

## Chapter 4

# TARGET GROUPS FOR FLOODPLAIN LAND USE MANAGEMENT

This chapter examines the land conversion process as it operates in urban floodplains in order to identify points in the process at which floodplain land use management programs can affect private sector decisions so that they adequately reflect flood hazards and contribute to public land use objectives. Also described is research in the ten cities to ascertain the nature of the floodplain development process and to determine whether floodplain land use management programs have affected that process. The findings from that research are then presented in the following chapters.

### The Land Conversion Process

We view the transformation of floodplain property from vacant to developed uses as a process extending over time and involving a number of important decision points.\* At the beginning of the process, land typically is held for its intrinsic value in agriculture and forest industries. At the end of the process, it usually is held by consumers whose interest in land stems primarily from residence or various commercial and industrial pursuits. Between those two states, land is first held and transacted by a number of owners and dealers whose primary motive is often capital gain, and then by developers and builders who use land in creating a product and whose motives are more often profit than capital gain from land value appreciation.

Each state is likely in the land conversion process and none is sufficient by itself to produce a change from rural to urban use. Previous research on the process of land development in floodplains has focused almost exclusively on the last two stages of the process--occupancy and redevelopment/abandonment.\*\* To understand variation in the effectiveness of floodplain

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\* The model presented in this section is adapted from our previous research on land transition processes in urban and recreational areas. See Kaiser and Weiss (1970); Burby, Donnelly and Weiss (1973); and Burby, French, and Kaiser (1980). That earlier work is based, in part, on Wheaton (1964) and Clawson (1971).

\*\* See Beyer, 1967; Burton, 1961; Cross, 1985; Cypra, 1973; James, Laurent and Hill, 1971; Kates, 1962; Kunreuther et al., 1978; Lasksa 1986; McPherson and Saarinen, 1977; Roder,

land use management programs, however, we need to be sensitive to the fact that floodplain development does not result from a one-shot decision.

Land use management programs often are targeted at several different decision points in the land conversion process. For example, programs may 1) encourage retention of land in open space uses through tax incentives aimed at the owners of vacant land; 2) discourage speculative land holding through tax and other disincentives which increase landowners' holding costs; 3) discourage developer and builder consideration of floodplain property as suitable for urban use through public investments which increase the attractiveness for development of property located outside of the floodplain, or by regulations which increase the costs of floodplain development; 4) minimize susceptibility to flood damage through land use and building regulations which require that buildings be elevated or floodproofed; and 5) discourage consumer and other investment in floodplain property through flood hazard information programs.

In addition, particular program components simultaneously may affect several different points in the land conversion process. By increasing development costs, for example, a building regulation designed to affect site development decisions may also encourage landowners to retain property in open space uses, so that for some parcels the "site development" state is never reached. Thus, we believe it is important to consider how policies adopted as part of a floodplain land use management program produce changes at each stage in the conversion of property from low-intensity, open space uses to high-intensity, urban uses.

### Key Decisions

The floodplain land conversion process results from a complex set of decisions and actions by individuals and groups, each guided by their own incentives. The key decision makers include the owners of vacant land (who also may be land investors and dealers), land developers and builders, and consumers who purchase and occupy buildings in the floodplain.

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and their adjustments to the hazard, including the purchase of flood insurance. Still, according to White and Haas (1975), there has been remarkably little investigation of how individuals who are affected by hazards decide what to do and what accounts for differences in their behavior.

### From Low-Intensity Use to Development Interest

At the beginning of the floodplain land conversion process, property may be held to satisfy various production needs for farm and forest products and for the satisfaction derived from residence on a large tract. While important, those sources of demand for floodplain property do not touch off the land conversion process, since property will be priced primarily on the basis of discounted net annual returns. A second and more crucial source of demand derives from land dealers' and investors' estimates of the long-term need for improved building sites in a community (which in turn are derived from their estimates of eventual consumer demand [Clawson, 1971, p. 112]).

