correspondingly, communities that have repeated crises are in a position to recognize cues, interpret them properly, know what should be done and who should do it to alert the population.

The important role of the sheriffs in the various communities is described in the following excerpt in the report on Thompson Canyon flood:

> A Colorado State Patrolman was on duty at Estes Park on the evening of July 31. Around 7:30 p.m. the patrol's dispatcher asked him to check a traffic problem somewhere on U.S. Highway 34 below Estes Park. The dispatcher had reports of rocks and mud slides on the road. It was a routine call but law enforcement officers know that a traffic problem in the Big Thompson Canyon can be a major headache with the heavy weekend traffic. It was raining very lightly when the patrolman responded to the call. As he drove down the canyon the rain quickly became a blinding downpour. The "traffic problem" was about seven and one-half miles into the canyon - tree limbs, mud and rocks were piled onto the highway.
>
> At about 8:00 p.m. the patrolman broadcast what he'd found. Larimer County sheriff's deputies and another Colorado State Patrolman responded from Fort Collins and a third patrolman tried to reach Drake from Loveland where no rain was falling.
>
> The first real alarm came about 8:45 p.m. when the patrolman from Estes Park broadcast:
>
> > ...Advise them we have a flood. The whole mountainside is gone. We have people trapped on the other side. I'm going to have to move out. I'm up to my doors in water. Advise we can't get to them. I'm going to get out of here before I drown.
>
> He reached safety as did all other law enforcement officers who tried to spread the word, except for the Colorado State Patrolman from Loveland. He never reached Drake, his destination. His body was

found later several miles downstream. (See U.S. Department of Commerce, 1976, pp. 37-38.)

Community organization may play an important part in determining the expediency with which the warning system is activated. If there is an active Civil Defense unit, with trained personnel, and a pre-planned action program, then interpretations and responses to flood reports may be expeditiously handled. The same may be true in communities that have planned emergency measures with appropriate designation of authority. The following excerpt based on the work of William Stiles and reported by Dynes (1974, pp. 113-114) illustrates the successful coordination of community activities:

> In 1955, the two cities of Marysville and Yuba City, on either side of the Feather River, were threatened by rising waters. The state division of water resources and various levee commissions patrolled two hundred miles of river levees. Hydrologic data and information throughout northern and central California were collected by means of a radio steam gauge network, and constant telephone contacts were maintained with various agencies and personnel in the field. Two thousand troops from Beale Air Force Base were called by the Marysville Levee Commission to help. The workers tried to strengthen the levee with thousands of sandbags. Some bags used had been intended for the local rice crop, and some of the bags were gunny sacks from Beale. Trucks hauled fill material. In some spots, improvised construction supplemented the levee.
>
> As the threat continued, the local officials in Marysville ordered the evacuation of low-lying areas. Residents left quickly in cars, trucks, and buses, and many proceeded to Beale Air Force Base. Later, the Marysville City Council, advised by the Marysville Levee Commission, issued a warning of the impending danger to the city. After a break in a part of the levee, the decision was made to evacuate Marysville. Watersprouts or boils appeared at the base of the levees in spite of the efforts to seal them with sandbags.
>
> Yuba City officials ordered evacuation of lower sections of the city, and the Sutter County sheriff evacuated residents of the threatened outlying areas. When the flood threat diminished, city officials told residents they could return.

On the other hand, many communities do not have the technology to receive the messages, the personnel to interpret and disseminate them,

and the designated authorities to act; or, the community officials may define water problems as outside their ken, as matters to be handled by the local people themselves. Then again, they might not agree among themselves as to what the best solution would be (Dynes and Wenger, 1971). In these situations, the community may have to rely on the assumption of leadership on the part of individuals regardless of their everyday roles. Since the evidence shows that persons in emergency situations do not panic, it is highly possible that individuals step forward to warn the population.

The case of the Virginia floods illustrates how warnings are disseminated through a combination of formal and informal networks.

> The methods for distributing warnings of natural disasters in Virginia are typical of that in most states. The excellent police and Civil Defense networks will get the word to responsible officials in the cities and large towns. From this point onward, no reliable method exists for alerting people in smaller communities and rural areas, especially at night when radio stations are off the air and the people are asleep. Heroic efforts by police and volunteers saved countless lives in Virginia, but they were unable to reach a large number of people before the rising waters cut off roads and telephones.
>
> Where an organized community-action program for flash-flood warning had been established, there was some warning and necessary evacuations were successfully completed. A similar situation existed where the arrangements were informal, but a responsible official armed with information took action. Local arrangements such as these offer the only real hope for distributing flash-flood warnings. (See U.S. Department of Commerce, 1969, p. 25.)

Flood Plain Occupants and Warning Systems

Humans do no respond to stimuli automatically. Frequently they do not perceive stimuli which people right beside them may "hear." But, assuming that they do "hear" a given stimulus, each one hears it differently, in his own way: one may reject it completely, another may mull it over in his mind, another may reject it for a while and then start to think about it; yet another may let it flash through his mind and dart out of the house.

A popular myth is that people in hazardous situations respond by panicking. The literature stresses the fact that this generally does not occur. On those occasions that it does take place, it tends to be

during the period of threat, particularly when there is a lack of information (Mileti, Drabek and Haas, 1975).

Drabek and Stephenson (1971) conducted a study of the 1965 flooding of Denver, Colorado. They analyzed the social context in which people heard about impending flooding, from whom they heard, how they interpreted the message, and what they then did. The following discussion is largely based on their findings. However, related information dealing with the communication process in other flood situations is incorporated where appropriate.

Social Context: The setting in which the person is at the time that he hears of a potential flood hazard affects his receipt of the message. A mother and small children may become anxious as her children ask questions as to what it all means or as she tries to figure out whether to wait for the rest of her family to return or to leave the house. Or, the possibility of flooding occurring may be so remote from a person's thinking that he may reject the idea and treat it as if it is part of the program being presented by the media. The "it can't happen to me" syndrome may come into play for the lone individual. It appears that people alone tend to respond to the source of the message with greater skepticism than those in the presence of other family members. The lone individual is also more likely to be anxious.

Perception of Messages: What people heard depended to a large degree on whom they heard it from. If a person in a position of authority - a public official - told them that there was danger impending, they were inclined to listen and to hear the message as "evacuate now." Messages received from other persons - members of the family, relatives, friends - were listened to with an element of skepticism. They were viewed as descriptions of what was taking place or as warnings. Individuals would seek verification of what their personal acquaintances told them. Interestingly, announcements people heard through the media were greeted with much greater disbelief than messages from family and friends.[3] People would turn from channel to channel seeking confirmation of the reports. The cumulative reaffirmation of the crisis led them to accept the reality of the flood.

