A TYPOLOGY OF PLANNING MITIGATION MEASURES AND CONCEPTUAL FRAMEWORK OF LOCAL PLANNING RESPONSE TO HAZARDS

This report outlines a typology of planning mitigation measures and a conceptual framework for the analysis of local earthquake mitigation programs. The typology and framework are based on the literature regarding hazards planning and policy making. While this literature is limited relative to research on individual and organizational behavior immediately before and after a disaster (Drabek 1986), it has advanced enough to provide a conceptual foundation for understanding different local mitigation responses to risk and the factors that might account for such responses.

Pioneering work on hazard mitigation was undertaken through several investigations. One study examined development and growth patterns in hazard prone areas, and first introduced the concept of land use planning as an alternative to building and structural design measures (White 1945). Another focused on the economic and political issues surrounding land use planning, and the extent planning was used by localities (Murphy 1958). Finally, White, et. al. (1958) investigated why certain mitigation measures were preferred over others, and then despite investments in them, why loss was increasing. A key conclusion of these studies is that of all possible mitigation measures, land use planning has the greatest potential to reduce loss from natural hazards.

Subsequent investigations attempted to better understand the process by which localities initiate, adopt and implement mitigation plans and policies (Burton and Kates 1964, Haas and Mileti 1976, Kates 1978, Slovic, et. al. 1974 and White 1974). All these studies point to the complexities of planning and policymaking. All maintain that planning is not strictly a technical exercise, but is intensely political as well. Furthermore, all suggest that the process is

altered by inaccurate appraisals of risk, inadequate time and resources of decision makers to devote to complex problem solving, and multiple and conflicting preferences of affected groups.

Much of the recent literature has focused on two general approaches to understanding hazards policymaking -- planning content and planning process. The content perspective focuses on both the specification of planning measures available for mitigation and how such measures can be packaged into politically acceptable and technically effective mitigation strategies (Burby and French 1985, Burton, et. al. 1978, Cochran 1975, Drabek, et. al. 1983, Godschalk, et. al. 1989, May and Bolton 1986, Mileti, et. al. 1975, Olson and Nilson 1982 and White and Haas 1975). The process approach examines the process through which organizational policy decisions are made, and emphasizes understanding factors, such as support of elected officials, demands of powerful interest groups, and program financial resources, that influence the outcomes of the process (Alesch and Petak 1986, Berke 1989, Burby and French 1981, 1985, Ender 1988, Faupel and Bailey 1989, Kartez and Lindell 1987, Kunreuther, et. al. 1984, Lambright 1984, Mileti 1980, Mittler 1988, Mushkatel and Nigg 1987a, 1987b, Rossi, et. al. 1982 and Wyner and Mann 1986).

Studies on hazards planning and policy have focused on either the process or content approach, but not both. As a result, there are two shortcomings in the hazards planning and policy literature. First, while the process literature focuses on factors that influence plan policymaking, existing conceptual frameworks in this literature (c.f. Lambright 1984 and Mileti 1980, pp. 335-342) do not examine how specific planning measures can be combined into viable mitigation strategies. This poses a major problem for determining how various measures might be used given variations in factors that comprise different decision making environments. Second, the content

literature generally does not account for the temporal dimension of plan strategy-building (Drabek, et. al. 1983, and Olson and Nilson 1982). A viable planning strategy should have different characteristics at different times given changes in environmental factors. For example, due to increased support from elected officials a voluntary strategy is revised, as an incentive measure is incorporated into the strategy to further entice target group compliance.

In addition, a third shortcoming in the hazards planning and policy literature is that existing conceptual frameworks tend to underestimate the capacity of public agencies to influence the planning process. While most process studies discuss the importance of program resources, past experience with disasters, and characteristics of the spatial distribution of development in hazardous areas, among others, they neglect the ability of public agencies to provide strong support for those who advocate mitigation, develop cooperative relationships with other organizations, and raise hazard issues on the public agenda. As mentioned, the content literature explores the characteristics of mitigation strategies, but does not focus on how political, economic and administrative factors influence strategy formulation.

The first two limitations discussed above are addressed in the conceptual framework presented in this paper by combining the process and content approaches. On the one hand, knowledge of planning strategy characteristics enhances the understanding of how to formulate appropriate strategies for different decision making environments. On the other hand, knowledge of the dynamics of such environments improves the understanding of how to adapt mitigation strategies to assure their viability over time. Used together, the approaches give a more complete understanding than any single one of public planning responses to hazards. Finally, the conceptual framework will

address the third limitation. A set of factors that reflect the capacity of public agencies to influence the planning process will be derived.

The remainder of this report will draw on hazards policy process and content literatures to develop a conceptual framework for understanding public agency response to risks posed by hazards. More specifically, the report examines the characteristics along which planning measures might be classified, the process by which such measures are used to formulate, adopt and implement mitigation strategies, and the factors that can facilitate or constrain this process.

A Typology of Planning Mitigation Measures

Localities can take a variety of actions to reduce loss of life, damage to the built environment, and social and economic disruption. These actions comprise a range of planning measures (incentives, regulations, and informational) that can be used for mitigating risks posed by hazards. Some measures are widely practiced, others are used infrequently, but hold considerable promise for application in mitigation (Godschalk and Brower 1985).

