

1. Introduction

Comprehensive and practical water management is required to solve problems due to water cycle change as well as due to social factors, such as increasing population and urban development. In order to contribute to future water policies in Asian monsoon-effectuated countries (see Fig. 1) where natural disasters frequently occur, we investigated water problems and laws in those countries, taking into account the circumstances for each country.

Investigation of water problems and laws in each country.

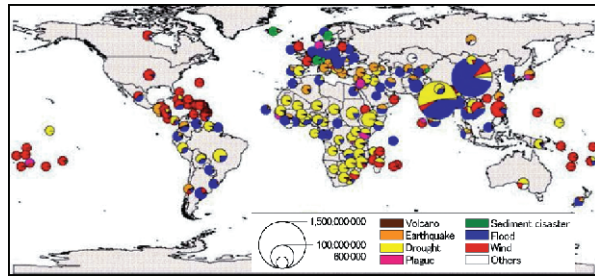


Fig. 1 Distribution of population suffering from natural disasters (1975-1999) (Source: OFDA/CRED International Disaster Database)

2. Investigation of water problems and laws in each country

Water problems and laws in each country were investigated

Table 1 Water problems and laws in each country

| Country | Water Problems and Laws |
|-------------|---|
| China | Increasing water demand due to the growing economy and population, plus measures to prevent interruption to flow of the Yellow River, the Water Law was amended in 2002 to enhance integrated water resources management. The problem of interrupted flow, that became apparent from the 1980s, was solved by building of a dam upstream. |
| Korea | Water management is carried out mainly under the River Law, Small River Development Law and Specific Multi-Purpose Dam Law. For Seikei River cleanup activities, the Seikei viaduct was removed to return the river to its original state. |
| Philippines | Matters related to water resource utilization and development are specified under the Water Code (promulgated in 1976). |
| Indonesia | In 2004, the Water Resources Law was put into effect. It defines interest coordination in developing policies and strategies for water resources management. For privatized water works in Jakarta, there are issues, such as quality and quantity of raw water, equipment maintenance and frequent water rate increases. |
| Malaysia | Water management is performed mainly through the Water Law and the Basic Land Law. River operations and river management are under the jurisdiction of different organizations. It would be desirable to set up an organization to manage water resources in an integrated manner. |
| Singapore | Water management is carried out mainly under the Public Utilities Law, and the Sewage and Effluent Law. Anyone other than the Public Utilities Agency is prohibited from operating water works. |
| Thailand | Water management is carried out mainly under the Private Irrigation Law and the National Irrigation Law. For water resources management, the Royal Irrigation Agency plays a leading role in planning and implementing water allocations associated with floods and droughts. |
| Laos | In development of waterways in the Mekong River, cooperation among countries involved, reasonable waterway development plans and measures to prevent erosion of river banks are required to mitigate effects of the development. |
| Vietnam | Nationwide and comprehensive water resource management is performed under the Water Resources Law, such as introducing a licensing scheme for water resources development and conservation on a river basin basis, plus water resources utilization. |

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| No. | Title of Paper | Names of Divisions |
|-----|---|----------------------------------|
| 230 | FY2003 Research Summary of Wastewater Management and Water Quality Control | Water Quality Control Department |
| 280 | FY2004 Research Summary of Wastewater Management and Water Quality Control | Water Quality Control Department |
| 291 | Proceedings of the 14th Conference on Public Works Research and Development in Asia | International Research Division |
| 309 | Study on Standards for Main Dimensions of the Design Ship | Port Planning Division |
| 324 | Integrated environmental research on a coastal wetland in Awase, Okinawa | Marine Environment Division |

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through field surveys and literature reviews (Table 1).

Many countries are seeking water management that can accommodate rapid social change, with only a few countries having effective, integrated water management in place. Only a few countries perform observation and monitoring on an ongoing basis, making it difficult to investigate problems based on evidence or facts and develop appropriate laws.

