

HOUSING PATTERNS AFTER A LANDSLIDE

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Evacuation is a common response to disasters, and many students have looked upon the short term aspects of evacuations [Hultåker, 1976] [Perry, Lindell, and Greene, 1980]. Much less is known about long term consequences.

Studies have shown the importance of family and kin when people decide to evacuate [Bates et al., 1963] [Drabek, 1969] and their preferences for staying with relatives rather than in public shelters [Young, 1954] [Moore et al., 1963] [Haas, 1978]. Families gather to decide if they should evacuate and where they should go. They want to keep together if they leave their homes, and they try to stay with their kin or with friends if they lack relatives. Hultåker [1979] has analyzed some factors affecting the family decision to leave and to stay away from a disaster site. People compare the disaster site with their best alternative available, i.e., they compare their home with their potential place of evacuation. Among factors taken into account are the standard of living, the risk of injuries, the cultural values, and the social norms. Mileti, Drabek, and Haas [1975, p. 12] have indicated the shortage of research on reconstruction following natural disasters. Others, like Cuny [1978], have stressed the need to evaluate housing programs, their efficiency and consequences. There is a need for more empirical studies and for systematic analysis of permanent housing.

The length of time before people can move into permanent houses is of great importance after a disaster. Two out of three necessary houses were constructed within ten months after an earthquake in Turkey, which is a developing country [Mitchell, 1977], but three years were not enough in northern Italy. Four years after the event, Pelanda [1980] characterizes the disaster site of the 1976 earthquake in Friuli as a temporary housing system; so-called temporary housing often becomes permanent [Davis, 1977]. Cuny [1978] has made a summary of difficulties in providing permanent housing after a disaster. He observes that houses cannot be efficiently provided without taking into consideration the process through which houses are normally provided in the society.

Iklé [1951] and [1958, p. 221 ff.] reports that Germans wanted to return to their earlier living areas when their cities and towns were reconstructed after the Second World War. Local business men returned as well, and the various parts of the cities conserved their social character. It is also reported that people want to repair their own houses rather than look for a new one after a disaster [Dacy and Kunreuther, 1969, p. 142]. One reason given for the return is the fact that land holdings often represent the only asset of the disaster victims, and that they want to retain it [Hawley, 1955].

Other students have observed the social differences between people who return and those who stay away during the reconstruction period (e.g., [Moore, 1958, p. 137]). Hingson [1977] reports that after an earthquake in Guatemala many disaster victims fled the area and that 80 percent of the remaining people owned their own homes. Similar results are reported by Weymes and Holt [1977]. Few studies have recorded the quality of repaired and rebuilt houses, but some reports indicate increased quality of the permanent houses as compared with the pre-disaster ones [Moore, 1958, p. 138] [Snarr and Brown, 1978].

The construction of buildings in a disaster area does not guarantee that the victims will get permanent housing. The houses and the environment must be acceptable to the victims or they will not live there. Mitchell [1977] reports from the earthquake in Lice, Turkey, that many of the victims did not accept the permanent houses provided for them; the houses were abandoned, and the victims returned to their original or other villages.

Housing patterns are instances of the structural and individual change that occur after a disaster. It is thus necessary to study the pattern of movements, not just the housing at a given period of time. The movements of families must be looked upon as a process. It is not enough to classify different dwellings as pre-disaster, temporary, and permanent; there are degrees of permanency, and some families pass through more temporary homes than others. A family may move into a temporary house but decide to remain there since it suits the wishes of the family. Others may leave a home intended to be permanent.

It is necessary to consider the societal conditions under which the disaster recovery occurs, since the social meaning of homes and houses differs between cultures. The place and type of a house may be entirely determined by the social position of a family or it may be only one indicator of social status. The quality of housing may be related to the stratification system of the society, so that the geographical mobility of families is interrelated to their social mobility in the stratification system. Families will change their social position simultaneously with a change of house. The economic importance of a family's house and land tenure will differ between cultures as will the propensity to move after a disaster. Some families in some cultures can enhance their social and economic standing by moving, and they will accordingly be likely to do so. Others will not have the same option, and they will show a tendency to remain where they lived before the disaster. Ownership of land and houses will have varying consequences.

The rest of this paper will report on the housing pattern after a land-slide that occurred in Sweden. The housing problems were of a magnitude that should be handled fairly easily by a welfare state, and

there was no real lack of resources. The major problems centered around the allocation of resources during the recovery period as in Dyne's [1975] Type III society. Data will show the number of dwellings occupied after the disaster, the length of time that families remained in their houses and flats, and the time that elapsed between the disaster and the day when the families moved into what they believed to be their permanent residence. There will be an analysis of change in housing quality caused by the disaster.

