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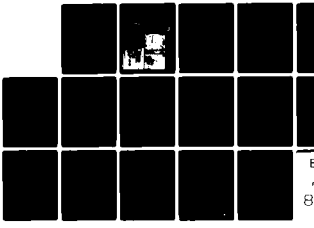

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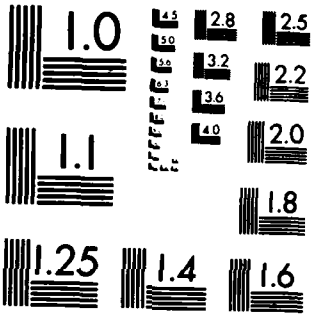

Research Report 81-R02
January 1983

US Army Corps
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Engineer Institute for
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Nonstructural Flood Control Measures: A Sociological Study Of Innovation

Executive Summary

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Four of the major flood plain management measures--insurance, zoning, flood proofing and warning systems--are discussed from the social perspective. An overview of the causes and effects of the various measures on policy agents, flood plain occupants, and the general community is provided. The final chapter presents specific recommendations to the Corps.

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NONSTRUCTURAL FLOOD CONTROL MEASURES:

A SOCIOLOGICAL STUDY OF INNOVATION

Executive Summary

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NONSTRUCTURAL FLOOD CONTROL MEASURES: A SOCIOLOGICAL STUDY OF INNOVATION

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 of a group face-to-face with another 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 calendar and place as if nothing exists outside the boundaries of a given space and a given time.

Our attempts to draw boundary lines in terms of time and space aptly apply to our inquiries into flood plain management. Flood plain management, a term that was almost exclusively used to refer to "structural measures," has broadened to increasingly emphasize its "nonstructural" component. Whereas the earlier meaning stressed building of dams and reservoirs, channelization, and levees, more recent usages include relocation, flood proofing, 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 already 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, and
- Widespread usage of a "special language," e.g., "flood proofing," "flood resistance," and "nonstructural measures."

The objective of this report is to identify effects (impacts)[1] of the flood insurance program, zoning, flood proofing and warning systems.[2] Four assumptions are made:

(1) Every effect has one or more causes;

(2) An effect may be a cause of something else and a cause may be an effect;

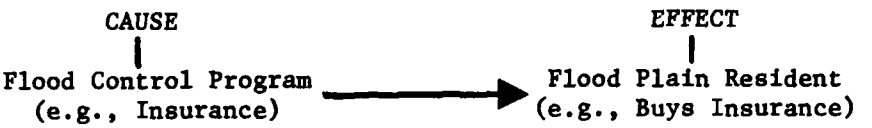
(3) The human mind makes the distinction between causes and effects and abstracts and labels activities as one or the other, and

(4) Individuals themselves may not be aware of an effect upon them or the fact that they may have an effect on others.

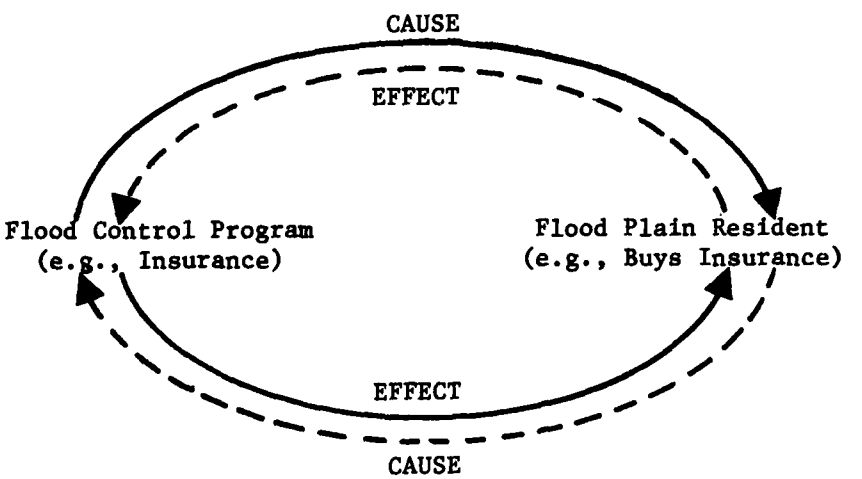
The difference between this perspective (symbolic interaction) and the more traditional one (stimulus/response) of causes and effects as applied to flood plain management is shown schematically in Figure 1. In this report each of the nonstructural measures is conceived of as an "effect," i.e., an outgrowth of the policy decisionmaking 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 ignore the riddle of which comes first by treating observable changes in behavior as both "causes" and "effects."

