APPENDIX F

NOTE ON THE EARTHQUAKE IN WEST YUNNAN, CHINA

Li-Li XIE

Two strong earthquakes of magnitude M=7.6 and 7.2 struck the West Yunnan Province, the south west part of China at 21:03 and 21:16 respectively on 6, November 1988. The epicenters of these two earthquakes were located at about 22.9°N and 100.1°E. After the mainshocks, about two hundred aftershocks of magnitude from M=3 to 6.9 on Richter's scale occurred. Among them, 3 registered from M=6.9 to 6.0, 7 from M=5.9 to 5.0 and 57 ranged from M=4.9 to 4.0. The epicentral area was distributed in an inclined rectangular area of 150 kilometer in length and 50 kilometer in width (Fig.1). The mainshocks were also strongly felt in Kunming, the capital of Yunnan Province, about 400 kilometer from the epicenter. (Fig. 2).

As a final official statistics reported, these two major events caused a considerable losses including 730 death toll, 4015 injuries, 5.1 millions residents affected and about one million homeless. The direct economic losses exceeded 1.5 billion Chinese Yuan (equivalent to 0.4 billion U. S. Dollor).

During earthquakes, more than 400 thousand rural and urban houses and buildings were collapsed and about 700 thousand damaged. Among them, there were 1300 primary and high school buildings and 98 hospitals and rural clinics collapsed and damaged. In addition, seventeen earth-dam were moderately and slightly damaged. Communication system were also disrupted and land transportations were prevented due to several small sized tremor induced landslides.

After the main shocks, the local public security police and about five throusand army were mobilized in five teams to evacuate the survivors from their damaged or collapsed houses. Mean-while 11 medical teams consisting of 900 medical workers reached to the quake-stricken area. Efforts were also made to build and repair houses to shelter the affected residents. According to a report from the news agency, 14 countries, UN organizations and other international non-governmental organizations had expressed their intention to offer assistance.

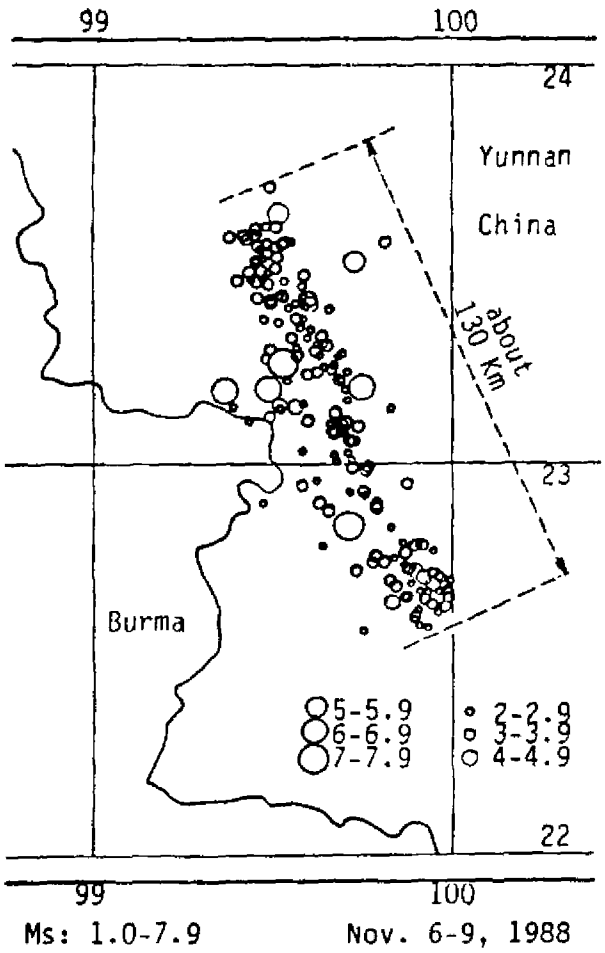
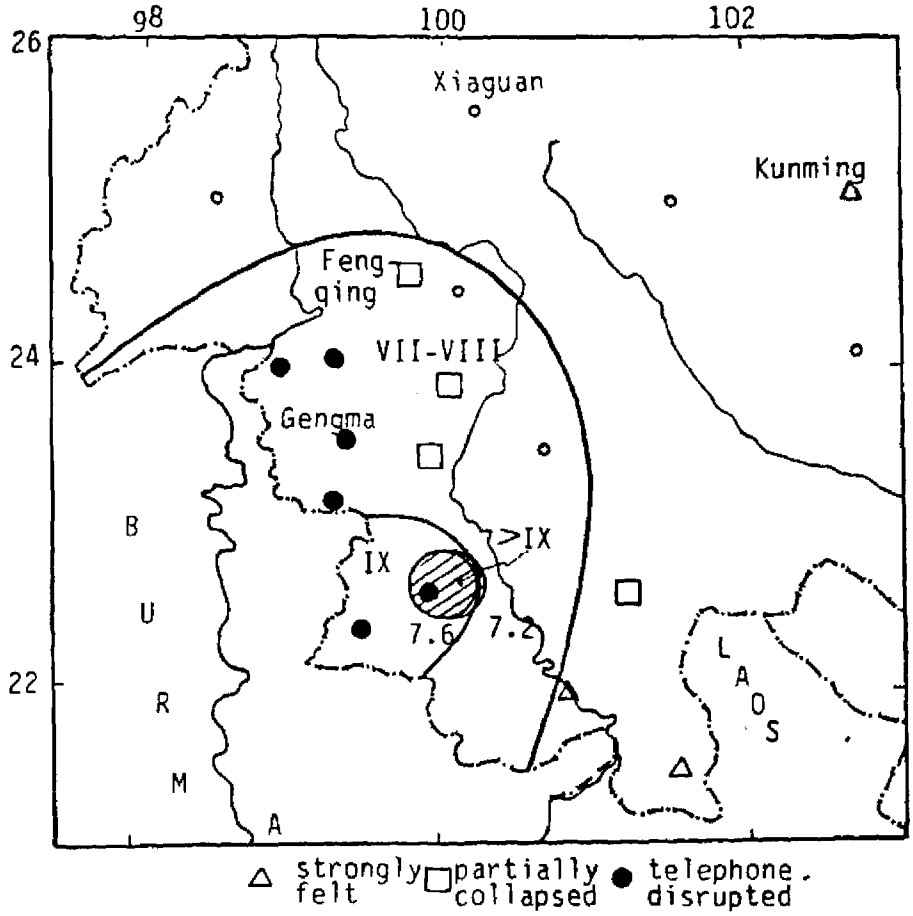