Long-term demand is translated in the market by the actions of land dealers and investors who, by capitalizing higher expected future income from urban use, bid up the price of property above returns to current, low-intensity uses. In that manner, they initiate the land conversion process. For property to enter a transitional state of "development interest," however, there must not only be a demand for land, but also a willing seller. Initial landowners' decisions to hold or sell, which are discussed more fully below, depend on the relative satisfaction they derive from their land in the form of pecuniary and nonpecuniary income and their expectations about future land value.

In a perfectly rational and orderly land market, the length of time land remained in a state of development interest would be relatively short. Land would remain in productive use until returns from urban development exceeded agricultural and nonpecuniary returns. At that point, the land would be sold to a developer or builder who would either improve the property and construct homes, stores, or offices, or sell it to a home builder or nonresidential developer who would have structures built for the land's final user. The land conversion process would involve few transactions, and price increases would be related solely to the increased productivity of land as it was transformed from low-intensity rural or open space uses to high-intensity urban uses.

In fact, however, the market for land in urban areas differs markedly from the perfect market of classical economics. Land is a heterogeneous commodity and land available for sale covers a wide area. Obviously, landowners do not have perfect knowledge, nor is there consensus about future events. As a result, the price of land is based on imperfectly formulated expectations of future income and other events and can vary widely from sale to sale, depending on the characteristics and expectations of buyers and sellers. Thus, acquiring and holding land for speculative rather than productive purposes is a natural and understandable byproduct of the land market and may begin a number of years before the actual demand for land for urban use materializes.

The proportion of floodplain property that is likely to be held by land dealers and investors in a state of development interest should increase as the time for conversion to urban use approaches.

In a study of idle land north of Wilmington, Delaware, which had long-term but not short-term development potential, Vaughn and Moore (1963) found that only 25% of the parcels they studied were acquired for investment and speculation. Milgram (1967), however, found that on the north Philadelphia urban fringe, during a period of steady urban development, the proportion of land shifting to a state of development interest steadily increased over the period she studied. As more floodplain property is held in expectation of eventual development, that development should become a self-fulfilling prophecy. Owners will lobby for public policies, such as structural flood protection, which enhance the development potential of their holdings and will oppose policies which might threaten their ability to capture the potential development value which prompted their initial investment in the floodplain.

#### Active Consideration for Development

For floodplain property to advance to the next state in the land conversion process--active consideration for development--a landowner must be willing to sell and, more important, a land developer or builder must see the potential for more immediate intensive use of the property as a finished residential, commercial, or industrial site and must purchase the land. The developer's location decision is the key decision at this point. In addition, profit rather than capital gains becomes the deciding factor.

The developer's location decision is in actuality a series or chain of sub-decisions. It can begin when a parcel is brought to a developer's attention and he must decide whether the property meets the specifications of a market for which he has been or could be developing land. It can also begin in a more rational way with the generation of an idea for a project, formulation of criteria regarding the characteristics of land which will be needed, and search for the site which best meets the criteria (Weiss, Smith, Kaiser, and Kenney, 1966; Miles and Wurtzbach, 1977). Regardless of the manner in which a developer comes across a parcel, before making a final purchase decision, developers typically take an option on the property while a number of feasibility studies are conducted: a marketing study may be undertaken to estimate the revenue likely to be generated by the anticipated project; an engineering study will be undertaken to produce an estimated number of lots and estimates of site development costs; lenders may be consulted to determine whether construction and permanent financing can be obtained and on what terms; and public officials will be contacted to determine the availability of various public

services and the nature of regulations governing development of the site.

Each of those studies and the numerous sub-decisions that they represent combine to form the basis for the developer's land purchase decision. This is a critical point in the floodplain land conversion process for, as Kaiser and Weiss have observed, "The prior decision to consider the land is anticipatory; the later decision to develop the land is anticlimactic to this decision, for development typically follows within less than five years and probably in a form not much different than the development programmed at the time of purchase" (1970, p. 32).