Accordingly, 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. At the same time or subsequently, these people may be identified as causing responses on the part of others. Thus, a family that is required to purchase insurance when buying a flood plain home may deem the action an "effect" of the community's participation in the flood insurance program. When filling out the necessary forms with the insurance agent, the family "causes" the agent to respond to its questions. In brief, the perspective taken is one wherein individuals and groups are both actors and reactors.

I. Stimulus/Response Perspective



II. Symbolic Interactionist Perspective



Two Perspectives on Cause/Effect Relations

Figure 1

Three major groups are identified in this report (See Figure 2). Among those most involved are the people engaged in establishing or implementing a program at the national or local level. By and large, these people are located in the Executive Branch of 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. In addition, there are the functionaries who do the necessary tasks --the planners, insurance agents, building code inspectors, household movers, 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 household movers--are referred to as policy agents.[3]

The second group of people who are affected by nonstructural programs are the flood plain occupants themselves. This group includes both "residents" and "businesses." Although many people in flood plains are not aware of their location or are minimally concerned about it, nonstructural measures are intended to have important effects on them. And the occupants' 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 "cause" policy makers to plan and implement the nonstructural programs. At the same time, the program developers may be a "cause" of the behavior of flood plain occupants.

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 if they were 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 will find it more difficult to locate housing or will 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.

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; they become the latter when they move into the flood plain or are associated with it through their work. The reverse process works for the policy agents and flood plain occupants as they dissociate themselves from flood problems. It is against this backdrop of symbolic interaction theory in which policy agents, flood plain occupants and the general community act and react that the following report is presented.