Fig. 1 Distribution of earthquake epicenters

Fig. 2 Illustration of seismically affected area



APPENDIX H

Remarks by David Webster of
The Annenberg Washington Program
to the Third Meeting of the International
Ad Hoc Group of Experts for the International
Decade for National Disaster Reduction

Rabat Kingdom of Morocco
25-27 January 1989

International Disaster Communications

Perhaps I should open my contribution to the discussion by saying that I am probably the only person in this room who is not a recognized expert on natural disasters. Also, I am not an engineer - so this is not going to be a technical approach. I am an editor who ended up in the management of a very large broadcasting organization. So I do know something about international communication and it is the gap between these areas of expertise that I wish to address both in technical and policy terms. Last year I was asked by The Annenberg Washington Program to chair a small task force in Washington to look at the coming developments in the communications industry and how these might be used to help in dealing with natural disasters, both before and after the event. It was an interesting group consisting of relief workers, lawyers, editors, engineers and communications experts. (A summary of our proposals is available on the table back there.) It soon became clear that there was an enormous gap between what the communications people knew were going to be the startling developments of the next decade in their business, and the ability of some disaster relief organizations to focus on these developments. Of course, most broadcasters themselves don't know much about the disaster business and haven't thought about their potential for a constructive role. So we learned a great deal from each other and fresh minds were applied to constantly recurring problems seen in a new light.

There is a strange underestimation of what can be done about disasters. The fact that they have caused more deaths, probably, even than warfare in the last two decades does not seem to focus the attention of governments. The false notion of unpredictability creates a psychological barrier to action. If you were to take one hundredth of the energy, intellect and money which is applied to the subject of how to win wars (in case they should break out) and applied those resources to how to deal with disasters (which we know will happen somewhere -- some day) great progress would be made. Existing efforts are inadequate. Institutions that are supposed to deal with the problem are too weak, lack effective resources and lack a mandate to manage. So the first task of the media, is to cover the subject of disasters more coherently and less fatalistically. It is only partially an act of God. There is something that Man can do -- and the media can tell us. In fact, I'm told, that the three of them God, Man and the Media together can manage all sorts of things.

When we look at the likely developments in the communications industry during the next decade, we see dramatic potential. Systems which cannot help us today, in their next generation of development can be full of possibilities. Most of these things will happen for straight-forward commercial reasons. There will be a growth of major private and public international satellite systems which will have very real applications to the management

of natural disasters. Of course, few of these developments are likely to be dedicated to the disaster business. That would be totally uneconomic. (Nobody would suggest that it is necessary to build a national telephone service across the United States designed specifically to warn people in Kansas of the likelihood of tornadoes.) It is because of the unpredictability of the demand for specialized disaster services that they should, in the main, function as add on systems to communications developments which have their own commercial justification. But there are plenty of these around and new one's that are growing. Take, as only one example, satellite location systems such as Geo-star which is now going into operation in the United States. The commercial purpose of this system is to be able to track and locate, at a moments notice, spare parts for industry and goods of all kinds being trucked across the United States. A small display device is installed in the cab of the truck and messages can be sent backwards and forth across the continent by satellite to a central control center. It's early days and it cannot, at the moment, handle much information, but it will be upgraded. This system will exist in the United States and will probably be developed elsewhere in the world. It is clearly a technology which, at very low cost indeed, could be applied in the coming decade to helping communications at times of natural disaster.