### Site Development

Although the next stage in the land conversion process--site development--may be anticlimactic in terms of whether or not development will occur in the floodplain, it has implications that are critically important for the ability of floodplain land use management programs to reduce the susceptibility of that development to flood damage. Therefore, we treated site development as a distinct and separate stage in the process. In addition, there is empirical justification for this approach. While in some development decision processes site development is so closely tied to the developer's land purchase decision as to be inseparable from it, in others it is not. Some developers, for example, maintain up to a ten-year inventory of land which is suitable for development (Kenney, 1972, p. 203). Also, site development and building of structures are not always carried out by the same firm. The land developer may subdivide the property and install basic improvements, while a custom builder purchases the finished lot and assumes responsibility for the characteristics of the structure erected on the site.

In terms of the effectiveness of floodplain land use management programs, two related decisions are critical in the movement of land from a state of being considered for development to the site development stage of the process: 1) the land development decision, and 2) the building development decision. The land development decision summarizes a host of related sub-decisions regarding site characteristics of the project. These include decisions about the number and size of lots that will be produced; the location of lots, streets, open space and other community facilities; grading; elevation of lots, streets, and other facilities through filling; and design and installation of streets, water, sewer, storm drainage and other off-site improvements. Each of those sub-decisions can have important consequences in terms of the effectiveness of floodplain land use management and is a logical target of a land use management program.

The implications of the building development decision for the effectiveness

of floodplain land use management are straightforward. On the one hand, if buildings are located outside flood hazard areas, the potential for flood losses is reduced and natural areas and open space values may be preserved; on the other hand, the community may suffer if by locating outside of flood hazard areas, potential buildings and economic activity locate outside the community or region, or if potential floodplain land uses locate at less efficient sites. In the case of building elevations above base flood elevations, the Corps of Engineers has observed, "Flood proofing...can permit economic development in the lower risk areas by holding flood damages and other adverse effects within acceptable limits" (Office of the Chief of Engineers, U.S. Army, 1972, p. 1-1). However, the Corps also noted possible adverse effects of elevation and flood proofing, as follows: "Through a false sense of security, occupants may choose to remain during a flood and risk being stranded or losing their lives....Also, unless correctly used, flood proofing can tend to increase uneconomical use of flood plains" (Office of the Chief of Engineers, U.S. Army, 1972, p. 1-2). Building development decisions may have both positive and negative implications for the effectiveness of floodplain land use management programs, and they may interact with each other. Location should influence design (elevation and floodproofing) and the ability to limit damages through design may affect developers' and builders' locational choices.

### Occupancy

With building construction, the die is more or less cast for the future effectiveness of floodplain land use management programs. Nevertheless, consumers' purchase decisions leading to the next state in the land conversion process--occupancy--are important for a number of reasons. First, the success of developers' and builders' location and construction decisions are determined by consumer decisions; few developers and builders will continue to produce products that are market failures. Second, consumer decisions influence the size of the population locating in floodplains and at risk from flood hazards. Third, consumer decisions determine the characteristics of the population at risk, including 1) the nature and value of damageable personal and business property; 2) the susceptibility of the floodplain population to influence by floodplain land use management programs; and 3) the distribution of a major portion of the costs and benefits of the land use management program. Finally, when aggregated and extended over time, consumer location decisions determine the continued viability of residential neighborhoods and nonresidential uses at particular floodplain locations.

In our previous research, it has been useful to consider consumer location

decisions as the second of a two-stage decision process. The first stage involves the decision to move from the previous location (or to form a new household or business) and almost always precedes the selection of a new home or nonresidential site. This first-stage decision and the reasons for it may have an important bearing on the subsequent choice of a floodplain or flood-free location, since research has shown that one of the strongest predictors of consumer avoidance of flood hazards is previous flooding experience (e.g., James, Laurent and Hill, 1971; Burton, Kates and White, 1975; Kunreuther, 1976). In other words, consumers who are seeking a new location because they have suffered flood losses are less likely to settle in another flood-prone area.

