

STUDY ON COMPARATIVE METHOD USING AHP AND GIS BASED DISTRIBUTED RUNOFF MODEL

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Research in the field of river hydrology has been mainly concerned with the *investigation of the rainfall-runoff phenomenon through the analysis* of hydrological factors such as meteorology and geography, with the focus being on each river basin. Recently, various forms of digital information such as GIS and RS data have been made available in worldwide digital map format. Therefore, there has been a shift in focus from lumped-parameter models to distributed runoff models, as the latter can consider temporal and spatial variations in water quantity. Distributed runoff models have made possible the comparison of runoff field and rainfall-runoff characteristics considering spatial distribution.

Based on this background, a comparative methodology using a GIS-based distributed runoff model and AHP (Analytic Hierarchy Process) for the analysis of river basins based on their regional hydrological characteristics and considering their temporally and spatially-distributed physical properties is developed. Based on the method, the comparative hydrology is proposed to make clear the characteristic and similarity for each river basin. The general purposes of comparative hydrology are (i) to understand the difference and similarities of river basin characteristics, (ii) to produce hydrological parameters for each river basin such that they can be used in other areas that lack data, (iii) to aid in transferring ideas about the management of similar river basins, and (iv) to investigate the environmental impacts for similar river basins. Comparative hydrology in this study is defined as a method of analyzing characteristics of regional run-off phenomena with common measures applying to regional data sets, and the river basin characteristics, uniqueness and commonness will be identified. Extracting the accurate hydrological phenomenon from each river basin is very important to build the comparative procedure because the river basin characteristics have great influence on runoff process.

In this paper, GIS based distributed long-term runoff model including short-term discharge is developed to calculate the distributions of water quantity in time and space. And, a comparative methodology using a GIS-based distributed runoff model and AHP for the analysis of river basins based on their regional hydrological characteristics and considering their temporally and spatially-distributed physical properties is developed.

In conclusion, the following results were summarized;

i) Integrated comparative methodology using a GIS based distributed runoff model and

AHP is proposed systematically.

- ii) Deriving effective hydrological data based on GIS provides enhanced results in river basin simulation.
- iii) Hydro-BEAM is developed to simulate accurately the temporal and spatial distributions of many hydrological characteristics for long-term hydrographs included with flood ones from multi-viewpoint of water quantity and quality.
- iv) The analysis on river basin simulation for three river basins in the Asian-Pacific region showed reliable results of high accuracy, and similarity between river basin was estimated.

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