The experience people have had with evacuation may help them to be alert to future possibilities of being warned. However, the probability is greater if officials provide advice on how to improve on procedures. (See Mileti, Drabek and Haas, 1975, p. 18-20.) And while prior experience with warning systems may help some people on future occasions, others may develop a false sense of security and a lessened sense of urgency.

> ...in Rapid City, South Dakota, where the flood of recent memory prior to 1972 had been a "moderate" one, after the impact of the devastating "big one" on the night of June 9, 1972, the response within the community was slow and faltering. Many persons

> apparently couldn't conceive of the magnitude of the event because their prior flood experience gave them a less than adequate view of what a "flood" could produce. (See Mileti, Drabek and Haas, p. 20.)

What the People Did: The people did evacuate in response to the warnings in Denver, 1965. Those who left early expressed regret that they had gone too quickly without taking care of their possessions. Some of them returned - or tried to return to their homes, but were prevented by roadblocks.

People used the telephones a great deal. They called relatives and friends and went to the homes of people whom they knew. A very small percentage had to rely on strangers to evacuate them and provide housing.

People in this situation, as in other hazardous situations, tried to minimize it by defining their evacuation in various ways:

> ...the processes characterizing their evacuation behavior were not uniform (Drabek, 1969). Although many families did evacuate their homes after making a rather clear decision to do so, others followed very different routes. For example, with many it was primarily a matter of having an invitation to join relatives for the evening and to discount their fears that precipitated some families to evacuate, rather than a belief that they were actually in danger. Some families reached a compromise and left simply to quiet the fears of one or two family members who were "overly shook" about the warnings. Others left their homes to confirm the warning and then found that they were unable to return home since police had established roadblocks in an effort to keep spectators out of the area. They found themselves evacuated by default since the behavior that resulted in their evacuation was actually designed for different objectives.
>
> Four evacuation processes emerged from this analysis: (1) evacuation by default, (2) evacuation by invitation, (3) evacuation by compromise, and (4) evacuation by decision. (See Drabek, 1969, pp. 345-346.) (See Drabek and Stephenson, 1971, p. 195).

Thus, the warning system used in connection with the Denver flood proved to effectively reach the public and protect it from the onslaught of the flood waters. The disbelief of people to warning reports is dramatically evidenced in the following occurence at Thompson Canyon:

The patrolman from Fort Collins reached Drake and began to warn campers and residents:

> They looked at me like I was crazy, most of them, he said. I had to turn on my lights and siren and turn back six or seven cars just about three-fourths of a mile above Drake.
>
> Then I came back to the town and turned on my loud speaker and told people to evacuate. The next thing I knew, the water was up over the road. Campers were being washed away and big propane tanks were coming downstream, spinning like crazy, starting to explode. I don't think any of us fully understood the magnitude of this until it was on top of us.

Sheriff's deputies were doing the same. Some without bullhorns were going door to door.

While many residents heeded the law enforcement officers' warnings and fled to higher ground or tried to drive out of the Canyon, others stared in disbelief and did nothing. Still others were openly defiant.

It was difficult for most people, particularly residents, to realize that they weren't safe where they were. After all they had lived in the Canyon "all their lives and had taken everything nature had given."

One such resident at Glen Comfort told the survey team that he had never been able to understand how people faced with imminent danger and warned that flood waters or hurricane surge were about to hit would disregard the advice. "And yet when they came to the door warning us to get out, I said 'Why? We've had hard rain before and we got through it.'" He added, "We just don't get those kind of storms and we felt that we had no reason to leave our home." He wasn't surprised, either, that many people made a fatal error of attempting to escape by automobile rather than abandon their cars for immediate high ground. "We've travelled these roads in heavy rains with water on them before without mishap." And he repeated, "We just didn't get those kinds of storms here. You can just bet I won't be that foolish the next time."

> The Larimer County Sheriff said, "We had trouble convincing them (the people in the Canyon) that the river was even coming up. The problem is that there wasn't time to convince the people, to get the urgency across to them."
>
> A Larimer County Commissioner said most of the victims "have never seen a mountain flash flood" and therefore, doubted its potential impact.
>
> Dr. Michael Weissberg, Director of the University of Colorado Medical Center's emergency psychiatry section explained it best. "Denial of danger is one way of dealing with danger," he said. "It is something we all do to some extent." (See U.S. Department of Commerce, 1976, pp. 38-39.)

By way of contrast, the flood warning system used during the August 19-22, 1969, floods in the James River Basin of Virginia did not work as effectively on the target population (U.S. Department of Commerce, 1969). More than 100 people perished. If and when people were warned, it was by the local police and local people. Since the major crises occurred during the middle of the night, there is some question as to whether local people would have responded to a better warning system. Interviews with the County Executive, the Director of Civil Defense, the Virginia State Police superintendent, and the Richmond Port Captain were negative. The rurality of the area, the time of night in which the warning would have been issued, and the incredulity with which people would define the message at that hour were given as reasons for the inadequacy of a warning system. Although the comments of the above people may appear to be self-serving, evidence from other sources suggests the same. Warning systems in outlying rural areas in response to flash flooding tend to be inadequate.

In a survey of 2,055 home owners living in flood-prone areas in 13 states, Kunreuther et al., (1977, p. 8) found that 141 respondents had suffered flood losses and had heard warnings. Most of these did something to protect their property, resulting in less damage. However, this group represents less than one-third of the home owners who had experienced flooding.

That the target population in certain circumstances may be highly responsive to warning is indicated by the fact that an estimated million people evacuated the Texas coastal area prior to Hurricane Carla. Dynes (1974, p. 114) attributes their responsiveness to a long warning period and the fact that the same area had been hit once before. Community organizations had taken protective preparedness actions since that time.

Warning Systems and the General Community

The responses of communities to the maintenance of warning system technology and personnel is likely to vary a great deal depending on the nature of a given community's experiences with flooding. Since, as indicated previously, most people in a community that rarely experiences flooding are not aware of the flood problem - let alone any of the non-structural measures - they are likely to be indifferent to the whole subject. It is only if the community leadership publicly draws attention to the problems or if there has been a crisis due to a potential or actual flood that the general population will become aware of the adequacies of the warning system. After the crisis their interest wanes.

As a matter of fact, they may be less interested in this approach than in the others because the target population assumes less responsibility for the system than they do for floodproofing, relocation, or flood insurance. Use of the limited tax resources of a city for protective devices and personnel when a big flood may not take place for years appears to be a waste of money. After all, the reasoning goes, life always involves an element of risk...