A locality's strategy for mitigation can be found in the actions it takes to influence the future design, density, timing, and spatial location of development. The strategy can be determined by identifying the various combinations of planning measures used by the locality. An understanding of the appropriate combination of measures in response to variations in interest group demands, budgetary constraints, hazard characteristics, and technical and administrative capacity is crucial for undertaking successful mitigation efforts (Olson and Nilson 1982).

The range of planning measures that could be used in formulating a mitigation strategy can be classified into three broad categories -- regulatory, incentive and informational. The typology is based on the work of May and Bolton (1986). They describe the three categories, as follows: 1) regulatory measures are coercive in that they attempt to control the activity of specific interest groups; 2) incentives measures are non-coercive in that they aim to reduce rather than require, desired development; and 3) informational measures enable people who might deal with hazards to make informed decisions. May and Bolton's typology effectively characterized the diverse range of measures and thus provides a basis for exploration of local mitigation response to hazards. The following are examples of measures representative of each response category:

Regulatory - building code provisions for new construction, hazardous building retrofit provisions for old construction, subdivision codes, zoning, critical facility permits, and lifeline location restrictions;

Incentives - purchase of development rights, capital improvement programs, property acquisition, and taxation schemes; and

Informational - hazards area impact reviews, real estate disclosure requirements, comprehensive and reconstruction plans, and building construction workshops.

Furthermore, this typology can be useful in understanding local response over time. Specifically because local mitigation programs typically operate in dynamic environments that impose numerous rapidly changing demands, mitigation strategies must be adapted over time to remain viable (May and Bolton 1986, Olson and Nilson 1982, and Sorensen and White 1980). For example, a building retrofit strategy in Provo, Utah had to be modified to reflect changes in the local economy (May and Bolton 1985). That is, what began as a regulatory strategy became ineffective because of the inability of

building owners to cover retrofit costs as a result of a decline in local economic performance. Thus, to enhance building owner compliance the local retrofit program incorporated incentive measures (e.g., low interest loans and development density bonuses) to the overall strategy.

How does this typology relate to other work on plan and policy content? As noted earlier, the typology provides a basis for understanding a range of possible mitigation responses, whereas much of previous research has not deciphered the characteristics of such responses. Thus, the typology can help determine which measures are likely to succeed or fail given variations in local political and economic conditions, as well as administrative capacity. Also the typology can be used to account for the dynamics of mitigation responses. As mentioned, previous research does not provide insight into how strategies can be adapted to maintain technical, political and economic viability.

Planning Process

Until the 1970's the traditional view of hazards mitigation planning and the policy process was premised on a theoretical model that approximated Simon's "rational man" (1957). Slovic, et. al. (1974) proposed, for example, that if participants involved in hazards policy decisions followed such a model they would: 1) clearly define goals; 2) set objectives that would specify measurable achievement of goals; 3) collect information on all possible policy alternatives and associated costs and benefits; and 4) select an alternative or mix of alternatives that provides maximum achievement of public goals at minimum public costs.

The rational mode of planning does not accurately depict reality. A number of studies characterize the process quite differently. Studies of

community planning and risk management focused on the structure of power and influence as keys to understanding the planning and policy process (Faupel and Bailey 1989 and Kunreuther, et. al. 1984). One of the most important conclusions of these studies was that different groups pursue their own goals rather than some simplified community-wide goals that attempt to optimize public welfare. These studies also strongly substantiate March and Simon's (1958) work on organizational behavior, which maintains that the ability of human beings to process information is more limited than the rational approach would prescribe. People are unable to canvass many alternatives, keep them simultaneously in their minds, and compare them systemically.

Other recent empirical studies of state (Drabek, et. al. 1983, Lambright 1984 and Mittler 1988) and local (Ender, et. al. 1987, Carter and Lindell 1987 and Wyner and Mann 1985) hazards mitigation planning have criticized the rational approach. These studies point to the complexities of planning and the constraints on rationality. These studies characterize successful planning as both technically and politically motivated. Accordingly, key activities for success are process oriented or procedural (e.g., coalition building, interorganizational communication, and leadership).

Another line of criticism of the rational planning model stems from analysis of local seismic retrofit policy (Alesch and Petak 1986). Similar to the work of Cohen, et. al. (1972) and Kingdon (1984) in organizational decision making under uncertainty, Alesch and Petak's study criticizes the orderly, sequential nature of the rational model. These researchers' characterization of planning suggests that people do not clearly recognize hazards problems first then seek solutions to them. The processes of problem definition and solution development did not occur in sequence. Problems and solutions

existed independently. Some problems had no apparent solutions, and some solutions were suggested without having a matching problem.

