Session 1

Date : November 2 (Tue) 9:30-17:00
Venue : Conference Room 402-403
Nagoya Congress Center

"Urbanization and Natural Disasters"

Coordinator/Reporter :
Yasuo Nishiyama
Associate Professor, Faculty of Engineering,
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Session 1-1 : " Increase in Vulnerability Accompanying Rapid Urban Development "

Chairman : Atsushi Takeda
Director, Earth Science Research,
National Research Institute for Earth Science and
Disaster Prevention (NIED),
Science and Technology Agency, Japan

Speakers : Yoshiaki Kawata, Japan

Thereza Lobo, Brazil

Yoshio Kumagai, Japan

Mahammad A. Mohit, Bangladesh

Sherif H. Kamel, Egypt

Commentator : Yoshiteru Murosaki
Professor, Department of Architectural and
Environmental Planning, Kobe University, Japan

Session 1-2 : " Urban Planning to Reduce Damage from Natural Disasters "

Chairman : Hideki Kaji
Director, United Nations Centre for Regional
Development (UNDDSMS/UNCRD), Japan

Speakers . Itsuki Nakabayashi, Japan

Dusan Zupka, Switzerland

Jukka Nieminen, Kenya

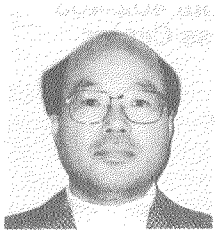
Andrew W. Coburn, U.K.

Ronald S. Parker, U.S.A.

Ulpiano P. Ignacio, Jr., Philippines

Commentator Takashi Onishi
Associate Professor,
University of Tokyo, Japan

Session 1 Urbanization and Natural Disasters



Coordinator

Yasuo Nishiyama
Associate Professor, Faculty of Engineering,
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- Many factors have contributed to the evolution of cities, including demographic currents, cultural transitions, technological innovation, changes in values and social norms, and shifts in political structures. The goals of urban residents are convenience, efficiency and economy, and urban planning was considered a means of achieving these goals
- However, these goals are dependent upon the stability of daily life during peaceful times Ensuring safety during emergencies has not been a prime consideration Major cities where populations, resources and capital are densely concentrated are highly susceptible when directly hit by a large-scale natural disaster. Urban planning should be required to devise and implement disaster prevention and land use in preparation for emergencies
- This session is divided into two parts: "Increase in Vulnerability Accompanying Rapid Urban Development" in the morning and "Urban Planning to Reduce Damage from Natural Disasters" in the afternoon. Consideration of disaster prevention and administrative measures to mitigate disasters will be discussed Participants are encouraged to focus not on general, abstract discussions, but rather on the exchange of opinions on concrete matters while learning from the specific disaster experiences of other nations.

Session 1-1 Increase in Vulnerability Accompanying Rapid Urban Development

Chairman

Atsushi Takeda
Director, Earth Science Research, National Research Institute for Earth Science and Disaster Prevention (NIED), Science and Technology Agency, Japan

- The recent, rapid and heavy concentration of populations in many developing countries has prevented city administrators from formulating appropriate disaster-prevention plans Many cities have been left vulnerable to disaster through the implementation of uniform urbanization programs that disregard local differences in disaster risks, as well as the risks inherent to each specific region
- Risks in cities have intensified specifically through the emergence of settlements in high-risk areas, the wholesale transplantation of urban technology from developed countries, the delay in infrastructure improvement, and the loss of a sense of community in cities Moreover, these factors have damaged not only the physical environments but also the societies and economies of developing countries. The extent of these problems may be endangering the economic foundations of these countries.
- Topics for the morning session will cover the kinds of risks existing in megacities and how these risks lead to urban damage in tandem with changes in urban activities and urban development Information will also be exchanged on the impact of urban disasters

Presentations

Speaker

Yoshiaki Kawata
Professor Kyoto University, Japan

"Characteristics of Urban Natural Disaster and Its Scenarios Toward Catastrophe"

- Approximately 45 percent of the world's population now lives in urban areas. The figure reaches 72 percent in Japan, with the cities being almost saturated. In developing countries, however, these figures fall to around 37 percent. In 1900, only 11 metropolitan cities had populations of over one million. In 2000, there will be over 400 such cities. Twenty-eight megacities, with populations of over 8 million, will emerge by that date, with 22 of them in developing countries. Therefore, urban disaster issues will dramatically increase in gravity.

