Quantitative approach and problems of river hydrological simulation models

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There are currently many conflicts regarding water, including flooding, shortages, pollution, eutrification of static water and so on. To solve these problems, detailed information about specific issues must be shared between stakeholders. A distributed hydrological model has been proposed as the most important tool in enabling the sharing of water information instead of a lumped model. In essence, a distributed model consists of sub-basins of tributaries and the main river channel. As for the main river channel, there are commercial models with the progress of mathematical techniques for hydraulic calculation. However the methodologies for the description of rainfall-runoff phenomena from sub-basins have not fully discussed. Especially for forested area, there are two key topics to address. The first is how to describe runoff phenomena continuously over several rainfall events and dry periods for further water quality simulation. The second is a serviceability of a model in identification of its parameters by measurable soil conditions of a sub-basin. To address these issues, the authors propose a new rainfall runoff model; Yamashita Model (Fig. 1), based on the assumption that retention capacities in the soil has the great effect on the runoff phenomena. This model consists of two step retention and three runoff mechanism. In this model, the basic parameters were retention capacities of soil pores, and these were identified by the measured

volumes of soil pores based on the classification by Takeshita, which classifies the retention capacities of a soil by suction force. They examined this model with the actual rainfall-runoff data of two small catchments of Uryu Experimental Forest of Hokkaido University, Japan. The simulation results fairly agree with observed data (Fig. 2) . For further investigation to improve rainfall runoff models, the long term observation of rainfall and runoff should be done at various type and size of watershed under the governmental initiative.

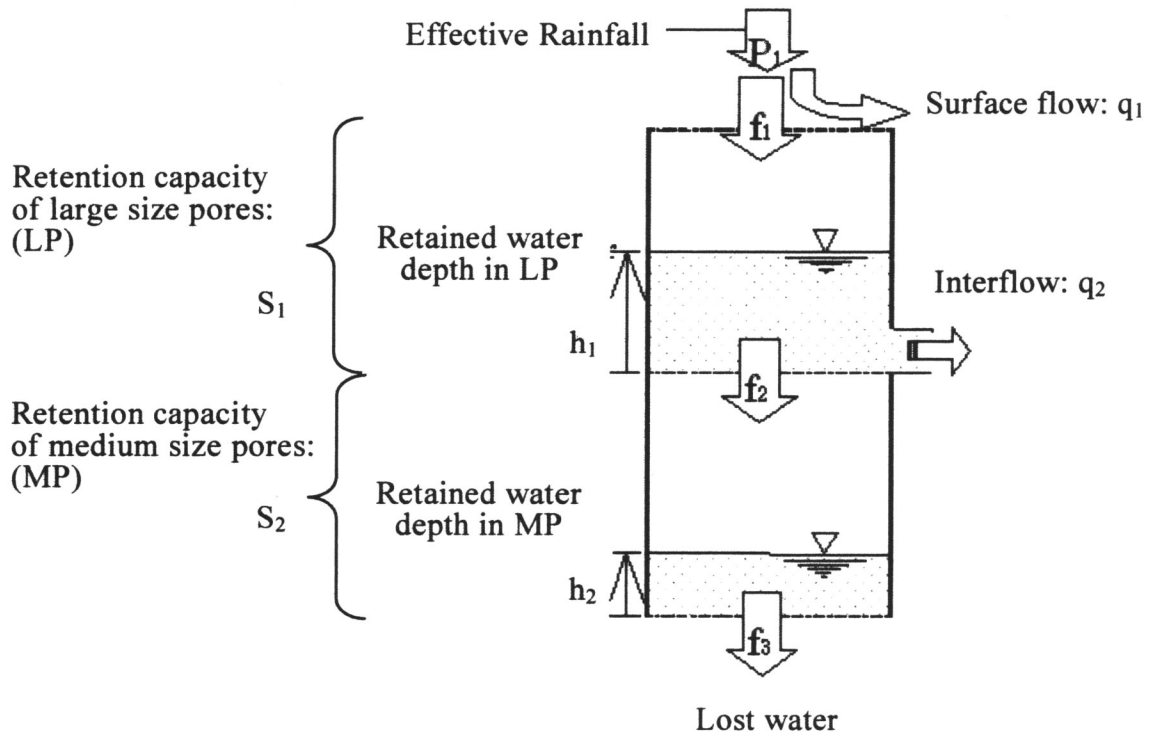

Fig. 1. Structure of Yamashita Model.

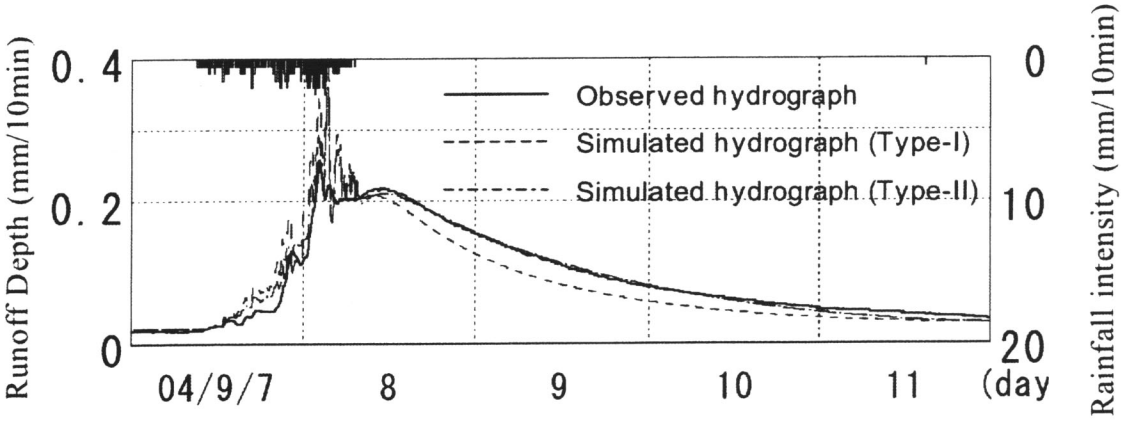

Fig. 2. Example of the simulation result.

Study site was a small catchment (5.88 ha) in the Dorokawa watershed.

Cumulative rainfall = 111.5mm, Maximum rainfall intensity =30mm/h.