Whenever you see or hear a story about a disaster, the second sentence is always "and communications have broken down." This is because these communications often consist of highly vulnerable hard-wire telephone lines. Many of the new systems which are being developed through the use of a variety of satellites do not depend on hard-wire and as the ground installations become smaller and more efficient, they multiply,so the likelihood of all your ground stations being knocked out at any one time is extremely small. The ability to restore shattered communications at times of emergency is of course growing rapidly. In the last few years, we have seen dramatic changes in the scale of equipment that is needed to communicate internationally. It is now possible to rush into a stricken area with small satellite uplinks and quickly restore communications with the outside world -- data, voice and video. In fact, most of the barriers to this activity turn out not to be technical at all, but often a lack of knowledge or imagination or bureaucratic delay.

A major proposal that came out of our Annenberg group was therefore to remove the bureaucratic delays beforehand. What is needed is a new International Convention for the free movement of communications equipment in order to deal with major disasters. A swift and unhampered deployment of relief equipment and personnel across borders is absolutely essential. So we drafted a Convention on Telecommunications Systems for Disaster. (Copies are available.) This would direct the International Telecommunications Union, or some other suitable body, to collect and disseminate information on available disaster communication resources, evaluate potential satellite

needs and help requesting nations to make disaster contingency plans. It would formalize a procedure for disaster stricken nations to request help in disaster communications, give assisting nations personnel and communications equipment, immunity from arrest and seizure and taxation, and otherwise encourage rapid entry into the requesting nations. It appeared to us that here was a gap that needed filling. Our's may not be the perfect convention but at least it is a try and other people can go on and improve upon it.

Another area (which is regarded by some people as extremely mysterious), in which we had recommendations, is that of the use of remote satellite imaging. Remote imaging after a disaster, by itself, sometimes is not terribly useful, but if such pictures from space relate to databanks full of pictures from space taken at time of normality (that is before disaster) the comparisons can be extremely instructive. This is another technology which will grow rapidly in the coming decade and new commercial systems will become available in addition to the existing ones of Landsat and Spot. What I think is important here is that this development (in relationship to disaster mitigation) should not be totally uncoordinated. It would be ridiculous to have a whole system of commercial orbiting satellites which only flew over a certain area every other Wednesday. What we need is some element of coordination so that the aggregate of these commercial developments will give a useful coverage of the world's most vulnerable spots and with a rate of revisit which can give us information as fast as possible. Gradually, the rates of revisit will improve, definition will become better, both with photographic techniques and with other imaging. Again I must stress that the usefulness of this information relates to the existence of databanks of comparable information which have to be built up beforehand.

Of course the difficulty of discussing this subject is that very little of this technology exists in the open commercial world. Most of it belongs to the world of military intelligence of the great powers, so that when you do discuss it with anybody who actually knows anything about it, they go a little pale, and start muttering about 'national technical means.' It is true that this is an extremely sensitive subject. On the other hand, I also believe it to be true that the total blanket of security with which it is covered should not continue to exist indefinitely and, in fact, I do not believe that it will continue to exist indefinitely. The great powers are well aware of 90% of each other's capabilities in this area and it would seem to me ridiculous to try and protect 100% of this information. In fact I suggested, in a recent article in the New York Times, that in this new era of cooperation that this might be a subject which Mr. Gorbachev and Mr. Bush should place on their agenda for discussion. At the time of the Armenian earthquake in the Soviet Union, I am sure that the United States were in possession of very good pictures of Armenia, just as at the same time the Soviet Union would have been in possession of very good pictures of Texas and Colorado. It is a tragedy that

those two great nations have found themselves unable to cooperate in this area and take the instruments of war and apply them to the saving of lives in peacetime.

Again, satellite remote sensing solely for its role in the mitigation of occasional disasters would be uneconomic, but future systems being built for other purposes can be made adequate if serious thought is given today. A small example. There have been studies of the Media-Sat proposal. And they concluded -- too expensive. We have done an engineering and cost study for a small Disaster-Sat system. Conclusion -- too expensive. But the technical specifications for both systems are very similar. Could they be combined and the costs shared -- indeed, are there other revenue creating uses not yet thought out?