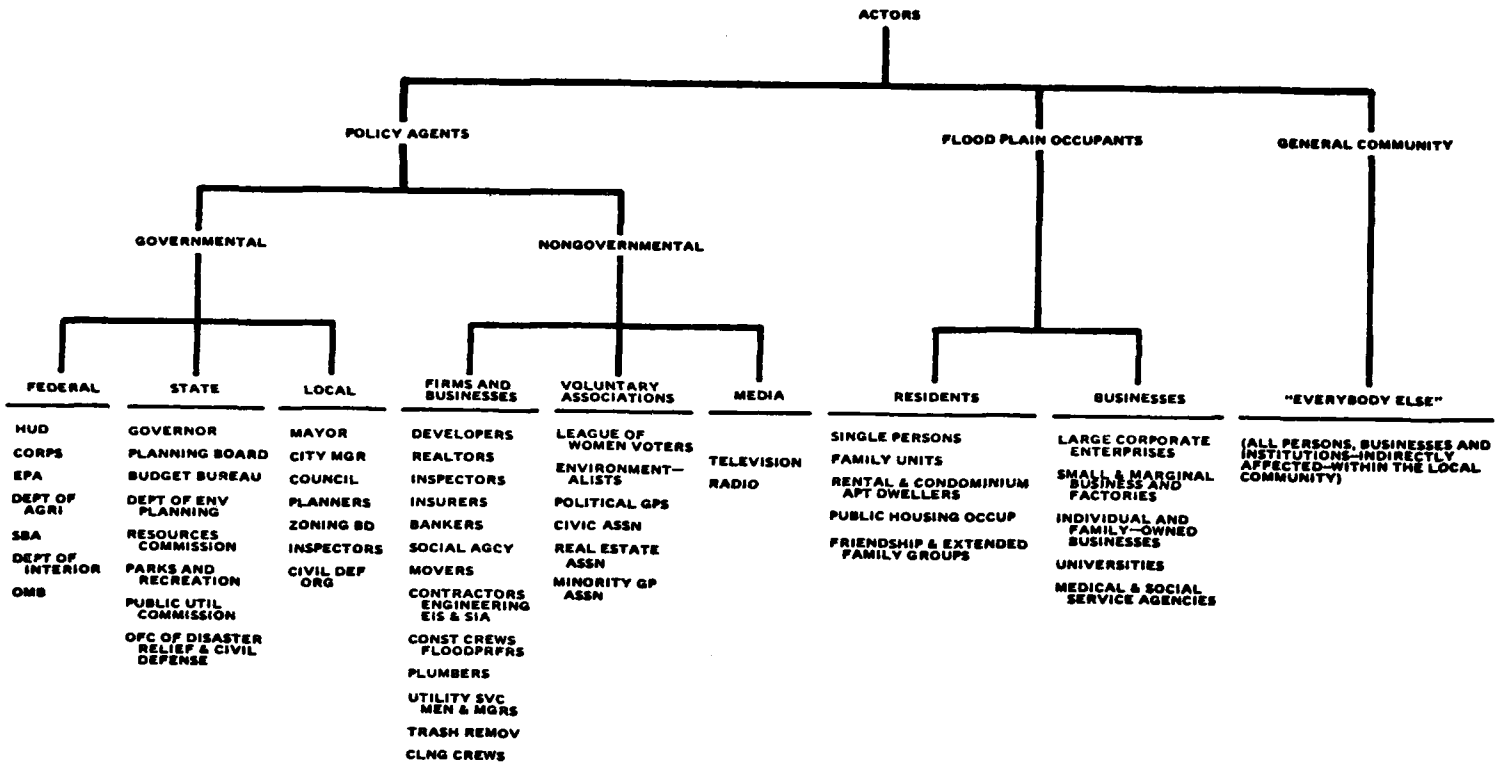


FIGURE 2: KEY ACTORS INVOLVED IN FLOOD PLAIN PROGRAMS

However, before discussing the various measures in relation to the actors, 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 groundwater subsidence. Secondly, 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. The very few studies that have been undertaken tend to be of a few scattered situations. The three major comprehensive studies (Mack, 1976; Sheaffer's unpublished manuscript; 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 is based on limited sources of information, i.e., government documents, social science literature, and interviews with government officials. 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. Let us now examine each of the programs in terms of the three sets of actors--policy agents, flood plain occupants, and the general community.

THE FLOOD INSURANCE PROGRAM

The National Flood Insurance Act of 1968 initiated the flood insurance program. Let us "arbitrarily" select as the initial cause (see page 2) of its passage, the expressed desire of a variety of interest groups which are:

(a) To reduce taxpayers' contributions to flood damages;

(b) To protect people from the trauma of flooding, and

(c) To control human behavior rather than nature's behavior for environmental protection.

This is to be accomplished by making community land regulation a requisite for subsidized insurance. This prerequisite is dependent upon the local government's concurrence that (a) certain areas are designated as lying in a flood plain, and (b) that the maintenance or development of new structures must acquire flood insurance or meet certain structural norms. As may be expected, local consensus in designating flood lands and concurring on structural standards is difficult to attain.

The linkage of insurance availability with a comprehensive community zoning program could ultimately affect approximately 22,000 communities lying in the 7 percent of the U.S. that is flood plain land (U.S. Water Resources Council, 1976, page II-2). There are currently 14,227 communities in the emergency program (where only the preliminary mapping has been done and insurance is available at the subsidized rates without flood plain regulations being enacted) and 1,511 communities in the regular program. A total of 1,191,209 policies had been sold by November 1, 1977, and $266 million had been paid in claims (Phippen, 1978). A problem associated with interpreting the above figures is that the exact number of structures eligible for insurance is unknown. Cochrane (1975, page 86) has estimated that there are 2.8 million residential structures, but this does not include businesses. Further, his estimate is based on only 6,000 communities exposed to inland flooding, plus 1.2 million homes on the coasts. This limitation makes it difficult to assess the success or failure of the program in terms of enrollment in it.