- Disasters in metropolitan cities have two characteristics: First, they may lead to complex disasters or secondary, tertiary disasters and prolonged reconstruction periods. Second, they are highly vulnerable to the huge external forces that occur at intervals of one hundred to several hundred years In other words, they are vulnerable to low-probability disasters with severe consequences. Furthermore, large cities have serious problems from an increase in newcomers who are uninformed about past disasters in their new hometowns or about the characteristics of such disasters. As well, such cities are vulnerable to the effects of disasters on highly information-reliant societies.

- Although high technology provides people with convenience, modern facilities are very vulnerable to earthquakes and floods. It is likely that large, dense populations will result in magnified disaster damage. Furthermore, the dual structure of cities—such as the coexistence of modern facilities and slums will dramatically change the nature of disasters.

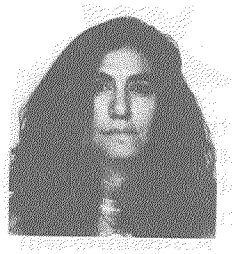
- Urban disasters have three distinct categories: Urbanization disasters (disasters that occur due to enlarged living spaces and infrastructure); urban-infrastructure disasters (destruction of infrastructure, particularly lifeline systems, but with less loss of human lives); and urban disasters (disasters magnified by over-concentration of population and social capital).

- There is a clear interrelation between Japan's prefectural income and average life expectancy. Average life expectancy as a social index is one factor denoting the disaster-reduction capability of a society.

- The mortality rate from natural disasters has been falling annually in Japan—deaths per disaster do not exceed 300 However, we cannot conclude that such extensive disaster would not occur This statistic may easily tumble, if an urban disaster occurs.

- There are many scenarios for heavy disaster casualties. For instance, if an earthquake destroys sea walls, areas below sea level will be submerged even before tidal waves arrive. Such areas total as much as 124 square kilometers in Tokyo and 60 square kilometers in Osaka. Liquefaction of the ground can cause earthquake-driven floods Underground gas tanks can explode. Destruction of storage tanks of other flammable substances such as petroleum combined with simultaneous earthquake-driven flooding may spread fires over a wide area Commuter panic during a rush-hour period is another risk These are scenarios that can greatly magnify disaster damage. Whether damage will occur through these particular scenarios is uncertain, as is the process of how an external force leads to particular types of damage This uncertainty is a problem

•If a society's disaster reduction capability is measured by average life expectancy, it is more important to formulate anti-disaster strategies than to build disaster prevention facilities in the developing countries of Asia, Africa and Latin America where the average life span is below 60 years. For industrializing and industrialized countries, disaster-prevention strategies are all the more important.



Speaker

Thereza Lobo
Consultant to the World Bank, Brazil

"Potential Hazard and Vulnerability in Urban Development of Rio de Janeiro"

•Rio de Janeiro is a beautiful and world-renowned city. Natural beauty is one of Rio's most vulnerable assets. The tendencies toward overuse and irresponsibility are factors in the destruction of cities. To avoid them, sustainable development is the only solution. We need to implement development that allows coexistence with the ecosystem. It is important to promote education toward sustainable development.

•The development of cities in Brazil has proceeded quite rapidly, as in other parts of the world. Since the 1950s, urbanization has rapidly advanced. In the 1990s, 70 percent of the population now lives in urban areas. In the 21st century, over 80 percent will be concentrated in urban areas.

•Another problem in Rio is that there is a slum district known as Favelas. Such slums have also increased dramatically, a result of uncontrolled urban expansion.

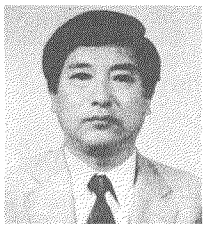
•We have been very fortunate regarding natural disasters. We have neither volcanoes nor hurricanes. The physical characteristics of the city, however, present an interesting paradox of both beauty and environmental risks. Man-made disasters are, in fact, more prevalent than natural disasters in Rio.

•There are two aspects to this: one is the increase in the number of poor, the other is the inadequate functioning of the public sector. The poor not only concentrate in urban areas, but poverty is also increasing more among the urban population than among rural residents. This has resulted in a lowered living standard in the major cities.