3. Study of solutions to water problems

In order to identify the direction for solving water problems in Asian monsoon-effectuated countries, it is necessary to develop economically sustainable management schemes suitable for the natural conditions and historical background of each country, plus establish governance and collect reliable data to ensure the effectiveness of any implemented laws. Japan's experience in policies for flood control, water utilization and river environments can be applied to these issues. The National Institute for Land and Infrastructure Management hosted special sessions at the Asia-Pacific Association of Hydrology and Water Resources (APHW) conferences in 2003 and 2004 and exchanged information with many Asian monsoon-effectuated countries.

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News Letter

Mt. Mayon Volcanic Mudflow Disaster

Research Center for Disaster Risk Management

1. Introduction

On November 30, 2006, heavy rains from Typhoon Durian caused a massive mudflow from the south to south east slopes of the volcano Mt. Mayon (2,460m) in Southern Luzon, the Philippines, leaving more than 1,200 people dead or missing. (Number of dead or missing people as of 6 p.m., December 16, 2006, provided by the National Disaster Coordination Council.) The authors were dispatched to the disaster site to investigate the disaster situation from December 10 to 16.

2. Amount of rainfall

At the Legazpi station of the Philippine Atmospheric, Geophysical and Astronomical Services Administration located on the plains near the coast, about 12 km south of the summit of Mt. Mayon, 466 mm rainfall was recorded in the 24 hours from 8 a.m. November 30, the day of the disaster.

Rainfall was concentrated between 10 a.m. and 4 p.m. with a torrential rainfall of more than 100 mm/h recorded at times during this period. In onsite

interviews, local people said that the mudflow occurred between noon and 2 p.m.

3. Results of investigation

An investigation conducted in Legazpi, Taraga, Guinobatan and St. Domingo showed that:

- (1) In the flooded areas, mud approximately 200 to 500 m wide and 2 m thick was deposited. (Picture 1)
- (2) Boulders of 2 to 3 m diameter were found scattered throughout the deposit, however most of the deposit was fine sand probably of volcanic ash origin.
- (3) Characteristics common to rivers the mudflow entered, were river channels with a gradient of less than 5 degrees at the mountain base that were significantly eroded (30 to 50 m wide and 5 to 10 m deep).
- (4) In areas around the mountain base, the Ministry of Public Works and Highways built erosion control structures, such as river training dikes and removed mud from the river bottom. Our investigation found that these structures



Pic1 Mudflow flood



Pic2 Effective river training dike

prevented mudflow floods and saved some villages. (Picture 2)

4. Conclusion

At the time of our investigation, a considerable number of residents remained in the disaster areas at the mountain base. There was the possibility of

New Research Projects

1. Maintaining the Functionality of Traffic Networks in a Large-Scale Disaster and Coordination with Business Industry Continuity Plans

Japan is susceptible to natural disasters, such as earthquakes, tsunamis and typhoons. As earthquakes in the Tokai earthquake and the Tohankai and Nankai Earthquake regions are predicted to be imminent, disaster preparedness is an urgent issue. With this background, importance of Business Continuity Plan (BCP) is recognized in terms of impact on economic losses and adverse effects on employment in local communities from interrupted business operations. Although not well recognized in the past, disaster prevention and response capability of local communities as a whole can be improved by supporting industries in developing BCPs. This is most likely to mitigate the adverse economic effects of large-scale disasters.

In order to develop effective BCPs that support cooperation among operators of public infrastructure, such as roads and ports, lifeline operators such as power and gas companies plus water works operators and other industries, this study focuses on: analysis of disasters and information on infrastructure required to develop BCPs; presentation of methods for estimating

2. A Comprehensive Sediment Management Approach for National Land Conservation

Topographic changes resulting from sediment movement, such as aggradations or degradation of river bed, sedimentation in reservoirs and coastal erosion, cause environmental problems. They also pose problems for disaster prevention and the use of rivers, for example from soil and river floods, reduced dam capacity, loss of habitat for plants and animals, and changes in landscape.