Although approximately three-fourths of the communities eligible for enrolling in the program have signed up, the above figures show that the great majority are in the emergency program. This may in part be due to the time needed for completion of accurate delineation of flood plains and flood ways; however, 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, suggests 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, 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.)

Against this background, let us look at what the insurance program has meant to <u>policy agents</u>. Firstly, it has meant the transference of functions that had been vested in Housing and Urban Development (HUD) by flood-related legislation from 1956 to 1975 to the Federal Emergency Management Agency (FEMA).[4] Since FEMA came into being <u>after</u> the data for this report were collected, the impact of these flood insurance acts on policy agents is demonstrated here by what happened to governmental groups prior to FEMA. The focus is on HUD and the U.S. Army Corps of Engineers. 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 (with the Corps) of the country's flood plain populations. The Federal Insurance Administration (FIA) was established within

HUD to assume implementation and management of the insurance program. This means a large office in Washington, networks of association nationally, and control over funds. A whole new set of rights and responsibilities commensurate with its position has developed. Thus, HUD has the right to indirectly control the use of lands in local communities. (The Constitution delegates direct controls to lower levels of government.) At the same time, this legitimizes the sphere of power that HUD has over the whole community. 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 Insurers Association. This group has been replaced in recent years 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. Illustrative of the effects of congressional action creating the National Flood Insurance Program are the development of new departments within HUD, the assignation of a service role to the Corps, the organization of the groups that handle the insurance policies and the employment of research and development companies.

Local community leaders are involved in the insurance program through the requisite comprehensive community zoning for insurance eligibility. The community decision of whether to participate in the program is dependent on several factors involving the local policy agents which include:

- 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 regarding flood plain management.

Large cities or communities close to large cities have more of the know-how to handle the situation. But smaller communities have serious problems such as the lack of planning departments and part-time or unpaid governmental officials. For some, the issue becomes one of community growth and development versus non-growth. 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.

Once a community joins the 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. Those who do purchase insurance tend to be older, richer and more educated than nonpurchasers and probably know someone who has already purchased a flood insurance policy (Kunreuther, et al., 1977). There is little information on business and industrial purchases of policies, but it appears that most find it uneconomical since very few are policy holders.

People in the general community tend to have less information about flood insurance than those in the flood plain. Some are reported as considering it a "good" thing for those 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.

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 am not considering 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.

Several premises underlie the recommendations:

(1) 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 sociopolitical setting is "ripe" for land controls, then a multifaceted program might be implementable.

(2) People do not know about or understand flood insurance and how it would benefit them. Community leaders (who may not be flood plain occupants) have to be apprised of the benefits for the total community. People need to have an opportunity to learn about the options and to choose between alternatives. If these people understood the benefits, they could make their own decisions.

(3) Another premise is that different people in different communities have different needs. Therefore, not all individuals or communities in a flood plain may need insurance or even consider it one of their needs. (For example, the unemployed may need jobs more than insurance.)

Given these premises, the recommendations are:

(1) The current flood insurance program should be offered to selected 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 success.

(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).

(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 homeowners who want to repair their dwellings in order to continue living in them can do so.)

(5) There should be extensive education about flood insurance. (Governmental inducement may be considered under certain circumstances.)

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 policy agents, i.e., the zoning commission or its equivalent. Because of the wide variation in state regulations and authority regarding zoning, one would expect the local flood plain 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. The Corps and other mapping contractors share a common technological approach in defining the flood plain area and meeting these standards. Next, a similarity is imparted by those planners who attended similar graduate schools and perceive similar interest groups which they must satisfy. And finally, court decisions generally uphold and enforce the middle class orientation toward zoning.

