R&D item

8. Damage Estimates

Progress until FY2023

1. Outline of the project

In this research item, we develop a methodology for estimating the effect of weather control on reducing economic damage. Specifically, we are; 1) developing a flood and inundation simulation model for the entire Japan for calculating the inundation area and its depth in the cases with and without weather control; 2) developing an exposure asset database based on various statistical data and a flood economic damage estimation model based on inundation depth and exposure information. By utilizing the developed flood and inundation simulation model and the flood economic damage estimation model, we aim to quantify the effect of weather control on reducing economic damage.

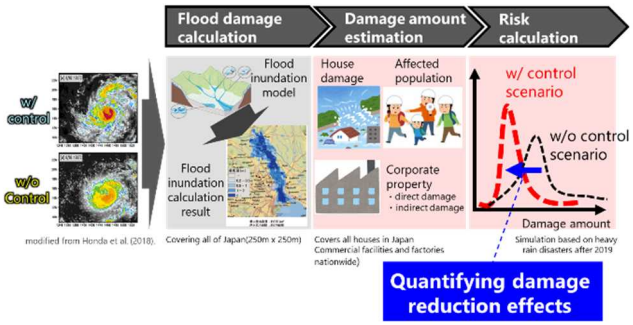

Fig.1: Quantification of the effect of weather control on reducing economic damage

2. Outcome so far

[Modelling of Artificial Infrastructures on Rivers]

Japanese river channels have been continuously modified and changed by levee construction, dredging, and installation of artificial infrastructure. Especially, the sluice gates at the confluents of large rivers and small rivers for preventing backwaters have significant effect on the characteristics of inundation phenomena. This year we developed a nationwide database of confluent sluice gates based on satellite images and documents by river managers, and introduced the database in the nationwide flood and inundation model. By a comparative experiment with and without sluice gate modelling, we demonstrated that the appropriate modelling of sluice gates is indispensable for simulating the area and dynamics of inundation in realistic manner.

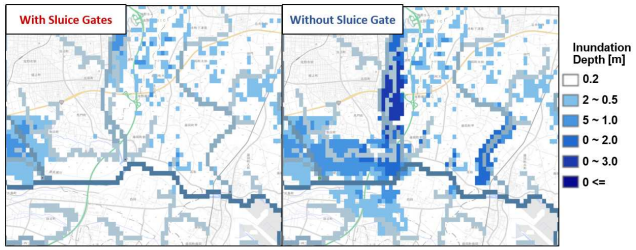

Fig.2: Change of inundation area by sluice gates

[Development of Exposure Asset Database]

We built an exposure asset database for entire Japan, which consists of population, private assets, and the properties related to the indirect loss, by combining the statistics by the government and several private companies. Since variables in the database have different spatial resolution from 100m mesh to prefecture, we disaggregated the low-resolution variables based on the higher-resolution variables, targeting four prefectures in the Tokyo Metropolitan Area. We are brushing up the quality of our database for that the actual economic damage by flood events and the effect of weather control may be reasonably quantified.

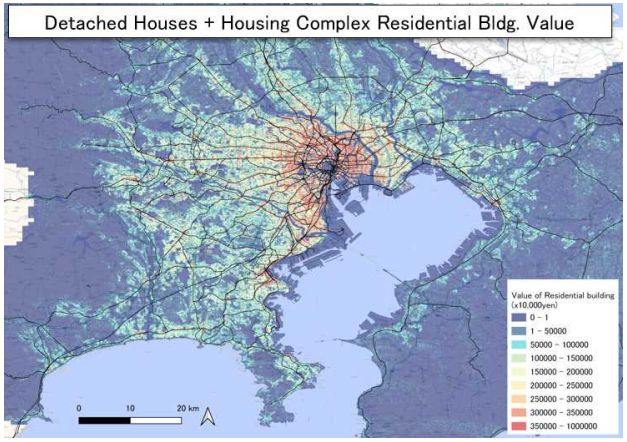

Fig.3: Disaggregation of Residential Bldg. Value

3. Future plans

We will introduce other artificial infrastructures into the nationwide flood and inundation model, and calibrate the model for ensuring its accuracy. Also, we will develop the damage function which converts inundation depth and asset value into the damage amount and ratio.