

A “PEOPLE’S WAR” AGAINST EARTHQUAKES

Lessons from the Chinese experience with earthquake prediction *

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Our duty is to hold ourselves responsible to the people. Every word, every act and every policy must conform to the people’s interests, and if mistakes occur, they must be corrected; that is what being responsible to the people means.

Mao Tse-Tung

INTRODUCTION

Among the many unique features of China’s attempt to build a qualitatively different society, the process that has commanded the most attention from Western observers is the deliberate attempt to change the nature of organizations, as well as the relations between organizations and their environment. Not only have the Chinese developed a theoretical critique of bureaucracy, but they also have put into practice their alternative to, from a Weberian standpoint, unavoidable features of bureaucratic organizations. Whyte (1973) provides a useful characterization of the similarities and differences between the Weberian and Maoist concepts of bureaucracy. While Weber stresses organizational autonomy, legal-rational authority, impersonality, unemotionality, and technical competence for task allocation, the Maoist notion emphasizes:

1) the political nature and consequences of organizational goals, decisions, and activities; 2) mass involvement with the leadership through charismatic authority relations; 3) comradeship; and 4) political as well as technical criteria for task allocation. While the Weberian model emphasizes hierarchical structure and communication patterns reflected in a differential structure of rewards and performances, as well as strict adherence to established rules and procedures, Chinese organizations stress collective leadership and consultation at all levels, a flexible approach to problem-solving, and a more egalitarian structure of performances and rewards (Whyte, 1973: 157).

A good illustration of the actual practice of the Maoist theory of organizations is provided in the Chinese approach to the problem of earthquake hazards. The problem has been defined as a matter of immediate governmental concern and its solution has been linked to

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the achievement of revolutionary goals. Grass-roots involvement has been sought, and masses of people trained to participate actively in the program of earthquake prediction. Collective participation takes place within research organizations as well as through the activities of amateurs recruited among students, workers, and peasants who report their findings to relevant organizations. According to the information provided by Chinese scientists to the American Seismology Delegation (ASD), the Chinese have predicted 11 earthquakes to date (ASDR, 1975: 840) [1]. The only successful prediction of a severely damaging earthquake about which there is some concrete information was on February 4, 1975, in Liaoning Province, where a 7.3 Richter magnitude shock took place.

It is the purpose of this paper to explore some of the organizational characteristics of the Chinese effort on earthquake prediction. Given that predictions may become possible in the U.S., an understanding of the Chinese achievement has obvious theoretical and practical importance. The reader should be warned that the information available is very scarce; there are no sociological studies about the organization of the program and its social impact. No data are available about the social consequences of predictions and warnings issued in the past and, to our knowledge, there is no research about the events that took place in Liaoning Province before and after the successful prediction of February 4, 1975. Under these conditions, the information at our disposal will have to be taken at face value. Such information will be interpreted in the context provided by studies and reports about other aspects of Chinese society which furnish insights about the socioeconomic situation and the success in changing organizations and encouraging mass participation. This paper should be taken as a theoretical essay in which we have attempted to answer the following question: given what we know about the Chinese experience on earthquake predic-

tion, what can other countries learn?

THE PEOPLE'S WAR AGAINST EARTHQUAKES

China has a large-scale program of research in earthquake prediction. It is well supported, and has a structure that includes hundreds of scientists, thousands of technicians and skilled workers, 17 basic seismic stations, 250 regional stations, and more than 5,000 observation points (ASDR, 1975: 839; CSR, 1975: 5) [2]. Perhaps the main reason China has directed considerable human and material resources into this kind of research is its long history of earthquakes, associated with great losses of human life. Earthquakes are particularly destructive in rural areas (and most of the people in China live in a rural environment), where housing has changed little since the 16th century. Lacking the economic resources to build earthquake-resistant structures, China's policy decision to foster research on earthquake prediction makes a great deal of sense. Accurate predictions, i.e. the identification of the place, time, and magnitude of earthquakes, make it possible to evacuate the population on time; relatively inexpensive reconstruction can follow. As a result of the 1966 earthquakes in Hopeh Province, whose destructive effects were inspected by Chou En-lai, the government gave high priority to the issue of earthquake prediction and, in 1971, the State Seismological Bureau was organized.

The Cultural Revolution, which began in 1966, challenged bureaucracy and its inherent elitism. Scientists and experts were put in a position of having to demonstrate their allegiance to a nonelitist educational and scientific practice. There are kinds of activities involved in earthquake prediction which lend themselves easily to the kinds of organizational requirements formulated in the course of the Cultural Revolution (ASDR, 1975: 873). A report from a delegation from Science For The People (1974) documents similar organizational

features in agriculture, industry, research institutes (e.g. genetics, chemistry, biochemistry), as well as in the areas of education, health care, mental health, and planning. The essential principle of the Cultural Revolution – that the wisdom of the people is a source of knowledge and that science should serve the people – appears as a pervasive trend throughout Chinese society. This approach to scientific practice also involves a search for scientific discoveries applicable to immediate problems rather than the pursuit of basic research which is necessary to establish a solid basis to deal with future problems. This raises questions as to the long-term benefits China may derive from its current policies which, in short run, appear to be highly successful.

Within this context, organizational response to the earthquake hazard assumes unique features which appear to further, rather than hinder, the attainment of the main organizational goal: earthquake prediction. The unique features are discussed below.

The Articulation of Scientific and Technical Activity With Specifically Stated Political Goals

The party and revolutionary committees work in conjunction with the State Seismological Bureau (SSB) and supervise earthquake studies at the provincial, regional, and county levels (ASDR, 1975: 842). According to the ASDR, the SSB appears to have jurisdiction mainly over scientific and managerial matters, and the party and revolutionary committees seem to be more concerned with personnel matters (ASDR, 1975: 878–879). The Canadian Seismological Mission, on the other hand, suggests that “. . . the local party committees ultimately act on or approve of any predictions, or influence the involvement of the masses,” while the SSB had also jurisdiction upon personnel matters at the highest level (CSR, 1975: 5). Scientific work becomes political work, and is integrated into the

philosophy of the Chinese Communist Party: “Prepare against war, prepare against natural calamities, do everything for the people” (Kisslinger, 1974). The social, political, and economic consequences of earthquakes and earthquake predictions are explicitly outlined and assessed in the context of the present stage of China’s economic development. Priorities are set accordingly, and scientific efforts are directed to meet the people’s needs most effectively.