There are a number of groups involved with zoning at the local level. The community officials 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, reinterpret, avoid or evade the regulations. Industries exert their influence by threatening to move out of the community, thereby taking away much-needed jobs. The developers favor growth and zoning when perceived as advantageous to them.

Zoning has always been a controversial area in the political arena. The cumulative evidence is that it is an activity desired by 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.

The people in the flood plain are affected differently, depending upon their socioeconomic 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, flood proofing, or the purchase of flood insurance. Some may feel they benefit because their neighborhoods are being protected from "undesirables." Affluent renters may be indifferent unless there is a concern that one's individual unit may actually be flooded. Other homeowners may feel that undue power has been exercised in declaring the area a flood plain or that because of public identification of the hazard potential, they may have problems selling their property. They feel caught and stigmatized.

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. Building codes may be more strictly enforced among them than among the affluent, making home ownership a burden. Those located in apartments find moderately priced apartments hard to come by.

Among some of the poor living in flood plains, zoning may make little difference because 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 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 cause a real hardship.

Most people in the general 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 and replace them with a "desirable" flood plain park.

Zoning comes to the forefront in many communities because of the community conflict which it engenders. Frequently expressed in terms of growth versus nongrowth, 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 interests 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 conducive to 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 should be discussed at this point.

One revolves around HUD's mandatory requirement that the community engage in comprehensive zoning prior to the availability of insurance to residents. Related to this is the fact that HUD approval of zoning legitimizes what the local officials have decided. (This is similar to what occurred after World War II when government loans were awarded to veterans 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 virtually every part of the community. Finally, zoning impacts on the relationships of communities in two ways:

(a) 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

(b) People in a zoned area have no political voice outside of their own political jurisdiction; they are powerless if they have to leave the flood area and have restricted choices.

At a more abstract level zoning does something else: it serves to homogenize American society. The 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 United States 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:

   a. That would provide a steady stream of information over several years.

   b. That would explain flood plain problems, local costs in terms of property and lives, and the need for controlled growth and development to local policy agents (primarily) and state officials.

   c. That would place responsibility primarily in the hands of the Corps.

2. Monetary incentives from the Federal Government to the communities:

a. That provide a comprehensive flood plain zoning to control flood plain occupancy and change conditions that might cause future overflows and expansion of the flood plain.

b. That provide a comprehensive program to improve flood plain, the housing conditions of the lower income population (particularly if in a flood plain), and reduce unemployment.

3. The Federal Government should establish levels of flood control protection programs (minimal to maximal protection). Local regulatory agencies would be compensated in accordance with the level of protection offered.

FLOOD PROOFING

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

Not only does the term have varied meanings, but there are also variations in its temporal referents and professional opinion about it. It covers a range of time periods. Thus, there are permanent (e.g., elevation), contingency (preplanned actions), and emergency (spur of the moment) flood proofing (Cheney, et al., 1974). Similarly, there are different views as to whether newer or older residences are more effectively protected. HUD (1966) states that flood proofing is most protective of existing properties and impractical for application to new single family units. On the other hand, a computer model of the Boulder Creek flood plain (Olson, et al., 1975) found that flood proofing was not economically feasible for existing residential structures. Further, there is a real question whether the sense of security that flood proofing may give people might be more harmful than not flood proofing.

The National Flood Insurance Act states that building permits are required for all construction under the emergency program. The permits are presumably awarded if the measures are taken to protect the structure from flooding. Under the regular program, new structures or those requiring substantial construction are to be "flood proofed or elevated." Certified architects and engineers are supposed to be available to advise people on flood proofing 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 flood proofing, 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 flood proofed. 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 flood proofing is undertaken other than "common sense" arrangements.

