THE INFLUENCE OF SOCIAL, ECONOMIC, ORGANIZATIONAL, AND POLITICAL VARIABLES ON EARTHQUAKE HAZARD REDUCTION POLICY

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SUMMARY

This paper identifies, describes and illustrates the impacts of key social, economic, organizational and political variables on public policy for earthquake hazard reduction in the State of California.

Specifically discussed are policy responses to historical California earthquakes, factors apparently facilitating or inhibiting policy and program development, the basic principles of key programs, and jurisdictional and organizational relationships important to understanding the administration and enforcement of hazard reduction programs. Also presented is a summary of policy goals to guide future earthquake safety efforts.

INTRODUCTION

The translation of technical knowledge into effective public safety programs is a difficult, complex, controversial, and somewhat opportunistic process involving the dissemination and implementation of that knowledge throughout society. Society is composed of many elements, and for purposes here these include interest groups, professional associations, influential professionals, governmental agencies, legislative bodies, and others which appear periodically and influentially in the decision-making process.

As far as public policy for the reduction of earthquake hazards is concerned, the relationship between technical expertise and the policy process is a relatively new phenomenon. The result of acquiring and translating knowledge into public policy causes social change. These changes appear in organizations, educational processes, professional practice, governmental decisions, and public opinion.

Realization by members of the scientific and technical community that they are involved in social change also is new. A few have become aware of this, but it appears that this realization is not felt as strongly by others who have not been closely involved with policy development.

HISTORICAL OVERVIEW

In outlining the development of hazard reduction policy in California, it has been traditional to follow a chronological sequence of events, usually beginning with the development of local codes following the 1925 Santa Barbara earthquake, passage of the Field Act of 1933 governing elementary and secondary public school construction and citing other examples through the years. This leads to observations such as, "Look how much we have been able to do, particularly in the recent past" or "Look how little we have learned and applied from past earthquakes."

However, when this chronology is separated from the dates of major policy developments, there is an interesting split. Especially after some of the larger magnitude earthquakes in California there have been major policy changes, but this discussion must also account for the occurence of other damaging earth-

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quakes where nothing of policy significance happened, except perhaps for relatively minor "tinkering." The question is "Why not?" No major policy changes followed the 1906 San Francisco "fire", the 1952 Kern County earthquakes, the earthquakes in Eureka, California and Dixie Valley, Nevada in 1954, the 1957 Daly City earthquake, the 1969 Santa Rosa earthquake, and the 1975 Oroville earthquake.

From the viewpoint of a practitioner, a key question becomes "What facilitates or impedes changes in public policy?" When reviewing existing programs and planning new efforts, it appears important to at least consider three dimensions: (1) the basic principle, (2) the jurisdictional roles, and (3) the behavior that will be changed. This allows movement toward an assessment of the factors which appear to influence earthquake safety policy.

POLICY AND PROGRAM PRINCIPLES

It is important that the basic principles underlying programs be recognized. Most subsequent difficulties resulting from the enactment of programs involve operational questions, such as the standards required, the performance characteristics, the rules of the organizationsinvolved, and others. A few examples of basic principles will suffice. The Field Act (governing public school construction in California) stated essentially that school children were a special population deserving of additional safeguards and that it was proper for the State to pre-empt local enforcement to help insure statewide uniformity. The Hospital Seismic Safety Act (which sets standards statewide for the construction of new hospitals and other medical facilities) recognized that hospitals are critical community facilities having increased importance following disasters. It is important for them to survive and remain functional. It reinforced the principle of State pre-emption, and it also introduced the concept of damage control.

The requirement that local emergency organizations have maps showing the areas that might be inundated should dams fail is based on the assumption that "fail safe" does not exist. The amendment to the State Planning Act which requires cities and counties to address earthquake safety in their general land use plans is based on the belief that better decisions will be made if the communities are aware of seismic and geologic hazards. The Special Studies Zones Act, which requires geologic reports for most structures planned for construction in major fault zones is based on the simple principle that it is permissive to build in the fault zones, but the builder and the local jurisdiction granting the permit must be aware of the site conditions as part of the permit process.