The purpose of this project study is to develop an approach for a comprehensive sediment management program addressing environmental problems, plus problems for disaster prevention and the use of rivers. The sediment movement system of the Tenryu River is one system where such problems are evident. This study investigates measures for improving problems due to the sedimentation in dam reservoirs and coastal erosion in the sediment movement system of the Tenryu River. Methods of measuring sediment movement, predicting future topographic changes and assessing the effectiveness

secondary disasters, therefore we made suggestions to the Ministry of Public Works and Highways concerning development of disaster prevention systems and implementation of emergency preparedness, to take into account this possibility.

Road Department
economic loss from disasters and the effect of BCP development; development of an indicator for road network assessment in terms of disaster prevention; assessment of spreading the effect of damaged infrastructure and the interdependency of damaged infrastructure; development of manuals for methods of information sharing; and development of a BCP implementation structure.

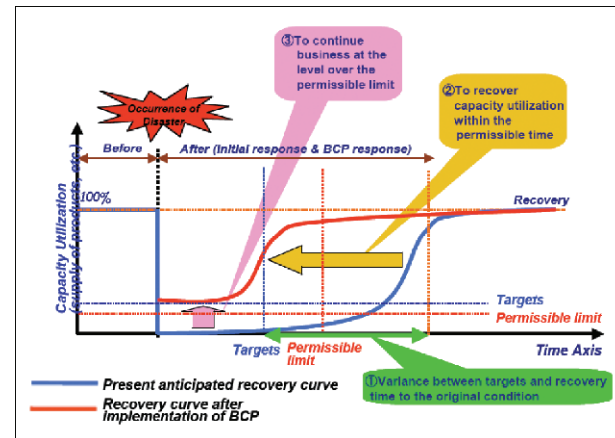


Fig. 1 Concept of Business Continuity Plan (BCP) (Source: Business Continuity Guidelines (Cabinet Office))

Research Center for Disaster Risk Management
of measures undertaken to address these problems will be identified based on the results of the investigation. "Guidelines for Developing a Comprehensive Sediment Management Approach" that can be applied to sediment movement systems across the country will be developed, aiming to contribute to improving these problems.



Pic. 1 Tenryu River mouth with receded shoreline

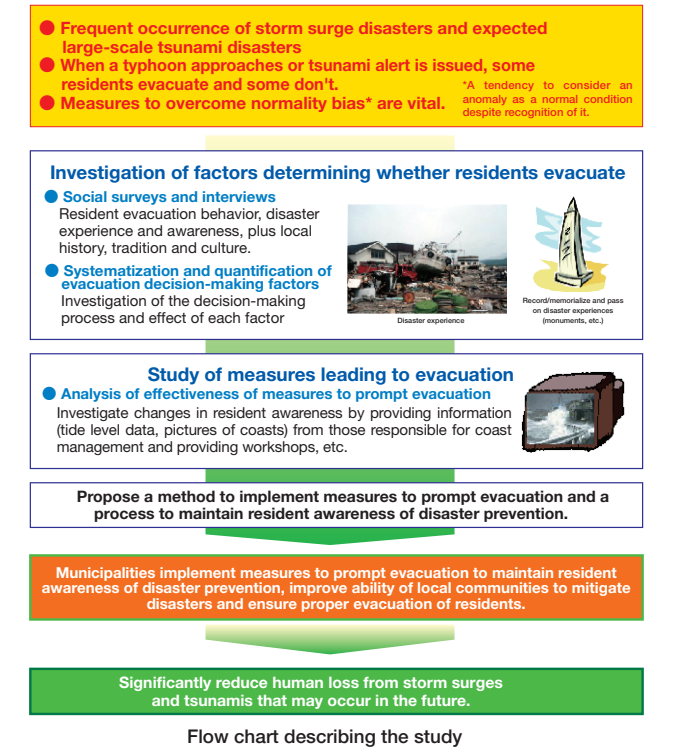
3. Prompting Evacuation from Coastal Disasters Based on Factors in Evacuation Decision-Making

In 2007, the Coastal Division will start a study of factors in evacuation decision-making for coastal disasters by residents, and measures to prompt evacuation based on these factors.