Policy agents at all levels--with few exceptions--seem to be minimally involved with promoting flood proofing. The Corps has a booklet that suggests minimum standards of design and construction, "Flood Proofing Regulations" (1972). Dexter (1977) has developed a manual to assist homeowners in flood proofing their residences. The FIA 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 flood proofing techniques from others and who are able to do the work or have friends with the necessary knowledge. They believe flooding will occur again in their neighborhood and that individual action is appropriate (Dexter, 1977). In locations which experience frequent flooding, as on St. Friol's Island in Prairie du Chien, Wisconsin, the people may have contingency plans to protect themselves and their property as soon as they are warned or observe the rising waters. Because of the limited knowledge about the responsiveness of the general community to flood proofing, only speculation is possible. We would expect that they would approve because the bulk of responsibility and expense is borne by the individual flood plain occupant.

Flood proofing, 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.

Recommendations: Flood Proofing

Flood proofing, 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 would have the greater impact. They should be instructed how to include flood proofing measures in

the design of buildings and projects and provided evidence of its value. Specific actions for "common sense" protection of property as well as for the formulation of contingency and emergency plans should be recommended to flood plain occupants.

2. Financial Assistance: One approach is to provide labor costs for flood proofing an individual's dwelling; the individual provides the materials. Another 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.

FLOOD WARNING SYSTEMS

This nonstructural measure differs from all of the others 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. Figure 3 illustrates the major variables involved in an effective warning system. 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. The following excerpt from a report on the Virginia floods (U.S. Department of Commerce, 1969, page 16) illustrates a drawback to this system:

> At about this time, the (experienced 81-year old) cooperative observer...called...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.

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 judgements, 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. Then people become skeptical and/or resentful that they took action when it was not needed. The judgement 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