Areas which experience frequen' flooding may be more aware of the value of a good warning system. However, flood problems have low priority among persons who do not feel threatened. Since flooding is often restricted to particular times of the year, they may want to use the city's funds for services to protect them from threats all year round. I would hypothesize that people are more willing to use tax money for police and fire services than for a warning system even though the damage attributable to the crime and fire are less than average annual damages from flooding. The explanation lies in the fact that (a) people can identify with criminals and victims on an individual basis;[4] (b) there may be a subtle recognition of the fact that floods affect a number of people simultaneously, ergo, the individual does not have to fend for himself, he has the support of the group in coping with the flood; (c) floods are an act of nature whereas crimes are acts of "bad people"; and (d) the media keep crime in the forefront of people's thinking all year round.

Where the local influentials or affluent are exposed to flood dangers warning systems are more likely to receive financial support. From the experiences reported in the literature, many communities have the technical equipment for the warning system. (Governments generally are willing to put money into hardware much more readily than into the personnel needed to maintain or operate the facilities at the highest level possible.) However, there are real problems with maintaining it when its usage is limited. And there are important cost/benefit considerations with regard to paying for training people who may not be called upon to use their skills. The problems undoubtedly have a bearing on the confusion that sometimes occurs when a crisis does arise and the people from the general community are needed to help. (In these instances confusion as to whom is in a position of authority and responsibility results.)

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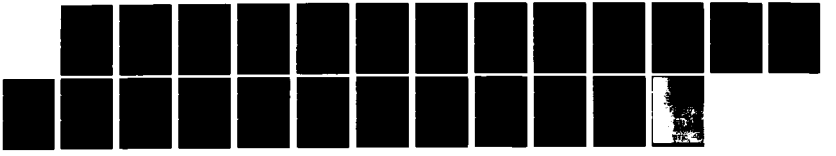

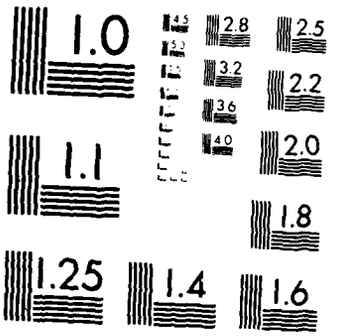

The climate that prevails among people in the community at large, then tends to be little different when it comes to warning systems than toward other controls. They possibly may be more willing to support the purchase of equipment than its maintenance and personnel. For such an action visibly shows their responsiveness to a local need and symbolizes their interest in community well-being.

Summation

Flood warnings are crucial regardless of what other measures may be taken as long as there are people and property in a flood plain. They alert people to take emergency measures to protect their property and/or themselves. They have proven to be highly effective under a variety of conditions. Figure 6 indicates some of the factors that impinge upon the operation of warning systems. Several necessary conditions for their efficacy and problems associated with them are discussed below.

1. Weather detecting and transmission technology is essential. As might be expected, the larger governmental units, e.g., the Federal Government and state offices, tend to be in a position to invest in equipment for detecting conditions and for transmitting the information. Further, they are able to replace it and to keep up with the best that is available given the present state of knowledge. The significance of knowledge of weather conditions for commercial (e.g., agriculture and airlines) as well as hazard factors gives impetus to budgetary support of research and implementation.

In addition to people involved in research and making decisions, interpretation of data and discretion in deciding what to do with the information - whether to send out alerts or not - are required. Accounts of what has happened in disaster situations indicate a high level of performance by the professionalized organizations.

2. It is important that local communities have well-maintained equipment and personnel to receive, interpret, and relay the appropriate message to the flood plain policy agents and residents. However, "90 percent of all towns and municipalities in the U.S. have no natural disaster preparedness plans." (See Natural Hazards Observer, December, 1977, p. 7.) Several factors inhibit these actions:

a. Cost considerations prevent local communities from investing in equipment and maintaining it. They also make it impracticable to have inspectors to check their levels of performance.

b. Frequently, local weather observations are made by part-time employees or volunteers. They may not be available at the time of warning nor qualified to interpret messages and make the appropriate decisions.