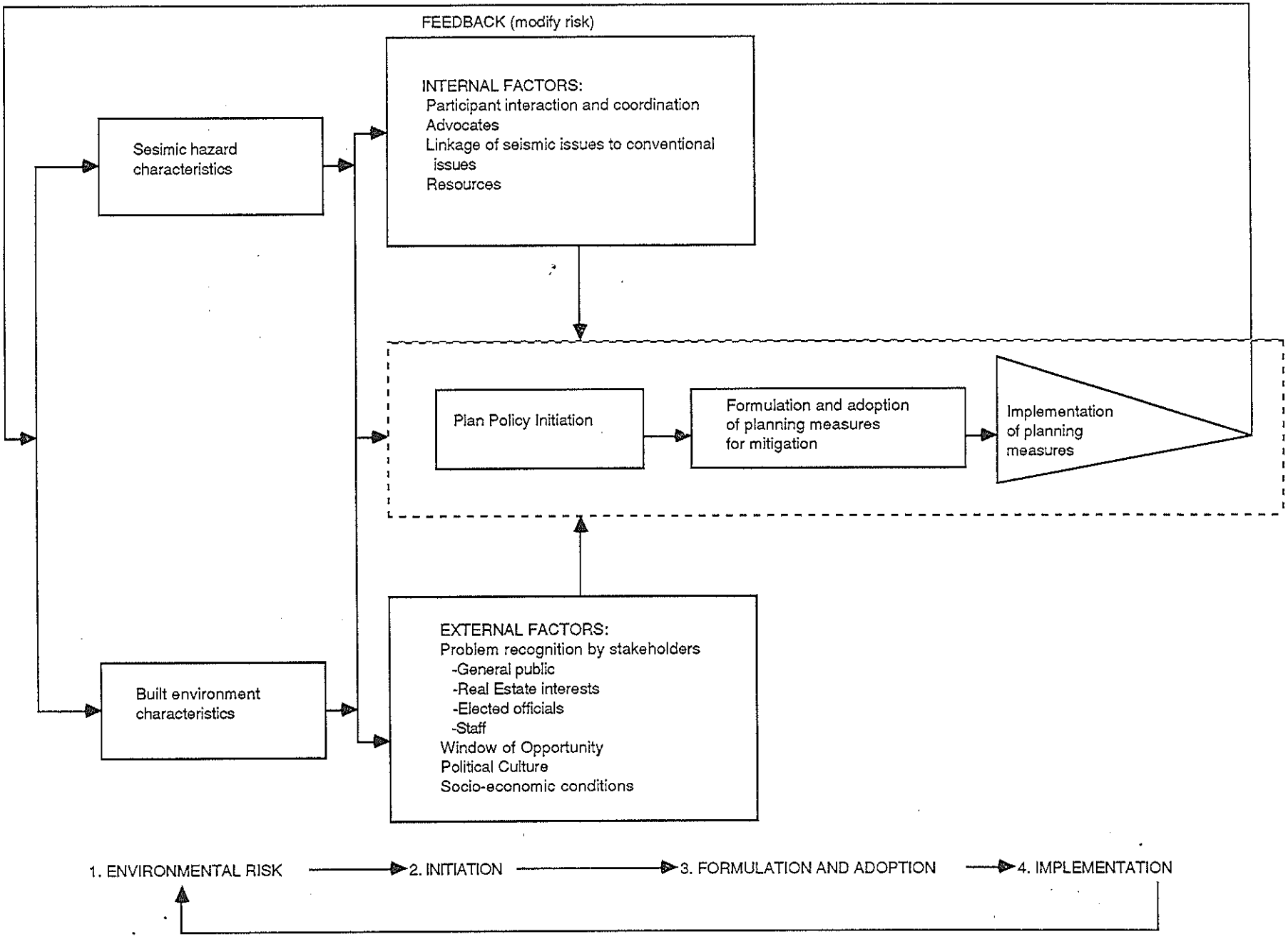
In sum, for most planning efforts concerning mitigation, the process by which plans and policies are adopted and implemented does not conform to the rational approach. Instead the process tends to reflect the characteristics discussed above. There are also a variety of factors that can facilitate or constrain this process as will be discussed below.

Local Planning Response to Hazards

As illustrated in Figure 1, the process of local response to hazards consists of four stages. The first stage is *environmental risk*. Risk is the threat to life, health and property as a potential consequence of a given hazardous event, such as an earthquake (Fischoff, et. al. 1981). It is produced by interaction between seismic hazards and the built environment. Environmental risk determines the character of the next three stages of the process.

The second stage is *policy initiation*. Initiation involves efforts to place the risk problem on the governmental agenda. Once on the agenda the risk problem is likely to receive an active consideration of authoritative decision makers (Kingdon 1984). Specifically, achieving agenda status means getting hazard issues on city council calendars, on a priority list for bill introduction by an elected official, or on the schedule of a public agency. However, achieving agenda status is not easy. High consequence, infrequent events like earthquakes are typically given low priority by public officials and their constituents as immediate day-to-day problems (e.g., traffic congestion, crime and jobs) are commonly viewed as more important.

FIGURE 1: CONCEPTUAL FRAMEWORK OF PLANNING RESPONSE TO EARTHQUAKE HAZARDS



The third stage involves *formulation and adoption* of planning measures. These measures set the direction in local government efforts to guide development in seismic areas. In formulating the appropriate combination of measures, public officials seek strategies that balance expected risk, effectiveness in reducing risk, political acceptability to various interest groups and cost. The decisions within this stage implicitly answer the question, "What is an acceptable level of risk?" If a mitigation proposal is considered technically feasible, accommodates the main concerns of influential interest groups, and loss levels are acceptable then the proposal is adopted. If a proposal is not viable, either a different combination of measures is reintroduced or no action is taken.