The Incorporation of Amateur Workers Within the Earthquake Program

Just as China has greatly expanded its ability to cope with the health care needs of the people through the proliferation of “bare-foot doctors” (i.e. paramedical personnel trained at various levels of competence), it has also expanded the potential of its earthquake program with amateurs. Besides 10,000 trained workers, including scientists, technicians and workers (ASDR, 1975: 843), there were also about 10,000 untrained volunteers working on a part-time basis in 1974, at the time of the U.S. delegation visit (ASDR, 1975: 863). The Canadian mission, which visited China a year later, found that the number of amateurs had risen to 100,000 (CSR, 1975: 5).

The policy of the Central Committee of the Chinese Communist Party in this respect is the following: “Under unified leadership of the party, take prevention first, combine professional and amateur efforts, mix modern and indigenous methods, wage a people’s war” (ASDR, 1975: 879). This policy has important organizational implications:

- 1) It emphasizes the political nature of the scientific task of achieving earthquake prediction. Organizational autonomy is replaced by party leadership.
- 2) It breaks down the boundaries between the organization and the masses which are its potential beneficiaries; the organization is open and receptive to grass-roots inputs.

3) It sets the basis for breaking down the hierarchical relations that tend to characterize the relations between experts and the masses.

There are no sociological studies documenting the extent to which these policies have affected actual organizational practices in the area of earthquake prediction; the process is too recent to expect significant qualitative changes. However, it is possible to draw some conclusions, in light of the ASD report.

Scientists and expert personnel are encouraged to rely on the "broad masses of the people" who have a "rich experience of long struggle against earthquakes" (ASDR, 1975: 875). It is assumed that people who have lived for generations in earthquake-prone areas have accumulated elements of folk knowledge which are relevant as premonitory signs. The extent to which scientists give serious consideration to "indigenous" efforts is debatable at this point. In the opinion of a member of the ASD, "the main work is being done by very well trained, competent scientists and engineers whose power to make decisions seems unquestionable" (Kisslinger, 1975).

Amateur workers are taught to carry on experimentation (e.g. the analysis of water samples to detect radon flux) and daily observations, and are encouraged to communicate any anomalous observation to the nearest authorities. This policy of "mass observation, mass prevention" has important scientific and social implications. It provides the experts with an enormous amount of data which can be used in the process of understanding the preconditions of earthquakes, and increase the probability of formulating reliable criteria for sound predictions [3]. It helps build a sense of technical competence in the people that encourages their willing and active participation in the program. It educates the masses in the nature of earthquakes and earthquake prediction, as well as in the best ways of organizing and acting collectively to minimize the loss of lives from earthquakes. Finally, it creates a feeling of solidarity with

the government and support for its efforts to achieve earthquake prediction with the involvement of ordinary citizens. In this context, false warnings can be accepted as a manifestation of concern rather than as a symptom of government interference and/or mistakes; the people's broad knowledge of the elements that enter into the prediction process [4] renders understandable and acceptable the possibility of failure (ASDR, 1975: 879; CSR, 1975: 41–44).

Although the skill and ability of Chinese scientists is probably comparable to those of their Western counterparts, the training of the new scientists in the context created by the Cultural Revolution has raised some doubts as to whether the quality of scientific training can be maintained. The program is also somewhat open to criticism because of the empiricism and pragmatism that characterize a great deal of the present effort; some Chinese scientists seem willing to consider any phenomena which may be related to earthquakes, no matter how uncertain their basis in known scientific principles (e.g. anomalous animal behavior). Theoretical development and use of statistical methods, laboratory experimentation, and exploration of the geophysical environment are needed to increase the effectiveness of the program (ASDR, 1975: 867). On the other hand, reliance upon extensive monitoring and analysis of premonitory effects make sense in a country like China where there are regions of frequent seismic activity, most of which can be easily reached for monitoring purposes.

American scientists are also concerned with the possible impact political objectives may have upon the program. Political pressure to predict earthquakes may result in the distortion of the claims of success. Indeed, their concern highlights a very important and practical problem: whether the training of scientists, the improvement of scientific quality, and the development of scientific leadership can be advantageously pursued in a social

context which attempts to abolish the hierarchical nature of scientific training and the isolation of science from politics.

From a practical standpoint, however, the participation of amateurs increases the efficiency of the program; it makes possible the collection and analysis [5] of a massive amount of data which would be vastly more expensive if exclusive reliance were placed upon trained experts. In judging whether the participation of amateurs is an asset or a drawback to the program, American scientists concluded that it made good scientific, economic, and political sense. It does not necessarily imply a lowering of scientific standards, but a unique articulation between the knowledge of the experts and the enthusiasm, ability, and productive potential of the people (ASDR, 1975: 879). In regard to the earthquake program, this approach seems to have important scientific and social implications. The emphasis given to mass education and collective organization to cope with eventual disasters appears to be conducive to the development of a level of community preparedness favorable to the reduction of casualties and socioeconomic disruption.

This assessment of the scientific and practical importance of the Chinese Earthquake Program can be illustrated with the events surrounding the successful prediction of a 7.3 Richter magnitude earthquake on February 4, 1975 in Liaoning Province. On the basis of the analysis of historical data about the seismic activity in the area (China has an earthquake record that goes back 3,000 years), plus the observation of anomalous ground tilts during September, 1973, and May, 1974, the SSB decided, in June, 1974, that a strong earthquake was probable in southern Liaoning Province. This led to an intensification of scientific activity, as well as to public campaigns to keep people informed. Harbor facilities in the area were reinforced, and an observation network of premonitory effects was established (Adams, 1976: 34–35; CSR,

1975: 46; *Earthquake Frontiers*, 1975) [6]. These activities involved close cooperation between experts and amateurs, whose motto was: “Rather a thousand days with no earthquake than one day with no precaution” (*Earthquake Frontiers*, 1975). There was a false alarm in December and people were evacuated for two days in spite of the cold weather (Adams, 1976: 35). After January 28, when the event seemed imminent, and a warning was given,

... individual communes and family brigades appear to have taken active steps to alleviate earthquake effects, including the preparation of tents and other temporary shelters for sleeping and the organization of small “working groups” to discuss the best way of helping the young, old, and disabled (Adams, 1976: 37).