The Landslide

On November 30 in 1977 a landslide occurred at Tuve, a parish situated twelve kilometers north of Sweden's second largest city, Göteborg. The stricken area consisted of quick clay in a river valley where the slide was caused by rainy weather. Excessive rainfall saturated the clay which could then no longer carry the weight of the houses in the area.

The slide moved 65 houses and flats within a triangle whose base was 1800 feet and whose sides were 2,400 feet. Some houses moved as far as 900 feet and were totally destroyed. Another 130 houses and flats remained outside the border of the directly affected area, but they were immediately evacuated since it was feared that more slides could follow. Some of the houses were left hanging on a steep cliff of about 45 feet.

A fortnight afterwards 46 families were able to return to their homes which were then judged to be outside of the dangerous area. Nevertheless, 84 other families had to remain out of their homes for extended periods, and responsible authorities evaluated their needs for temporary and permanent housing to be similar to that of people directly affected.

The slide happened at four o'clock in the afternoon, and the majority of the family members were at home, especially women and children. Some of the families had visitors. It seems as almost a miracle that no more than nine persons in four houses were killed.

The Victims

The disaster-stricken area was a well established suburb with a fairly homogeneous, middle-class population. Most families owned their terraced houses or bungalows, while a few lived in flats in condominium houses of two stories. There was little movement in or out of the area, and the majority of the families had lived in their houses for more than ten years, i.e., since their houses were built. Some of the people had been born in Tuve.

The educational level was high, and one man out of four had studied at a university. Three out of four women were gainfully employed. Sixty percent of the families had children living at home, and every third family had preschool children. The majority of the adult population was between 36 and 52 years old.

Some of the neighboring areas were profoundly different. They consisted of flats in large buildings owned by the city of Göteborg, and

the population had entirely different characteristics. Although empty flats were available in these buildings, many families refused to move into them even for a short period, since the areas had bad reputations.

Methods

The families directly and indirectly affected were interviewed about their responses after the disaster. The interviews were highly structured but unstandardized. They were conducted by trained interviewers who generally talked with several family members for at least an hour. Among the topics covered were the movement of the family after the disaster.

A mail survey was conducted three years after the landslide in order to follow up on changes that had occurred after the interviews. Many of the questions were devoted to housing changes and problems. Official descriptions of the landslide was gathered through 68 interviews with responsible authorities and other representatives of disaster relevant organizations.

Most of the data in the present paper will be taken from the mail survey. The population consists of the 65 directly affected families and the 84 indirectly affected families who could not return to their homes until long after the landslide. The directly affected families had 215 members among whom 100 were children, whereas the other group of families had 255 members (100 children). The study therefore concerns 149 families with 470 members of which 206 were children.

The sample included all 149 families except those where at least one member was killed by the slide. There remained 145 families to be studied, but one family died before the questionnaires were posted. Ten families refused to be interviewed, and 14 families did not return their questionnaires. The response rate was 93 percent for the interviews and 90 percent for the mail questionnaires.

Economic Consequences

All directly affected victims lost their houses and most of their property kept at home. Objects were scattered all around the area, and many families could only rescue a few things of great personal value. All the directly affected houses were destroyed.

The houses of indirectly affected families remained intact, but they could not be used for an extended disaster period because of the danger of their collapse. Some of these houses were hanging on a steep cliff, and there was the risk that successive landslides would demolish them. It was possible to remove furniture and other family property from most of these houses.

Half of the families had valid insurance covering most of their losses, but half of them were insufficiently insured. They were promised, however, that the government should cover all their losses, when the Secretary of the State for Home Affairs visited the disaster site two days after the landslide. He was asked in public about the economic consequences for the victims.

There was some discussion afterwards about the meaning of the promise, but the government paid 50 percent of the value of lost property not covered by insurance. The government also reimbursed the affected victims for their houses at the market price. Some of the houses closest to the edge of the slide area were also reimbursed at the same price level.

The rest of the families living in the indirectly affected area had two options to choose between. They could either sell their houses at the market price, or they could move back into their own house after a period of seven to eighteen months after the ground had been strengthened.

The disaster area was entirely reconstructed after 18 months. No new houses were built, but the majority of the houses had been repaired in the indirectly affected disaster area. Some were used by the same families as before the disaster, but most of the houses and flats were sold on the market at a price somewhat lower than the one at which the government had bought them.

There are at least three markets for houses in Sweden. The economically most favorable one is the market for new houses and building plots, which are generally distributed through municipality offices. The prices are fairly low, and it is possible to borrow most of the money at a favorable rate of interest. The second hand market is much more expensive, and it is harder to borrow the full price. Nevertheless, most people believe it to be more favorable to own than to rent a home because of the fiscal system.