Jurisdictional roles and the types of decisions that are affected also are ways of expressing public policy. Some programs are locally developed and administered. Examples include the adoption of building codes; local siting, grading and parapet ordinances; and programs to mitigate hazardous buildings. Another group of programs are those required by the State but which are administered primarily by local government. The Special Studies Zones Act and the seismic safety element requirement for land use plans are examples. A further group of programs are those that are both required and administered by the State, including the Field Act, Hospital Seismic Safety Act, and the professional registration programs. In other cases, there is almost no role for local and State government since the jurisdiction primarily belongs to the national government. The siting, design, and construction of nuclear power plants is the most prominent example; others include federally owned dams and buildings.

Public policy, or the absence of it, affects decisions about how the earthquake hazard is managed in specific contexts. These fall into a few general categories, including land use, building systems, lifeline systems, and support programs. In land use planning there are programs such as the Seismic Safety Elements, Special Studies Zones, and local requirements for detailed site studies. Programs affecting building decisions include the Field Act, Hospital Act, building codes, elevator safety regulations, and other requirements. One emerging policy area is that of lifeline systems and critical facilities. The types of decisions to be affected include those that relate to public utilities, communication systems, transportation facilities, perhaps dams and water systems, and other critical facilities.

POLICY DEVELOPMENT: FACILITATING FACTORS

There is very little systematic knowledge of the factors that facilitate or impede earthquake policy development, and those who share the responsibility for the translation of knowledge into public policy would benefit greatly from a more thorough understanding of the forces involved.

From a practitioner's perspective, a number of factors seem to be influential in promoting earthquake safety. First, the occurrence of significant earthquakes presents opportunities for public action. This is due to heightened interest and the consequent motivation of public officials. Political bodies face many pressures and crises in normal times, and it is easy to understand why problems related to earthquake hazard reduction receive relatively low attention during the interim between events.

A second contributing factor is the activities of advocate organizations. They offer ideas, proposals, support, and the influence necessary to help achieve seismic safety objectives. Closely allied to the presence of advocate organizations is the influence of opinion leaders. Legislators, members of city councils and boards of supervisors, and other local leaders who have some expertise in the subject play key roles in developing new public policy.

A more recent factor supporting improved seismic safety is the awareness of environmental quality. The concerns about air and water quality, resources conservation, growth management, and similar problems have supported increased attention to environmental safety, especially when it is related to natural hazards.

The rapidity of communications is a fourth major factor. The earthquake damage speedily communicated to the American public as a result of earthquakes in Nicaragua, Guatemala, Turkey, northern Italy, Romania, Iran, the Phillipines, and other countries has meant that viewers and readers can understand the effects of disastrous earthquakes almost immediately.

A fifth influence has been increased financial and human resources devoted to the analysis of earthquake problems. It seems that the results of this investment are that the earthquake problem is better understood; knowledge of its implications has entered the fields of practitioners who must be concerned about ground motion; college and university curricula have expanded to include courses dealing partially or entirely with earthquake hazards; and expanded research programs have been undertaken within, or financed by, government and other organizations. This has produced a larger community of knowledgeable people, answers--or at least approaches to answers--to problems that needed study, and support of some action programs, such as the creation of the California Seismic Safety Commission.

A last and relatively new factor that may be facilitating improved seismic safety policy is the publicity surrounding earthquake prediction research. As noted earlier, the greatest advancements in earthquake safety seem to be in response to the larger damaging earthquakes. The emergence of earthquake prediction as a major research effort in the United States and elsewhere has provided the subject with a continuing popularity. Although the public may get confused about the state-of-the-art, the validity of specific predictions and the reliability of certain sources of information, they are continually reminded that the earthquake threat is present and that people are working on ways to posibly predict such events.

POLICY DEVELOPMENT: BARRIERS

These few factors seem to be the major ones that have facilitated the improvement of seismic safety policy, particularly in California. It is also fairly easy to identify some factors that appear to impede the development of seismic safety policy.