The final stage of the process involves *implementation* of adopted measures. Plans and policy measures remain largely statements of intention until they are translated into operational programs. Indeed, the impact of such measures depends upon how they are implemented. Thus, what government is doing about risk problems relates to how the programs have been implemented (May and Williams 1986). The effectiveness of implementation will dictate the degree of change in one or a combination of seismic hazard and built environment characteristics. These changes alter the potential risk levels which can require renewed or continued planning efforts to mitigate environmental risk.

In addition, Figure 1 indicates two categories of factors that influence stages two through four of the plan policy process[1]. First, internal factors represent activities (interorganizational communication and coordination, advocacy, provision of resources, and linkage of hazards to conventional activities) that can be undertaken by public officials to advance mitigation. These activities comprise the capacity of public agencies to influence the

planning process. As mentioned, previous research tends to neglect public agency capacity to advance mitigation programs. Second, external factors (e.g., problem recognition by stakeholders, past disaster experience, political cultural and socioeconomic conditions) comprise the environment within which planning operates. Of key importance to this study is the balance of influence between these categories of factors. If a locality has a high capacity to advance mitigation then its policies will reflect the intentions of its participants. In contrast, if external factors predominate, then a locality's mitigation efforts will be far less relevant and its policies will arise from environmental circumstances instead of its own actions.

Plan and Policy Influencing Factors

In this section we derive both internal and external factors. These two categories serve well to integrate the findings of recent research in hazards planning and policy making.

Internal Factors

Participant interaction. Participants are players in a given public planning arena. Some players are elected officials. Others are government specialists, such as emergency management or city planners. Still others represent real estate or environmental interests.

Participant interaction varies tremendously from one public arena to another. Some arenas are tightly knit and interaction is frequent and sustained. The capacity to diffuse, adopt and implement planning innovations is high. Other arenas are more diverse and fragmented. Participant interaction in planning activities tends to be infrequent and transitory. The potential for enactment of innovations in loosely knit arenas is low.

The literature on hazards policy process (Berke 1989, Drabek, et. al. 1983 and Mileti 1980) suggests that when high levels of interactions are maintained, participants share common information, generate common outlooks and ways of thinking. They become more aware of the interests and activities of others. Issues of local concern, for instance, have a greater chance to be communicated to state and federal government agencies. Technical and financial support from high levels of government are more likely to fit the specific needs of localities. There is more opportunity for bargaining, compromise, and the chances for adoption and implementation of acceptable planning policies for a broad range stakeholders increases.

The consequences of public planning without substantial interaction among stakeholders have been addressed by several hazards planning studies. Ender, et. al. (1988), for one, suggests that traditional comprehensive planning relies on expert knowledge and does not incorporate the values and spirit of the community. Reliance on experts does not induce commitment and participation because it eliminates a need for various participants to come together and work to solve problems in the cooperative spirit that forms community cohesion. In addition, Rohe and Gates' (1985) work on neighborhood planning maintains that because the business community has city-wide interests and is usually organized, it often participates to a much greater extent relative to other stakeholder groups. Downtown merchants, for instance, are accustomed to monitoring local issues that may affect their interests. They become involved with any given proposal at the early stages of discussion and understand its consequences on their interests early on. In contrast, members of the general public tend to become aware that something is afoot and then take some time to organize. Thus, traditional comprehensive planning has tended to favor commercial interests over those of residents.

In the area of natural hazards, Drabek, et. al. (1983) investigated seismic mitigation activities in Missouri and Washington, two states at risk to earthquakes. A key study finding was that numerous seismic activities were placed on the public agenda in Washington, while few were placed on the agenda in Missouri. These researchers contend that an important factor that explains this difference in activity is the extent of interaction among key participants. Interaction in Washington was sustained and frequent. It was sporadic and infrequent in Missouri. They concluded that the energies, skills, and values each participant brings into the arena are needed to identify relevant issues and consequences of alternative solutions that would otherwise be neglected by a fragmented public arena.

Presence of advocates. Advocates are those participants in the planning process willing to invest their resources -- time, energy and money -- to assure that a particular problem is raised on governmental agendas and is given more attention than others. Advocates can be a moving force in planning (Lambright 1984). They can be found in many locations in a given public arena, such as a local government planner or a seismologist from a private consulting firm.

The most critical characteristics that contribute to the success of advocates, according to Kingdon (1984), are expertise in the subject area, political skill in forming coalitions around a given proposal and most important, persistence. On this last factor, Kingdon contends that persistence implies a willingness to invest substantial resources over a long period of time to create a political climate receptive to change.

In the natural hazards field, Alesch and Petak (1986) examined the influence of advocates in advancing earthquake mitigation in three California communities. A major conclusion of this study was that the presence of strong

advocates was a key factor in stimulating adoption of a seismic retrofit ordinance. Advocates played a strong role in formulating an acceptable ordinance that dealt with a variety of stakeholders, ranging from low income tenants to building owners. Another conclusion was that "muddling through" tends to be the prevailing mode of planning, with periodic spurts of activity largely attributable to persistent efforts of advocates.

