Heavy Rainfall Control for Living Together with Isolated-Convective Rainstorms and Line-Shaped Rainbands

R&D Theme

Research and development theme 3 (Research on impact assessments of heavy rain control and social acceptance)

Progress until FY2022

1. Outline of the project

Establish heavy rain control scenarios and evaluate the effect of controlling flood flows by heavy rain mitigation as a first step toward estimating the natural impacts of reducing heavy rains. Consider the risk of rain areas shifting due to the control of heavy rains and causing floods or droughts in other basins. Estimate the impact on water resources and society, and evaluate how a water-based society will change, by considering the behavioral changes of the residents.

Additionally, construct a conceptual model, "weather commons," that captures the mechanism of cooperation by local residents to live with heavy rains reduced using new regulatory technologies, and clarify the conditions for its establishment. Construct social and institutional response scenarios for ELSI/RRI topics based on this conceptualization.

The awareness of "living in the bosom of nature," where people revere and co-exist with nature, will permeate, and the scope of application of heavy rain regulation techniques will be decided within the scope of "people living their lives by borrowing the bosom of nature."

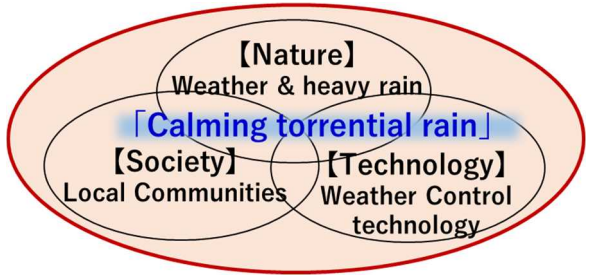

Figure 1. Conceptual diagram of "weather commons"

2. Outcome so far

①Impact assessment of heavy rain control on floods and water resources

Observing the changes in flood damage due to weather control requires ascertaining the locations and extent of vulnerable areas, and the consistency between the damage from previous disasters and land use plans. Therefore, we have collected and organized government-owned open data and privately-owned commercial data from the past 10-year period on basic information related to disaster risk in Kobe City and northern Kyushu.

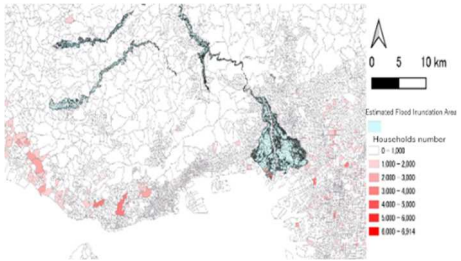

Figure 2. Areas of expected flooding and the number of exposed households (Hanshin area)

②Strategic examination to solve ELSI issues

ELSI refers to "ethical, legal, and social issues," and must be considered in the research on heavy rain control, such as the uncertainty of nature and environmental impacts. We established ELSI interdisciplinary study teams for the three core research topics, organized ELSI on the regulation of typhoons and heavy rain, and classified them into six issues as shown in the figure3.

③Examination of the positioning of the weather commons

The idea of thinking about technological development centered on the vision of social development rather than focusing on ELSI based on technological development was emphasized throughout the entire project. Several issues under consideration were categorized as governance

Figure 3. Overview of ELSI (Results from the ELSI cross-sectional study team for the three core projects)

problems for the weather commons, such as the formation of independence as "commoners" for local residents and stakeholders, developing a symbiotic relationship with the weather and disasters, formation of non-normative ethics based on local community practices, and citizen participation in technological development. Regarding the expression "weather control," we also examined words based on the concept of the weather commons and proposed the use of the expression "calming heavy rains."

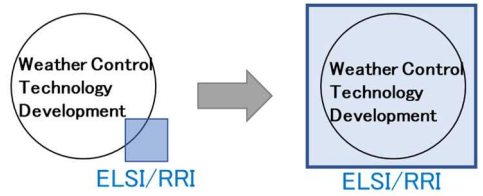

Figure 4. Schematic diagram of positioning ELSI research on weather control

3. Future plans

Set up multiple scenarios with varying degrees of heavy rain control, and evaluate the flood flow control effect due to heavy rain control. Clarify the requirements for the establishment of a "weather commons." Construct social and institutional response scenarios for ELSI topics based on this concept.

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