So, let me now turn to the role of broadcasters themselves. I know from my own experience both in the management of broadcasting and in early years when as a producer I actually used to rush off to earthquakes such as that at Skopje in Yugoslavia, that, as a journalist, one often feels helpless when confronted with merely reporting major human suffering rather than helping. You wish to put down your camera or your notebook and try to help with your bare hands. Sometimes this concern is overlayed with a layer of cynicism. But there may be ways in which one can maintain one's professional objectivity and one's primary role but at the same time be of assistance. The first is obviously by providing fair and accurate reporting and fulfilling one's professional role according to the highest standards. But there are also other ways in which one can be made to feel less of a voyeur. Without compromising one's professional integrity, one can cooperate with the relief authorities. In many instances the scale and cost of the technology applied by large broadcasting organizations to the coverage of disasters far exceeds the sophistication and the cost of the technology available to relief organizations. It is certainly possible, by careful prior agreement, to allow some of this expensive communications technology to be used by the relief authorities in the management of the problem. Satellite uplinks for instance have multiple capabilities and broadcasters usually make block bookings. This time is not used efficiently. There is some slack. By prior arrangement relief authorities could have cheap international communication by satellite and possibly access to material of interest to them not actually broadcast. They in turn could make their expertise and knowledge available to broadcasters at the time of the disaster and in prior training sessions.

Other ways in which the broadcasters could help are obviously in the general education of people, in emergency warning systems, and with the understanding of disasters when they happen. In many, many countries the television weatherman is a major messenger, someone who is known and trusted in the household and it would seem natural that the weatherman (or weather person) be adapted to become a conduit for a gradual public education about disaster mitigation and the person one turn to in the event of danger.

Broadcasters have always of course been thought of as the transmission belt for governmental information at times of emergency. The changes that are taking place in the communications industry, however, have created a need for a rather serious reassessment of this role. Many nations have become used to the idea of having a fairly straightforward national broadcasting system which is easy to contact and whose signal reaches most of the population. In many parts of the world this is changing very rapidly, particularly in western Europe, where there is a rapid deregulation of broadcasting on a national level and new systems are growing -- many on a regional level. Instead of making one telephone call, say to the director general of the BBC, it will be necessary to make dozens of telephone calls to lots of different independent broadcasters many of them transmitting to your country from somewhere else in the world. So it's not going to be as simple as it used to be and a lot of the emergency plans will have to be rethought. The audience is being fragmented. Also, it will be much more difficult to control the flow of information. This will make even more evident and important a basic rule of information management. That is, that in order to maintain credibility you have to tell the truth and be open. You not only have to tell the truth and be open, you have to tell the truth and be open quickly, indeed immediately.

In the world of communications, which is changing rapidly even as we speak, it will become more and more difficult for any one authority or any one transmission system to maintain a particular line of information without being contradicted by another stream of information which comes from elsewhere, outside the control of national authority. Therefore, it is not only right to tell the truth quickly, it is also necessary and practical to do that.

So to sum up, <u>one</u>, we need more resources, new and strengthened international institutions. Many of our problems are managerial. We need something like an 800 Disaster number, perhaps duplicated on a regional basis, which would be the central point for all information relating to disasters. They would have the computer banks both to receive new information and to regurgitate the old. <u>Two</u>, we need a new international convention on the free movement of communications equipment in the event of disaster. Three, we need to reexamine the cloak of security which lies over the use of remote imaging systems so that both the growing commercial systems can be more effectively utilized, and the vast existing intelligence resources of the great powers can be applied to this problem. <u>Four</u>, we need a new relationship to gradually develop with broadcasters who bestride the transmission systems. They too need education so that they can report more effectively. They need to be given a constructive role. And we need a new openness of authority. It will no longer be possible to hide behind the excuse of bureaucratic convenience. We will have to take the risk of being open with the people -- lest a worse fate should befall us.

Lastly, governments have to give disaster mitigation a higher priority. Disasters are inevitable only in one sense. The sense that eventually death is inevitable. In the meantime, there are things that can be done. Governments, media organizations, insurance companies, large international corporations. All of them need have a major stake in this and all of them need to be sensitized to the need to plan for the entirely predictable fact that disasters will and do happen. When they do happen the scale of cost is enormous. However, the cost of mitigation is not so great. In the area of communications, these costs are manageable because most of the things that need to be done can be intelligent add-ons to developments both governmental and commercial which are already happening. Now is the time to ensure that they happen in the way, which is most useful for your specific needs.

To conclude, perhaps one immediate practical step which can be taken would be to take inventory -- to initiate a study of all new communications development in order to determine what is likely to happen in the course of normal commercial and governmental ventures, how they might be of use in disaster mitigation (how to hitch-hike upon them) and how institutionally, financially and technically these ventures might be nudged into the most useful shape before they are fully formed. I doubt that any of these suggestions are new, but there seems to be some kind of institutional drag which has to be overcome. It is, I suspect not technical possibility, but political energy that is lacking. And if you want to generate political energy -- I do have some advice -- go thou to the media.