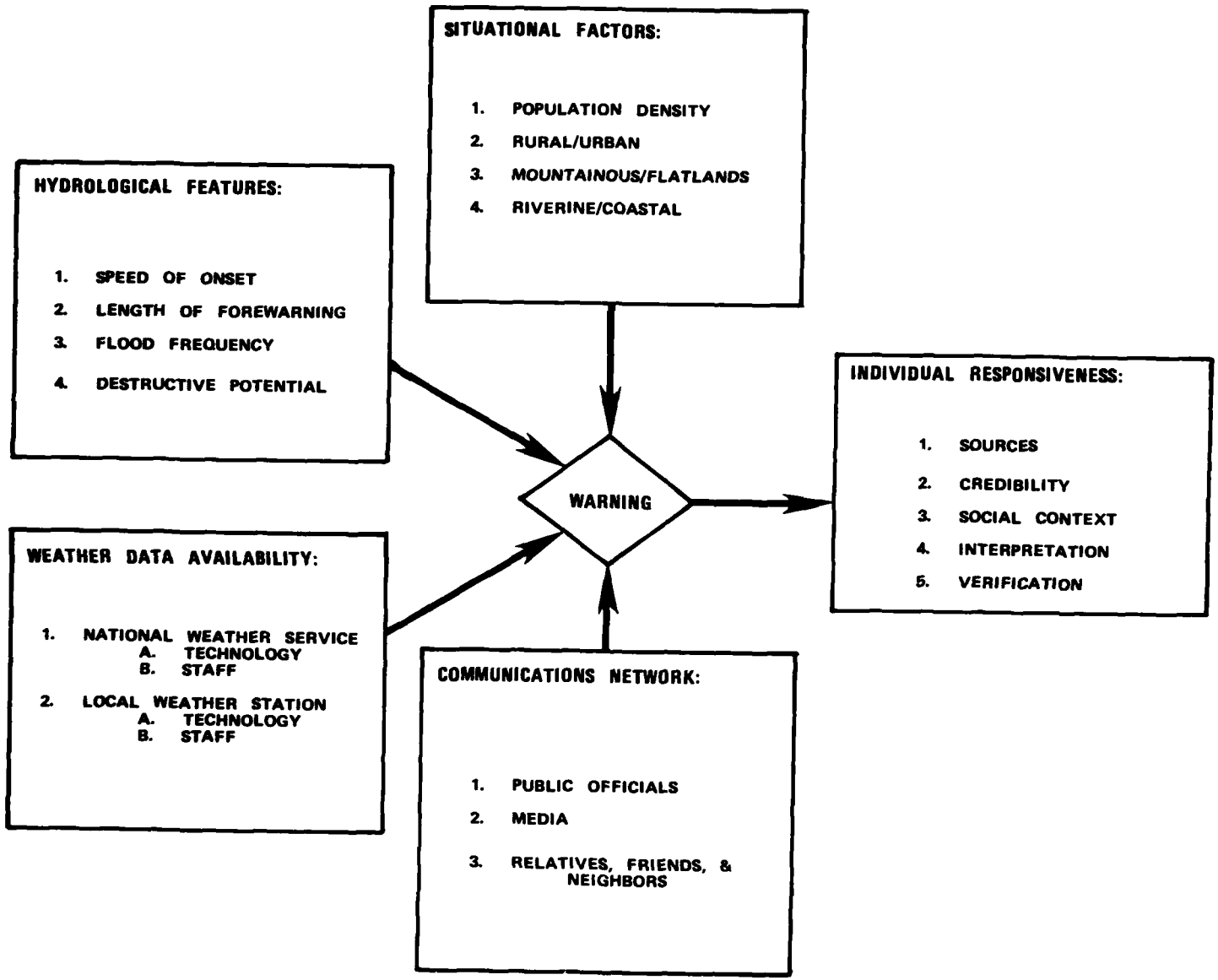


FIGURE 3: MAJOR VARIABLES INFLUENCING WARNING SYSTEM EFFECTIVENESS

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, 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, they are likely to help organize it or get the governing body to do so. (Political leaders are more ready to purchase equipment--a visible expenditure of public money--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. Drabek and Stephenson (1971) analyzed flood warnings and have found:

- The social context in which the warning is received influences the response;
- A mother with small children will react differently than a lone individual;
- Messages from persons in authority are received with more belief than those from relatives or the media, and
- People do evacuate in response to warnings, although for varying reasons.

For people to be responsive to warnings, a degree of education is needed. People must learn how to recognize the warning signals, how to interpret them, and what concrete steps should be taken. Policy agents need, too, to be educated to consider warning systems--technical equipment and personnel--as worthy of their support. They also must learn ways to make the system effective.

The general community tends to be less interested in this measure than the other nonstructural measures which have been discussed. Quite often they are unaware of the flooding problem 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. 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: 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 should be designated to oversee the organization of local communities for crises, to promote hazard response education in the schools,[5] and to stimulate an awareness of what local influentials may do to facilitate preparedness. The agent would 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.) An important aspect of the "hazard agents" work would be public education.

CONCLUDING REMARKS

The objective of this report has been to focus attention on the changes that occur in the lives of individuals and groups as a result of the redirection of flood plain management from the control of waters to the control of people. An effort has been made to view this shift in national policy as one that not only affects the householders and other enterprises within a flood plain, but also those who are responsible for creating and implementing policy and those who are members of the community at large. Each set of actors is affected by the various flood plain measures. Each interacts with the others in such a way that identification of causes and effects becomes blurred.

The circular nature of cause/effect relations is brought out in a variety of ways involving policy agents. In the case of flood insurance, HUD, as the lead agency, initiated the program. However, when the policy agents in the local communities failed to respond, Congress amended the original act by making participation compulsory in connection with receipt of disaster relief. Subsequently, policy agents placed pressure on Congress to amend the Act once again in order to remove one of the sticks held over communities; i.e., the constraint on local FSLIC banks from making loans in nonparticipating communities.

The flood insurance program highlights another important cause/effect: the co-sharing of flood plain management responsibility between the Corps and HUD, two major policy agents. To what extent the shift from control of water to the control of people is a response to the activities of the Corps in earlier decades and/or to other factors on the American scene remains to be answered at another time. Nevertheless, the new relationship between these two agencies is undoubtedly a major sociopolitical change.

