•Risk assessment must be made from a comprehensive point of view. The risk of system disruption is the product of occurrence probability and cost of system disruption. It is important for us to know how to connect each factor to integrate quantitative evaluation with evaluations from other fields.

[Sun Shaoping]

•In China, the Haicheng earthquake of 1975 and the Tangshan earthquake of 1976 were typical disasters. Strengthened construction, improved networks, backup assurance and the like must be systematized through comprehensive engineering methods to improve reliability when an earthquake occurs.

•In order to improve lifeline resistance to disasters, the governmental support structure is important. That is, appropriate criteria must be established. For lifelines, ultimately, what matters is improvement of everyday reliability, which is closely connected with improvement of reliability when a disaster occurs.

[Yoichi Yoshikawa]

•We heard that seismic monitoring is being installed and an earthquake emergency operation system targeting lifelines during emergency shutdown being built in a city gas supply system in Tokyo.

•A basic concept underlies these actions: Installed seismograph are used in this system to collect local information, perform accompanying information processing, and carry out decision making, enabling us to prevent secondary disasters and to separate affected areas from unaffected areas.

[Manuel M. Bonoan]

•When a road network is isolated, aid activities for affected areas and material transfers to affected areas may be jeopardized. This situation varies according to the seriousness of the road damage, whether slope collapse, land liquefaction, volcanic eruptions, or other event.

•We learned that alternative routes, roads resistant to disasters, and strong bridges that are portable in emergencies are effective. Strategies for putting these items into practice are necessary; specifically, strategic disaster-prevention measures for the road network, reinforcement and systems that can cope with emergencies must be built.

[Masami Kobayashi]

•We must consider the problem of what infrastructures we should put in place to support the urban structures and lifestyles of the next century. At the same time, maintaining a common technological and planning base without losing sight of regional diversity would allow us to create the groundwork for international cooperation in the future.

[Masanori Izumi]

•In disaster prevention for hospitals, engineering and science and engineering theories and technologies are clear, but they also involve comparisons between cost and benefit in reality, making discussion difficult In today's earthquake-proof structure, we have mostly established criteria under which a 'strong earthquake" is considered to cause no damage, and a "disastrous earthquake" or "very disastrous earthquake" is considered to cause no local collapse, however, the possibility of the outbreak of fire is the biggest problem.

•The key to disaster prevention in hospitals is: first, earthquake-resistant structural design; structures must retain complete functional capability during an earthquake; and hospital functions should be enlarged in emergencies.

[Claude de Ville de Goyet]

•Reports were made on disasters in Latin America and the Caribbean area; their impact on hospitals; and the countermeasures taken

•When comparing the cost of increasing hospital resistance to disasters in terms of new construction and reinforcement, the latter costs considerably more than the former. When increasing hospital resistance to disasters, public and political awareness and technology and education are important

[Jamilur R. Choudhury]

- Areas in Bangladesh in which the cyclone disaster hazard is high are populated by 5 percent of the whole population, or 5.2 million inhabitants. In such a situation, various-disaster prevention measures are taken and attempts are made to increase the effectiveness of shelter construction as a wide-area countermeasure. It was emphasized that more efficient use can be made of shelters, and their maintenance can be better ensured if they are multipurpose, serving as schools, family welfare centers, passenger's terminals, health clinics, community centers, offices or the like rather than just as shelters.

[Badaoui M. Rouhban]

- Various advisory activities, including UNESCO activities, targeting schools located in areas where disasters frequently occur, emphasize the multipurpose use of schools, specifically that schools should be used as accommodation and relief centers in emergencies. The multipurpose use of schools is also effective when education and training for disaster prevention are performed regularly.

- As an example of this protocol, design guidelines in the form of technological and administrative recommendations on floods, earthquakes and cyclones were provided to Vietnam.

[Xie Zongfu]

- Distribution in the city, land-use plans, and earthquake-resistant design were explained for the earthquake that struck Tangshan city on 28 July 1976.