New information kept accumulating and many shocks of increasing magnitude were felt during the first three days of February. On the basis of information, which included amateur observations of anomalous animal behavior and changes in the underground water, the Yingkoo Seismology Brigade at 7:00 p.m. on February 3, concluded that a strong earthquake was imminent. On February 4, at 3:50 p.m. the Haicheng seismological observatory predicted that an earthquake would occur within the next three hours (*Earthquake Frontiers*, 1975). The Provincial Revolutionary Party Committee had been warned early on February 4 by the Liaoning Seismological Bureau, and, at 10:00 a.m., had instructed the Haicheng-Yingkoo party committees to implement their emergency measures:

... stores were closed . . . the masses on communes were ordered to construct simple outdoor shelters and leave their houses. Militiamen patrolled to enforce evacuation from houses to shelters despite the very cold weather. The news was broadcast that a major earthquake would soon occur, production teams showed films out of doors and animals were evacuated. Most of the disbelievers who returned to their homes were usually forcibly evacuated (CSR, 1975: 47–48).

The 7.3 magnitude earthquake occurred at 7:36 p.m. on February 4, about 30 km to the SSE of Haicheng; damage was extensive and

the city of Haicheng (100,000 inhabitants) was totally destroyed (Adams, 1976: 33–35; CSR, 1975: 48). While more than 1,000,000 people lived in the epicentral area, the loss of lives was extremely small. The death rate was only 3.3 per 10,000 in the most heavily damaged area (*Earthquake Frontiers*, 1975).

Agricultural activities were not seriously disrupted, and the people gave time both to reconstruction and keeping up their production targets (Adams, 1976: 37; *Peking Review*, 1975: 22). There is no information about the consequences of the earthquake in the commercial and industrial sectors. The government praised the ability to predict before the event, the cooperation between experts and the people, and the use of traditional and modern methods (*Earthquake Frontiers*, 1975; *Peking Review*, 1975).

The Chinese acknowledge that the reduction in the number of casualties is due to the fact that the earthquake took place shortly after people had been evacuated; if it had occurred after a lengthier period of time, some people might have returned to their homes (Adams, 1976: 37). In Adams' view,

... the achievements of the Chinese people relating to this earthquake are twofold. Technically, this is the first major earthquake anywhere in the world to have been adequately predicted... but an even greater achievement ... is the education of the people to take part in prediction programs, and to accept the disruption to their lives that must accompany any action taken following an earthquake prediction. In this aspect perhaps lies the greatest value of involving the people in mass prediction programs (Adams, 1976: 38).

Admittedly, the little we know about what took place after (and before) the February 4 earthquake is based upon impressionistic materials, and any conclusions based upon them must be severely qualified. Nevertheless, this remarkable experience highlights the social and economic importance of the Chinese theories of science and organizations, and emphasizes the need to explore their potential relevance for dealing with earthquakes and other natural hazards in the United States.

THE CONSEQUENCES OF EARTHQUAKE PREDICTION: CHINA AND THE UNITED STATES

Given that China has had only one successful prediction of a major event [7] and the U.S. has had none, our knowledge of the socio-economic and political consequences of earthquake prediction is necessarily tentative and incomplete [8]. With respect to the U.S., the recent report from the National Academy of Sciences (NASR) on *Earthquake Prediction and Public Policy* (1975), is a rich source of reasoned speculation about the possible implications of earthquake prediction, as well as a source of research and policy recommendations for the U.S. government.

Since a similar work dealing with the Chinese experience is lacking, a comparison between the probable consequences of earthquake prediction in both countries becomes a difficult, but not impossible task. There is, after all, a great deal of information about other aspects of Chinese society, and it is possible to draw some inferences as to the probable consequences of predictions, warnings, and hazardous events in China. Here, then, is a brief discussion of those aspects of Chinese society which are likely to have a decisive influence in determining the impact of predictions. In the second part of this section, we will compare China and the United States in regard to three specific issues: warnings and predictions, the economic impact of earthquake predictions, and the problem of equity.

The Historical Context of China's Earthquake Program

The main objective of the Chinese program is to determine the location, time, and magnitude of future earthquakes. The Chinese earthquake prediction policy is to issue public warnings after pertinent organizations have reviewed and evaluated the data upon which the prediction has been based. Whenever the

magnitude of the predicted event is large, the SSB in Peking is informed before action is taken. Preventive measures involve evacuation of people from hazardous areas. This task is facilitated by the fact that, in high risk areas, the population is kept well informed about the best way of coping with earthquakes and their effects. The information includes description of precursors, ways of minimizing damage, and methods to reinforce buildings in new construction (ASDR, 1975: 863). The underlying philosophy of China's building code is that "... safety of human lives and important equipment should come first and that the building should be in repairable condition after the earthquake" (ASDR, 1975: 872). The program goal and policies as well as the building code reflect Chairman Mao's advice to the Chinese people: "Serve the people."

Reports from visiting delegations and individual scholars coincide with in-depth analyses of specific aspects of China's approach to socioeconomic development in depicting a society where ideological emphasis upon the worth of ordinary citizens and organizational changes encourage them to actively participate in decision-making processes affecting their lives. This has resulted in concrete accomplishments (e.g. building canals in areas where experts thought it would be impossible to do so; reorganizing work and achieving higher labor productivity) which reinforce the people's self-confidence and their trust in a leadership that trusts them (see, for example, Hinton, 1966, 1970; Sidel, 1974; *Science For The People*, 1974; Milton et al., 1974; Coye and Livingstone, 1975). Many observers have suggested that, in order to understand China's present and the allegiance of the people to the government, one must compare it to the past. In that context, the concrete achievements of the present government stand in glaring contrast with a past which is still remembered by the older generations. Such achievements have been

recognized by those sympathetic to China's efforts as well as by those who are highly critical.

The Role of Ideology

Perhaps the main theme underlying Maoist philosophy is the power of the masses to accomplish goals which are defined as socially and individually desirable. "... central to the Maoist belief system is the presupposition that will, spontaneity, consciousness infused by and reflected in ideology and organization can serve as substitutes for technology, equipment, and material forces in general, at least within certain ranges" (Eckstein, 1975: 75). While the mobilization of human capital at all levels of activity (the earthquake program with its tens of thousands of amateurs is a good example) can theoretically be obtained through physical or normative coercion (if material incentives are minimized, as is the case in China at the present time), the latter option has been chosen by the current leadership. Observers indicate that planning is not rigidly implemented; on the contrary, some degree of flexibility is deliberately introduced and targets are set at such levels that they leave room for the "exercise of initiative by the masses" (Delayne, 1973; Eckstein, 1975).

