

## Evaluation of the climate change impact in the Yoshino river and development of disaster prevention policy as adaptation measures

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In climate change adaptation policy, it is necessary to grasp characteristics of the region and disaster risk. Also, climate change projection output should be downscaled to regional scale.

In this research, we will evaluate the impact of climate change on flood risk and drought risk for the Yoshino River.

Many dams were built in the Yoshino river basin. The dams control floods and supply water to the four prefectures of Shikoku at the same time. Sediment disasters occur frequently in mountain rivers in the upstream. In the downstream part, inner flood damage will occur in the lowland of the basin. The Yoshino River basin has various disaster risks.

As a first step, the hydrological model predicts the river flow rate using statistically downscaling data the global model. As the second stage, we simulate the operation of the dam and analyze the effect of dams of flood control and water use.

Sameura Dam, the largest dam in the Yoshino River system, is famous for the dry up due to drought. There was also a case where a typhoon came after the drought and it became full at a stroke. If it was not a drought, the dam could not sufficiently mitigate flood damage. So it is necessary to analyze the flood and the drought at the same time. WEB-DHM (hydrological model) used can reproduce both.

Also, statistical downscaling data provided from SI - CAT is high resolution 1 km mesh. However, since it is daily data, it is necessary to perform temporal downscaling. Typhoon 16 in 2004, which brought the largest flood in Yoshino river in recent years, caused stronger flooding even with the same rainfall, so we created rainfall data with spatiotemporal distribution using this rainfall data.

We conducted a dam simulation of dams using the output of the hydrological model. There is a common tendency between increase in flood frequency and probability flow among GCMs. However, the trend is different for the drought risk.

For the operation of the dam, it is important not only the scale of the flood / drought alone but also what intervals and combinations occur during the year. In addition, as an adaptation measure, we also verified the change of operational rules of the dam and the effect of reducing the water intake.

Furthermore, we conducted a flood analysis in a town where the Yoshinogawa downstream area conducts policy consultations with SI - CAT. In the town spread low lowland, the risk of inundation flood is high. In addition, the Yoshino River is a long river flowing to the east, flooding flows downstream from the upstream after a typhoon passes.

Inner water flooding that occurred earlier will stop the evacuation route and citizens may be exposed to the risk of later external flooding from the river. For this reason, we analyzed singularly and integrated analysis of flooding of inland water and flooding of external water.

Conventional flooding analysis has a relatively large mesh such as 50 m due to DEM constraints, but this mesh size can not reproduce micro topography. In addition, in inner water flood, the small flood depth of several tens of centimeters affects the evacuation route, so accuracy of altitude data in centimeters is required.

For this reason, Ultra High Resolution Flood Analysis was carried out with 10 m mesh utilizing the 5 m mesh DEM released by Geographical Survey Institute generated from the laser profiler which has been launched in recent years.

As a next step, I shared the analysis results with the staff of the town and understood that flooding occurred in a micro topography like the remains of the river. Reproducibility was verified using past inundation records. At the same time, we also presented the behavior of flooding outside water as an animation. We also examined the safety of the evacuation route by overlapping with the road map. By superimposing the information on the location of evacuation facilities and relocation of welfare, we considered evacuation guidance for vulnerable people. These analyzes gave insight as the foundation of measures to protect lives.

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