The regular distribution of new houses and plots was stopped immediately as a consequence of the landslide. Local authorities decided that all available resources should be used for the disaster victims. A large number of families who had queued up for new dwellings for many years were by-passed in this process.

About 100 dwellings were available to the victims less than two months after the slide, and 19 of them were fairly close to the disaster site in Tuve. People could have moved into them a little more than one year after the slide.

The disaster stricken families had four alternatives:

To rent an apartment or to buy one in a condominium (available within a few months);

to buy a house on the second hand market (available within a few months);

to buy a new dwelling from the town (available in twelve to eighteen months);

to return to their pre-disaster dwelling (available to most of the indirectly affected families within seven to eighteen months).

Results

Number of temporary dwellings and length of residency

The average disaster victim lived in three to four different places since the landslide occurred, and there was almost no difference between the directly affected families and those indirectly affected. No family was able to move directly to a permanent home from their destroyed pre-disaster home, but 14 families needed to pass through only one temporary dwelling.

Two families did not find a permanent home until they arrived in their seventh house, and two families were on the move until they reached their sixth. More than ten percent of the families had to stay in at least five places, and almost every second family moved to at least four homes.

The median family lived in temporary dwellings more than two years before they could move into a permanent home. More than four out of ten families had to wait between two and a half and three years, and the situation was the same for indirectly as for directly affected families. No family had to wait more than three years for a permanent home. A small minority of ten percent were able to move into a permanent home within a year, and less than five percent could do so within six months.

There is no simple association between the number of dwellings and the length of time that people had to wait for a permanent home. Families with only one temporary dwelling had generally to wait more than two years and a half in order to get a permanent house.

The victims stayed for only a few days in their first temporary dwellings. One third of them had moved out within three days, and every second family left before a week. Nevertheless, 20 percent of the victims stayed in their first temporary home for more than a month.

The families stayed longer in their second and third temporary dwellings, and the latter seems to have been the most long-lasting. Forty percent of the families stayed more than a year, and two out of three stayed more than six months. The fourth dwelling was more transitory, and half of the families moved out of it within three months after their arrival there. It has to be noted, however, that there was a limited number of families who stayed in more than three temporary dwellings.

Many of the families had very vague ideas about their intended length of residency when they moved into their various temporary homes. They planned to live there for the immediate future, or they were simply unable to answer questions about their intentions. An analysis shows, however, that many of the families stayed for longer periods than intended, especially in their third and fourth temporary houses.

The wait for permanent homes was much longer than expected. Some families said that they would have acted differently if they had known how long the waiting time would be. They should either have chosen a

Table 1
 Number of Dwellings Occupied by Disaster
 Victims During Three Year Period

Families	Number of Dwellings							Total
	1	2	3	4	5	6	7	
Directly affected	0	3	19	19	5	2	2	50
Indirectly affected	0	11	32	28	9	0	0	80
All families	0	14	51	47	14	2	2	130

Table 2
 Number of Months in Temporary Dwellings before
 Moving to Permanent Homes

Families	Number of Months						Total
	6	7-12	13-18	19-24	25-30	31-36	
Directly affected	1	0	15	8	7	19	50
Indirectly affected	5	8	13	10	5	36	77
All families	6	8	28	18	12	55	127

Table 3

Proportion of Disaster Victims by Length of
Residency in Temporary Dwellings

Dwellings number	Length of residency							
	days			months				
	1-3	4-7	8-30	2-3	4-6	7-12	13-	
1	.32	.17	.30	.17	.02	.03	.00	N= 113
2	.07	.04	.15	.24	.17	.10	.24	N= 103
3	.00	.04	.07	.11	.12	.25	.40	N= 57
4	.00	.06	.12	.35	.06	.12	.29	N= 17

Table 4

Relationship between Permanent Homes of Victims
and Type of Residence before Landslide

Permanent residence	Residence before Disaster			Total
	Bungalow	Terraced house	Condominium flat	
Bungalow	13	68	10	91
Terraced house	0	16	3	19
Flat	0	2	6	8
Total	13	86	19	81

type of permanent house that was available earlier than the one actually chosen, or they should have organized their temporary homes in a different way. The number of different temporary dwellings seemed to be more annoying than the length of residency in each of them.

The quality of permanent homes

The majority of the victim families, 73 percent, lived in terraced houses before the landslide, 16 percent lived in condominium flats, and only 11 percent in bungalows. Their living standard had changed entirely three years after the landslide.