•The causes of the inadequate functioning of the public sector are a distorted development strategy and unsuccessful urban planning. To date, there has been no analysis of the impact of environmental costs. Exploitation of natural resources and uncontrolled development have continued and cities have expanded through environmental destruction.

•Local governments have not had sufficient authority to manage adequate public facilities or to implement public policy. Comprehensive decisions that consider the above points have not been produced in the decision-making process.

•Macroeconomic restrictions are also significant. For example, although Brazil is one of the largest countries in the world, it suffers from a high inflation rate. All macroeconomic adjustment policies carried out during the past decade have failed. Moreover, several political scandals have occurred. These political and institutional problems have had effects worse than the earthquakes that have struck our country.



Speaker

Yoshio Kumagai
Associate Professor, Institute of Socioeconomic Planning,
University of Tsukuba, Japan

"Vulnerability Assessment and Its Application in Peru"

- The Grau region of Peru is an earthquake-prone area. Large-scale earthquakes hit this area roughly every 100 years. As well, the El Niño weather phenomenon regularly brings heavy rains. Recently, for example, an area with an average annual precipitation of about 60 mm received more than forty times this amount in 1983 due to a large-scale El Niño phenomenon. Southern Peru, however, was stricken by a severe drought at that time. It was reported that the annual average temperature of the capital, Lima, rose 5 degrees centigrade.

- The Grau Region is the first area to be involved in a decentralization scheme begun in 1988. A pilot study was carried out to determine disaster countermeasures for local governments with the aim of formulating a national program for disaster prevention and mitigation. The goal is to implement, in a wide sense, microzonation in this region, considering both natural disasters and socioeconomic conditions. A more comprehensive, advanced, and detailed socioeconomic development plan based on the results of this study will be needed.

- This project included the Lima metropolitan area. Some 8 million people, or nearly one-third of Peru's population, are clustered in this area. Most of the population increase occurs among those living in the surrounding slum districts and in the central buildings built during the Spanish colonial period. In some cases they are illegal squatters.

- Lima has suffered from several destructive earthquakes. A hazard map indicating the earthquake vulnerability of buildings is posted on each block in the city center. Individual plans for building improvement will be implemented according to this map.

- The most important and useful advice for Peru and other developing countries is to apply the macrozonation method. With this method, we can clearly define safer areas for urban expansion, substantially reducing infrastructure construction costs.

- A major challenge for developing countries is, however, the lack of detailed data. In Japan, for example, many technological supports use such detailed data. We need to develop a new method utilizing comprehensive data. Urban renewal of existing metropolitan areas is of course necessary, but it is also important to formulate relocation plans (although several such plans have already been made in Peru) to define suitable locations beforehand.

- In Japan, both structural and non-structural countermeasures are carried out simultaneously when disaster countermeasures are implemented. However, it is very difficult for developing countries to take structural measures first. Placing priority on non-structural countermeasures—including disaster education for citizens—can be considered one option for developing countries.

Speaker

Mohammad A. Mohit
Associate Professor, Department of Urban & Regional Planning, Bangladesh University of Engineering & Technology (BUET), Bangladesh

"Socioeconomic and Environmental Impacts of Flood Control Facilities in Dhaka City"

- In 1988, Bangladesh experienced a devastating flood that inundated 58 percent of the area of the country and caused property losses totaling US$1.3 billion. In the city of Dhaka alone, it was estimated that 77 percent of the total area was submerged and about 60 percent of the city's population was directly affected. The misery caused by the flood created a global awareness of flood-management problems in the country. In the wake of the flood, the government appointed a Committee for Flood Control and Drainage Plans in order to protect investments in the city. It was decided that 16 programs would be implemented in two phases.

- Eight flood-control programs were submitted and $142 million were budgeted. Of this, 77 percent was spent for constructing embankments. Almost all the programs in the Phase-I have been completed. Newly constructed embankments have caused social, economic and environmental influences in Bangladesh.

- Construction of the embankments has resulted in the following positive influences. They have (1) given the people a sense of security; (2) facilitated population movements in cities, (3) facilitated land utilization and improved accessibility; (4) expanded services; (5) increased employment; and (6) decreased land prices.