[Haruo Hayashi]

- The concept of the "Island of Civilization" was presented. An electrical blackout occurred in Hiroshima city during typhoon No. 19 in 1991 At that time, only the center of Hiroshima city escaped power failure, creating the "Island of Civilization" zone that was helpful in enabling the city to recover its functions and it had the great psychological effect on the inhabitants around the center of Hiroshima city. In this way, it was proposed that increasing the resistance of specific areas, especially significant facilities rather than individual disaster facilities, could be effective as a disaster-prevention measure in the future.

[Michel F. Lechat]

- Naturally, we should build schools, hospitals and the like that are not destroyed during a disaster. Although reinforcing such structures is expensive, this must be done on the basis of strategic decisions, taking into account the importance of such facilities.

- Facilities and equipment for countermeasures against disasters should be multipurpose to make them more effective in terms of cost and operation.

- Since we cannot reduce the disaster hazard to zero, we should pursue a balance between nature and means of communication.

SESSION 3

Reporter. **R. B. Singh**
Associate Professor,
Department of Geography,
University of Delhi, India

- We must encourage people to participate at the grass-roots or local level.

- For disaster prevention, strategies suited to the society must be worked out. Disaster mitigation must be of practical value in developing countries, and efforts must take into account each country's unique culture.

- Comprehensive disaster prevention plans for Aichi Prefecture, City of Nagoya, were presented.

- The rapid increase in the numbers and density of populations are highlighting significant issues for each segment of the metropolitan area in terms of disaster-

prevention strategies. In this connection, specific cases in Mexico City and Seoul were presented.

- For the mapping of seismic zone, and the education and enlightenment of inhabitants regarding hazards, specific cases were presented, taking as examples the Loma Prieta earthquake in the U.S.A., the Flores earthquake in Indonesia, and the Maharashtra earthquake in India.

- The role of NGOs, independent disaster-prevention organizations and volunteers in disaster relief and mitigation activities was discussed. The function and degree of penetration of information systems at various levels were also covered.

- Information-conveying systems capable of allowing disaster-prevention agencies to act must be provided in order to convey information effectively.

- When disaster-prevention plans are prepared, decision-makers and planners at NGOs and local authorities must be involved. Plans must be drawn up and made known on the basis of experience. Economic, cultural and political aspects must also be focused. Again, volunteer activities are important as well as training.

- Information systems and disaster-observation networks must be maintained at local levels. This will allow us to use local observations, GPS, remote sensing, geographical information systems, and the like to generate comprehensive hazard maps.

- Volunteer activities must be used effectively while organizations such as independent disaster-prevention systems, relief bodies, the Red Cross and others play a primary role as coordinating teams in emergencies. Volunteers must also be appropriately trained so that they can deal with complex situations on the spot.

- We have an important role to play in the area of policy enforcement, such as in the preparation of hazard maps, especially those concerned with the control of human behavior.

- The importance of education was focused upon in particular. The importance of diffusion of disaster plans was considered.

SESSION 4

Reporter: **Zhao Bolin**
Professor, Department of Geophysics, Beijing University, China

- Explanations were given of probability forecasts, observation of heavy rainfalls, strengthened systems for forecasting, remote sensing, data collection concerning disasters due to heavy rainfalls, earthquake networks in South Pacific and Southeast Asian countries, and Global Seismic Hazard Assessment Program (GSHAP).

- It was pointed out that warnings and cautions are important in disaster prevention and preparedness. Various warnings models exist.

- Remote sensing, observation by satellite, numerical forecasting techniques and the like are important when issuing warnings for heavy rainfalls, and effective if a wide area is targeted.

- Activities such as monitoring of earthquakes in Southeast Asian and East Asian countries, entering the results in a network and generating hazard maps of Asia as well as the globe are especially useful in mitigating earthquake disaster damage.