An overwhelming majority of the disaster victims had moved to bungalows, and the proportion of families in flats and terraced houses had diminished. The number of families who lived in bungalows had increased from 13 to 91, or to 77 percent. No family who lived in a bungalow before the disaster had left that type of housing, but the majority of those living in flats or in terraced houses had moved into bungalows. This change was in accordance with the wishes of the victims, among whom the majority declared that they wanted to move into bungalows irrespective of their predisaster type of home.

Dwellings as well as people can be rank orderd in a stratification system, where bungalows represent the upper status, terraced houses the middle, and flats the lowest. There are, of course, exceptions: some terraced houses are more exclusive than many bungalows, and there exist high quality flats in central areas of the cities. Nevertheless, the general pattern holds, and some families used this opportunity to move up the ladder. This was not, however, the only reason for people to prefer bungalows to terraced houses. There was at the time of the landslide a shortage of terraced houses.

A few families wanted to return to their pre-disaster home. Some of them did so, although after a few months many of them moved to a new permanent house. Other families wanted to live in Tuve, but they preferred a new bungalow to their pre-disaster house. Almost half of the victims, 59 families, returned to Tuve, where the disaster occurred. An additional 17 families moved into neighboring parishes north of Göteborg, and 26 families preferred to move to the southern part of the city, often to popular areas. Three families left Göteborg and the remaining were scattered around in diverse areas of the city. The disaster victims were aware of the reputation of different areas of Göteborg. One out of four families said that they wanted to avoid bad living areas.

Many families wanted to return to Tuve, but there were others who wanted to stay away from the parish. Every fifth family was afraid of the risk of future landslides. Another group wanted to stay away because of disaffection over conflicts which mostly concerned the allocation of houses and plots. Still another group wanted to live near other families hit by the disaster.

Many families mentioned that they wanted to live close to relatives and friends or near certain institutions such as their jobs or schools. It is worth noticing that the institutions of children were more

Table 5
Areas Where Families Relocated Permanently

Area	Number of families
The parish of Tuve	59
Other Parishes close to Tuve	17
Southern Göteborg	26
Other parts of Göteborg	13
Outside Göteborg	3

Table 6
Proportion of Families Considering Various Factors
in Choice of Permanent Residence (N=130)

Factor	Proportion
Wanted to avoid bad areas of the town	.27
Wanted to stay away from risky disaster area	.20
Wanted to live near other families hit by the disaster	.09
Wanted to get away from the conflicts in the disaster area	.10

important than the institutions of adult persons. Only 13 families, ten percent, indicated that they had no choice between alternative dwellings. They said that they had to take the only alternative offered to them. A majority of 90 percent made choices.

Summary and Conclusions

Housing problems occur in all types of societies after a disaster, including welfare states where there are enough resources to provide good housing for all citizens. About 150 families lost their homes in a landslide that occurred in a middle-class suburb close to the center of the second largest city of Sweden, Göteborg. Most observers would guess that the victims would find new permanent homes which would be acceptable to them fairly soon. Nevertheless, three years passed before they all had moved into permanent houses, and half of the families had to wait for more than two years. They also had to occupy a great number of temporary dwellings. Every second family lived in at least four different homes after the landslide, and some families lived in as many as seven different homes.

The same pattern could be found in many different societies at various levels of development. The social and economic causes are different, however. Sweden is a Type III society in Dyne's [1975] typology, while developing countries belong to Types I and II. The latter have problems after a disaster because of their lack of material resources; a society of the third type has the resources needed for reconstruction, but it faces problems of allocation. Both the lack of resources and allocation problems may have the same consequences: a prolonged period until permanent dwellings are provided.

The allocation of resources concerns the bureaucratic structure of decision-making. No Swedish family is allowed to construct a new house without being permitted to do so. Various bureaucratic organizations have to study the plans and approve of them. There are certain standards that must be met, and all houses have to fit into a general plan.

Nevertheless, many of the bureaucratic problems were efficiently handled after the landslide at Tuve. The decision-making process was coordinated in a way that made things move faster than usual, and the rules were changed in order to help the disaster victims. But, three years passed before the families moved into their permanent houses.

One of the characteristics of modern western societies is the type of market through which resources are allocated. People can improve their material and social situation by choosing between alternatives offered to them. There are, however, always limitations, and people must have economic or social resources in order to support their demands in an exchange situation.

The largest part of a family's resources generally are not available to be used on the market of exchange since they are already invested. Their material resources are found in their houses, furniture, and other private objects. Their social resources are invested in their friends, their relatives, and their neighbors. These resources cannot easily be made available.

A disaster changes that situation; material and social resources are suddenly set free. Families have lost their homes, but they have cash money received from insurance companies and official authorities. These funds can be used to buy an entirely new house.

