

# Research Trends and Results

## Study of methods to reduce risks of flood damage integrated with urban planning

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1. Necessity of the joint effort to reduce disasters with societies

As we face the risk of increased intensity and frequency of water-related disasters caused by climate change, societies are expected to steadily develop infrastructures and implement disaster reduction measures integrated with urban planning (example: responses in the Social Infrastructure Development Council, “Ways to adapt to climate change in the field of water-related disasters – To share the information of disaster risks and sense of crisis to build a society to reduce disasters – “ August 2015). The team started a study of measures to reduce disasters in urban planning and lifestyles and methods to evaluate them by focusing on cities with high vulnerabilities and identifying the vulnerabilities to water-related disasters. This paper introduces this study.

2. Three focuses

(1) Identification of flood hazards for both overland flooding and river flooding

Many hazard maps have been created for class 1 water systems if the annual flooding probability is 1/100 to 1/200 and the external force of flooding with the scale of 1/5 to 1/10 of sewage planning (overland flooding and river flooding). Yet, hazards are not well known for overland flooding that exceeds 1/100, such as cases of so-called guerrilla rainfall and cases with simultaneous overland flooding and river flooding. Thus, the team develops methods to analyze actual flooding hazards for various external forces, such as for a case in which the overland flooding expands to a scale that exceeds 1/100 and a case in which overland flooding is joined to river flooding.

(2) Interpretation of damage risks from flooding hazards based on urban diversity

Even when the information of hazards, such as flooding depths, is released, business owners and residents cannot easily understand what kind of risks they are facing. Thus, the team analyzed characteristics (attributes) of buildings, business owners, and residents for which flood damage can be defined. The team then developed a model to convert the obtained information into information on the damage risks for specific urban conditions (Fig.-1). For example, the evaluation of the relationship between flooding depths and damage to assets for individual attributes of buildings will enable the identification of damage risks as well as the quantitative evaluation of the effects of damage reduction measures,

such as the use of piloti, water stops, and the relocation of assets.

(3) Suggestions for measures based on regional abilities to prevent and reduce damages

Even if detailed information on the hazards and risks is released, it is meaningless unless local governments, business owners, and residents can understand what kind of measures they should combine. Thus, the team also looks for methods to present the information by examining proper response menus for specific damage prevention measures and abilities (strengths and weaknesses of society) of above attributes and target areas to reduce damage.

3. Research system integrated with urban planning and damage prevention departments

Three-year cross-sectional research studies are being implemented using the system from the Climate Change Adaptation Research Group in which the following research divisions related to river and wastewater management, urban planning, and disaster prevention can work together: River Department (River Division, Water Cycle Division, Flood Disaster Prevention Division); Urban Planning Department (Urban Planning Division, Urban Disaster Mitigation Division); Water Quality Control Department (Wastewater System Division); and Research Center for Land and Construction Management (Research Coordinator for Land Management and Disaster Prevention). Practical case studies will be implemented in the future with local governments in model areas.

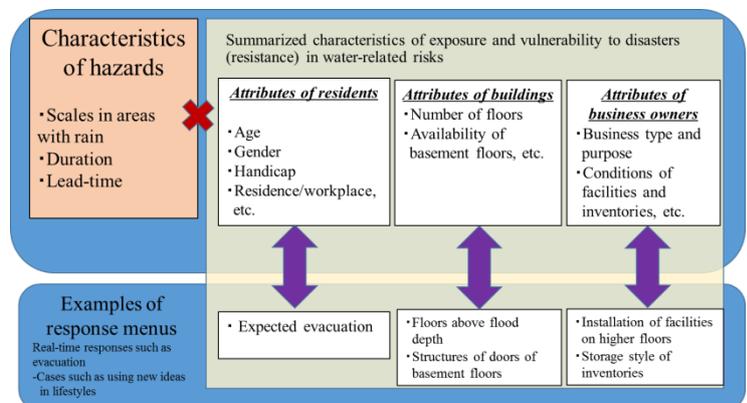


Fig-1. Interpretation of risks from hazards based on various attributes in cities and concept of presenting menus of responses to the risks