Classification of Lebanese catchments according to their structural and functional characteristics

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Although a global catchment classification scheme is yet to be established, grouping of catchments according to their hydrologic similarities based upon catchment structure and function is an important tool for modeling guidance, generalization, transferability, prediction in un-gauged basins and anthropogenic global change impacts. The purpose of this study is to create a typology of a set of 17 catchments in Lebanon according to their hydrologic similarities using structural (landform, topography, geology, land use, climate, etc.) and functional (magnitude, duration, frequency, rate of change, climate, etc.) hydrological indices. These indices could be derived from widely available hydrologic and landscapes data. Correlations were performed over pairs of indices and only those showing little or no positive correlation were kept for analysis. To further reduce the number of variables, PCA (Principal Component Analysis) was carried out between structural and functional hydrological indices; as variables, and their correspondingbasins respectively. Only variables strongly associated with one or more of the three principal axes were retained. Furthermore, a stepwise linear regression was used to define relationship between multiple structural indices and each individual functional characteristic for each basin. Herein, two classification approaches has been followed. (1) Classification according to functional index: for each index, basins showing similar regression relationships were grouped together, thus resulting in different catchment classifications from one index to another. One can use one or another of these different classifications according to the problematic that have been raised. (2) A global classification approach where catchments representing similar regressions in more than half of their functional indices were gathered in one class. This latter approach permits the regrouping of catchments that have the maximum of similarities in term of their structural and functional characteristics.

Keywords:catchment classification, hydrologic indices, structural characteristics, functional characteristics, Lebanon.