There are more options open to the families than ever before because they can start from scratch; they can decide where to invest their housing money, in what type of home they should invest it. They are in a new situation. To choose between, say, a terraced house in a southern suburb and a bungalow in a northern one, is quite different from choosing between painting and not painting the old terraced house.

The same type of change in social resources; investment in social surroundings are often lost during disasters. Families first experience an increase in the disaster area solidarity, but it is usually weakened when the victims are spread outside the disaster site. The families are reimbursed in social resources since they are the focus of a general interest. It becomes a matter of public concern to help the disaster victims, and they are often welcomed, at least during an initial period. The families can use their social resources as well as their economic ones to invest in their future. They can choose between alternatives that they have never had before.

Only ten percent of the victims in Tuve said that they had no options to choose between, while the rest of the families compared different housing areas in several respects. They thought about the general reputation of different parts of the city, the risk of a new landslide, the type of people they wanted to have in their neighborhood, and their proximity to various types of social institutions. The families also used their social and economic resources in order to improve their general level of living; they moved upwards in the stratification system of houses. Few of the victim families had lived in bungalows before the disaster, but an overwhelming majority did so three years afterwards.

The situation is very different in a society where there is a lack of economic and material resources. There are not many alternatives open to the victims; they have lost their houses without receiving any cash money instead. The social resources may also diminish since they not only have to compete with their fellow victims but also with all other members of a poor society. A developing country cannot afford the same priority to disaster needs as can be given in developed countries. Thus, disaster victims in a poor society lose their homes and houses without being reimbursed, either economically or socially. They often stay on the disaster site because they may own a parcel of it, or it is the only social context where they feel that they are welcomed.

The decision to stay in the disaster area or to leave it is not a question of universal human propensities. Nor is it a difference between the western culture and other cultures. Whether people stay or leave is a consequence of the reward system of a society hit by a disaster. Human beings try to make the best of their situations; they also try to find the best possible home that is available to them.

Disaster responses cannot be analyzed without taking into account the social and economic context in which they occur. There is no need to ask whether people stay or leave a disaster stricken area or whether they

evacuate or not before a disaster. It is necessary to understand the rewards and costs of a given society. It is also necessary to understand the change that occurs in the social and economic resources available to the disaster victims.

Just a word of caution: To say that disaster victims increase their available social and economic resources is not to say that the victims profit from the disaster. On the contrary. They receive their increase in available resources as small and insufficient compensation for their overall losses. Moreover, many of the victims at Tuve had to pay an additional price: they had to wait almost three years before they got a permanent house. Some of the families drew the conclusion that they would have employed their resources differently if they had known about the waiting time. They might have chosen different houses or made other arrangements during their period of temporary housing.

REFERENCES

Bates, Frederick L. The Social and Psychological Consequences of a Natural Disaster. Disaster Study No. 18, Disaster Research Group, National Academy of Sciences. National Research Council Publication No. 1081. Washington, D.C.: National Academy of Science--National Research Council, 1963.

Cuny, Frederick C. "Disasters and the Small Dwelling: The State of the Art," Disasters, Vol. 2 (1978), pp. 118-124.

Dacy, Douglas C. and Howard Kunreuther. The Economics of Natural Disasters. New York: The Free Press, 1969.

Davis, Ian. "Emergency Shelters," Disasters, Vol. 1 (1977), pp. 23-40.

Drabek, Thomas E. "Social Processes in Disaster: Family Evacuation," Social Problems, Vol. 16. (1969), pp. 336-349.

Dynes, Russell R. "The Comparative Study of Disaster: A Social Organizational Approach," Mass Emergencies, Vol. 1 (1975), pp. 21-31.

Haas, J. Eugene. "The Philippine Earthquake and Tsunami Disaster: A Reexamination of Behavioral Proportions," Disasters, Vol. 2 (1978), pp. 3-11.

Hawley, Amos. "Land Value Patterns in Okayama, Japan, 1940-52," American Journal of Sociology, Vol. 60 (1955), pp. 487-492.

Hingson, Luke. "The Guatemala Earthquake of February 1976: Case Study of a Relief Agency's Operations," Mass Emergencies, Vol. 2 (1977), pp. 83-94.

Hultåker, Örjan E. Evakuera (with an English summary). Disaster Studies No. 2. Uppsala, Sweden: Department of Sociology, Uppsala University, 1976.

Hultåker, Örjan E. "Der Beschlussprozess bei Evakuierungen," paper presented at the Internationalen Symposium Zur Katastrophen und Unfallforschung at Christian-Albrechts-Universität, Kiel, Western Germany, September 26-28, 1979.