First, the absence of damaging earthquakes has an effect on the receptivity of decision making bodies to enact or support new earthquake programs. Closely related to this is the problem of other priorities that demand attention. Public policy-making is a very dynamic process, and to a large degree it tends to be somewhat crisis oriented. The California Legislature, for example, has been concerned recently with property tax reform, public school financing, medical malpractice insurance, and other major issues. Should a big earthquake occur, one effect would be to change its priorities, and more attention would be given to earthquake safety. This was so clearly demonstrated following the 1971 San Fernando earthquake. Nevertheless, the press of other priorities does impede the advancement of seismic safety during the interim between significant earthquakes.

A second difficulty has been the inability to define the threat in precise enough terms so that people perceive that there is a high probability that they will be affected. This seems to be a strong factor. However, the development of a reliable and effective prediction system will almost certainly erode its influence.

A third problem which has impeded further seismic safety policy has been the somewhat negative reaction to some programs. This has required their defense, particularly as the time between earthquakes becomes longer. Many people have spent time going back to the California Legislature to defend the standards for school construction enacted after the 1933 earthquake, and since the 1971 earthquake there have been such occasions with regard to programs initiated following that one. Under these circumstances, it is very hard to initiate new programs.

A fourth, and last, factor which has been influential has been the inability, in most cases, to demonstrate the effectiveness of many existing programs. Partly, this is a function of the relative infrequency of damaging earthquakes. It is only in recent years, for example, that enough data has accumulated about the actual behavior of public school buildings built since 1933 according to the Field Act to show that the program is basically sound.

In sum, the factors that facilitate or impede the development of seismic safety policy may help account for the different responses to historic damaging earthquakes. An extremely valuable research project, carefully done, and based on a refinement of these factors, tested against the public records of previous earthquakes, might show that certain combinations of them have produced actions. Their absence might help explain inaction by policy makers following other earthquakes.

FUTURE POLICY FOR SEISMIC SAFETY

Some of the major policy issues which will be present in the future include a continuing effort to try to reduce the hazards from non-earthquake resistant buildings; the continuing work on earthquake prediction; the concern about the adequacy of siting and design standards for lifeline and critical facilities and the role of public agencies in governing those systems and facilities; the role of the Uniform Building Code as a basis for minimum standards; and the increasing role of intergovernmental coordination of local, regional, state and federal agencies in achieving earthquake hazard reduction.

There will also be increasing emphasis on more effectively utilizing knowledge and speeding up the process of implementing it into effective programs. Organizations such as the Seismic Safety Commission may take on added significance as the link between the knowledge community and the practitioner and governing authorities. There will continue to be a strong need for policy oriented research which will help answer some of the difficult questions related to the design, acceptance, and administration of public programs.

To focus on these issues and help guide public and private efforts to lessen earthquake risk, the Seismic Safety Commission of the State of California has adopted a set of important goals. Covering all major subject areas, this statement of goals was prepared to focus attention on the fundamental issues, to communicate what the Seismic Safety Commission believes ought to be accomplished over the long run, and to help the Commission decide on specific work projects. Each of the following goals is supported by a series of specific policies which, when implemented, will greatly improve earthquake safety.

A Partnership for Seismic Safety. All Governmental jurisdictions must share responsibility in the complex quest for improved seismic safety. Each principal governmental level has its role in formulating and implementing components of a comprehensive seismic safety program. For full effectiveness, the contributions of each government must be clearly defined and well understood. In addition, private businesses, professional and technical groups, and civic organizations must make long-term commitments if practical seismic safety levels are to be achieved.

Planning and Regulating Land Use. Planners should avoid creating new hazards or increasing danger to life and property, and whenever possible they should try to reduce existing hazards. All State, regional, and local planning programs and all regulatory measures governing the use and development of land and adjacent waters should include consideration of seismic and geologic hazards.

Improved Building Design and Construction Practices. Buildings and other structures intended for significant use by humans should be planned, designed, and built to the best current standards. This will require continuing improvements in design and construction practices, and where necessary, independent design review processes should be employed. Code requirements, enforcement policies, and inspection procedures should insure that all structures provide acceptable levels of life protection.