Changes in Social Organization

As the changes in Chinese society have taken place very recently, drastic and widespread changes in everyone's consciousness cannot be expected. China's leadership copes with the situation through the interaction of ideology and organization in a way that emphasizes collective decision-making processes in the context of small groups where social control is exercised through peer pressure. Within urban areas, each household is embedded, through membership in small groups, into a network of block, lane, street, and neighborhood committees. The same pattern obtains

in the rural areas, where households are linked to work groups, production teams, production brigades, and communes (Eckstein, 1975: 344–346). This complex network, which is also linked to Revolutionary Party Committees, operates as a channel for the transmission of policy guidelines, ideology, and information. The totality of organizational changes conducive to the involvement of ordinary citizens in collective decision-making processes about issues directly affecting the community can be viewed as the counterpart, at the level of social organization, of the political and economic functions of ideology.

Changes in the Economic System

Theoretically, “. . . a socialist economic system is one in which there is public (or social) ownership for the public good of all the means of production” (Hunt and Sherman, 1975: 580). From this standpoint, China could at best be defined as a society in transition towards socialism; while land reform and nationalization of some portion of the private sector have taken place, the process of centralization and nationalization is by no means complete. What remains of the private sector operates, however, in the context of state policies that have reduced private capitalists to bureaucrats for all practical purposes.

China has a planned economy with a complex system of controls and features unique to the Chinese situation (Robinson, 1974: 47–58; Eckstein, 1975; Hunt and Sherman, 1975: 593–599). Having learned from the Soviet experience, the Chinese pursue the goal of collectivizing the economy gradually, in an attempt to avoid the economic and human costs inherent in the Soviet model of development. The Chinese process of development is characterized by a tension between two camps: those who would urge the introduction of economic incentives and the use of technological criteria of efficiency in order to increase output and further economic growth;

and those who, following Chairman Mao’s directives, are willing to slow down the process of growth in order to further social and behavioral changes necessary to build a social system qualitatively different from that prevailing in capitalist societies.

The Cultural Revolution was a stage in the struggle between those two approaches which ended with the success of the Maoist standpoint. Monetary incentives have lost primacy and moral incentives are emphasized throughout the system; increases in work productivity at the individual and group level are viewed as expressions of self-respect, public spirit, and as a proof of revolutionary zeal. This involves “putting politics in command” in the context of production, distribution, and consumption; “putting profits in command” is rejected and regarded as “taking the capitalist road” (Robinson, 1974: 47–48). Under these conditions, the social and economic consequences of predictions, warnings, and hazardous events, and disaster preparedness planning and hazard reduction measures, will most likely be different from those which can be expected in American society, which rests upon class and socioeconomic status differences and fosters competition and individualism at all levels of the social organization.

China and the United States: A Comparison

Warnings and Predictions

Available studies of individual and organization response to disaster warnings in the West suggest that earthquake prediction may encounter a rather problematic reception. At the individual level of analysis, it seems that the spontaneous tendency of many people is to deny the danger and to be over-optimistic about the situation. At the organizational level, those in charge of issuing warning are generally reluctant to do so; their desire to avoid giving a false warning may sometimes

lead them to wait until it is too late (NASR, 1975: 48). A false warning may affect their credibility and public effectiveness, or may render them legally responsible for property damages that may result from the social and economic impact of the warning. In this respect, Haas (quoted in the NASR, 1975: 51) suggests that not only the credibility of the officials will be endangered, but also the credibility of the forecast itself. From the standpoint of the differential response associated with the position of groups in the social structure, those who are placed "outside the mainstream" of society (i.e. the elderly, the handicapped, the lower socioeconomic status groups, and members of minority groups) may be less likely to respond adequately to the warning. They may not receive it or, because of lack of education or knowledge of the English language, may not understand it. Furthermore, they may not give it credit because of their lack of trust and grievances towards the public authorities (NASR, 1975: 47–52). Finally, warnings and predictions may be questioned and attacked by those groups whose social, political and economic interests may be negatively affected by them (NASR, 1975: 57).

Reactions to warnings and predictions are likely to be different in China; the available information suggests that they are favorably received and respected by the population. This response is partly the result of the intense educational campaigns, the practical involvement of the people in the program, and the relationship of trust developed between laymen and experts, the people and the government (Adams, 1976; *Earthquake Frontiers*, 1975; *Peking Review*, 1975). Within the seismically active areas, the Chinese appear to have developed, through organizational action, a level of "disaster culture" (i.e. familiarity with the hazard and its consequences, as well as readiness to cope with them efficiently) which may have been strengthened by repeated exposure to predic-

tions and warnings. The Chinese have not hesitated in issuing warnings and evacuating people even though the prediction technology is still in preliminary stages of development.

Amateur and local political participation in the prediction process, as well as the current Chinese political structure, are considered, by Canadian scientists, the reason why "... the people involved appear to accept the enormous self-discipline involved in wholesale evacuation, (even at -20°C) and indeed may well have stayed in primitive field conditions for up to 2 weeks on the occasion of some false alarms" (CSR, 1975: 41) [9]. Given that the government has been able to fulfill its promises in the subsistence and health care areas, it would seem safe to assume that the credibility of public officials is relatively high.

Also, the involvement of ordinary citizens may have produced "... an awareness among the people that this is *their* programme, and that failures or false alarms are the responsibility of the people themselves, as well as of the scientific experts (Adams, 1976: 33). Collective responsibility for failure seems to be linked to collective responsibility for success: "... when a successful prediction occurs, such as the Haicheng event of Feb., 1975 ... *no one official or scientist or group of these at either the central, provincial or local level claimed this as an individual triumph*" (CRS, 1975: 41; emphasis added)."

However, not everyone believed the warnings issued prior to the February 4 earthquake. There is no way to ascertain the extent to which those who died did so because they did not believe in the warnings. What public officials would like the people to believe is, however, very clear, and a fable has developed which will probably be used in future educational campaigns dealing with earthquake prediction:

Most people moved outside when warned of the earthquake, but a few old, stubborn men said "What earthquakes? We don't have earthquakes here!" and did not believe that the party and the state could predict earthquakes. They stayed inside, and were killed (Adams, 1976: 37).

Within the Chinese economy, the role of private property has been changed, and the issue of responsibility is likely to be conceptualized in political, rather than legal terms: what is at stake is the political purity and dedication of the masses and the experts rather than the protection of individual property rights. Chinese scientists and officials may fear political reprisals, although they have been willing to issue warnings and evacuate people very early in the program; this suggests that the situation may be different, at least as long as the program is in its early stages. As stated before, we lack data in this respect.

Changes in social organization and income distribution would suggest that in China, no one is placed "outside the mainstream of society" either socially or economically. It would seem reasonable to assume that the complex organizational network surrounding households would maximize their exposure to warnings as well as the likelihood of adequate response. Although no data are available, it can be conjectured that a probable result of the interaction of ideology and organizational change in the area of natural hazards may be that of increasing the likelihood of collective responses to warnings favorable to saving lives and maintaining some degree of social order.