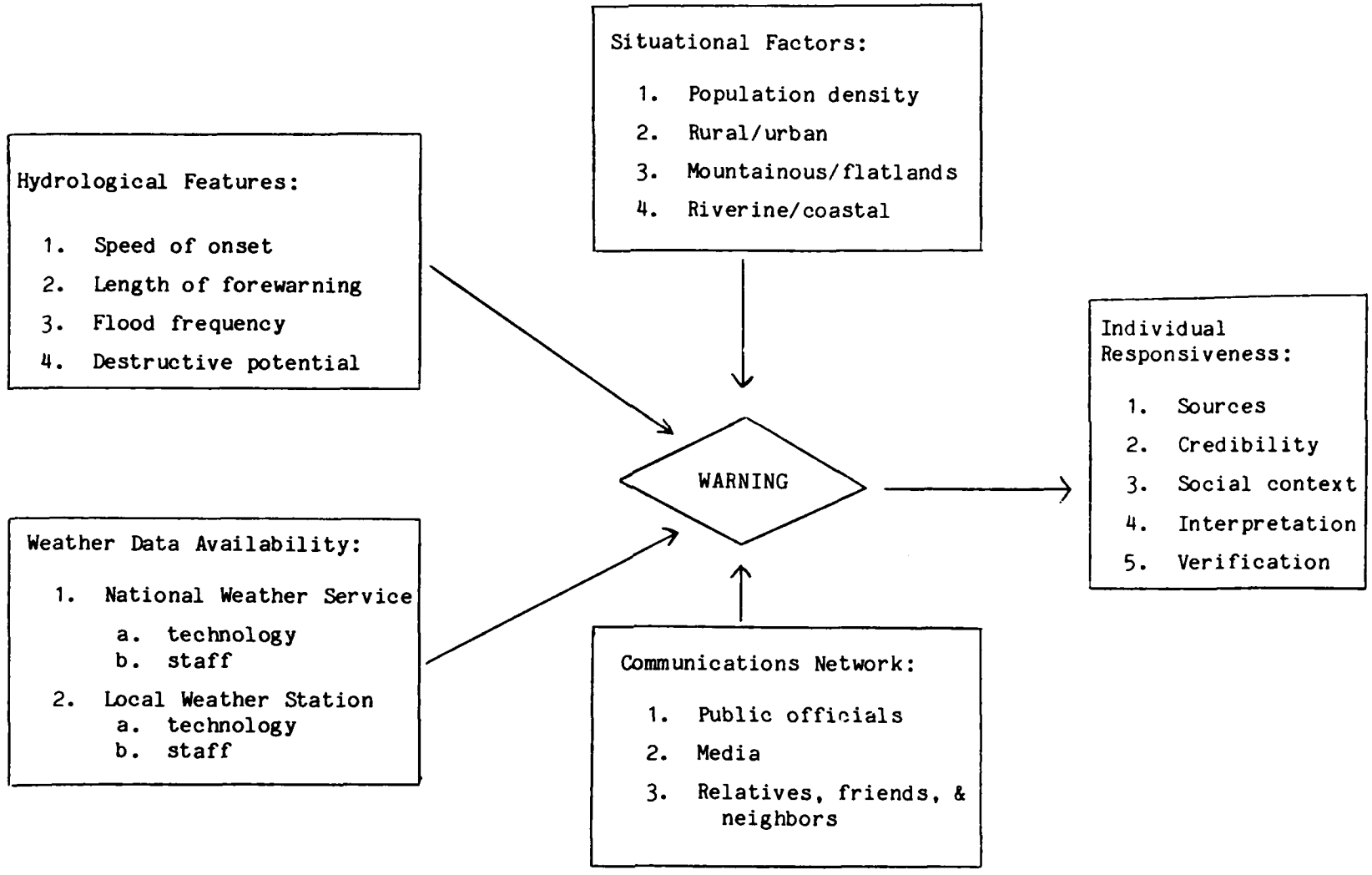

Figure 6: Major Variables Affecting Warning System Effectiveness

c. Policy agents tend to be oriented to the here-and-now, to responding to current crises. Water problems generally do not have high priority unless there has been a recent flood or there is the likelihood of gaining something politically. Therefore, the investment in equipment or personnel has low priority.

d. Outlying communities, whether in terms of geographic accessibility or in the fringe of a weather zone, may be difficult to reach or may experience different atmospheric conditions. In either case, the transmission of information may be impeded.

3. Local personnel are needed who can communicate in a manner or language that the residents can understand (Mileti, 1975). The communicator must deliver a clear message so that the audience knows whether an emergency watch or evacuation is necessary. Explicit instructions should be given if possible. Yet, at the same time, the communicator has to be careful not to stimulate anxieties. A good deal of discretion is required in order to know what should be recommended and to whom the recommendations should be made. The problems are complicated if the residents speak foreign languages.

4. The assignation of authority and responsibility prior to the occurrence of a crisis is essential. Studies of crises indicate that confusion of role assignments contributes to faulty communication of messages and reduces efficiency in meeting problems. Where specialists have been identified previously and know what to do the warning will be transmitted effectively. But when the lines of authority have not been defined, confusion may result from people waiting for someone else to provide leadership. Dilemmas attributable to interagency conflicts, the role of volunteers vis-a-vis paid professionals, and the like arise. Preparation and training for crisis responses reduces the possibility of these situations delaying appropriate actions.

5. The recipients of warnings need to be prepared to recognize warnings, interpret them, and act accordingly.[5] Unfortunately, many people in a flood plain delay making appropriate responses to the hazard. They do not hear the reports or they deny their pertinency to themselves, or they do not know what to do. (There are, of course, people who do not receive the warning.)

The foregoing conditions could, despite the obstacles suggested, enable warning systems to be among the most effective nonstructural measures to assist people in flood plains. In certain types of flood hazardous situations, lives and property could be saved with relatively limited expenditures.

Recommendations: Flood Warning Systems

1. A government agency should be empowered to fund and/or inspect warning systems in all flood-prone communities. Conceivably, the work could be channelized through existing Corps or Civil Defense units.

2. County "hazard agents" comparable to agricultural extension service agents could be designated to oversee the organization of local communities for crises, to promote hazard response education in the schools,[6] and to stimulate an awareness of what local influentials may do to facilitate preparedness. The agent could serve as a coordinator of services available in the community so that when a crisis occurs, persons would know the channels of authority and their responsibilities. After the crisis, they could help the community to recoup its strength. (If the community has a civil defense worker, his tasks may be of the nature suggested here.)

This account would not be complete without indication of the recognition of important confounding factors. One is that in many locales, flooding is so rare that the designation of money and personnel for that which is remotely possible is likely to be deemed "wasteful" by large numbers of the population.

Perhaps even more important than this is the fact that overemphasis on potential hazards and assignment of money and people to them may arouse an undue amount of anxiety on the part of the people. It may create unnecessary fear. (Conversely, of course, the awareness that everyone shares the same problem might give people a sense of common identity and foster community cohesion around efforts to do something to help themselves.)

There is yet another danger with warning systems. It is the danger of calling "wolf" too often. People in a community become upset and angered if they have been made anxious about the possibility of flooding and nothing happens. Rather than being greatly relieved, many are prone to feel that they were taken advantage of, that they did a lot of unnecessary work to protect themselves and their property. And, most importantly, next time they are not going to do anything until they are certain that something has to be done! Those in charge of the warning system become the butt of abuse.

Perhaps the anger of citizens who feel they were mislead is a small price to pay for the lives that were protected if something major had really happened. But unfortunately, it feeds into one of the problems that has arisen when there are excellent technical facilities, designated leaders, specialists with know-how. People become reliant upon them and assume a perfection void of unanticipated breakdowns in equipment or personnel. The result may increase the havoc caused by flooding.

FOOTNOTES

[1]The discussion of warning systems relies heavily on Dynes (1974), and Mileti, Drabek and Haas (1975). Their findings from studies of all types of hazards have been reinterpreted in relationship to flood hazards.

[2]An example of this is referred to in "Flood Forecast and Warning Systems Evaluation, Susquehanna River Basin, New York, Pennsylvania and Maryland, Susquehanna River Basin Flood Control Review Study," Susquehanna River Basin Commission, Mechanicsburg, Pennsylvania, (revised), December 16, 1976.

[3]The Billings, Montana Police Department has recently installed the capability to send emergency messages over the local MUZAK system to the 170 local subscribers, e.g., supermarkets, shopping centers and office buildings (Natural Hazards Observer, December, 1977, p. 5). The evidence shows that media messages are received with skepticism. Unless the population is alerted that this system exists, it is questionable whether they will accept warnings over MUZAK as authoritative or as mistakes in programming.

[4]Since criminal behavior is generally assumed to be aggressive behavior directed at an outsider and since every individual has within himself aggressive tendencies, individuals are in a way seeking to protect themselves from their own actions. Therefore, they see in the police people who are keeping them from committing the acts that they know are capable of committing. Flooding is beyond their individual behavior.

[5]Dexter's study (1977) of Charlotte and Atlanta indicates that the people did not perceive a need for a longer warning period. Many felt that warnings were of no value in helping them protect their possessions, some mentioned the lack of accuracy in the area forecasts. It would appear that preparedness training and increasing the precision of forecasts would be more valuable here than providing earlier warnings.

[6]Mr. George Antle of IWR suggests that "flood drills" be introduced that are akin to fire drills in areas that are likely to be flooded. As Dynes (1974) and others have pointed out, communities that have had experience with evacuation are able to respond to warnings more efficiently.