- Among the socioeconomic effects, however, we discovered the following negative impacts: (1) human relocation problems at construction sites; (2) disruption of many activities due to construction of embankments; and (3) adverse effects on farmland.

- We implemented an environmental impact assessment that was led to the submission of short-, medium- and long-term programs and policies.

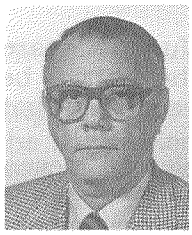
- As short-term programs, (1) water-drainage facilities are needed immediately where water is landlocked by embankments; (2) perfect walls need to be built; (3) internal drainage is needed within the city; (4) maintenance and repair of embankments are necessary for flood control; and (5) illegal squatters should be expelled from the embankment areas.

- As medium-term programs, (1) solid waste should be collected; (2) low-cost hygiene programs should be implemented, particularly in slum districts; (3) waste should be reduced; (4) industrial waste should be disposed of, (5) pumps should be installed to drain stagnant water; and (6) residents should be educated on how to dispose of wastes

- As long-term programs, we need to consider (1) controls on land utilization, (2) environmental restrictions; (3) flood-control programs; (4) formulation of drainage plans and flood-control plans; and (5) devising of programs to improve slum districts.

- Flood-control programs and other programs should be integrated Urban planning should integrate flood control within the framework of infrastructure improvement programs.

- Although I stressed the importance of building structures as a program for urban disaster reduction, other measures that do not rely on structures should also be considered For instance, zoning and such other measures should be considered.



Speaker

Sherif H. Kamel
Chairman, General Organization for Physical Planning (GOPP), Egypt

"Earthquake Damage Caused by District Differences in Urban Structure : Lessons Learned from the 12 October 1992 Earthquake"

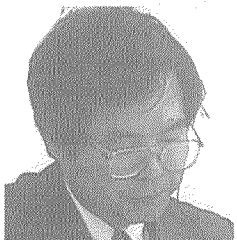
•On October 12, 1992, Egypt experienced a severe earthquake with a moment magnitude of 5.8. The epicenter was 20 kilometers southwest of Cairo, with the depth determined at around 25 kilometers. This earthquake was the first disastrous one to occur near Cairo since 1847. Although this earthquake was a relatively mild event by global standards, it was a serious event for Egypt. The earthquake caused much damage to buildings, killed about 560 people, and injured over 10,000. There was much serious damage to the historical districts near Cairo Houses, schools, mosques and other Islamic monuments were affected

•Cairo's Old City was most seriously damaged because its houses were the roof-supportive type, and many different types of houses were intermingle in this area. Lack of quality control of housing exacerbated the damage. It was found that some construction subcontractors used unskilled workers or substandard materials to reduce construction costs.

•As well, maintenance was insufficient. For example, plumbing leaks had deteriorated concrete and steel structures. Building proprietors disregarded inspections of their buildings.

•We are considering making the following recommendations in Egypt: (1) to conduct surveys on the hazards in each region to define earthquake-vulnerable areas and to know the reasons for this vulnerability; (2) to promote urban renewal and create urban structure capable of withstanding earthquakes and reducing the impact of earthquakes; (3) to design better buildings, in particular, to design disaster-proof buildings; (4) to create programs for assess building vulnerability: (5) to enlarge or to renovate buildings to reduce their vulnerability to earthquakes; (6) to incorporate earthquake-proof designs into construction codes and urban planning; (7) to formulate measures for reducing the vulnerability of the urban area and to develop such an infrastructure.

•Many lives and much property have been lost in earthquakes. These losses will be even greater in the world's metropolitan areas, because their population is concentrated in these areas. It is very important for developing countries to mitigate the impact of natural disasters and earthquakes in particular.



Commentator

Yoshiteru Murosaki
Professor, Department of Architectural and Environmental Planning, Kobe University, Japan

•Professor Kawata pointed out the necessity of separating the issue of being a major city and that of urbanization

•As to the problems of major cities, it has been pointed out that because of the over-concentration of populations in cities, being a major city itself leads to disaster vulnerability; moreover, a city's disaster frequency has a close relationship with its being a major city In other words, disaster risks in urban areas correlate with high population density. Over-concentration in cities is likely to create conditions in which disaster risk factors may lead to chain reactions and combinations of disasters.