Economic Consequences of Earthquake Prediction

It should be clear that predictions will always have economic effects (besides social and political) which may vary according to the particular structure of productive activities characterizing the area affected by it. Economic effects will also vary depending on length of lead time; problems arising from predictions with short or long lead times will be very different. In our view, such economic implications cannot be properly conceptualized without including in the analysis the specific features of the socioeconomic system where such predictions are made public. The determinants of investments, the levels of employ-

ment, the role of the state, and the pattern of income distribution differ from one system to the other, and will most likely structure the economic impact of predictions in different ways. Because of the limitations of this work and the lack of data on China's past prediction experience, we can give only perfunctory treatment to a topic that deserves a much more detailed investigation.

The U.S. economy is a capitalist economy, i.e. an economy characterized by the private ownership of capital in which the prime motivation for investment is the expectation of future profit (Hunt and Sherman, 1975). Consequently, an earthquake prediction is likely to have a negative effect upon the "propensity to invest" in some sectors of the economic structure: "The severe local economic depression produced by the earthquake prediction may represent economic loss as great as that produced by the earthquake itself" (Haas and Mileti, 1976: 18). Consequently, a key concern and responsibility of public officials in assessing the probable effects of issuing an earthquake prediction is the possibility of generating an economic breakdown in the threatened area. According to the National Academy of Science Report, "... some economic relocation, some economic losses, and some economic disruption are inevitable" (NASR, 1975: 70), and public assistance will be required to mitigate the consequences of the economic downturn in the area. Somewhat similar effects are likely to follow from prediction failures, to which political problems and loss of credibility in predicting may be added. Although the economic decline will affect the public sector through loss of revenues, some public services and public utilities will have to be maintained. Some form of outside aid may be necessary, thus increasing the complexity of the problem (NASR, 1975: 70-77).

Some of the possible manifestations of economic disruptions in the United States are the following.

Private Sector: 1) Chaos in the real estate and security markets because of panic selling; 2) decline in investments; 3) possible flight of capital; 4) downward multiplier effects in income and employment; 5) changes in credit and lending policies; 6) changes in insurance policies; and 7) speculation resulting in panic selling of homes or purchase of expensive and unnecessary building improvements.

Public Sector: Both the government and public utilities will face similar problems: a loss of revenues and ability to borrow at a time where public services and utilities should be maintained. An additional burden to the government will arise from the need to expand certain services (e.g. fire protection, emergency agencies) (NASR, 1975: 72–77).

Needless to say, what goes on in the private sector affects the public sector and vice versa, and the different effects within each category interact.

Although incomplete, the possible consequences listed above provide a base for speculating about possible consequences in China. Assuming a credible prediction with a long (e.g. three years) lead time, and in light of what we know about China's economic and social organization, it is likely that whatever economic measures may be taken are not going to result in widespread unemployment and/or economic insecurity. Such a conclusion follows from the qualitative differences between the U.S. and the Chinese economies as we understand them, and from the ideological, organizational, and political features currently dominant in China.

Ideologically, earthquakes have already been defined as targets for the people's collective struggle. A credible prediction would provide a rallying point for intensifying professional and amateur efforts, and increasing the scope of educational campaigns. This would create a favorable social context for the implementation of political and economic measures designed to minimize the loss of lives and economic losses.

Although it allows a varying degree of flexibility and relative autonomy at the local levels, the Chinese economy is highly centralized. It is reasonable to assume that, while encouraging self-reliance at the local level to cope with the impending disaster, the leadership will impose severe limitations on the private sector. Sudden declines in investments and/or flight of capital, real estate and other kinds of speculation, and changes in credit policies detrimental to the economy are not likely to be tolerated. Income and employment levels are likely to be maintained while alternative possibilities are explored by local, regional, and central authorities. Once a plan of action has been decided on, its implementation is likely to coordinate changes in the allocation of capital and labor such that the employment of the population and its levels of subsistence do not suffer drastic changes.

Such conclusions do not stem from "faith" in the Chinese system; they follow from the differences between a capitalist and a socialist economy. The essential characteristic of the capitalist economy is "... the absence in the market automatism of a 'built in' mechanism keeping aggregate effective demand on a level requisite for the maintenance of full employment ... (hence) the state has to assume responsibility, when unemployment develops, for measures calculated to raise aggregate effective demand to a level compatible with full utilization of human resources" (Baran, 1969: 118–119). If, in "normal" times, unemployment and state intervention (e.g. through military spending, welfare payments, foreign aid) characterize the U.S. economy, an earthquake prediction is likely to exacerbate the situation, increasing pressure on the public sector to cope with the ensuing situation.

Theoretically, in a socialist economy the distinction between the public and the private sector disappears with the collectivization of capital. The economy is committed to full employment and, therefore, there is no conflict between the pursuit of economic effi-

ciency and the welfare of the working population. At this stage of China's socioeconomic development, it would not be accurate to describe it in those terms; although highly centralized, the collectivization process is by no means finished. Consequently, some sectors of the population may support the present system while others oppose it. An earthquake prediction is likely to trigger among the dissenting economic sectors reactions similar to those described as probable within the U.S. However, since the interests of private property must be subordinated to the interests of the people represented by the state, it is likely that the government may curb those interests through coercive measures in order to implement its economic policies and ensure the livelihood of the population. Under these conditions, it is probable that economic panic may be short-lived and economic disruptions avoided (if by such we understand drastic changes resulting in widespread unemployment, speculation, uneven distribution of the financial burdens required for hazard reduction measures).

Finally, it seems reasonable to suggest that Chinese prediction failures might be taken in good faith without creating political and economic problems. This type of response would be ensured by the practice of collective responsibility and "criticism and self-criticism" so prevalent at all levels of Chinese society, as well as by the organizational uniqueness of the earthquake program. There are no data on actual consequences of prediction failures, and it is not known how many failures are likely to be tolerated.

Equity

The problem of equity takes on different meanings according to the context in which it arises. It would seem logical to assume that the economic costs following a Chinese earthquake, or the expenses associated with the issuing of a prediction, would be collectively

met without any specific sector of the population assuming an unfair share of the burden.