Several hazards policy studies (e.g., Berke 1989, Lambright 1984 and Olson and Nilson 1982) recommend that scientists, planners and public officials in general should act as advocates for those groups and issues that typically are underrepresented in public planning. These studies found that plans are often expressions of values of a few powerful special interests and do not meet the needs of the general public at risk to hazards. A key conclusion of these studies is that public officials should advocate alternative proposals for underrepresented clients and issues in the public arena. The very act of advocacy was found to clarify assumptions and enhance communication, which enabled judgements about potential consequences to be assessed more accurately. Thus, the advocacy role is educational as those that are underrepresented learn about their rights, opportunities, and resources in the context of the public debate.

Linkage to well-established precedents. There are times, with the passage of landmark legislation or the adoption of a decision by a public agency to use a particular planning innovation, when precedent is established. Once that occurs, planning and its attendant policies in that arena is never quite the same. Establishing a precedent does not necessarily imply that a policy or program actually has taken a dramatic new turn, at least in the short run. The step might or might not be small; the importance of such events lies in their precedent setting nature. Precedents are important

because people become accustomed to the new way of doing things and build new practices into their standard operating procedures. Inertia sets in, and it becomes difficult to divert the system from its new direction.

Once a precedent is established in one arena, it can be used to gradually open windows and further similar change in another arena that is like the first in some way. For example, passage of structural flood control legislation in the 1930's resulted in legislation for flood hazard mapping and nonstructural floodplain management, dam inspection, coastal land use planning, earthquake prediction technology, and other diverse fields (Clary 1985).

Spillover is promoted when advocates are persistent in their efforts and use their expertise to develop linkages. Establishing such linkages requires that for an issue to progress from one arena to another it must be linked to an issue in another arena. In other words, the two issues need to be placed in the same category of public concern. For example, people may easily move from one issue (e.g., adverse environmental impacts from rapid urbanization) to the next (e.g., impacts of new development on hurricane evacuation times) because they are linked to the common category of "urban growth." Beatley and Godschalk (1985) and Godschalk, et. al. (1989), maintain that natural hazard mitigation efforts can be advanced by linking mitigation issues to traditional local development management measures. Measures guiding development would then be applied to mitigation, and, in turn, the feasibility of hazard mitigation would be enhanced because of integration with politically acceptable development management measures. Thus, the two activities would cease to operate as separate administrative functions.

Availability of resources. Planning proposals can wax and wane according to availability of resources. Resources can be monetary or

nonmonetary. Monetary resources can be translated into additional staff, studies on geology or structural engineering, and outside consulting assistance. The principal nonmonetary resources for hazard mitigation activities would be staff time.

When resources are provided, efforts to evaluate problems and to generate alternatives can be undertaken. These efforts can lead to an improved understanding of risks and an increased likelihood that a viable proposal can be formulated for adoption. Moreover, provision of resources during the early stages of planning can have a significant impact when participants are most open to suggestions. That is, if there is a significant knowledge base about both problems and their potential solutions at the outset, it is less likely that initial decisions will constrain future viable courses of action.

Resources for seismic mitigation, however, usually are not adequate. Drabek, et. al. (1983) and Wyner and Mann (1986) suggest that modest or nonexistent allocation of resources is a major contributor to the low levels of accomplishments by communities. These studies maintain that when resource constraints are severe, efforts to undertake seismic mitigation activities have been virtually paralyzed.

External Factors

Problem recognition. Risk perception about hurricanes is crucial to setting the public agenda. There must be a perception that the current situation reflects a disparity between what is and what ought to be. The chances of a problem being given high priority in public planning forums is markedly enhanced if the problem is perceived to involve potentially catastrophic loss of people and property.

Participants in the public arena attend to a long list of problems. Local government officials in earthquake prone communities, for example, could be investigating the costs of providing public infrastructure (e.g., roads, sewer, water systems), deficiencies in the local job market or safety issues related to earthquakes. While developers may be concerned for the safety of residents, they are likely to be more worried about the immediate economic implications if they are required to spend money to meet new development or land use codes. Obviously, each participant gives attention to some problems and ignores others.

In the case of low probability/high consequence events like earthquakes, achieving high agenda status is not easy, as people typically place a low value on such events. It is difficult to convince key decision makers to devote time and attention to working on a low-probability problem, when the public agenda is full of generally acknowledged problems that are viewed by constituents as more pressing and important (Alesch and Petak, 1986). This situation is particularly true when low-probability problems generate immediate political and economic costs, but the benefits are long-term.

Kingdon (1984) indicates two key ways in which a problem captures the attention of participants. Sometimes their attention is affected by a systematic indicator that shows there is a problem. Indicators abound in public arenas because both governmental and nongovernmental agencies routinely monitor various activities and events. Indicators may suggest problems ranging from a declining number of jobs in a local economy to rising crime rates. In the case of earthquake hazards, indicators might include reports that indicate dam safety problems or structurally inadequate critical facilities such as schools

and hospitals. This information can raise awareness about the risk and draw attention to the need for action.