The implementation of the insurance program has caused local policy agents to review and plan their regulation of flood plains in ways which were rarely considered before (except in a few states). How the communities had previously zoned the flood-prone areas undoubtedly had something to do with their reactions to the national requirements. Resistances to the program are indicated by the limited number of participating communities and by court tests to modify it.

The effects of the nonstructural measures on flood plain occupants vary depending not only upon the measure but also on the social, political and geographic context in which it is implemented. For example, residents whose dwellings have been severely damaged by flooding may be caught in a bind: they cannot get flood insurance nor can they repair their extensively damaged homes. On the other hand, the insurance makes it feasible for some people to put up with flooding. These diverse reactions of flood plain occupants toward the insurance program mirror insurance company behavior. Some companies are active in promoting the policies or in promptly paying claims; others are indifferent on both scores.

The impact of zoning on flood plain occupants depends upon whether they are living in the area or engaged in businesses and industries there. Effects on householders are prone to depend on their socioeconomic position; effects on businesses and industries, upon their economic position. By and large, whether residents or business people, the greater their economic insecurity, the greater is the impact of any zoning program likely to be.

Flood proofing, although specified as part of the insurance program, has received little attention from Federal or local policy agents. Some efforts are being made to identify procedures for flood proofing structures. However, the actual implementation of flood proofing is dependent upon the individual owner. It is probable that many people move their furniture and take measures to protect themselves; how and to what extent is not known.

Warning systems are unlike the other three nonstructural measures in that they depend on a combination of local and national policy agents to be effective, but are not coordinated by any lead agency. Their implementation involves a high degree of cooperation during a period of potential crisis. But during periods of relative security from flooding, policy agents tend to be preoccupied with spending their limited funds in other areas. The result is that no one group spearheads the furtherance of warning systems as an important nonstructural measure. Therefore, this very important program is varied from community to community as an effective medium for reducing death and damages at times of flooding.

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 section, 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 conceptual, to stimulate thinking along new or different lines and re-evaluating traditional patterns. I believe that there has to be a relation between ideas and overt 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:

   a. The basically physical characteristics of the area, e.g., frequency and velocity of water flows, and

   b. The social ecology, e.g., population density and socioeconomic characteristics.

A typology of locales could be indicated. 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 mountainous terrain, 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 general community in each of these settings? For the flood plain population? Which of the nonstructural measures provides the best flood protection: Flood insurance? Relocation? Zoning? Warning systems? Flood proofing? Or, perhaps something that has not yet been suggested? In other words, the programs proposed would vary in accordance with socioeconomic/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 local communities that have achieved consensus among interest groups should be considered for participation in flood control programs. Hopefully, a cooperative community would be in a position to more successfully implement a program.

4. As a suggestion of a fairly specific nature, I would recommend that the Corps direct increasing attention to flood warning 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 flood control measure that our present state of knowledge and social or sociopolitico-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 be established. It would educate people about flooding and flood controls in those areas that are threatened by flooding, as well as about other local hazards. In those communities that have civil defense agencies, the civil defense organization might include this as one of its 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 controls. 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 sociopolitical climate. Whether the Corps' initiative or reticence in promoting nonstructural measures as 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 decisionmakers 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 hazard reduction.

For the Corps to take a "wait and see" attitude may be wise in light of the transitional position of the FIA, and President Carter's announcement of water resources policy. 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.

The Corps' obvious talents are in engineering personnel and feats. 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 control 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, ongoing 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 the Office of Management and

Budget 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 flood proofing--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. But what about the vast majority in the working class? What about equity?

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 in 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. It is time to reconsider our priorities.

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," Unpublished Manuscript, IWR, Summer, 1977. It is omitted in this presentation.

[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.

[4]The acts referred to include: the Federal Flood Insurance Act of 1956, the National Flood Insurance Act of 1968, the National Housing Act, and the National Insurance Development Act, 1975.

[5]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.

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