



Development of river flood model in lower reach of urbanized river basin

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Japan, with its natural mountainous landscape, has demographic feature that population is concentrated in lower reach of elevation close to the coast, and therefore flood damage with large socio-economic value tends to occur in low-lying region. Modeling of river flood in such low-lying urbanized river basin is complex due to the following reasons. In upstream it has been experienced urbanization, which changed land covers from natural forest or agricultural fields to residential or industrial area. Hence rate of infiltration and runoff are quite different from natural hydrological settings. In downstream, paved covers and construct of sewerage system in urbanized areas affect direct discharges and it enhances higher and faster flood peak arrival. Also tidal effect from river mouth strongly affects water levels in rivers, which must be taken into account.

We develop an integrated river flood model in lower reach of urbanized areas to be able to address above described complex feature, by integrating model components: LSM coupled distributed hydrological model that models anthropogenic influence on river discharges to downstream; urban hydrological model that simulates runoff response in urbanized areas; Saint Venant's equation approximated river model that integrates upstream and urban hydrological models with considering tidal effect from downstream. These features are integrated in a common modeling framework so that model interaction can be directly performed.

The model is applied to the Tsurumi river basin, urbanized low-lying river basin in Yokohama and model results show that it can simulate water levels in rivers with acceptable model errors. Furthermore the model is able to install miscellaneous water planning constructs, such as runoff reduction pond in urbanized area, flood control field along the river channel, levee, etc. This can be a useful tool to investigate cost performance of hypothetical water management plan against impact of climate change in the region.