In making the second-stage location decision, which involves the choice of a new house or business site, consumers are likely to be pursuing a variety of objectives. Although one normally would assume that avoidance of flood hazards would be an important factor, it has been found, instead, "...the average person is unlikely to rank freedom from flooding as one of his higher priority objectives unless flooding is manifestly severe or frequent, a major flood has recently occurred, or he has past experience at some other location to make him wary of the problem" (James, Laurent and Hill, 1971, p. 8). Since most persons have little actual experience with flooding and the highly probabilistic nature of the hazard makes it unlikely flooding will be "manifestly severe or frequent," the widespread and increasing occupancy of flood hazard locations should not be unexpected. In deciding to locate in flood hazard areas, households and nonresidential occupants are likely to be assisted by various supporting decision makers, particularly realtors and lenders (Palm, 1981).

### Site Redevelopment/Abandonment

Occupancy is not the final stage of the floodplain land conversion process. Even after structures have been occupied, land use management measures can be used to lessen the potential for losses and other adverse consequences of future flooding. For example, structural floodproofing, mentioned earlier, may be applied after as well as before a building has been occupied. Although Kusler has observed, "...flood plain regulations have generally been ineffective in reducing flood losses to existing uses" (Kusler, 1976, p. 116), interest in post-occupancy applications of floodplain land use management has been increasing in recent years (see Laska, 1986).

Information on most post-occupancy adjustments to minimize potential flood damage is not adequate to estimate the frequency with which such decisions are made. Including both pre- (applied by builders) and post-occupancy measures in his tabulations, Kunreuther found that 36% of the

households interviewed in a national survey of flood hazard area occupants had adopted protective measures (Kunreuther et al., 1978). Laska (1986) asked homeowners in Slidell, Louisiana, whether they had taken steps to mitigate flood hazards. She found that 31% of those who had recently had flooding on their property had taken steps to mitigate the hazard, versus 14% of those who were at risk from flooding but had not actually been flooded.

In comparison with the adoption of floodproofing measures by floodplain occupants, relocation of structures is much rarer. Burton has observed, "Despite the recurrence of floods, earthquakes, droughts, tornadoes, and similar phenomena, human populations have not only occupied hazard zones in large numbers but have almost invariably moved back into such areas after a disaster has occurred, sometimes in greater numbers than before the disaster" (1972, p. 184).

Studies of flood hazard area occupants in the United States have shown that three sets of factors account for households' disinclination to relocate. First, some households move into flood hazard areas knowing of the flood risk because they view the advantages of a floodplain location as outweighing the disadvantages. Others, who occupied a flood-hazard area in ignorance of the risk, report that they would repeat the decision because of the advantages of their particular floodplain location (James, Laurent and Hill, 1971). Thus, comparative advantage is a major factor in continued floodplain occupancy and resistance to relocation. Second, there is evidently lack of concern on the part of floodplain occupants. Research in LaFollette, Kentucky by Kates, for example, led him to conclude, "In the face of community knowledge and experience, there is a variety of personal perceptions of hazard and potential loss that rationally leads managers to ignore the flood hazard (1962, p. 136). Similarly, a study of Davenport, Iowa concluded, "The people living within the area by their own admission were not afraid of being flooded, they were merely afraid of what would happen if they tried to sell their property" (Johnson, 1969, p. 110). Finally, Laska (1986) found little interest in relocation from the hazard area in her study of floodplain occupants in Slidell, Louisiana.

In addition to personal perceptions and choice, a third factor producing resistance to relocation is social rigidity and the stake of economic influentials in the continued use of the floodplain. Singer and Walzer (1975) have observed that floodplains have been favored locations for industrial activity. Roder found in his study of the Topeka, Kansas floodplain, "Economic pressures add to the desire of residents to remain in their homes after a flood event rather than to relocate in a less vulnerable community....Aid is forthcoming only to those who remain in the community" (1961, p. 78).



## **Influences on Land Conversion Decisions**

We view floodplain land use management as an attempt by local governments to influence the probability that property will move from one state to the next in the land conversion processes and, if development does take place, that it will comply with development standards set forth in building and land use regulations. Because the initiative behind decisions which move property through the land conversion process lies in the private sector, the influence of public policy is most often indirect. Land use management programs rarely order a response from decision makers; instead, they seek to achieve desired private sector actions by changing the values of key variables that are considered by target groups in making decisions about floodplain property.