CHAPTER VI: SUMMARY AND RECOMMENDATIONS

The objective of this report has been to provide an overview of nonstructural flood plain management procedures in order to assess their effects on American society. Since flood prone areas range from those that rarely experience flooding (and then only in a limited portion of the community) to ones that have frequent, recurrent, widespread, and highly damaging flooding, it would have been recklessly audacious to be more than suggestive of the range of impacts that any of the flood plain management procedures educe. In keeping with the interactionist orientation of the sociologist, it was pointed out that all parties in the programs are affected and in turn "cause" effects. To understand the interactive process of causes and effects, we must remember the raison d'etre for the so-called nonstructural measures. It has been that the costs of flooding in terms of property and human losses have steadily increased despite the innumerable structural attempts to control the direction and courses of the rampant waters with dams and reservoirs and the like. Rather than controlling the waters, the current programs are designed--or better, intended--to control the behavior of human beings so that they will get out of the way of the flood waters. Since large numbers of people are affected by flooding and since the work of those affected in turn affects other people in our interdependent society, what otherwise might be considered a personal woe is, in reality, a public problem. That is why I have referred to the effects on American society and not on a small segment of the population.

Several caveats are in order. First, there is tremendous variation in the frequency, duration, intensity and other basically hydrological characteristics of flooding. Further, these occur at different times in different locations. Sometimes, once in a decade; other times virtually week after week for a month or more. Also the precipitating factor may vary. It may be a very heavy rainfall, a hurricane, or ground water subsidence. Second, social factors may significantly contribute to the situation. Thus, extensive upstream community development or slag accumulation as in coal mining areas may affect the flow.

Whereas the foregoing caveats have to do with water flow, the remaining are of a different order. One has to do with the lack of empirical analysis of programs. Very few studies have been undertaken. The handful that have been done tend to be of a few scattered situations. The three major comprehensive studies (Mack, 1976; Sheaffer, unpublished ms.; and Kunreuther et al., 1977), are primarily economic and of only one program, the flood insurance program. There is a lack of evaluative research or demonstration projects in terms of social impacts of the programs.

Another caveat is that generalization about the programs is dangerous since the communities and persons to which they apply vary from place to place and year to year. Therefore, all of the analysis must be interpreted in light of the fact that the governance of cities varies greatly, the populations in the flood plain are very different. In some

places virtually everyone in a city is included; in others, a tiny percentage of the total population and the ways of life even within the same flood plain population may be significantly different. And a final caveat is that what is reported in these pages reflects the judgment and interpretation of the writer who relied on the perceptions of other scholars. In order to provide a truer picture of the impacts, one would have to find out what the various programs personally mean to the people who are referred to in these pages as the policy agents, flood plain occupants, and the general community. In other words, what is needed is a series of empirical studies.

In keeping with the format introduced in this report, each of the programs will be discussed in terms of the three sets of actors--policy agents, flood plain occupants, and the general community. The chapter will then proceed to a summation of overall effects of the programs, conclusions and recommendations.

The Insurance Program: The Flood Insurance Act of 1968 initiated the flood insurance program and gave HUD the authority for program operation. The intent of the Act is to tie flood plain regulation to planning which will prevent the expansion of the flood plain through areal development and discourage noncompatible usages of the flood plain. The linkage of insurance availability and a comprehensive community zoning program is the source of various problems.

First, let us look at what the insurance program has meant to policy agents. HUD has experienced an enlargement of its scope of authority, become the "lead" agency in the area of nonstructural flood measures, and a co-equal guardian of the country's flood plain populations. The co-sharing of responsibilities associated with flood control work has, of course, meant a change in the position of the Corps. While still the major organization with regard to structural controls, in the area of flood insurance its role is essentially one of providing services, i.e., mapping the flood plains for HUD.

Two nongovernmental groups are involved in the program at this level--the insurance industry and research and development firms. Originally, the policies were sold by individual agents, turned over to their companies and then processed through the National Flood Insurance Aasociation. This group has been replaced within the last year by the Electronic Data Service (EDS) which receives the policy directly from the agent. It remains to be seen whether the relationship of HUD and EDS will improve the promotion and operation of the insurance program. Various aspects of the flood insurance program are being studied by research and development companies and individuals with funding from HUD. Their findings will impact on future developments and modifications in the program.

Local community leaders are not directly involved in the insurance program except through the requirement for comprehensive community zoning to enable the flood plain inhabitants to take out insurance. The

community decision of whether to participate in the program is dependent on several factors involving the local policy agents. Among them are: a feeling that flood plain management is actually within their sphere of responsibility; prior experience with zoning; and a willingness to cope with community conflict in an effort to bring about a general consensus.

Once a community joins the National Flood Insurance Program, do the flood plain occupants become policy holders? Apparently relatively few do. There are many contributing reasons for this reluctance to purchase the insurance. There is a general ignorance of whether one lives in a flood plain, a common belief that "it will not happen to me," and a low priority of flood probability in the daily scheme of values and expenses. Many people do not feel the insurance is worthwhile and some, after participating for a while, become dissatisfied and withdraw. There is little information on business purchases of policies, but it appears that most find it uneconomical since very few are policy holders.

People in the community at large tend to have less information about flood insurance than those in the flood plain. Some are reported as considering it a "good" thing for people in the flood plain. But they, themselves, are indifferent unless flooding is a serious problem in their community or they are directly affected by some aspect of the flood plain regulations.

One of the aims of flood insurance is to relieve the general population of taxpayers from the costs of assisting people whose places are flooded. Since we do not know where, i.e., in what communities people are covered by flood insurance and the amount of damage those communities have experienced, we cannot say whether the amount that governments have had to put out in disaster assistance has been greatly reduced with the insurance. From a sociological standpoint, once such figures are procured, it would be interesting to see what they show and how they are interpreted.

In brief, although the flood insurance program is more than five years old, it is still in its infancy because of the general ignorance of people about it and the relatively small number of policy holders. At this point, it provides a particularly advantageous program for people whose homes are of greater value. It is probably the middle class that takes advantage of it and that gains the most from it.

Zoning: Whereas taking out a flood insurance policy is an action that is dependent upon the individual flood plain occupant, the matter of zoning is dependent upon the local commission (or its equivalent). Because of the wide variation in state regulations and authority regarding zoning, one would expect the local regulations to vary widely. However, a degree of uniformity is bestowed due to three factors. First, the flood insurance program sets minimum standards which must be met. These are in part attributable to the precedents set by the Corps (which originally had major responsibility for flood plain mapping). Next,

people who have degrees in planning graduated from schools where they are likely to have acquired similar orientations to the profession and to interest groups which are viewed as potential employers. And finally, court decisions generally uphold and enforce the middle-class orientation of zoning.

There are a number of groups involved with zoning at the local level. The community officials may have a vested interest in the regulations and their enforcement by virtue of being flood plain property owners. The various implementers wield a certain amount of power by being in a position to knowingly abide by, re-interpret, avoid or evade the regulations. Industries may exert their influence by threatening to move out of the community, thereby taking away much needed jobs. The developers will favor growth and zoning when viewed to be to their advantage.

