SUGGESTION OF A SIMPLE VEGETATION PARAMETER AGGREGATION METHOD APPLICABLE TO A DISTRIBUTED RAINFALL-RUNOFF MODEL

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Recently the water resources community stands on the brink of a new era of water management system with the advent of the weather forecasting information and remote sensing data in Korea. It is likely that the water resources community turns to using the ensemble streamflow prediction from R-R modeling forced by weather forecasting data. Two types of data are needed to run an R-R model: land surface data and hydrometeorological forcing data. The hydrometeorological forcing data is a grid-averaged value of rainfall rate from ground measurement, radar, or satellite based retrievals. The land surface data include soil texture, vegetation cover type, and elevation and these factors control the flow. When a precipitation event occurs, water is deposited on many different surfaces and then, from these surfaces, it propagates by a number of routes into the local stream or the local water table (Maidment, 1993). Rainfall excess is the amount of water that eventually reaches the saturated overland flow and channel flow, which are controlled by the nature and presence of vegetation and underlying soil. Then it is important to adequately represent all the vegetation related factors by a single value and often the hydraulic roughness has been used. Unfortunately the hydraulic roughness is rarely measured due to the difficulty in nature and a numeric value is in need for a watershed scale in R-R model. Hence, the specification of the land cover characteristics is essential to have runoff simulated by a Rainfall-Runoff (R-R) model in watershed hydrology. The recent availability of land cover map from remotely sensed data makes the specification of the land cover characteristics easier (Vieux, 1994) but it is unlikely that the rainfall-runoff models incorporate all spatial scales of the land cover map in need of application. On the basis of mass balance theory, a simple strategic approach acceptable to R-R model is proposed to represent natural vegetative heterogeneity.

The objective of this study is to give an improved diagnosis of R-R modeling approach by developing a mathematical method which is a similar suggestion by meteorologists for blending the value of vegetation-related parameters of heterogeneous land cover to give optimum, simultaneous, equivalent area-averaged parameter values. It is a simple method to calculate the effective value of vegetation parameters that determine surface runoff at the length scales used in R-R model. The proposed method provides a reasonably realistic description of area-averaged vegetation nature and characteristics.

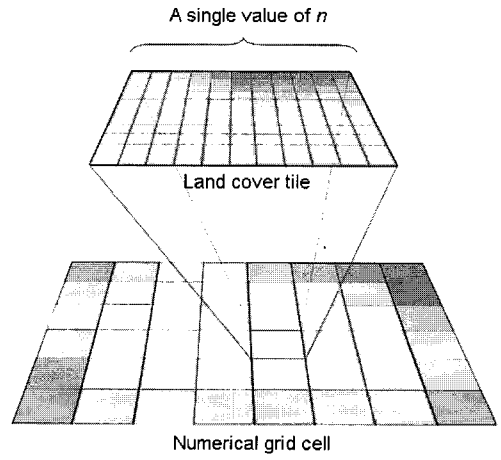

Fig. 1 Schematic diagram to show the aggregation concept in a distributed R-R model. A modeling grid cell consists of 11x11 finer land cover tiles but it needs to be represented by a single value of n

REFERENCES

Maidment, D.R., (1993), Handbook of Hydrology, MsGraw-Hill Inc., New York, USA

Vieux, B. E., (1994). Distributed hydrologic modeling using GIS, Kluwer Academic Publishers, Dordrecht, The Netherlands