- In the monitoring of severe local rainfalls in East Asian countries, international cooperation is necessary, and this will be an issue for the IDNDR in future. Areas such as China, Japan, and Southeast Asia experience very severe local rainfalls. Monitoring, forecasting, and research into severe local rainfalls must be carried out over wider areas than before in order to gain a better understanding of the mechanism of heavy rainfalls and to increase forecasting accuracy.

•GEWEX helps to prevent disasters due to heavy rainfalls. It is implemented as one of the main projects of the WCRP, and it is also an important international project that reveals changes in global energy, water cycles and weather.

Comments

[Tesfaye Gissila]
•In Ethiopia, natural disasters followed by large-scale famines occur five or six times a year, causing severe damage especially through repeated drought.

•Since 1980, there have been very serious droughts that have killed many people An early warning system was thought useful, and it has provided good results up to now

•Monitoring of rainfalls and yields is being carried out using satellites. In this way, I think we can avoid large-scale disasters.

[Dusan Zupka]
•I think that the economic and social aspects involved in disaster management have not been adequately discussed.

•I think it is important to consider whether the governments of countries prone to natural disasters are putting sufficient financial and human resources into disaster prevention.

•Through my experience at Habitat, I recognize that international donor countries are providing very important aid for disaster prevention; however, I believe that only a part of such aid is allocated to disaster prevention.

[Mr. Watanabe]
•JICA emphasizes improving the standard of living of the poor, as it believes that it is important to distribute wealth and knowledge worldwide. When constructing cyclone shelters in Bangladesh, we want to do this in a way that will serve to educate the people at the most basic levels of society. We do not want to limit ourselves to constructing concrete buildings

[Carmen Almeida-Biggart]
•Investment in hard science always is 100 times as much as investment in soft science. How about a little more emphasis upon social science? Since buildings are meaningless if people do not use them, people's participation in the programs is important.

Discussion

Commentator

Claudia H. Candanedo
Head, Instituto de Recursos Hidraulicos y Electrificacion (IRHE), Panama

•The social aspect of disaster prevention is important. In disaster prevention, engineers and scientists must encourage policy makers to emphasize this aspect to the public as well as to social and economic bodies.

•The Scientific and Technical Committee (STC) recognizes that the important missions of the IDNDR not only emphasize scientific aspects but also clarify goals for this decade, and take measures for disaster prevention while consolidating the knowledge we already have.

- Since many megacities concentrate in developing countries in the next century, local communities must learn about the methods of disaster prevention which are available to the developing countries from the viewpoint of social communities.

- Education of local communities must start with work in those communities. In order to allow local communities to participate in disaster prevention and disaster management, training must be carried out and organizations formed.

- In international cooperation, knowledge transmission is important and, at the same time, international cooperation is also needed in developing and improving warning systems

- Disaster-prevention measures must be incorporated and integrated into development planning. For this, money is needed, and allocation of funds allows the creation of a safer society.

Commentator: **James P. Bruce**
Chair, Canadian Climate
Program Board, Canada

- In order to minimize damage from disasters in megacities, appropriate countermeasures must be reflected in substantial programs for each city during the remaining five years of the IDNDR.

- Technologies such as strengthening lifelines, forecasting heavy rainfalls and measurement of earthquakes are expensive, and high-level.

- In the remaining five years it will be a challenge for scientists and engineers to simplify and improve technologies, which can also be used in developing countries.

- What I would like to propose to the World Conference is that we should note the existence of vulnerability while referring to urbanization plans, land-use plans, building restriction ordinances, and the like. We can greatly contribute to disaster mitigation if urbanization plans are established according to reliable risk assessments.

- Damage from disasters must be mitigated in cities of developing countries. However, disaster-prevention plans are not, in reality, put into practice in such cities Therefore, the advanced technologies and techniques of the developed countries must be applied to cities in developing countries.