In the context of the U.S. economy, the problem of equity becomes acute. The very issuing of a prediction "... will change the basis on which various groups in the community calculate their own interests" and, therefore, "[it] will affect the wealth and welfare of the population unequally" (NASR, 1975: 96-97). All those sectors of the community which stand to experience economic losses will probably take measures to protect their interests; the impact upon the welfare of the population as a whole will depend upon the kind of economic rights those measures are designed to protect. Homeowners' decisions will not have such a profound impact as those of the sector that provides employment and controls the livelihood of the majority of the population. The impact of the economic disruption will spread throughout all levels of the socioeconomic structure, affecting not only wage earners but also the poor, the handicapped, ethnic minorities, big and small businesses, and the public sector. Although every sector will suffer, their unequal wealth and power will unavoidably be reflected in their unequal share of the costs. An illustration of this point is provided by past experience with postdisaster relief which indicates that "... low income groups may benefit little from public programs for mitigating earthquake hazards: over 75 percent of the recipients of Small Business Administration disaster loans following the San Fernando earthquake of 1971 had incomes over \$ 12,500" (NASR, 1975: 104).

LESSONS FROM THE CHINESE EXPERIENCE

The extent to which the Chinese experience could be taken as a model for the United States is a matter that deserves careful consideration. A first approach to the question of its transferability might tend to emphasize the obvious fundamental differences between the two

societies and the apparent impossibility of transferring any organizational patterns from one to the other [10]. It could also be argued that we actually have no data about the actual consequences of predictions, warnings, and earthquakes in China. Furthermore, given that earthquake prediction is still at a preliminary stage, any attempt to draw “lessons” could be viewed as a superfluous exercise.

Nevertheless, the little we know is interesting and compelling enough to justify the attempt to explore its possible relevance for the U.S. Broadly speaking, the Chinese experience can be viewed as a challenge to our deeply ingrained beliefs about “human nature” and “the way things are.” It forces both scientists and policy makers to specify and evaluate the structural constraints that may stand in the way of the use of earthquake prediction as a means of ensuring social welfare, rather than as a means for increasing existing socioeconomic inequalities. That a danger exists in that direction is recognized by the authors of the report on *Earthquake Prediction and Public Policy*:

The opportunity to devise means for saving life and property through constructive long- and short-term actions and the necessity for coping with potentially counterproductive responses to earthquake predictions constitute the social challenge of earthquake prediction (NASR, 1975: 24).

White and Haas have expressed similar concerns, and argued that high priority should be given to empirical research on the social, political, economic, and legal consequences of earthquake predictions and warnings (White and Haas, 1975: 331). It is perhaps from the Chinese experience that American policy makers and social scientists may learn ways to cope with at least some counterproductive consequences.

Scientific research on earthquake prediction is not only well under way in the U.S., but is developed on a technological level that renders superfluous the participation of amateur seismologists. Consequently, if a U.S. program

of amateur involvement were created, it would most likely be focused upon the social, economic, and political dimensions of the prediction issue. For the purposes of developing the argument, we shall assume that such a program will be created and will provide some tentative answers to those questions. Sociologically, it can be hypothesized that the participation of ordinary citizens could have important consequences at both the program and community levels.

Citizens' Participation at the Program Level

While the U.S. technological level seems to rule out the participation of amateur seismologists, ordinary citizens could have an important input in the program as “amateur sociologists.” It has been suggested that the level of potential disruptions resulting from credible predictions may be reduced if:

... in advance of credible forecasts for damaging earthquakes, responsible public agencies and *private interest* groups develop plans and policies which are based on *realistic assumptions about the actions of other organizations and people* *If the results of careful research on the probable responses of organizations and the public* are reported to all responsible officials, *they* will have adequate, realistic knowledge upon which to develop *their* plans (White and Haas, 1975: 331–332; emphasis added).

Research of the kind suggested above could be carried out in a variety of ways; each of them could meet the goal of providing a sound basis for planning, while having drastically different impacts for the various sectors of the community affected by those plans. Some of the key questions emerging in this context are the following: 1) which interest groups would be taken into account?; 2) how would the interests of the most vulnerable and non-organized sectors of the community be considered?; 3) which officials would do the planning; public officials only, or public officials and representatives of those interest groups?; 4) if public agencies and private interest groups plan separately on the basis of research findings which they share or have

contracted on their own, how is it possible to guarantee the harmony among the consequences of those plans?; and 5) whose plan would it be? – whose interests would be contemplated?

The Chinese experience suggests that a participative democratic interpretation and implementation of a pre-prediction research project on the potential socioeconomic impact of earthquake prediction would be more conducive to social welfare than a bureaucratic and paternalistic approach. An active role should be given to those who are the object of the research, especially the less privileged sectors. Theoretical perspectives tend to reflect the viewpoint of the dominant groups in the society and, in downgrading the knowledge that could be obtained from the less privileged sectors' interpretation of their world, social scientists may overlook some of the key points of stress, as well as some of the most positive aspects of the existing social arrangements. It would be to the advantage of public officials and public agencies genuinely committed to the interests of all sectors of the community to take seriously ordinary citizens' assessments of their situations.

Research findings of the kind suggested above will unavoidably reflect the existing balance of power between classes and interest groups; levels of income and employment; levels of perceived consensus and conflict; and, broadly stated, the structural constraints and opportunities characterizing the threatened area at the time. It may be that leaving the status quo unchanged may guarantee the predictability of organizational and public responses; however, such responses may necessitate a greater use of social control measures and a greater level of public spending than what would be necessary if a greater degree of cooperation among different sectors and collective involvement were rendered possible. For example, responses suggesting the possibility of serious social disturbances may be linked to a series of factors amenable

to change through the intervention of relevant public agencies, e.g. discriminatory hiring practices affecting minorities and women and landlords' lack of compliance with the law in the most deprived areas.

While social scientists could find such information without involving the people directly affected, there may be advantages to soliciting their input actively.

Social scientists should be concerned with discovering, through their research, not only what organizations and individuals would be likely to do in case a credible prediction becomes possible, but also the structural constraints that make those responses possible. Research findings may thus provide data to assess the existing positive and negative features of the current socioeconomic system and its ability to cope constructively with earthquake prediction. Also, such data should enable scientists and policy makers to evaluate the wisdom of allowing earthquake prediction to become a commodity from which groups may benefit or not, depending upon their command of resources in the market. Individuals placed in different *class situations* have different chances for "... a supply of goods, *external living conditions*, and *personal life experiences*, insofar as this chance is determined by the amount and kind of power, or lack of such, to dispose of goods or skills for the sake of income in a given economic order" (Gerth and Mills, 1958: 181; emphasis added). Besides the usual units of analysis found in the current literature (individuals, families, communities, and organizations), additional research should incorporate those units of analysis which actually determine an individual's life chances: class structures defined in terms of the ownership or lack of ownership of productive property. This is of extreme importance in determining the structural limitations within which planning and policy making can proceed before and after a prediction. To the extent that the implications of power differentials linked to class differences

remain outside the scrutiny of those concerned with the safety of the community, they will impose limitations to the implementation of hazard reduction measures.