APPENDIX I

THIRD MEETING OF THE INTERNATIONAL AD HOC GROUP OF EXPERTS FOR THE INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION

25-27 January 1989
Rabat, Morocco

ACTIVITIES OF ESCAP ON NATURAL DISASTER REDUCTION IN ASIA AND THE PACIFIC

UNITED NATIONS
ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC
Bangkok, Thailand

This document has been issued without formal editing.

I. INTRODUCTION

The Economic and Social Commission for Asia and the Pacific (ESCAP) was founded in 1947 as the regional arm of the United Nations covering Asia and the Pacific. The membership currently is more than 40 countries and territories in an area stretching from the Islamic Republic of Iran in the west to the Cook Islands in the Pacific Ocean in the east. The population of the region is nearly 3 billion, with 45 million more being added every year.

The climate, topography, geology, demography within the areas of the region vary considerably, together with different problems, including natural disasters, faced in different parts of Asia and the Pacific.

It must be mentioned here that, the major natural disasters periodically faced by the peoples of the ESCAP region are largely due to climatic and seismic factors. Heavy precipitation and resulting flooding, storm surges, and earthquakes are the natural disasters which cause tremendous destruction to human lives and property, and in some countries, such as, Bangladesh and Philippines, significantly affect the national economy. In addition tsunamis, landslides and volcanic eruptions are known to have affected certain areas of the region at varying degrees in different times.

ESCAP, as presented in this paper, has been undertaking activities on various aspects of natural disaster reduction in the region, within the context of its work programmes, and will continue to do so in order to improve and accelerate the economic and social development in the region. Therefore, it is only natural that ESCAP undertakes its appropriate role in the activities of the International Decade on Natural Disaster Reduction.

The current and future activities of some of the sections of ESCAP, which are involved largely in natural disaster reduction, are briefly summarized in the following paragraphs.

/II. ESCAP

II. ESCAP ACTIVITIES IN NATURAL DISASTER REDUCTION

A. Water Resources Section

ESCAP, since its ECAFE days through its Bureau of Flood Control and Water Resources Development of the time, which was subsequently incorporated into the Natural Resources Division as the Water Resources Section, continues to be involved in promoting and enhancing co-operative efforts in the Asia and Pacific region to mitigate damage from typhoons/ cyclones, floods and droughts. In addition, continuous support has been provided to the ESCAP/WMO Typhoon Committee and the WMO/ESCAP Panel on Tropical Cyclones, two regional intergovernmental bodies, since their inception.

Current Activities

The present medium-term plan of work of the Water Resources Section (1984-89) includes a programme element on "Mitigation of damage from cyclones, floods and drought". This programme element is planned to be continued in the next medium-term plan as well.

ESCAP's current activities (1988-1989) in this field, an area in which it has been involved over a span of several decades, includes a project on comprehensive flood loss prevention and management which started in 1987. Under this project a manual and guidelines for application of the comprehensive approach to flood loss prevention and management will be prepared by 1990, and the techniques of this approach will be disseminated through seminars. This project is in recognition of the complementarity between structural and non-structural measures in optimizing flood prevention efforts. At its 44th session in 1988, the Commission (ESCAP) had considered urban flooding as currently the main issue in the field of water resources development and expressed support for the implementation of an activity on

/urban flood

urban flood loss prevention and mitigation. Subsequently, a project prepared by the Secretariat received funding from Japan and presently is under implementation. Recognizing the special problems of the least developed and island developing countries of the region, a study is currently being undertaken on the problems caused by natural disasters in these countries and long term effective measures to mitigate the effects of such disasters. Since 1950, ESCAP has been publishing an annual review of damage incurred by countries in the region caused by such disasters as cyclones, floods, and droughts in its quarterly publication, Water Resources Journal.

ESCAP's activities in reduction of water related disasters over the past five years, and the publications, produced since 1951 are listed in the Annex I and Annex II.

Future scope

Considering the magnitude of the suffering - human and economic - of the countries of the region due to heavy floods and the amount of work that still remains to be undertaken in flood loss prevention and management, flooding remains the main issue in the water sector. The Typhoon Committee at its last session held in Manila in November 1988 urged endorsement of flood loss prevention and mitigation as the main issue under the water sector to be considered by the ESCAP Commission in its next session. The Commission (ESCAP) is being invited to consider and endorse at its session in 1989 the need for further action by the Secretariat on this issue. Subject to the approval of the Commission, a project specifically on natural disaster reduction will be included in the 1990-1991 work programme. Since typhoons, cyclones and floods affect diverse facets of the economic and social life in the region and that the 1990's has been designated as the International Decade for Natural Disaster Reduction, a proposal has

/been made

been made to include natural disaster reduction as an area meriting inter-sectorial considerations in the programming exercise currently being undertaken for the preparation of 1992-1997 medium term plan of work of the Water Resources Section.