Iklé, Fred Charles. "The Effect of War Destruction upon the Ecology of Cities," Social Forces, Vol. 29 (1951), pp. 383-391.

Iklé, Fred Charles. The Social Impact of Bomb Destruction. Norman, Oklahoma: University of Oklahoma Press, 1958.

Mileti, Dennis S., Thomas E. Drabek and J. Eugene Haas. Human Systems in Extreme Environments: A Sociological Perspective. Boulder, Colorado: Institute of Behavioral Science, University of Colorado, 1975.

Mitchell, William A. "Partial Recovery and Reconstruction after Disaster: The Lice Case," Mass Emergencies, Vol. 2 (1977), pp. 233-247.

Moore, Harry Estill, et al. Before the Wind: A Study of the Response to Hurricane Carla. Disaster Study No. 9, Disaster Research Group, National Academy of Sciences. Washington, D.C.: National Academy of Science--National Research Council, 1963.

Pelanda, Carlo. "Behavioral and Social Tendencies after the Friuli Earthquake: State of the System" in Unfall und Katastrophenforschung: Aktuelle Sozialwissenschaftliche und Medizinische Aspekte, by Toni Graf-Baumann and Stephan Metrevelli. Erlangen: Perimed-Fachbuch-Verlagsgesellschaft, 1980.

Perry, Ronald W., Michael K. Lindell and Marjorie R. Greene. Evacuation Decision-Making and Emergency Planning. Seattle, Washington: Battelle Human Affairs Research Centers, 1980.

Snarr, Neil D. and E. Leonard Brown. "Post-Disaster Housing in Honduras after Hurricane Fifi: An Assesment of Some Objectives," Mass Emergencies, Vol. 3 (1978), pp. 239-250.

Weymes, Hazel and Julius Holt. "Rural Centre and City Slum after the Guatemala Earthquake," Disasters, Vol. 1 (1977), pp. 90-97.

Young, Michael. "The Role of the Extended Family in a Disaster," Human Relations, Vol. 7 (1954), pp. 383-391.

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SECTION XIV

CONCLUSION

CLOSING REMARKS

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It is a pleasure for me to offer some comments at the closing of the Third International Conference on the Social and Economic Aspects of Earthquakes and Planning to Mitigate Their Impacts. I have been particularly interested in this conference for two major reasons. The first is that this conference is being held approximately ten years after cooperative projects in earthquake research between U.S. and Yugoslavian researchers were initiated under National Science Foundation Programs. I have had the honor of participating in the establishment of a number of these programs, and it is gratifying to reflect on the progress that has been made through these efforts. The second is that the subject matter of the Conference is an indication of success in achieving a more comprehensive approach to the earthquake problem in which social and economic consequences are being studied in addition to considerations of physical damage to constructed facilities.

In looking back at the research programs of the last ten years, many successful accomplishments can be identified. These programs were of great assistance in establishing a network of strong-ground motion instruments in Yugoslavia. This network has recorded a number of significant seismic events and has provided data which improve our knowledge of how the ground actually moves at different locations during an earthquake. Such information is an important key to establishing design levels and conditions for various types of structures. A comprehensive program of laboratory testing, computer modeling, and dynamic tests on real buildings has improved our capabilities during the design stage to predict in advance the seismic behavior of structures. One computer program, which is known under the acronym TABS or XTABS has made dynamic analysis of three dimensional structures much more feasible. The original versions of this computer program were developed under the cooperative research program, and the computer program is being extensively used by both designers and researchers. A great deal of valuable research on masonry structures is being carried out. In the planning area joint studies have been carried out leading to new procedures for estimating building stocks and for reconstruction planning. Many other valuable accomplishments could be listed, but this

sampling provides an indication of the success of these cooperative programs.

It is hoped that the momentum and linkages which have been built up through these cooperative research efforts can be maintained in the future. This conference and the two preceding ones have provided a basis for continued joint efforts which include cooperation between disciplines which have too frequently followed separate paths even within a single country. I hope that in the future fruitful interaction between researchers and professionals in the U.S. and Yugoslavia will continue.

Finally, I would like to acknowledge the substantial efforts of Professor Barclay Jones and Dr. Jože Vižintin, Co-chairmen of this Conference. It is through their unusual skills in organization and investment of substantial amounts of energy that this Conference was organized in a very short amount of time--particularly considering the complexities of international communication. I would also like to express my appreciation to the large number of people in both countries, and I will not even try to name all of them, who worked to make this Conference a success. I have found the Conference to be stimulating and to provide me with a broader insight into approaches for understanding and dealing with the earthquake problem in a more comprehensive way. I hope you have found it to be a similar experience.