The encouragement of ordinary citizens to voice their concerns to social scientists and/or public officials could help social scientists and officials refine their understanding of the situation. It may be that, through input from the "broad masses of the American people," small and feasible changes may be undertaken which would greatly enhance the possibility of mobilizing public support for community preparedness and hazard reduction measures.

Citizens' Participation at the Community Level

Conditions conducive to adequate public responses to earthquake predictions may also be enhanced by a program of mass education in seismic areas. A prediction with a long lead time may allow for the organization of a long-term educational campaign within and outside the educational system in which teachers as well as volunteers from community organizations may participate. For example, a series of multimedia presentations addressed to different sectors of the community could be devised as part of an outreach program to educate and mobilize citizen support. Emphasis would be given to eliciting feedback from the audience in order to learn from them; there may be positive or negative features in their situation which might be easily overlooked. An effort could be made to reach them a second time to let them know whether their criticisms and suggestions have been taken into account, and what alternatives are open within the existing constraints. This is all very general, of course, but the Chinese experience suggests that public support of the kind needed to cope successfully with these issues is more likely to be obtained through active citizen participation and concrete demonstration of concern for citizen plight, than through the imposition of measures

from above with the help of law enforcement agencies.

Once a warning has been issued, public officials are faced with three main tasks: 1) "preparation for postdisaster emergency response and recovery; 2) devising and implementing hazard-reduction plans; and 3) coping with potentially counterproductive responses to prediction" (NASR, 1975: 109–110). Public support and participation may be more readily forthcoming for the first task, while the other two are likely to encounter some resistance and could be more "politically hazardous" for public officials (NASR, 1975: 110).

The area of health care is one in which collective participation may be encouraged to increase the ability of the community to cope with postdisaster emergencies: "... training in emergency skills such as first aid could be organized on a massive scale in the months just before the predicted event" (NASR, 1975: 109–110). China provides a striking example of the advantages involved in the large-scale training of paramedical personnel, and its gains in the area of public health are partly due to its hundreds of thousands of "barefoot doctors" (Coye and Livingstone, 1975: 409–413). A similar approach may be taken in the U.S. to insure that no sector of the community is left defenseless. Public support for the other two tasks mentioned above may be obtained through the activity of already existing voluntary groups which "... can be utilized to help in posting safe and unsafe facilities, to devise community plans for the actions to be taken as the time of the predicted quake approaches, to inform public officials about individuals who may suffer because of hazard reduction measures, and to encourage community cooperation" (NASR, 1975: 110).

The achievement of organizational changes implied by the two types of citizen participation previously described would require an extraordinary degree of commitment on the part of scientists, public officials, and "leading

citizens.” That commitment should be manifested in concrete efforts to remove some existing social conflicts in the community if public support is to be mobilized effectively. The success of Chinese leaders in activating “people’s wars” against earthquakes, pests, disease, or low productivity rests not only upon ideological indoctrination and social control through peer group pressure, but also on the basis of concrete achievements from which Chinese citizens actually benefited.

It may be argued that, given the superior technology of American society, there is no need to mobilize human capital as the Chinese have done. However, exclusive reliance on technology may be fatal in case of an actual disaster. Furthermore, the “people’s wars” are more than mobilizations of human capital; sociologically, it could be argued that their latent function is the creation of social solidarity and collective support which are invaluable in cases of mass emergencies. Regardless of the extra time and resources involved in creating conditions favorable to widespread collective involvement, it would seem that communities could not but benefit from waging their own “people’s war” against earthquakes.

THE ISSUE OF EQUITY

It is important to notice that, besides positing organizational alternatives such as those discussed above, the potential of China’s socioeconomic system to neutralize the disruptive economic effects of earthquake prediction raises an important question: To what extent would it be possible to take earthquake prediction (and those aspects of community preparedness which local governments do not take care of) out of the market context and treat it as an objectively defined social good from which everyone – regardless of position in the social structure – should benefit?

As was previously pointed out, different classes have different chances in the market

and to leave to the operation of the market something which could be enormously disruptive is, to say the least, questionable. The issue of equity requires careful consideration because “. . . the publication of an earthquake prediction will affect the wealth and welfare of the population unequally” and “. . . the very steps taken by government and public agencies to mitigate earthquake hazards will have costs that could easily fall unfairly on some segments of the community” (NASR, 1975: 96). For example, mandatory earthquake insurance and expenses necessitated by earthquake-related building improvements specified by new building codes would greatly increase the cost of housing. Given that housing is already expensive and large sectors of the lower income population have already been constrained to live in mobile homes where they become highly vulnerable to nature hazards, such measures would push even more people out of the market for adequate housing (NASR, 1975: 103). To suggest that the government may provide such building improvements at a nominal cost for low income homeowners runs against deeply held beliefs as to how the American system should function. On the other hand, without some governmental action, stricter building regulations and mandatory insurance in threatened areas may contribute to an increase in existing inequalities in the housing situation. The issue becomes further complicated if the situation of low-income and welfare recipients renting substandard housing is considered.

Although the authors of the report on *Earthquake Prediction and Public Policy* encourage the exploration of alternatives to the present methods of adjusting to natural hazards, they are nevertheless doubtful in their assessment of the possibilities of coping effectively with the issue of equity:

It is doubtful that any set of rules can be devised to ensure that the politically and economically weak are not the innocent victims of programs to lessen destruction and injury from a predicted earthquake. It may be essential to

assign responsibility to some public agency to serve as watchdog in this regard. As plans are developed in response to a prediction, they should be *monitored by the watchdog agency* for inequitable features that might then be corrected before the plans are actually implemented (NASR, 1975: 104; emphasis added).

In this regard, China's experience suggests some alternatives. A public watchdog agency may be insufficient and perhaps counter-productive to the extent that, following Western criteria, it may be formed by experts of one kind or another and be isolated from the people which it aims to serve. An agency of this kind might gain effectiveness to the extent it incorporates citizens' input representing the most vulnerable sectors of the community. Plans might be more effectively monitored with the participation of all those whose lives will be directly affected by them.