The Typhoon Committee, in its last session reviewed its regional co-operation implementation plan upto the end of 1993, and identified activities in which, within the frame of its work programme ESCAP could participate. These activities, some of which might be undertaken in co-operation with some other concerned agencies, include provision of assistance to the Members in:

- Preparation of flood risk maps
- Implementation of various aspects of comprehensive flood loss prevention and management
- Establishment/upgrading of national disaster prevention and preparedness plans
- Improvement of damage assessment and reporting
- Study of effects of deforestation, urbanization and changing land use on the hydrology of the catchment and on the intensity of floods

Various other activities are planned to be undertaken jointly with concerned agencies, such as WMO, UNDRO, LRCRCS together with the Typhoon Committee Secretariat. ESCAP's activities on these subjects will cover other concerned countries of the region as well as Typhoon Committee Members.

B. Mineral Resources Section

ESCAP Mineral Resources Section of the Natural Resources Division, through its programme elements on geology has been involved on various natural disaster reduction activities, in particular on urban geology.

The problems related to natural hazards with regard to urban development have been the focus of a programme in the entitled "Geology for Urban Development" since 1985. Receiving detailed studies in 1985-1988 were 10 cities affected by seismic risk, subsidence, ground water contamination, highly compressible soils, and karst collapse.

Current activities on urban geology programme

The ESCAP urban geology programme by late 1988 had resulted in the organisation of three meetings as follows: the Expert Working Group Meeting cum Workshop on the Urban Geology of Coastal Areas was held in Shanghai on 13-22 October 1987, a Seminar on Geological Mapping in the Urban Environment was held in Bangkok on 29 October, 1986, and in co-operation with UNESCO, a meeting on Quaternary Geosciences and Human Survival, in Asia-Pacific on 21-25 November, 1988 in Bangkok.

The documents which have flowed from ESCAP's urban geology meetings have now been published in an Atlas of Urban Geology series which includes many papers on the subject of natural hazards reduction. It is believed that this Atlas and the papers are relevant to the focus of the International Decade for Natural Disaster Reduction.

In addition to organising training courses, workshops and seminars on urban geology the following cities are the focus of special studies for the publication series entitled Atlas of Urban Geology; Bangkok, Kathmandu, Colombo, Kuala Lumpur, Kuching, Karachi, Lahore, Quetta, Shanghai, and Ning Bo.

The first detailed study of a city, Bangkok, is in the final stages of preparation.

ESCAP's activities on urban geology and the recent publications on the subject are listed in Annex I and Annex II.

/Future scope

Future scope

The urban geology programme has received strong support from the 44 members/countries of the ESCAP region. A series of detailed studies of cities in the region is underway. These studies will produce thematic maps which will indicate areas affected by natural and man-induced hazards and propose methods of mitigating those hazards. Participants in ESCAP's urban geology meetings noted that many cities of the region had similar problems related to the lack of communication between geoscientists and planners, a problem which all participants agreed needed prompt and serious attention. The participants attending these meetings agreed to assess the geology of their major human settlements and to prepare large scale maps which would show clearly the geologic and hydrologic conditions in advance of development. It was especially recommended that the countries prepare a risk atlas for their large urban areas which would attempt to estimate the consequences of expected disasters, in order to indicate "hotspots" resulting from ineffective or non-existent mitigation measures. It was the view that the risk atlas would provide a series of scenarios for different hazards which would be of great value to planners, decision makers and emergency response teams. Consequently, ESCAP in co-operation with its member countries has begun a systematic assessment of a number of a major cities in the region.

C. Human Settlements Unit

Human Settlements Unit of ESCAP/UNIDO Division of Industry, Human Settlements and Technology has been involved in various aspects of natural disaster reduction and could make significant contributions towards achieving the goals of the Decade, particularly in long-term protection (building codes, site modifications, etc) and in land use planning.

/Current activities

Current activities

The Human Settlements Unit undertook a research on disaster mitigation policy measures and published a "Study on human settlements planning in disaster-prone areas with focus on management of marginal settlements" in 1987. The study reviewed current policies and practices for disaster mitigation by member countries, in particular, through land-use planning, building design and codes and training programmes.

One of the United Nations Regional Housing Centres related to ESCAP, National Buildings Organization of India (NBO) in New Delhi organized "International conference on natural hazards mitigation research and practice: small buildings and community development" in co-operation with International Council for Building Research Studies and Documentation (CIB), and the U.S. National Science Foundation, in 1984. The conference brought together a broad cross section of building researchers, settlement planners and experts on the subject of natural hazards mitigation practices.

