INDOT Research

TECHNICAL *Summary*

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REGIONALIZATION OF INDIANA WATERSHEDS FOR FLOOD FLOW PREDICTIONS PHASE I

Studies in Regionalization of Watersheds

Introduction

Several studies have claimed that regionalization of watersheds is essential to develop regional flood flow equations. These flood flow equations would be used to estimate flood magnitudes at locations where actual flood data are not available.

Although several regionalization methods have been proposed, there is no agreement about the method or methods which are to be used. In this study of regionalization of Indiana watersheds, a two-step procedure was adopted. In the first step, regionalization methods in use were reviewed and the most promising of these were selected for testing. In the second step, the selected methods were tested by using the watershed and flow data. The following regionalization methods were tested:

- The L-moment based method
- The method based on hybrid cluster analysis
- The hybrid cluster method using rainfall data
- The method based on fuzzy cluster analysis
- The method based on artificial neural networks.

Findings

The L-moment based method requires subjective judgment in regionalizing watersheds. Consequently, the results would not be unique and hence unacceptable. The hybrid cluster method is superior to the L-moment method, but is computationally quite involved. The hybrid cluster method in which rainfall data were used gave unacceptable results. The fuzzy cluster and artificial neural network based methods were the easiest methods. The regionalization results from the hybrid cluster, fuzzy cluster, and artificial neural network methods were identical.

Another important finding of the study is that the results from any of these methods will not give statistically homogeneous regions. The results from cluster analysis will have to be tested and the regions revised before arriving at statistically homogeneous regions.

The characteristics of flood data from these regions were tested by noting tests based on simple scaling. The data from the homogeneous regions were found to behave as expected.

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