Zoning has always been a controversial area in the political arena. The cumulative evidence is that it is an activity desired by the middle class people to protect their interests. Unless the flood plain occupants are organized to present their perspectives (which may be the case if they are middle class), they are unlikely to have much to say--nor given the opportunity to say it and be taken seriously. It seems plausible that communities are not pushing for participation in the regular flood insurance program because of the difficulties in coming to some agreement with regard to flood plain regulation. In the interim, if the community is a participant in the emergency program, development may proceed or be postponed with the hope on the part of proponents and opponents that legislative changes will satisfy them. If it is not in the program, the conflict continues at the local level.

The people in the flood plain are affected differently, depending upon their socio-economic status. The affluent are more likely to favor zoning because they are able to influence the regulations to meet their wishes. They are better able to afford to protect themselves through relocation, floodproofing, or the purchase of flood insurance. They may actually feel they benefit because their neighborhoods are being protected from "undesirables." Some may feel that undue power has been exercised or worry that it will be harder to sell their homes. Affluent renters may be indifferent unless there is a concern that one's individual unit may actually be flooded.

For the working class, probably the largest percentage of flood plain occupants, zoning may be a real hardship. For this group, property improvement may be difficult, if not impossible. It is hard to locate new housing without increased expenses. And building codes may be more strictly enforced among them than among the affluent, making homeownership a burden.

Among some of the poor living in flood plains, zoning may make little difference for flooding is probably one of many problems and movement from dwelling to dwelling may be a frequent occurrence. For them

and others, it may become traumatic if they are forced to vacate buildings because of building code enforcement throughout an area where the low income apartment dwellings are located. Unless the community can provide safe, sanitary and decent housing for the people affected by zoning, building codes and flood plain regulations are likely to work a real hardship on them.

As pointed out in the text, most people in a community are unaware of zoning and its significance unless their neighborhood experiences a change which they may welcome or oppose through zoning. They are likely to favor land usage which will enlarge the tax base, reduce their own taxes, increase employment, or improve housing. (They favor these particularly if they perceive them to be favorable to their personal interests.) They also are likely to approve of regulations which will move "undesirable" dwellings and businesses from proximity to their own places.

Zoning comes to the forefront in many communities because of the community conflict which it engenders. Frequently expressed in terms of growth versus no growth, or in some other euphemistic form which hides struggles over the usage of a valuable resource, people align themselves with one faction or another depending on their interest at the time. Flood plain regulations become the basis for arguments reflecting latent dissatisfactions or community conflicts stemming from other issues. Some sociologists consider community conflict a desideratum because it stimulates identity with the community and the open discussion of important problems; others view it as disruptive. One way or another, zoning issues are very conductive of factionalism.

The foregoing potential effects of zoning as a way of regulating human behavior in flood plains are essentially the same whether considered apart from the National Flood Insurance Act or in conjunction with it. There are a few important consequences of zoning in connection with the flood insurance program that were suggested in the text and that are worthy of discussion here in a summary fashion.

(One revolves around the requirement of HUD for the community to engage in comprehensive zoning prior to the availability of insurance to residents.) Related to this is the fact that HUD approval of zoning legitimatizes what the local officials have decided. (This is similar to what occurred after World War II when GI loans were awarded in developments that conformed to the traditional patterns of the local community. The result was Federal extension and reinforcement of local prejudices and discriminatory practices.) (Unless the HUD-approved plans provide for the availability of housing for populations which the zoning may displace from the flood plains, some people may be kept out of part of the community.) And finally, zoning impacts on the relationships of communities in two ways. Local officials outside of a political area may condone development which vitiates the effects of the zoning of the community participating in the program. And, people in a zoned area have no political voice outside of their own political jurisdiction.

Floodproofing: A more accurate term for floodproofing is "water-resistance." But even if that term were used, its exact connotation varies with the writer. Dexter (1977) and others use the term floodproofing to refer to elevation as well as arrangements of furniture, fill that raises a structure above flood level, and encasement of utilities in watertight protectors. (This report follows Dexter's usage.)

Not only does the term have varied meanings, but it also covers a range of time periods. Thus, there are permanent, contingency, and emergency floodproofing. Similarly, there are different views as to whether newer or older residences are more effectively protected. Further, there is a real question whether the sense of security that floodproofing may give people might be more harmful than not floodproofing.

The National Flood Insurance Act states that bi ding permits are required for all construction under the emergency pr am. The permits are presumably awarded if the measures are taken to ect the structure from flooding. Under the regular program, new s uctures or those requiring substantial construction are to be "floodpr or elevated." Certified architects and engineers are supposed to b ilable to advise people on floodproofing and the owner is supposed to maintain records which are turned over to the local authorities. The wording of the law is so general that a great deal of discretion is left to the local community.

The extent of floodproofing, being a matter that is up to the individual owner's discretion, is really unknown. Several studies, including Dexter's (which is the most complete) suggest that a very small percentage of flood plain occupants actually floodproof. However, in estimating its extent, the term tends to be restricted to structural changes or material applications rather than to the spatial arrangement of damageable equipment and property.

In light of the relative lack of knowledge people have about being in a flood plain and their slight concern (unless they have had experience with frequent flooding or a recent flood), it is probable that little floodproofing is undertaken other than "common sense" arrangements.

Policy agents at all levels seem to be minimally involved with promoting floodproofing with few exceptions. The Corps has a booklet that suggest minimum standards of design and construction, "Floodproofing Regulations" (1972). Dexter (1977) has developed a manual to assist homeowners in floodproofing their residences. The Flood Insurance Administration appears to have done little to promote it other than provide the legal stipulations. No public educational programs have come to the attention of this writer. The flood plain occupants themselves who have shown an interest have become involved because of their own experiences with flooding. Frequently they are people who have heard about floodproofing techniques from others and who, themselves, are able to do the work or have friends with the necessary knowledge. In locations which experience frequent flooding, as on St. Friol's Island in

Prairie du Chien, Wisconsin, the people may have contingency plans in readiness to put into action to protect themselves and their property as soon as they are warned or observe the rising waters.

In brief, then, floodproofing as a national policy appears to have limited momentum. It is largely a responsibility assumed by individual property owners. Contingency plans and "common sense" spatial arrangements are probably undertaken by flood plain occupants who are very aware of flooding. To date there is no evidence that it has extensively involved policy agents, flood plain residents, or the local communities.