- Among the problems faced by many cities in developing countries is the disruptive growth of informal cities. These disorderly buildings sprawling rapidly around formal cities cannot be incorporated into the mechanism of urban planning. In order to solve these problems, both the cooperation of social scientists and various social skills will be required

Question-and-answer

[Mr. Tsukagoshi (United Nations Centre for Regional Development)]

- In order to promote disaster assessment in megacities, the important issue of developing and popularizing simplified measures suitable for each region and country should be placed at the top of the UN agenda.

- Implementation of disaster assessment in megacities is the first prioritized one of the three targets established by the Scientific and Technical Committee for the IDNDR (STC) And it is also an issue that must be put into practice by 1999.

- The problem is how to implement such disaster assessment. Developing simplified measures suitable for each region and country could become an important issue as the first step However, developing countries cannot be compelled to implement the sort of risk-assessment techniques that are used in developed countries. It is therefore vital that we develop simplified techniques suitable for developing countries.

•After simplified techniques have been developed, international cooperation is necessary in order to investigate and prepare for disasters in developing countries while implementing various assessments.

[Mr. Nishida (National Land Agency)]

•In the case of "complex emergency", humanity has invested money to develop scientific technologies while spending money on wars, religious disputes, and the like. It is important to specify targets now that the Cold War is over. In this connection, we should endeavor to avoid disasters and save lives and property as a target for the 21st century.

SESSION REPORTS AND CONCLUDING REMARKS

•An international forum entitled "Natural Hazard Mapping" was held for the first time on June 22-25, 1993 to study the creation of hazard maps of East Asia. The International Tsunami Symposium was held August 23–27 in Wakayama, Japan. Against the background of these events, we are devising a disaster science.

•In the coming year, the World Conference in Yokohama is planned on the theme "A Safer World for the 21st Century" In this connection, I would like to make an appeal as part of the concluding statement for this international conference.

•Mr. Kitamoto, assistant chief of the National Land Agency of Japan, will summarize the session reports and concluding statement in English and Japanese, integrating all the discussions at the IDNDR Aichi/Nagoya International Conference 1993 JAPAN.

The concluding statement of the IDNDR Aichi/Nagoya International Conference 1993 JAPAN were read. (Omitted since already presented in P.11 - 13.)

(Applause)

Adoption of the above appeals

•In conclusion, I would like to express my heartfelt thanks to the presenters in the respective fields, the chairman, the coordinators, those who made the session reports today, the commentators, and all who participated in the various discussions. This concludes the conference

Visit to disaster-prevention facilities

Participants, mainly those from overseas, took part in a study tour to disaster-prevention facilities and cultural facilities in Aichi Prefecture. Approximately 100 people participated in three separate tours.

The participants remarked that the tour to the disaster-prevention facilities was very useful to their future disaster prevention administration and research; they also remarked that the tours to cultural facilities enabled them to learn about the area and Japan's culture, history and industry.

A. Visit to facilities related to voluntary disaster prevention

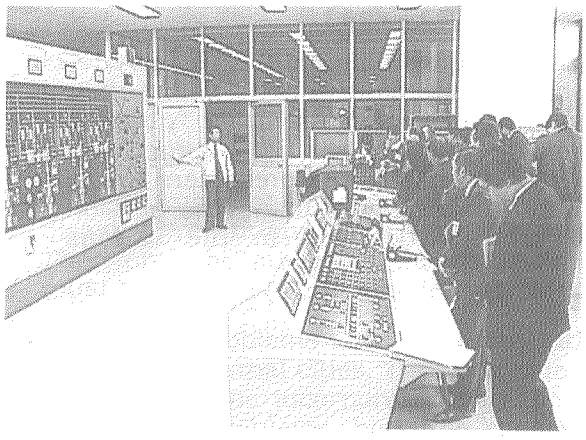
United Moriyama Ward Fire Volunteer Corps Inspection Parade ⇨ Aichi Prefectural Ceramics Museum ⇨ The proposed site for EXPO 2005 in AICHI ⇨ Toyota Automobile Museum