Future scope

The Human Settlements Unit will continue the research study on disaster-resistant building design, and intends to publish a special publication on Disaster Resistant Building Technology, as part of its current series of Building technology leaflets. The Unit will also organize seminars/workshops to exchange the experiences and knowledge on disaster-mitigation measures. In particular, from the experience of the mission sent in December 1988 to the flood-damaged area in the southern region of Thailand, a multi-disciplinary research study is planned to be undertaken to delineate the areas unsuitable for human settlements. A seminar will be organized to discuss the findings of the research study.

/The Human

The Human Settlements Unit will continue to disseminate information on disaster-resistant building design and materials and land-use planning in disaster-prone areas through distribution of published materials, publication of research studies and through seminars/workshops.

III. CONCLUSIONS

ESCAP has been involved in many activities in the past on natural disaster reduction and will continue such work well into the future in order to improve and accelerate economic and social development in Asia and the Pacific. Therefore, ESCAP can be involved in many ways in the activities of the International Decade for Natural Disaster Reduction. Major activities in which ESCAP can make significant contributions on achieving the goals of the decade are marked on the "Decade activity matrix for the International Decade for Natural Disaster Reduction - United Nations agencies, Annex VI, International Decade for Natural Disaster Reduction, Report of the Secretary General, A/43/723, 18 October 1988" as presented in Annex III of this paper.

IV. APPENDIX

Annex-I

Recent Activities of ESCAP Water Resources Section in Natural Hazard Reduction

1. Expert Group Meeting on Comprehensive Flood Loss Prevention and Management, Bangkok 17-21 October 1988

2. Expert Group Meeting on the Improvement of Flood Loss Prevention Systems based on Risk Analysis and Mapping, Bangkok, January 1988.

3. Expert Group Meeting on the Improvement of Disaster Prevention Systems based on Risk Analysis on Natural Disasters Related to Typhoons and Heavy Rainfall, Bangkok, July 1985

4. Meeting on the establishment of a Cyclone Council for the South Pacific, Port Vila, February 1985

5. Survey on damage information compilation system in Burma, Maldives, Pakistan and Sri Lanka (1984)

6. Series of projects on flood risk analysis and mapping (1984 to 1988)

7. Seminar on the application of remote sensing techniques to flood hazard assessment and to flood loss prevention and management (1984).

8. Survey of the damage information compilation systems in the Typhoon Committee region for identifying deficiencies and recommending improvement (1983).

9. Seminar on the Principles of Flood Plain Management for Flood Loss Prevention, (1983)

Recent Activities of ESCAP Mineral Resources Section in Natural Hazard Reduction

1. Quaternary Geosciences and Human Survival in Asia/Pacific, Bangkok, 21-25 November 1988 (in co-operation with UNESCO).

2. Expert Group Meeting cum Workshop on the Urban Geology of Coastal Areas, Shanghai, 13-22 October 1987.

3. Seminar on Geological Mapping in the Urban Environment, Bangkok, 29 October 1986.

Selected Publications of ESCAP Water Resources Section in Natural Hazard Reduction

1. Proceedings of the Expert Group Meeting on Improvement of Flood Loss Prevention Systems Based on Risk Analysis and Mapping, ST/ESCAP/633, September 1988

2. Proceedings of the Expert Group Meeting on the Improvement of Disaster Prevention Systems Based on Risk Analysis of Natural Disasters Related to Typhoons and Heavy Rainfall, ST/ESCAP/424, United Nations New York 1986

3. Proceedings of the Seminar on The Application of Remote Sensing Techniques to Flood Hazard Assessment and to Flood Prevention and Management, ST/ESCAP/323, United Nations Bangkok 1985.

4. Damage Information Compilation Systems in Burma, Maldives Pakistan and Sri Lanka, Prepared by the ESCAP Roving Mission on Improvement of Systems of Cyclone and Flood Damage Data Collection and Compilation, ST/ESCAP/342, United Nations Bangkok 1985

5. Damage Information Compilation Systems in the Typhoon Committee Region, ST/ESCAP/299, United Nations Bangkok 1984.

6. Proceedings of the Seminars on Flood Vulnerability Analysis and on the Principles of Flood Plain Management for Flood Loss Prevention,
Water Resources Series No. 58, United Nations publication,
Sales No. E.84.II.F.12

7. Guidelines for Disaster Prevention and Preparedness in Tropical Cyclone Areas
Geneva/Bangkok, 1977

8.. Proceedings of the Regional Seminar on Community Preparedness and Disaster Prevention
Water Resources Series No.49 United Nations publication Sales No. E.78.II.F.13

9. Assessment of the Magnitude and Frequency of Flood Flows
Water Resources Series No. 30, United Nations Publication,
Sales No. 66.II.F.7.

