

3. Research on impact assessments of heavy rain control and social acceptance

Progress until FY2023

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.”

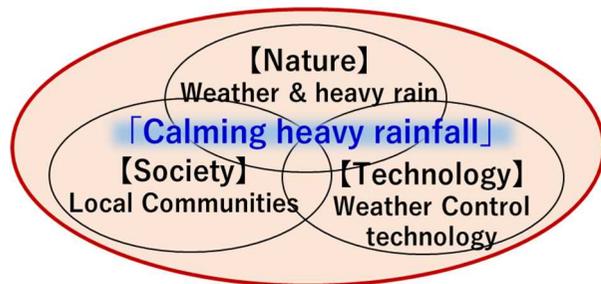


Figure 1. Conceptual diagram of “weather commons”

2. Outcome so far

① Effects of heavy rainfall suppression on flooding and inundation control mechanisms

We assessed the impact on flood inundation depth and dam storage capacity, assuming a reduction in rainfall due to heavy rainfall control. Given that the flooding was triggered by a water-related incident in a riverbed, we analyzed the necessary heavy rainfall control measures to prevent such incidents during guerrilla torrential rains by examining the relationship between the rate of decrease in rainfall intensity and the unit-width specific force, which is a fluid force index influencing evacuation strategies.

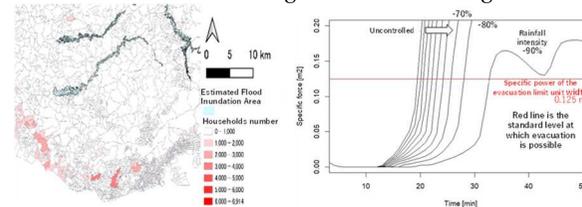


Figure 2. Expected inundation zone and the number of exposed households (left), and the calculation results of the decrease of the unit-width specific force in the river (right).

② Strategic examination for solving ELSI

ELSI refers to the ethical, legal, and social issues. It is crucial to consider the uncertainties of nature, their environmental impacts, and their effects on the disaster preparedness mechanisms of communities. Through interdisciplinary ELSI study teams focused on three core research topics, we organized and categorized ELSI concerns related to typhoon and heavy rain control into six issues, as depicted in Figure 3.

③ Examination of positioning of weather commons

The project embraced the concept of focusing technological development around societal visions rather than basing the ELSI on technological advancements. This shift in perspective was recognized as a critical governance issue for managing the weather commons. Based on existing knowledge of resource management in the “commons,” the study identified several key areas for investigation. These



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

included the organization of local residents and stakeholders into a “commons,” promoting symbiotic relationships with weather patterns and disasters, developing non-normative ethics based on local community practices, and encouraging citizen participation in technological development. Additionally, the term “weather control” was scrutinized. The team explored linguistic choices informed by traditional views of nature and social acceptability within the context of the weather commons, ultimately proposing the term “calming heavy rainfall” for theoretical discussions.

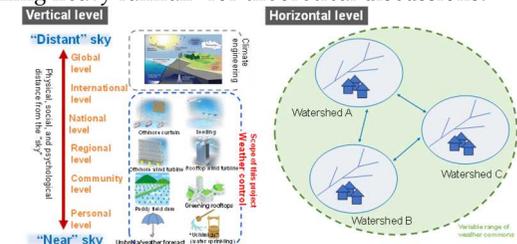


Figure 4. Hierarchy in the weather commons

3. Future plans

We have developed multiple scenarios that vary in the extent of heavy rainfall control to evaluate the effectiveness of flood flow management. Moreover, we formulated methods for assessing self-sustaining symbiotic control techniques to support the formation of a weather commons. Additionally, we are designing social and institutional response scenarios to address ELSI topics.