A second way is a focusing event. Problems associated with low probability/high consequence events are often not self-evident by indicators. They need a push to get attention of people. The push in the case of natural hazards is provided by a disaster event that calls for immediate attention. Such an event moves key participants from general awareness to action oriented decision making (Abney and Hill 1966, Godschalk, et. al. 1989, Mileti 1980 and others).

Window of opportunity. Cohen et. al. (1972) indicate that windows are occasions during which a problem becomes pressing, creating an opportunity for advocates of proposals to push them as solutions. In the natural hazards field windows are opened by a disastrous event such as an earthquake.[2] If proposals are ready, the disaster provides an opportunity to argue for enactment.

Once the window opens, however, it does not stay open long. If solutions are not enacted quickly the window closes. The disaster that prompted the window to open will pass from the scene. A crisis event by its nature is of short duration. People can stay excited only for so long. Plan proposals must develop well in advance of the time when the window opens. Without earlier consideration, decision makers cannot take advantage when it opens.

Alesch and Petak's (1986) study of local efforts to enact seismic mitigation building codes found that when the 1971 San Fernando Valley earthquake occurred, local officials in Long Beach were prepared. They were aware of the problem, a solution was already available due to recommendations from a consulting report on retrofitting, and key advocates were poised for an intensive effort (Alesch and Petak 1986). In Los Angeles local officials were

not prepared when the window opened. It took 14 years before another window opened -- the 1985 Mexico City earthquake. This time, however, Los Angeles officials were ready. Immediately after the earthquake, while elected officials' and publics' memory of television reports about the disaster was still vivid, a stringent seismic building retrofit ordinance was adopted.

Social and economic conditions. There are two ways in which these conditions can influence local support for new initiatives and, hence, the degree of success in formulating viable solutions for seismic hazards problems (Bryson 1983). First, social and economic conditions reflect overall community wealth, and the availability of resources to carry out new initiatives (Alterman and Hill 1978, and Burby, et. al. 1985). A prosperous community with a growing fiscal capacity (high income level of residents, and a growing economy and tax base) makes possible governmental innovation that would be nearly impossible in times of economic stagnation and tax base erosion. Tight fiscal conditions lead public and private groups to be conservative, to protect what they have, and to avoid big changes. Many proposals fail to obtain serious consideration because the future looks bleak.

A prosperous community, however, creates slack resources which free up organizations. Governmental agencies may have more opportunities for experimentation and more resources to sink into the production of innovations. Real estate developers are likely to be more willing to absorb unproductive costs, e.g. seismic retrofit of buildings. Thus, proposals have a better chance to survive because they are obtainable given expected fiscal conditions.

Social and economic conditions may also reflect perceived needs for public action related to hazard mitigation (Kunreuther, et.al. 1984, ch. 8, Rowe 1977 and Wyner and Mann 1986). There may be objective facts about such

things as extent of expected damages or loss of life from earthquakes, but needs for hazard mitigation are also subject to interpretation. In affluent communities, the costs of hazard mitigation may be viewed as acceptable given the benefits of loss reduction. In communities of low affluence, the costs of mitigation are of greater concern and are likely to be found unacceptable. There is thus no absolute level of acceptable loss; rather, there could be a close relationship between the question of acceptability of loss and the social and economic setting in which losses might occur.

Political culture. This factor reflects prevailing local attitudes toward private property and government regulation of private development actions. Various cultural perspectives on property and regulations among different localities can cause substantial variation in influence on local response to environmental risk. Particularly affected are those planning measures which involve regulation of private property rights to the use of land (Petak and Atkisson 1982).

The effects of conservative attitudes toward regulation of development rights are exacerbated by the timing and distribution of the benefits, and costs associated with such regulatory approaches. As Baker and McPhee (1975) observe, land use planning measures are often not feasible because of the long time span before benefits can accrue. Often benefits cannot be "seen" by the public. Moreover, many types of measures, such as zoning and subdivision controls, involve short-term costs. It is difficult for public officials in a conservative political climate to endure short-term political costs, when weighed against more indefinite and long-term community benefits.

Pioneering work by Banfield and Wilson (1963) suggests that the extent to which constituents hold "public regarding" values strongly influences the degree of support that constituents give beyond their narrow self-interest.

These researchers found that when such values exist, constituents are likely to support expenditures that do not benefit them directly. Elazar (1966) expanded the notion of political culture by identifying three political cultures, each with distinctive characteristics and implications for government and politics: individualistic; moralistic; and traditionalistic. Elazar (1966) defines the individualistic political culture as emphasizing "...the centrality of private concerns, it places a premium on limiting community intervention -- whether governmental or nongovernmental -- into private activities to the minimum necessary to keep the marketplace in proper working order (pp. 86,87)." The traditionalistic political culture supports some government intervention, but primarily maintains existing political and social relations.