10. Proceedings of the Regional Symposium on Flood Control, Utilization, Reclamation and Development in Deltaic Areas
Water Resources Series No. 25, United Nations publication
Sales No. 64.II.F.6.

11. River Training and Bank Protection
Flood Control Series No. 4 United Nations publication, Sales No. 1953.II.F.6

12. Proceedings of the Regional Technical Conference on Flood Control in Asia and the Far East
Flood Control Series No. 3, United Nations publication, Sales No. 1953.II.F.1.

13. Methods and Problems of Flood Control in Asia and the Far East
Flood Control Series No. 2, United Nations Publication, Sales No. 1951.II.F.5

14. Flood Damage and Flood Control Activities in Asia and the Far East
Flood Control Series No. 1, United Nations Publication, Sales No. 1951.II.F.2.

Selected Publications of ESCAP Mineral Resources Section in Natural Hazard Reduction.

1. **Urban Geology of Coastal Lowlands in China - Atlas of Urban Geology, vol. 3 ST/ESCAP/624, 168 p., 1988.**

2. **Urban Geology in Asia and the Pacific - Bangladesh, Fiji, Indonesia, Malaysia, Nepal, Pakistan, Republic of Korea, Sri Lanka, Thailand, Viet Nam, Atlas of Urban Geology, vol. 2 ST/ESCAP/586, 220p., 1988.**

3. **Geology and Urban Development - Hong Kong, Malaysia, The Netherlands, Thailand, Atlas of Urban Geology, vol. 1, ST/ESCAP/570, 142 p. 1987.**

4. **Geology for Urban Planning - Selected Studies of the ESCAP Region, ST/ESCAP394, 39 p. 1985.**

Selected Publications of ESCAP Human Settlements Unit in Natural Disaster Reduction

1. Study on Human Settlements Planning in Disaster-Prone Areas with Focus on Management of Marginal Settlements, 1987.

Decade activity matrix for the International Decade for Natural Disaster Reduction - United Nations agencies

(ESCAP involvement proposed as marked)

Type of action \ Type of hazard	Wind storms	Storm surges	River floods	Volcanic eruptions	Earthquakes	Tsunami	Landslides	Avalanches	Wildfires	Insect plagues
Action on the causative phenomenon	WMO	FAO WMO UNESCO					FAO DTCD		FAO	FAO
Hazard zoning and microzoning	WMO UNCHS IAEA	UNESCO WMO IAEA ESCAP	WMO UNCHS IAEA DTCD ESCAP	UNESCO	UNESCO UNCHS IAEA DTCD ESCAP	UNESCO IAEA ESCAP	UNESCO UNCHS DTCD ESCAP	UNESCO WMO	FAO WMO	FAO WMO WHO
Prediction and warning	WMO	WMO UNESCO	WMO FAO UNESCO DTCD	UNESCO	UNESCO	UNESCO	WMO UNESCO	WMO UNESCO	WMO	FAO WMO
Preparedness planning and training and response to warnings	UNDRO WMO WHO UNCHS	UNDRO WMO WHO ESCAP	UNDRO WMO WHO UNCHS DTCD ESCAP	UNDRO WHO UNCHS	UNDRO WHO UNCHS	UNDRO WMO WHO ESCAP	UNDRO WMO WHO UNCHS	UNDRO WMO WHO	UNDRO WMO WHO	UNDRO FAO WHO WMO
Disaster assessment and analysis	UNDRO UNCHS WMO	UNDRO UNCHS UNESCO ESCAP	UNDRO FAO WMO UNCHS ESCAP	UNDRO UNESCO UNCHS FAO ESCAP	UNDRO UNESCO FAO UNESCO ESCAP	UNDRO UNESCO UNCHS ESCAP	UNDRO UNESCO UNCHS ESCAP	UNDRO UNESCO WMO	UNDRO FAO	UNDRO FAO WMO
Long-term protection (building codes, site modification, etc.)	FAO WMO IAEA UNESCO	UNCHS WMO UNESCO IAEA ESCAP	UNCHS UNESCO WMO IAEA DTCD ESCAP	UNCHS FAO ESCAP	UNESCO UNCHS IAEA ESCAP	UNESCO FAO ESCAP	UNCHS FAO ESCAP	UNCHS		
Land-use planning		UNESCO DTCD ESCAP	UNCHS FAO WMO UNESCO ESCAP	UNCHS UNESCO ESCAP	UNCHS UNESCO DTCD ESCAP	UNESCO ESCAP	UNCHS UNESCO DTCD ESCAP	UNESCO	FAO	FAO WMO

Source: International Decade for Natural Disaster Reduction, Report of the Secretary General, United Nations, A/43/723, 18 October 1988, pp. 19.