Much previous research on the implementation of public programs has implicitly assumed that if the programs are implemented well, they will achieve the desired policy objectives. However, as Sabatier and Mazmanian (1979) have observed, this ignores the fact that target groups may not behave as policy makers expect or intend. In the case of floodplain building codes, for example, private sector decision makers must weigh a number of alternatives, only one of which is compliance with the regulations: 1) they can avoid compliance by not developing or building at all; 2) they can avoid compliance by developing or building in an area not covered by the regulations; 3) they can avoid compliance by ignoring the regulations; 4) they can avoid compliance by seeking a variance from the regulations; 5) they can avoid compliance by seeking a change in the regulations; or 6) they can comply by developing and building in the manner prescribed by the regulations. The decision maker's choice among those alternatives depends upon the interaction of the land use management program with other factors entering into the decision.

Our previous research on land conversion processes in urban areas points to three sets of variables that have proven useful in explaining the decisions of various target groups: community contextual factors, floodplain property characteristics, and decision maker characteristics.

Community contextual factors include city growth rate, median housing value, and the amount of flood-free developable land within the city limits. Those factors, when taken together, set limits on the overall rate and type of change in a community. As one example of a contextual factor, we hypothesize that floodplain management programs will have a stronger effect on investment decisions in cities with plentiful amounts of buildable land outside the floodplain than in cities where alternative, flood-free building sites are scarce.

Floodplain property characteristics describe the land about which decisions are being made. Two types of property characteristics--physical and locational--may affect target group decisions. Physical (hydrologic and physiographic) factors, such as degree of flood hazard, are inherent in the land and cannot be changed by decision makers except by direct modification of the site itself, such as by adding fill. They affect decisions through their effects on development costs. Whether property has been flooded in the past may also influence perceptions of the development potential of property and the need for actions to mitigate the hazard. Locational characteristics, such as accessibility to employment, on the other hand, are not inherent in the land but stem solely from the relative location of property within the spatial pattern of urban activities in a city or region. Locational characteristics affect land price and the attractiveness of land for urban uses.

Decision maker characteristics may affect the relationships among community contextual factors, property characteristics, and decision outcomes, and hence the impact of floodplain land use management policy. Decision maker characteristics include income and education levels, awareness and perceptions of the flood hazard, and attitudes toward government regulation and oversight of the floodplain.

### **Surveys of Decision Makers**

We conducted mail surveys of landowners, builders and developers, and consumers in the ten cities studied, identified decisions they had made about floodplain property, and analyzed statistically the relative influence of variation in floodplain management policies, community contextual factors, property characteristics, and decision maker characteristics on decision outcomes. We assembled sample frames from tax and other local records during field visits to each community during the spring of 1986. The mail surveys were conducted the following spring using a "total design" survey methodology perfected by Dillman (1978). After a post card reminder and two follow-up letters with replacement questionnaires, we obtained responses from 101 landowners (50% response rate), 106 land developers and building firms (36% response rate), and 105 consumers (58% response rate). Each survey is described in greater detail in the following three chapters (chapters 5, 6, and 7). Copies of the survey questionnaires are provided in Appendix C.

When they are aggregated, landowners', developers' and builders', and consumers' decisions create a market (supply and demand) for floodplain property. To further explore the effects of floodplain management policies, we selected a random sample of 1,008 floodplain parcels that were vacant at the start of the study period in 1976. We measured two land market variables that

provide an indicator of whether policies had an effect on the market for floodplain property: 1) development status (vacant or developed) of the parcels in 1985; and 2) if not developed, their assessed value in 1985. When combined with other data describing parcels' attractiveness for development, statistical analyses enabled us to measure rather precisely the effects of variation in the ten communities' floodplain land use management policies on the two land market indicators. The results are reported in Chapter 8.