In contrast to the above two forms of political culture, and particularly the utilitarian and reactive individualistic culture, is the moralistic culture. Here politics is considered as an activity intended to promote the public interest and the good of society. Elazar (1966) suggests that this form of political culture "...creates a greater commitment to active government intervention into the economic and social life of the community (p. 92)." Public officials initiate new governmental activities to tackle problems that are often not perceived by the majority of the citizenry.

In sum, localities characterized as less public regarding, more individualistic, and more private property-oriented, will tend to give less support to hazard mitigation. In such localities the priority given to hazard issues is likely to be low, and mitigation program activities will tend to be very limited.

Conclusions

This report presented a typology of planning mitigation measures and a conceptual framework for understanding the dynamics of planning for earthquake mitigation. The typology can help determine which measures are likely to succeed or fail given variations in a range of technical, economic, and political factors. It can also provide insight into how mitigation strategies can be adapted when such factors change over time.

An essential premise of the conceptual framework is that planning in turbulent environments, like the public arena of earthquake mitigation, does not necessarily follow the simplified, orderly, sequential process of the rational approach. Decision makers discover preferences through action more than act on clearly defined goals. Decisions require considerable judgement, and are often made without full knowledge of the consequences of alternative proposals.

To explain the dynamics of public planning, the framework consisted of a sequence of four stages: environmental risk; plan policy initiation; plan policy formulation and adoption; and plan policy implementation. Internal and external factors that shape the evolution of planning policies for mitigation were derived. Of particular interest are the internal factors which comprise the capacity of public agencies to achieve their intentions. These factors represent those activities that can be undertaken by public agency staff to advance mitigation programs. The balance of influence exerted by internal and external factors determine the extent local public organizations determines their own plans and policies.

Finally, the typology and conceptual framework were used to interpret the survey and local case data as part of a larger study associated with this report. The mail survey covers communities in the 22 states that contain high

hazard earthquake zones. Forty follow-up telephone surveys of localities were selected from those included in the mail survey to review a range of mitigation measures. Three follow-up case localities were selected from those surveyed for more detailed analysis.

Notes

1. The two categories of factors -- internal and external -- were introduced by Weschler and Backoff (1987) in their study on strategy making by public officials.

2. Alesch and Petak (1986), Cohen, et. al. (1972) and Kingdon (1984), among others suggest that windows of opportunity can open not only by crises like earthquakes, but through other events. These events might include passage of a state mandate requiring localities to undertake a specific activity (e.g., preparation of a seismic element for local comprehensive plans) or the election of a politician with a new agenda.

References

Abney, F. and L. Hill. 1966. Natural Disasters as a Political Variable: The Effect of a Hurricane on an Urban Election. American Political Science Review, Vol. 60, No. 4.

Alesch, D. and W. Petak. 1986. The Politics and Economics of Earthquake Hazard Mitigation. Boulder, CO: University of Colorado, Institute of Behavioral Science.

Alterman, R. and M. Hill. 1978. Implementation of Urban Land Use Plans. Journal of the American Institute of Planners, Vol. 44, No. 4.

Altshuler, A. 1965. The City Planning Process. Ithica, NY: Cornell University Press.

Baker, E. and J. McPhee. 1975. Land Use Regulations in Hazardous Areas: A Research Assessment. Boulder, CO: Institute of Behavioral Science, University of Colorado.

Banfield, E. and J. Wilson. 1962. City Politics. New York: Vintage Books.

Beatley, T. and D. Godschalk. 1985. Hazard Reduction Through Development Management in Hurricane Prone Localities: State of the Art. Carolina Planning, Vol. 11, No. 1.

Berke, P. 1989. Hurricane Vertical Shelter Policy: The Experiences of Florida and Texas. Journal of Coastal Management, Vol. 17, No. 3.

Bryson, J. 1983. Representing and Testing Procedural Planning Methods. I. Davis, (ed.), Evaluating Urban Planning Efforts, Aldershot, England: Gower Publishing Co., Ltd.

Burby, R. and S. French. 1981. Coping with Floods: The Land Use Management Paradox. Journal of the American Planning Association, Vol. 47, No. 3.

_____. 1985. Flood Plain Land Use Management: A National Assessment. Boulder, CO: Westview Press, Inc.

Burton, I. and R. Kates. 1964. The Perception of Natural Hazards in Resource Management. Natural Resources Journal, Vol. 3.

Burton, I., R. Kates and G. White. 1978. The Environment as Hazard. New York: Oxford University Press.

Clary, B. 1985. The Evolution and Structure of Natural Hazard Policies. Public Administration Review, Vol. 45.

Cohen, M., J. March and J. Olsen. 1972. A Garbage Can Model of Organizational Choice. Administrative Science Quarterly, Vol. 17.

Drabek, T., A. Mushkatel, and T. Kilijarrel. 1983. Earthquake Mitigation Policy: The Experience in Two States. Boulder, CO: University of Colorado, Institute of Behavioral Science.

Drabek, T. E. 1986. Human System Responses to Disaster: An Inventory of Sociological Findings. New York: Springer-Verlag.

Elazar, D. 1966. American Federalism: A View From the States. New York: Crowell Company.

Ender, R. L., J. C. Kim, L. L. Selkregg and S. Johnson. 1988. The Design and Implementation of Disaster Mitigation Policy. In Managing Disaster, edited by L. Comfort. Durham, NC: Duke University Press.