APPENDICES

APPENDIX A
FINAL CONFERENCE PROGRAM

THIRD INTERNATIONAL CONFERENCE:
THE SOCIAL AND ECONOMIC ASPECTS OF EARTHQUAKES
AND PLANNING TO MITIGATE THEIR IMPACTS

June 29-July 2, 1981

Grand Hotel Toplice
Bled, Yugoslavia

FINAL PROGRAM

SUNDAY, JUNE 28
ARRIVAL OF PARTICIPANTS AT BLED

MONDAY, JUNE 29

0800-0845 REGISTRATION

0900-1000 OPENING CEREMONY

Chairmen: Dr. Jože Vižintin
Dr. Barclay G. Jones

Welcome: Mrs. Marija Zupančič-Vičar
Representative of the
Socialist Republic of Slovenia
Dr. Muris Osmanagić,
Chairman of the US-Yugoslav Joint
Board on Scientific and Technological Cooperation
Acad. Prof. Dr. Janez Milčinski
President, Academy of Science and Arts,
Republic of Slovenia
Prof. Sergej Bubnov, President,
European Association of Earthquake Engineering

Opening Remarks: Mrs. Marija Zupančič-Vičar
Dr. Charles Zalar
Dr. Jakim Petrovski
Dr. William A. Anderson

1000-1030 Coffee

1030-1230 SESSION I

Subject: Macro- and Micro-Economic Considerations

Chairman: Dr. Vladimir Frankovič

- 1) Dr. Jerome W. Milliman "Modeling Regional Economic Impacts of Earthquakes"
- 2) Dr. Randall Baker "Land Degradation in Kenya: Economic or Social Crisis?"

Monday, June 29, Continued

- 3) Prof. Sergej Bubnov "Governmental Role in Mitigating The Impact of the Earthquake Disasters in Yugoslavia"
- 4) Dr. Branko Zelenkov "Financing the Losses and the Risk Due to Earthquakes"
- 5) Dr. William D. Schulze "The Benefits and Costs of Seismic Building Codes"
- 6) Prof. Vladimir Ribarič "An Extension of the Concept of Specific Destruction of Earthquakes on the Basis of Gross National Product of Affected Countries"

1600-1700 SESSION II

Subject: Risk Evaluation

Chairman: Dean Myer R. Wolfe

- 1) Dr. Janez Lapajne "Social and Economic Aspects of Seismic Risk"
- 2) Mr. Wiratman Wangsadinata "Risk Criteria as a Rational Basis for Seismic Resistance of Structures of Different Grades"
- 3) Prof. Jakim Petrovski "Post Catastrophic Earthquake Studies for Planning of Immediate Actions and Seismic Risk Reduction"
- 4) Dr. E.M. Fournier d'Albe "The Problem of Assessing Seismic Risk to Existing Buildings"

1700-1730 Coffee

1730-1830 SESSION III

Subject: Attitudes Toward Risk

Chairman: Dr. Stane Saksida

- 1) Prof. Ritsuo Akimoto "Some Prospects of Earthquake Prediction in Japan"
- 2) Colonel (ER) Charles Chandessais "Fausse Alerte à Pouzzoles"
- 3) Dr. Thomas F. Saarinen "Warning and Response to the Mt. St. Helens Volcanic Eruption"
- 4) Dr. Risa I.K. Palm "Public Response to Mandated Earthquake Hazard Disclosure by Real Estate Agents"

1830-2000 Reception, Grand Hotel Toplice

TUESDAY, JUNE 30

0800-1000 SESSION IV

Subject: **Social System Vulnerability**

Chairman: Dr. Jerome W. Milliman

- 1) Dr. Russell R. Dynes "The Contribution of the Social Sciences to Emergency Planning"
- 2) Prof. Carlo Pelanda "Disasters and Sociosystemic Vulnerability"
- 3) Dr. Enrico L. Quarantelli "An Agent Specific or an All Disaster Spectrum Approach to Socio-Behavioral Aspects of Earthquakes?"
- 4) Dr. Ralph H. Turner "Disaster Subcultures in Earthquake Country: Between Earthquakes in Southern California"
- 5) Dr. Vit Karnick: "Problems of Earthquake Hazard Assessment and Vulnerability Analysis"
- 6) Michel L. Lechat, M.D. "Disasters Epidemiology: An Epidemiologists's View of Health Management in Disasters"