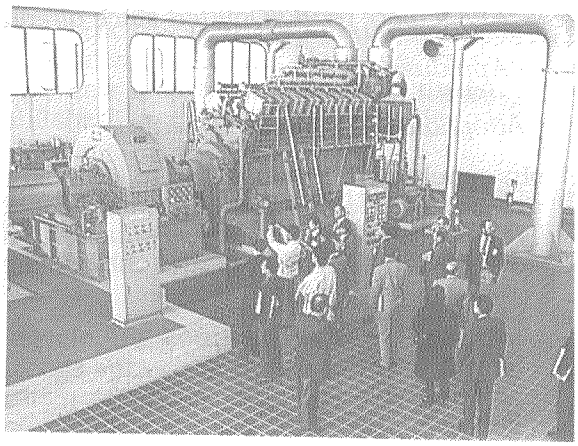
B. Visit to facilities related to flood prevention

Kiso Sansen Riverside National Government Park ⇨ Nikkogawa Water Discharging Facility ⇨ Nagoya City Disaster Control Center

C. Visit to cultural facilities

Higashiyama Sky Tower ⇨ Toyota Automobile Museum ⇨ The proposed site for EXPO 2005 in AICHI ⇨ Tokugawa Art Museum





Nikkogawa Water Discharging Facility

Nagoya City Disaster Control Center

Special Programs for Citizens in the Aichi Prefectural Area

■ Organized by : Aichi Prefectural Government, City of Nagoya

■ With the Cooperation of :
Japan Broadcasting Corporation (NHK), Nagoya Station; Chubu Regional Construction Bureau, Ministry of Construction; Tokai Regional Bureau of Postal Services; Nagoya City Disaster Prevention Management Corporation; Nagoya Local Meteorological Observatory, Japan Weather Association; The Japanese Red Cross Society, Chapter of Aichi Prefecture; and 24 private enterprises

■ Supported by :
Gifu Prefectural Government, Shizuoka Prefectural Government, Mie Prefectural Government, and 18 information media

Outline of Disaster Prevention Events

1. Disaster Prevention Festival

■ Objectives : ＊To increase public awareness of disaster prevention, participants are given an opportunity to watch, listen to and take part in various disaster-prevention program
＊To deepen public understanding of disaster-mitigation measures taken by the Aichi Prefectural and City of Nagoya.

■ Date : Saturday, Oct. 30, 1993, 14:00–17:00
Sunday, Oct. 31, 1993, 10:00–16:00

■ Venue : Mochinoki Park (South of TV tower)

■ Participants : Approximately 50,000

■ Programs :

	Theme	Programs
Stage Zone	To increase public awareness and knowledge of disaster prevention through events designed to enhance communication under the theme of disaster prevention	Performance by the Aichi Prefectural Police Music Band, Addresses by the organizers, Disaster-prevention poster award ceremony, Ultra disaster-prevention quiz, Disaster-prevention comedy, Nagoya City Fire Department Music Band, Cartoon character show
PR Zone	To enhance public awareness of disaster prevention through exhibits of photographs and posters of disasters. To introduce to the public disaster-prevention measures taken by the Aichi Prefectural Government and City of Nagoya and their related organs and to increase public understanding.	Exhibition of world disasters, Exhibition of disasters in Aichi Prefecture, Exhibition of disaster-prevention measures, Serving of emergency food, Exhibitions and sample tasting of emergency snacks, Mobile post office, Disaster prevention posters, Animation theater, Fund raising corner
Simulation Zone	To inform the public of the necessary activities in an emergency through simulation equipment.	Earthquake simulation, Fire extinguishing, Smoke simulation, Dial 119 training, Mini-SL, PC games, Stamp rally
Exhibition Zone	To enlighten public preparedness through an introduction of disaster-prevention goods	Exhibition and sale of disaster-prevention items, Sale of snacks, Sample tasting of milk

Note: The performance of the Aichi Prefectural Police Music Band, part of the opening ceremony program (stage zone) was canceled because of rain on Oct. 30. The disaster prevention poster award ceremony was held in the Space EF in the Aichi Arts Center.