Flood Warning Systems: This nonstructural measure differs from all of the other ones in that it is primarily associated with the time of disaster. It requires the close involvement of policy agents and flood plain occupants--and frequently the general community--in ways unlike the interactions in the other types of situations. First of all, it is dependent upon the assessment of weather conditions. In some communities this may mean that a local person recognizes impending flooding and warns others. In other situations, a local person may be in touch with the experts at the National Oceanic and Atmospheric Administration or with the Corps of Engineers who relay the information to him. Depending on individual subjective judgments, the situation may be perceived as one that serves as merely preliminary notification (usually only officials notified in such instances), flood watch (which means that local people are alerted to be prepared to act), or warning, the point at which action must be taken. Sometimes the responsible individuals misjudge the severity of the situation, in which case the appropriate warning may be too late. At other times, the error is in the opposite direction. The result is that people become skeptical and/or resentful that they took action when it was not needed. The judgment of the communicator is of great importance, as well as the confidence that people have in him.

Communities differ in their organization and ability to warn their citizens. The larger cities tend to have full time, trained personnel, good equipment and an organization able to disseminate information and take action as needed. Some small communities with minimal equipment but with personnel and an organization that has developed from past experiences with flooding also may be skilled at reaching their population.

Whether or not a community has developed an effective warning system depends to a great extent on how important the local policy agents believe flooding is to the community. If flooding is relatively infrequent, then they may not want to use limited tax funds for equipment or personnel. The political clout of the flood plain residents plays a part. If they are considered to be influentials whose support is needed and they want a warning system to be developed, then they are likely to help organize it or get the governing body to do so. (Political leaders are more ready to purchase equipment--something that shows how public money is spent--than to provide pay for needed personnel.)

People in the flood plain frequently resist heeding a message. There is a belief that "it cannot happen to me," so they may delay taking action. Students of natural hazards have identified many circumstances under which warning systems are successful or not. For people to be responsive to them a degree of education is needed. People must learn how to recognize the warning signals, how to interpret them, and what concrete steps need to be taken. Policy agents need, too, to be educated in what is needed to make the system effective and to consider warning systems--technical equipment and personnel--as worthy of their support.

The general community tends to be less interested in this measure than the other nonstructural measures which have been discussed. Quite often, if they are not in the National Flood Insurance Program, they are unaware of the flooding problems in their community and so they are indifferent to it and its possible solutions. They do not want their limited tax resources used to protect against something which may never happen. And also, they may feel that the flood plain population bears less responsibility for a warning system than for the other measures. Therefore, members of the general community may have little interest in having a high quality system organized.

Recommendations for the Corps

As indicated earlier, causes and effects are difficult to identify because of the circuitous process of multiple stimuli and responses. Therefore, the following recommendations, intended more specifically for the Corps than for other agencies (or the sociological profession), may be viewed as either causes and/or effects of what has already taken place in the field of flood control and what may take place in the future.

At the end of each chapter, suggestions were made regarding each of the nonstructural measures discussed therein. Here, I am proposing a few of the major directions in which the Corps might proceed. They are meant to be ideational, to stimulate thinking along new or different lines and reevaluation of the traditional patterns. I believe that there has to be a relation between ideas and actions; therefore, I perceive each of the recommendations as within the realm of realistic implementation.

1. In view of the fact that there are variations in flood plains, as well as in flood plain populations, flood coping measures should be developed that are appropriate for given populations in given flood plains. It has to be recognized that there are different types of flood plains which therefore require different types of flood control measures. (This is acknowledged in the undertaking of structural projects wherein each project is designed for the particular region to be protected.) This recognition would involve identifying flood plains along two dimensions: First, the basically physical characteristics of the

area, e.g., frequency and velocity of water flows; and secondly, the social ecology, e.g., population density and socio-economic characteristics. A typology of locales could be indicated. For example, three obviously different types of situations are illustrated here:

- a densely populated, low-income, urban apartment complex in an area prone to spring flooding at the 10-20 year level,
- the mining areas of Appalachia that experience flash flooding in a completly different ecological situation, and
- the sparsely populated, very high income area of Charlotte, which has expensive homes in the floodway.

Given these differences, what kinds of flood plain regulations would be economically, socially and environmentally appropriate for the total community? For the flood plain population? Should it be flood insurance? Relocation? Warning systems? Floodproofing? Or, perhaps something that has not yet been suggested? In other words, the programs proposed would vary in accordance with socio-economic/hydrological needs.

2. In consideration of methodological and funding needs, I would recommend that the above, as well as the implementation of any aspects of the succeeding recommendations, be undertaken as demonstration projects. This would mean that in the above case, one or two communities of each type would be selected for study to determine the effectiveness of different measures and for potential alternative measures.

3. Participation in a program should be on a voluntary basis. Wherever possible, only those communities that have achieved consensus among interest groups should be considered for participation in flood plain management. Hopefully, a cooperative community would be in a position to more successfully implement a program.

4. As a suggesion of a fairly specific nature, I would recommend that the Corps direct increasing attention to floodwarning systems. This attention could be on the technical aspects in keeping with the technical expertise of the Corps. Or, it could be directed to coordinating a comprehensive program establishing appropriate systems and procedures for different types of flood areas. It is my conclusion that for certain types of flooding situations, effective warning systems may be the most appropriate that our present state of knowledge and social or socio-politico-economic organization permit.

5. There is a great need for an educational program to alert people to flood dangers, to explain flood protection alternatives, and to convince them of the need to support programs that are protective. Since protection from flood problems frequently parallels protection from other hazards, I would recommend that the Corps take the initiative in integrating a number of the programs. (There is a danger in creating

undue anxiety on the part of the people through over-publication of hazard information -- especially if protective procedures are not spelled out -- and if "wolf" is called too often.) I suggest a program that has similarities to the agricultural county agent program should be established. It would educate people about flooding and flood controls in those areas that are threatened by flooding, as well as about other hazards where applicable. In those communities that have civil defense agencies, the civil defense organization might include this as one of their functions or be responsible for the program. Antle's suggestion that a program that parallels fire drills be established in schools and other organizations is worthy of consideration. In brief, it is paramount that the public become more knowledgeable about all forms of hazards to which they may be exposed and that flood protection be included in a unified program.

6. Historically, the Corps of Engineers has had a relatively well-defined role vis-a-vis flood control. It has demonstrated its expertise throughout the country by constructing dams and reservoirs that have successfully protected lives and property. Within the last few years, it has deviated from the narrow path it had been following. It became involved with nonstructural measures befitting the country's changed socio-political climate. And, whether the Corps' initiative or reticence in promoting nonstructural measures was a cause or an effect of HUD's involvement in flood control, the ex cathedra position it had occupied has been challenged. As a result, the decision-makers in the Corps of Engineers are at a crossroad. Among the alternatives available are:

- continue as at present, favoring consideration of nonstructural measures as well as structural, but playing a responsive rather than initiatory role;
- continue as at present, favoring consideration of nonstructural measures as well as structural, but actively assisting in the clarification of policies as needed;
- restricting Corps activities to structural flood control projects at the same time as actively directing communities to other agencies that may assist them with nonstructural measures; and
- adopting a new role for the Corps by assuming responsibility for all forms of Flood Plain Management.