Faupel, C. and C. Bailey. 1989. Movers and Shakers and PCB Shakers: Hazardous Waste and Community Power in a Rural Community. Paper presented at the Mid-South Sociological Association meeting. Baton Rouge, Louisiana.

Fischoff, B., S. Lichtenstein, P. Slovic, R. Keeny and S. Derby. 1981. Acceptable Risk, Cambridge, U.K., Cambridge University Press.

Godschalk, D. and D. Brower. 1985. Mitigation Strategies and Integrated Emergency Management. Public Administration Review. Vol. 45.

_____, D. Brower and T. Beatley. 1989. Catastrophic Coastal Storms: Hazard Mitigation and Development Management. Durham, NC: Duke University Press.

Haas, H. J. and D. S. Mineti. 1976. Socioeconomic Impact of Earthquake Prediction on Government, Business and Community. California Geology, Vol. 30, No. 37.

Kartez, J. and M. Lindell. 1987. Planning for Uncertainty: The Case of Local Disaster Planning. Journal of the American Planning Association. Vol. 53, No. 4.

Kates, R. 1978. Risk Assess of Environmental Hazard. New York: John Wiley & Sons.

Kingdon, J. 1984. Agendas, Alternatives and Public Policies. Boston, MA: Little, Brown and Company.

Kunreuther, H. and J. Linnerooth. 1984. Risk Analysis and Decision Processes. NY: Springer-Verlag.

Lambright, H. 1984. Role of States in Earthquake and Natural Hazards Innovation at the Local Level of Decision Making. A report to the National Science Foundation. Syracuse, NY: Syracuse Research Corporation.

Lowi, T. 1964. American Business, Public Policy, Case Studies and Political Theory. World Politics. Vol. 16.

March, J. G. and H. Simon. 1958. Organizations. NY: John Wiley and Sons.

May, P. and W. Williams. 1986. Disaster Policy Implementation. Managing Programs Under Shared Governance. New York: Plenum Press.

_____ and P. Bolton. 1986. Reassessing Earthquake Hazard Reduction Measures. Journal of the American Planning Association, Vol. 52, No. 4.

Mileti, D., T. Drabek, and J. Haas. 1975. Human Systems in Extreme Environments: A Sociological Perspective. Boulder, CO: University of Colorado, Institute of Behavioral Science, Monograph 2.

Mileti, D. 1980. Human Adjustment to the Risk of Environmental Extremes. Sociology and Social Research, Vol. 64.

Mittler, E. 1988. Agenda-setting in Nonstructural Hazard Mitigation Policy. In Managing Disaster, edited by L. Comfort. Durham, NC: Duke University Press.

Murphy, F. C. 1958. Regulating Flood Plain Development. Chicago: Department of Geography, Research Paper #56, University of Chicago.

Mushkatel, A. H. and J. M. Nigg. 1987a. Opinion Congurence and the Formulation of Seismic Safety Policies. Policy Studies Review, Vol. 4, No. 6.

_____. 1987b. The Effect of Objective Risk on Key Actor Support for Seismic Mitigation Policy, Environmental Management, Vol. 11, No. 1.

Olson, R. S. and D. Nilson. 1982. Public Policy Analysis and Hazards Research: Natural Compliments. The Social Science Journal, Vol. 19.

Petak, W. and A. Atkisson. 1982. Natural Hazard Risk Assessment and Public Policy. New York: Springer-Verlag.

Rossi, P., J. Wright and E. Weber-Burdin. 1982. Natural Hazards and Public Choice: The State and Local Politics of Hazard Mitigation. New York: Academic Press.

Rohe, W. and L. Gates. 1985. Planning with Neighborhoods. Chapel Hill, NC: The University of North Carolina Press.

Rowe, W. 1977. Anatomy of Risk. NY: John Wiley and Sons.

Slovic, P., H. Kunreuther and G. White. 1974. Decision Processes, Rationality and Adjustment ot Natural Hazards. In Natural Hazards: Local, National, Global, edited by G. White. New York: Oxford University Press.

Sorensen, J. and G. White. 1980. Natural Hazards: A Cross Cultural Perspective. In Human Behavior and the Environment, edited by I. Altman, A. Papaport and J. Wohwill. New York, NY: Plenum Press.

Weschler, B. and R. Backoff, 1987. The Dynamics of Strategy in Public Organizations. Journal of the American Planning Association, Vol. 53, No. 1.

White, G. F. 1945. Human Adjustment to Floods. Chicago: University of Chicago, Department of Geography, Research Paper No. 29.

White, G. et. al. 1958. Changes in Urban Occupancy of Flood Plains in the United States. Research Paper No. 57. Chicago, IL: University of Chicago, Department of Geography.

White, G. 1974. Natural Hazards: Local, National, Global. New York: Oxford University Press.

_____. and E. Haas. 1975. Assessment of Research on Natural Hazards. Cambridge, MA: MIT Press.

Wyner, A. and D. Mann. 1986. Preparing for California's Earthquake. Berkeley, CA: University of California - Berkeley, Institute of Governmental Studies.