Storm surge disasters and large-scale tsunami disasters are very likely to increase in the future both in Japan and abroad. However, when a typhoon approaches or tsunami warning is issued, many residents do not evacuate due to normality bias*, despite their awareness of the necessity for evacuation. Awareness of disaster prevention decreases over time, therefore measures to maintain it are required.

This study makes a quantitative assessment of the effect of single factors on evacuation decision-making for storm surges and tsunamis by residents, plus investigates the effectiveness and durability of measures (e.g., workshops) to prompt evacuation through social experiments. Based on results of this study, we will propose a specific method for implementing measures to prompt evacuation and a process to maintain awareness of disaster prevention for municipalities. This is likely to significantly reduce human loss from storm surges and tsunamis by improving the evacuation decision-making capability of residents, ability of local communities to mitigate disasters and evacuation assistance

Coast Division
capability of municipalities. This study will be conducted as part of the research project "Estimation of Local Damage and Application to Disaster Prevention Projects."



4. Development of Design and Maintenance Technology of Control Systems to Ensure Safety of Building Equipment

Following last year's fatal elevator accident, plus a series of accidents where passengers were confined in elevators, public concern for the safety of elevators has increased. These accidents led to recognition of the importance of properly designing and maintaining control and safety systems for building equipment with powered moving components, including elevators, escalators and automated doors. Controls systems and application programs are becoming more sophisticated and complex, becoming more "black boxed", not allowing anyone other than the manufacturer to determine their details.

The purpose of this study is to collect accident data and establish a target for safety technology to ensure safety, to develop design technology specifications and safety assessment methodology to achieve equipment safety, plus to develop maintenance technology to maintain equipment safety, thereby allowing third parties to objectively assess the safety of equipment, such as elevators, escalators and automated doors.

The study period will be from 2007 to 2009 and conducted as part of the research project "Assessment and Prevention Technology of Accident to Ensure User Safety in Daily Living Activities in Architectural Space."

Building Department

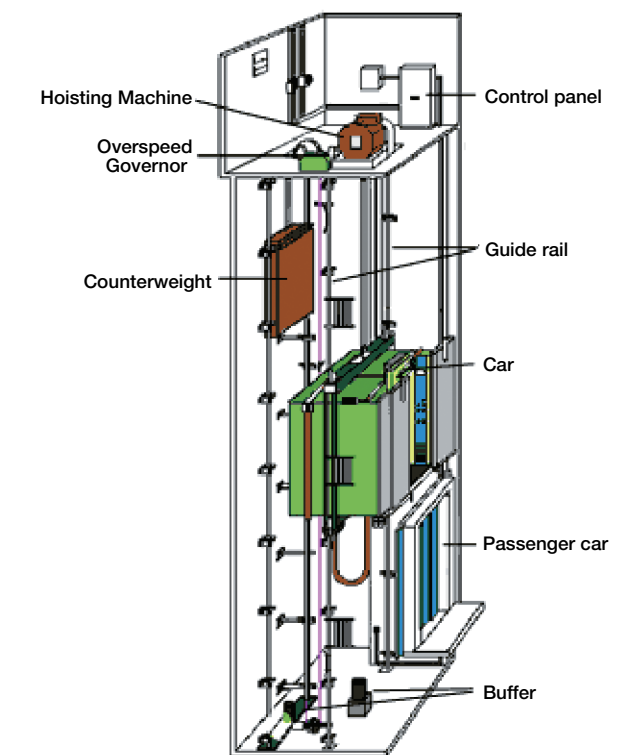


Fig. 1 Construction of -Elevators (Electric Lifts) (Source: Japan Elevator Association's homepage)