For the Corps to take a "wait and see" attitude may be wise at this point in time in light of the transitional position of FIA at this date (March, 1978), and the President's plans to announce a water resources policy shortly. On the other hand, in view of the serious threats to lives and property that flooding causes and the inequity involved, the anxieties produced when people are uncertain as to what a program

demands of them (e.g., whether they can remodel or not when in a flood plain); and the Federal costs in terms of time, effort, manpower and money, the Corps must face up to its present position and let the citizenry awaiting its actions and the Congress to whom it is responsible know the course of action or inaction it intends to pursue. Even if it cannot control its fate, it certainly may make its interests known.

Obviously, the talents of the Corps are found in the skill of its engineers and their ability to build structures. Unless it is prepared to develop expertise in new areas and acquire the personnel appropriate for another role, it may be wisest for it to share the responsibility for Flood Plain Management with other agencies--the others assuming leadership in nonstructural areas; the Corps, in structural--the job it knows best!

Toward a Broader Perspective

The continuous "acts of nature," coupled with the "acts of man," make the mitigation of flood problems an endless, on-going one. Yet we humans try to capture the moment in order to forecast the future. What do we see from the sociological perspective?

(One observation is that a relatively young governmental department has had its lead role legitimatized as the agency in charge of nonstructural flood control.) Congress' authorization of HUD, through the introduction of the Flood Insurance Act, and the funding it receives from OMB via the Appropriations Committee, places it in a lead position. These actions by the Legislative and Executive Branches of the government reflect the changed climate of the times, a climate that no longer spells "technology" with a capital "T"! By their actions the two branches reinforce that climate. The situation illustrates how the dynamics of institutional power relationships are played out on the stage of everyday life in settings that are both created and changed by man and nature.

A second observation is that three of the programs discussed--insurance, zoning and floodproofing--have strong middle-class overtones. Facetiously, it might be said that the first is purchased by middle class people, the second is designed by them, and the third is used by them. For it is middle class people who are most accustomed to purchasing insurance, who have a strong sense of pride and possession of property and want to protect it, and who plan for the future.

And, lastly, the programs and their implementation are posited on several basic American values that have been seesawing back and forth throughout the history of this country. On the one hand, there is the Protestant/Capitalistic ethos of private property, individual responsibility, and risk-taking. On the other hand, there is the notion of the common good and the government as the protector of the people's interests. Government subsidized insurance is contradistinction to the need

to justify projects and programs in terms of traditional indicators used for benefit/cost ratios illustrate how these values are implicit.

It is this matter of values that is all-important in efforts to control flood waters. Sometimes, it seems, we forget that the purpose of projects and programs is to protect people's lives; we forget because other values preoccupy us--the seductiveness of power, the discomfiture in assisting anxious people, the preoccupation with balancing a budget vis-a-vis the improvement of the quality of human life.

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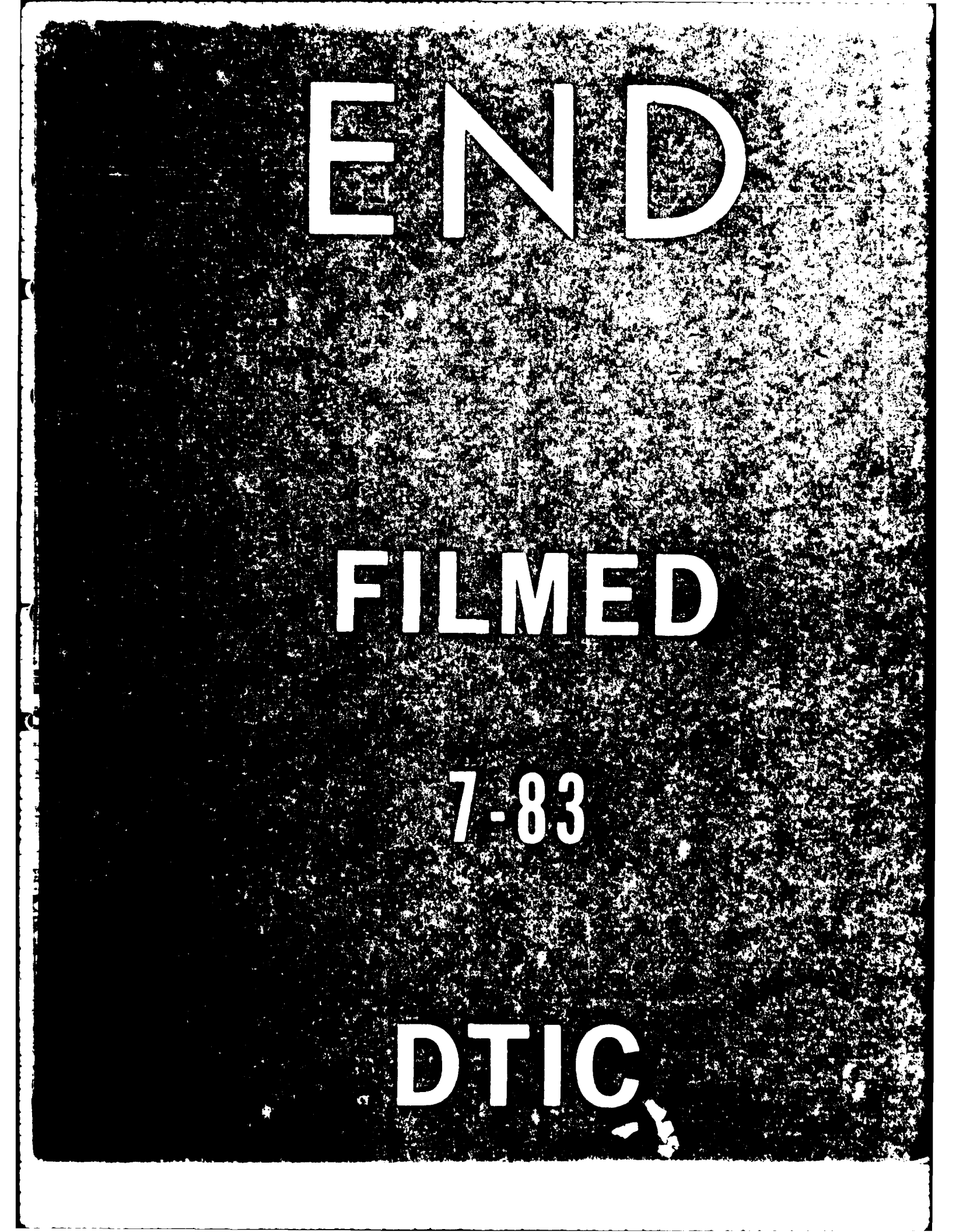
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