The measures taken will most likely be insufficient to ensure the welfare of the politically and economically weak as long as they remain subject to the forces of the market. That the market is likely to have the final say in the issue follows from the first recommendation of the NASR:

The highest priority in responding to earthquake prediction should be assigned to saving lives, with secondary attention to minimizing social and economic disruption and property loss, *provided the costs of specific measures are within the limits that society is willing to accept* (NASR, 1975: 3; emphasis added).

The abstract and misleading notion of "society" obscures a fact that policy makers, public officials, and citizens already know: the limits will most likely reflect not the decision of an abstract entity called society, but rather the concessions public officials and public pressure might be able to exact from the dominant economic interests in the area.

It may be argued that some levels of government spending to reduce inequalities may be possible if, like other types of government spending (e.g. military spending, foreign aid, public works), they raise the level of aggregate demand and create a favorable climate for investments. There are, however, inherent

limitations to what the government may accomplish in this regard because it cannot compete with private enterprise (Baran, 1969: 116–126). Perhaps the main policy available is that of increasing the level of disposable income of individuals through tax reforms and low interest loans, but such policies might not deal effectively with the needs of the most vulnerable sectors (i.e. unemployed and underemployed, retired, welfare recipients).

CONCLUSION

Theoretically, some conclusions relevant for developing the comparative analysis of adjustments to natural hazards can be derived from the previous discussion. The analysis of responses to predictions, warnings, and actual disasters comparing socialist and capitalist societies should focus not only upon variables common to both types of society (e.g. technical and social division of labor, organizational complexity), but also upon those features which define them as qualitatively different modes of social organization – the systems of production and distribution. An admittedly tentative comparison between the possible consequences of earthquake prediction in China and the U.S. suggests that their respective systems of production and distribution, operating through their dominant forms of social organization, income distribution patterns, levels of employment, and access of individuals to nonmarket goods, are likely to have an enormous impact in structuring the possible social and economic consequences of predictions. It is beyond the scope of this paper to further develop this theoretical point. We want to stress the need for pursuing that line of theoretical inquiry, however, because, to the extent that such differences are overlooked under the guise of a general theory of "industrial society," the results are likely to be highly misleading [11].

With respect to organization theory, the Chinese experience with earthquake prediction,

as well as with other areas of socioeconomic activity, suggests that more theoretical and empirical consideration should be given to the Maoist theory of organization. To cling to the Weberian model as the only efficient form of bureaucratic organization may be as misguided as suggesting that the Maoist model has completely replaced it (Whyte, 1973: 162–163). Both types of organizational structures may achieve high levels of efficiency within different social contexts. Given the qualitative differences between their respective latent functions (i.e. the Maoist model may increase social solidarity and collective involvement, while the Weberian model increases social distance and individuals' mistrust of the experts), it would seem of great theoretical and practical significance, in the context of adjustment to natural hazards, to investigate the conditions that would make possible the functioning of the Maoist model with a maximum of efficiency.

From the standpoint of policy making, the most important lesson from China's experience is that, when citizens at large are allowed to voice their concerns and actively participate in social processes which affect their own welfare, the gains in efficacy as well as in social welfare are likely to be considerable. This posits a challenge to scientists and public officials. Social research can limit itself to describing the status quo and developing possible modes of adaptation to it or, instead, uncover those features that stand in the way of maximizing policy effectiveness and social welfare in relation to natural hazards, and suggest constructive ways of overcoming them. Protection against natural disasters can be left to the contested struggle among classes, as it is reflected in the forces of the market and agencies that deliver services to the underprivileged, or the American people can also wage a war against earthquakes and other natural hazards in close cooperation with experts and public officials. The resolution of these issues depends, ultimately, upon the

commitment of scientists and policy makers to consider the interest of ordinary citizens first.

Such a statement may seem naïve and utopian. On the contrary, the notion that the potentially negative consequences of earthquake prediction, as well as the consequences of earthquakes and other natural hazards, may be reduced through greater public concern with social equity, through an increase in collective involvement, and through the development of social solidarity is sociologically more sound than the assumption that such results could be achieved in a context of unrestricted competition among very unequal contenders.

NOTES

- 1 The American Seismology Delegation visited China from October 5 to November 5, 1974 and, throughout the text, their report will be referred to as ASDR.
- 2 The Canadian Seismological Mission visited China from October 20 to November 10, 1975 and, throughout the text, their report will be referred to as CSR.
- 3 There are some problems at the present time. Since amateurs decide when they are confronted with an anomaly, it becomes difficult to evaluate the results; however, the potential of this program for generating a vast data base is excellent (Kisslinger, 1975).
- 4 While this may appear to be an overstatement, it must be realized that, among the amateurs' tasks, that of mass education is of key importance (ASDR, 1975; CSR, 1975; *Earthquake Frontiers*, 1975).
- 5 Analysis is carried out by amateurs – who decide which observations are anomalous – and experts to whom those observations are reported. Needless to say, the area of amateurs' decision making introduces an element of uncertainty in the program with which Chinese scientists will eventually have to deal to improve the quality of their data.
- 6 Besides the article from *Earthquake Frontiers* listed in the references, the author has also consulted another article from the same journal: "Success of Earthquake Prediction in China" (translated into English by Kazuo Oiko from the Japanese translation published in the journal *Kagaku*; no further information given).
- 7 On May 29, 1976 a major earthquake occurred in Yunnan Province in southwest China. While first reports indicate that this earthquake also was predicted, no specific information is available at this writing.
- 8 Empirical research is currently under way on this subject: J. Eugene Haas and Dennis S. Mileti, "Socioeconomic and Political Consequences of Earthquake Prediction" (NSF

- Grant #AEN 74-24079). Their research covers the actual consequences of earthquake predictions in Kawasaki, Japan (1974–75) and Wilmington, North Carolina (January, 1976) as well as estimates by organizational executives and families as to what their responses are likely to be to prediction of a damaging earthquake in California.
- 9 These are observations made by the scientists of the American and Canadian Seismology Missions; there are no sociological studies about the actual consequences of failures and predictions in China.
- 10 In this respect, Canadian scientists state that “The life-style in urban areas in Canada, the socio-economic situation and the freedom of communication is such that no member of the Canadian mission can envisage any realistic or acceptable adaptation of the Chinese style of earthquake precautionary measures to Canada even were earthquake prediction possible at this time” (CSR, 1975: 54).
- 11 To quote Giddens (1976), who argues that the theory of industrial society should be abandoned or at least scrutinized, given that its assumptions have become obsolete, “We should take seriously and explore the possibilities inherent in the idea that there are differing “paths” of development among the industrialized countries which *cannot* be squeezed between the confines of the old theory of industrial society” (Giddens, 1976: 721).
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