Critical Facilities and Utility Lifeline Systems: Location, Design, Construction, and Operation. All new critical facilities and utility lifeline systems should be built to the best current state-of-the-art design for earthquake resistance and should be subject to independent review and inspection of design and construction. All existing critical facilities should be strengthened to the extent possible and practicable, to minimize the risk of damage and give reasonable assurance that they can continue to function after damaging earthquakes.

Hazardous Buildings. Buildings that are not designed to withstand earthquakes are major hazards. California has many thousands of such buildings constructed before and, in some cases, even after the development of earthquake standards. One of the Commission's most important goals is the methodical reduction of these hazards by strengthening, rehabilitating, or replacing such buildings or changing their uses to lower occupancies.

Improving Emergency Preparedness and Response Capabilities. Responding to disasters and providing emergency services (public, nonprofit, charitable, etc.) are important responsibilities. Because emergency activities are not routine functions, success depends on planning and training. A goal is the incorporation of earthquake preparedness and response programs into the duties of all levels of government, and the maintenance of adequate levels of emergency response capability.

Guiding Earthquake Recovery. After a major earthquake, decisions related to land use and reconstruction of public and private facilities can help redirect future building and growth. All public agencies and private organizations with influential roles in guiding recovery from natural disasters should take steps to eliminate existing earthquake hazards and to guard against new risks being created.

Promoting Earthquake Information, Education, and Training. Those whose professional or public responsiblities require technical and scientific knowledge should have available the latest and best information in clear and usable forms. It is a goal to increase informational, educational, and training activities in order to improve public understanding of earthquakes and the possibilities of for reducing the hazards.

Financing Seismic Safety. Several fiscal and financial measures are needed to promote seismic safety. Seismic safety criteria should guide financial planning and long-range capital improvement in both the public and private sectors. Fiscal policies should provide incentives that facilitate and encourage public and private efforts to improve seismic safety. Coercive fiscal measures may be required to deal with protracted failures to reduce hazards.

Dealing With Earthquake Prediction. A safe working and living environment is the best protection against casualties and damage in future earthquakes, with or without accurate earthquake predictions. The Commission will keep abreast of research into the causes and possible precursors of earthquakes as well as studies of ground motion and other phenomena that accompany earthquakes. The findings will guide responsible policy formulation in dealing with the implications of earthquake prediction.

Research Needs For Seismic Safety. The many accomplishments in science and technology have demonstrated the utility of basic and applied research. Further pursuit of such research is essential to improvements in earthquake safety. Especially important objectives are increased knowledge of seismicity and the causes of earthquakes; better identification of related geologic hazards; improved ability to predict seismic ground motion and the responses of man-made structures; development of better ways to reduce hazards to life and property; and further understanding of the social, economic and fiscal impact of earthquake safety programs. It is a goal of the Seismic Safety Commission to stimulate appropriate research in seismology, geology, engineering, social science, public policy, and other disciplines in order to further our understanding of seismic phenomena and their consequences, and to guide the formulation and implementation of policies that will effectively reduce earthquake hazards.[II]

CONCLUSION

Concern about the earthquake hazard will continue in California, especially when noted scientists are quoted as saying:

> In anticipating the next big California earthquake of magnitude 7 or higher, we must conclude that time is running out. The evidence strongly suggests that such an event must now be considered imminent. Until recently there has been a tendency to think of such an occurence in terms of "the next 10 or 20 years." But now, for several reasons, we can no longer keep pushing this "time window" into the future. In short, present evidence that a large earthquake is imminent in California is much stronger now than 30 years ago--or even 10 years ago.[III]

Public policy will play a major role in determining the scope of hazard mitigation, disaster response, and long-range recovery. Understanding the policy process is central to taking constructive steps to make improvements in all areas important to greater safety.

II. California Seismic Safety Commission, Goals and Policies for Earthquake Safety in California. SSC 79-04 Sacramento: May 10, 1979. 76 pp.

III. Bolt, B.A. and Jahns, R.H., "California's Earthquake Hazard: A reassessment," Public Affairs Report, Vol. 20, August 1979, No. 4, University of California, Berkeley.

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