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Extended Abstracts

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IDENTIFICATION OF HOMOGENEOUS HYDROLOGICAL REGIONAL TYPES OF BASINS

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Based on general definition regional types in regional taxonomy (Fischer 1987) a homogeneous hydrological regional type is defined as an open system consisting of spatial units-basins that show a high degree of similarity from the point of hydrological response and are not the neighboring ones in the geographical space.

If the assumption that approximately the same hydrological response is linked to basins with similar physical properties is valid, homogeneous hydrological types can be delimited not only on the basis of the hydrological response data but also on the basis of data on physical properties of the basins. Such an approach creates a necessary prerequisite for the causal explanation of spatial variability of the hydrological response and makes it possible to solve the problem of extrapolating hydrological data. The use of physical regional types of basins as a source for the identification of homogeneous hydrological regional types of basins confronts us with four problems: (a) creating a network of mutually comparable basins, (b) selecting the hydrological response and physical properties of basins, (c) selecting method for the delimitation of homogeneous physical regional types of basins, (d) identifying of homogeneous hydrological regional types of basins on the basis of evaluation of the differences in the selected hydrological response existing among, and similarity, within physical regional types of basins. Identification of homogeneous hydrological regional types of basins of Slovakia on the basis of the above mentioned steps is the aim of the present contribution.

CREATION OF BASIN NETWORK AND SELECTION OF PHYSICAL VARIABLES

The network of basin was created in such way as to fulfill the following conditions: (a) the area of basins was situated in only one macro form of relief (mountain, basin, hilly land and lowland), and (b) its size did not exceed 300 km². 139 basins with hydrological observation were selected from the population. Each basin is characterized by ten variables (a) average total precipitation in the period of 1971-1980, (b) permeability of soil-substrate complex, (c) basin area, (d) afforestation, (e) mean slope of basin, (f) mean altitude of basin, (g) maximum altitude of basin, (h) relative altitude of the basin, (i) shape of basin, (j) drainage network density.

DELIMITATION OF HOMOGENEOUS PHYSICAL REGIONAL TYPES OF BASINS

From the existing classification procedures centroid method was used. Analysis of the aggregation process on the basis of losing information showed that the optimum point of termination of the clustering process will be the one set of 139 basins divided 11 physical regional types of basins.

IDENTIFICATION OF HOMOGENEOUS HYDROLOGICAL REGIONAL TYPES OF BASINS

The hydrological response of each physical regional type of basin is expressed as a average annual total runoff. Its regional value was determined from hydrological observation in the period 1971-1980 on the basis of selected groups of basins. If physical regional types are to be homogeneous hydrological regional types as well, then differences in hydrological response among them indicated by sample of basins have to be adequately contrast. A suitable method for judging the significance of these differences is the analysis of variance. The zero hypothesis is tested on the basis of F-ratio. This is the initial step in analyzing the difference of hydrological response among the delimited physical regional types. It only provides information that the differences are significant without specifying which of the differences between physical regional types are sources of this significance. The solution lies in mutual couple comparison. In this case the zero hypothesis is tested. This hypothesis is rejected in the selected level of significance 0.05 if zero is not a part of the 95% confidential interval for the difference between arithmetical means of two analyzed physical regional types of basins. For the calculation of confidential interval a method of least significant differences was used. Only in those cases in which the zero hypothesis is rejected will physical regional types be homogeneous hydrological regional types of basin as well. Four homogeneous hydrological regional types of basins were identified on the territory of Slovakia by this method. Originally delimitation of the basins was reclassified yet by discriminant analysis to be more homogeneous.

REFERENCE

Fischer, M. M. (1987) Some fundamental problems in homogeneous and functional regional taxonomy. *Bremer beitrige zur geographie und ramplanug*, (11), 267-282.