Application of the Hydrological Prediction for the Environment (HYPE) Model for a Watershed Mixed Urban and Rural Area

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In this study, HYdrological Prediction for the Environment(HYPE) model was applied for a watershed mixed Urban and Rural Area in order to evaluate an effects of urbanization on runoff characteristics. The model was set up and applied for the Kinokawa watershed in Kii peninsula, Japan. Although Kinokawa watershed is for the most part a rural area, 2 middle-size cities exist middle and lower basin. The area and the population of the watershed are 1,750 km2 and 0.8 million people. Initial attempts of this study focused on HYPE model set-up by using land cover and soil database that are available all over Japan. Land cover data to set up the model is based on high-resolution land use and land cover map products obtained satellite observation. Soil classification in the model was performed by using soil map provided by Japanese government. Secondly, sensitivity analysis of parameters that characterize hydrological properties in urbanized area were performed. The runoff response to two storm events were verified; one minor event is a rainy day after several dry days and one major event due to Typhoon is heavy rainfall continuing for several days. For the miner event, only a HYPE model considering urbanization effects could express an increase of river flow rate due to rainfall. For the major event, however peak flows in HYPE models due to rainfall were generated regardless of the presence/absence of considering urbanization, flow rates were extremely large in both cases. It was demonstrated urbanization effects on runoff from large and rural watershed were relatively larger in small rainfall events.