- If a disaster occurs in a major city where a country's principal functions are concentrated, the functions of that entire country as well as those of the city will be affected, seriously damaging the economy in particular. It should be recognized that a disaster in a developing country could lead to a national crisis.
- The problems of urbanization lie in its rapidity and in the resultant uneven development The cycle of and interval between disasters is quite long, while urbanization has developed more rapidly. The present speed of urban development has proceeded too rapidly, and regardless of whether development has taken the right track, it can be checked by a disaster.

- Professor Kawata pointed out that a new scenario is needed. Estimates of potential damage in Japan are based on the damage caused by the Kanto Earthquake in 1923, for example. Such estimation is not necessarily useful in addressing the risks of large underground shopping malls in metropolitan areas or tanks of hazardous substances such as petroleum. How we imagine such new hazards created within cities and the problems they could cause is very important.

- In many cities, imbalances are reflected economically When a city is rapidly developing, investment in disaster prevention is likely to be put on the back burner As a result, vulnerability increases. We cannot overlook the problem of development bypassing the poor and poor areas. How to make poor areas secure is one of our greatest challenges

- Many speakers have pointed out that there is a huge difference between the history of the city and the urbanization process. In this sense, we need to take specific disaster reduction measures tailored to the characteristics of particular regions.

- We need to recognize the difference between urbanized and urbanizing areas. Urbanizing areas must develop their economy as well as their culture. It is very important to balance economic development with the city's security.

- The report from Rio de Janeiro referred to the close relation between natural protection and disaster prevention. It has been pointed out that disaster prevention programs have caused the deterioration of the natural environment, the economy and the social life of the community.

- It is also important for us to recognize that security does not count without amenity and community. It is necessary to acknowledge that a vibrant culture and a natural environment are necessary to ensure security. In this respect, we cannot ensure security if we focus only on disaster reduction.

- Moreover, it is very important to assess hazards possibly resulting from the development of rapid urbanization.

- Hard countermeasures alone cannot ensure the security of a city, as is the report from Dhaka emphasized. Professor Lobo used the term "sustainable development". This viewpoint is needed to review disaster-prevention measures.

Discussion

Yoshio Kumagai

I see two issues here: one is the question of the specific approach to be taken after microzonation and the citizen response to the results of microzonation; the other is to clarify microzonation according to both the natural and artificial conditions of earthquake microzonation.

Let me clarify microzonation according to both the natural and artificial conditions of earthquake microzonation. Generally speaking, microzonation often refers to geological engineering or seismology. Geological engineering holds a narrow interpretation of microzonation Microzonation based on artificial conditions is a wider interpretation It is important to discern the difference. The first step in microzonation according to natural conditions is to determine an area's most hazardous zones on an absolute scale; generally speaking, the most hazardous zone does not cover a wide area. Very safe zones are also determined. Other areas are identified as gray zones

The specific use of microzonation requires legal controls as well as management.

Experience of and education on disasters are major factors in citizen response. I had the impression in Peru that disaster-prevention techniques are not passed on to the next generation. To do so, many pilot projects should be implemented and new building construction methods should be diffused. Also, it is important to create a forum for citizens when they construct buildings

Yoshiaki Kawata

I have been asked about what strategies exist to increase wealth and information for people of developing countries that are vulnerable to disasters. My answer is to expand school education; residential registration and land registration are important; and the nation's fundamentals should be improved. The Ministries of Education and Health and Welfare, as well as the Prime Minister's Office, should improve resident and land registrations.

The IDNDR approach so far overemphasizes technology. An emphasis on socioeconomic areas is necessary to strengthen disaster reduction capability. I'd like to have opinions on this point from the speakers.

Thereza Lobo

I think the problem of poverty is the most serious. The poor are the most seriously affected by disasters. Therefore, we need to pay attention to the socioeconomic impact of disasters; otherwise, no matter how hard we try to reduce disasters through technology, we cannot overcome the negative impact of a disaster.

Mohammad A. Mohit

Structural disaster reduction efforts are not enough. Disaster reduction control is necessary. We need to formulate socioeconomic countermeasures and to improve the living standard of the poor or to improve slum districts. It is important to develop the economies of urban areas.

Sherif H. Kamel

All the problems are interrelated. I do not think that technology is more important than socioeconomic aspects. All are related and inseparable.