1000-1030 Coffee

1030-1230 SESSION V

Subject: **Preparedness Measures**

Chairman: Prof. Sergej Bubnov

- 1) Dean Myer R. Wolfe "Urban Scale Vulnerability: Some Implications for Planning"
- 2) Prof. Aydin Gemen "Earthquake Sciences and City Planning Are Still Disconnected"
- 3) Mr. Vladimir Braco Mušič "Spatial and Urban Planning and Design in Earthquake-Prone Areas"
- 4) Mr. Stanley Scott "Formulating and Implementing Policies for Seismic Safety"
- 5) Mr. Robert A. Olson "The California Seismic Safety Commission, 1975-80: Public Policy and a Practitioner's Observations"
- 6) Dr. Alan J. Wyner "Implementing Seismic Safety Policy: The Case of Local Governments in California"

Tuesday, June 30, Continued

1600-1700 SESSION VI

Subject: Emergency Situations

Chairman: Dr. Ralph H. Turner

- 1) Mr. Harun Alrasjid "Social and Economic Aspects in the Mitigation of Earthquake Disasters"
- 2) Prof. Bernardo Cattarinussi "Victims, Primary Groups and Communities After the Friuli Earthquake"
- 3) Prof. Enso V. Bighinatti "In the Spirit of William James: Reflections on League of Red Cross Societies Experience of Earthquakes"

1700-1730 Coffee

1730-1830 SESSION VII

Subject: Education and Information in Disasters

Chairman: Prof. Viktor Turnšek

- 1) Prof. Francesco M. Battisti "The Organization of a Mass Education Program in Order to Mitigate Earthquake Hazards in Calabria"
- 2) Prof. T. Joseph Scanlon "The Mass Media in Crisis: A Predictive Model"
- 3) Mr. Polde Štukelj "Rescuing Actions After Earthquakes"

2000-2200 Dinner, Grand Hotel Toplice

WEDNESDAY, JULY 1

0800-1000 SESSION VIII

Subject: Disaster Impacts and Effects

Chairman: Mr. Stanley Scott

- 1) Dr. Frederick L. Bates "The Use of a Crossculturally Valid Level of Living Scale for Measuring the Social and Economic Effects of Earthquakes and Other Disasters and for Measuring Progress in Recovery and Reconstruction as Illustrated by the Case of the Guatemalan Earthquake in 1976."
- 2) Dr. Robert Geipel "The Case of Friuli/Italy: The Impact of an Earthquake in a Highly Developed Old Culture: Regional Identity versus Economic Efficiency"

Wednesday, July 1, Continued

- 3) Prof. Viktor Turnšek "Earthquakes as a Social Problem"
- 4) Prof. Ada Cavazzani "To Be Announced"
- 5) Mag. Milan Orožen Adamič "The Consequences of the Earthquakes which Occured in 1976 in Slovenia"

1000-1030 Coffee

1030-1230 SESSION IX

Subject: Post Disaster Response

Chairman: Mr. Vladimir Braco Mušič

- 1) Prof. Tiberije Kirijas "Physical and Urban Planning and Design in Seismic Areas"
- 2) Mr. Anton Ladava "Guidelines and Procedures to Eliminate the Impact of Earthquakes in Soca Valley"
- 3) Dr. Alcira Kreimer "Housing Reconstruction in the Caribbean and Latin America"
- 4) Mr. George G. Mader "Land Use Planning After Earthquakes"
- 5) Prof. Ārjan E. Hultāker "Housing Patterns after a Landslide"
- 6) Dr. Barclay G. Jones "Estimates of Building Stocks as a Basis for Determining Risk"

1400-1945 SESSION X

Study Trip to Institute

1500-1700 Visit to the Institute for Research and Testing Materials and Structures in Ljubljana

1700-1730 Closing Ceremony: Cultural Center "Ivan Cankar"

Chairmen: Dr. Jože Vižintin
Dr. Barclay Jones

Greetings: Dr. Marjan Rožič
President, Assembly of City of Ljubljana

Closing Remarks: Vladimir Braco Mušič
Dr. Michael P. Gaus

1730-1900 Reception: Cultural Center "Ivan Cankar"

1900-1945 Return to Bled

THURSDAY, JULY 2

0630-2000 SESSION XI
Study Trip

Excursion by bus to the Soča-Valley, damaged by the 1976 Friuli Earthquakes (Via Kranjska gora-Vršič-Bovec-Kobarid-Tolmin-Cerkno-Skofja Loka)

0930-1100 Visit to Podbela and Breginj

1200-1400 Lunch at Breginj

1500-1700 Visit to Partisans' Hospital Franja

2000 Return to Bled

APPENDIX B
LISTS OF ATTENDEES AND AUTHORS

THIRD INTERNATIONAL CONFERENCE:
THE SOCIAL AND ECONOMIC ASPECTS OF EARTHQUAKES
AND PLANNING TO MITIGATE THEIR IMPACTS

June 29-July 2, 1981

Grand Hotel Toplice
Bled, Yugoslavia

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