

Application of the Tokyo Storm Runoff (TSR) Model with a Vector-Based Minute Catchment Delineation

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Abstract

The recent advances in GIS technology as well as data availability open up new possibilities concerning urban storm runoff modeling. In this Study, a vector-based distributed storm event runoff model - the Tokyo Storm Runoff (TSR) model - is applied for urban runoff analysis using two historical storm events. The set-up of this model is based on urban landscape GIS delineation that faithfully describes the complicated urban land use features in detail. The flow between single spatial elements is based on established hydraulic and hydrological models with equations that describe all aspects of storm runoff generation in an urban environment. The model was set up and applied for the urban upper Kanda catchment in Tokyo Metropolis, Japan. No calibration or tuning was performed, but the general model formulation was used with standard parameter values obtained from the literature. The general model formulation was used with standard parameter values obtained from the literature. The runoff response to two storm events were simulated; one minor event resulting only in a small-scale flood wave and one major event which inundated parts of the catchment. For both events, the simulated water levels closely reproduced the observed ones. For the major event, also the reported inundation area was well described by the model. It was also demonstrated how the model can be used to evaluate the flow conditions in specific components of the urban hydrological system, which facilitates e.g. evaluation of flood-preventive measures.