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Parsimonious Regional Models of Flow-Duration Curves for Engineering and Environmental Applications.

An empirical Flow-Duration Curve (FDC) provides an estimate of the percentage of time (duration) during which a given streamflow was equalled or exceeded over the historical period-of-record. A FDC is one of the most familiar graphical tools available to the hydrologist. Because of its ability to condense a wealth of information about runoff variability into a single graphic image, and because of the relevance of runoff variability to both human water use and the maintenance of environmental health, the FDC is used in a wide range of applications. Several countries and geographical areas worldwide lack streamflow observations. This condition, along with the worldwide pursuit of the optimal estimation and management of water resource, led to the formulation and proposal of numerous procedures for regionalising FDC. The present paper briefly illustrate a review of the literature on FDC prediction in ungauged sites and reports on an extensive analysis performed over a wide and hydrologically complex area in central Italy. The analysis was promoted by the RD department of ENEL S.p.A. (Ente Nazionale per l'Energia eLettrica), an Italian energy provider, which at that time needed to develop a parsimonious yet as-reliable-as-possible regional model for predicting long-term flow-duration curves (FDC's) in ungauged sites located within a broad region of central Italy. The regional model has then been used in the context of hydropower feasibility analyses to locate suitable sites (i.e. ungauged basins characterized by suitable surface water availability and streamflow regimes). Also, the analysis was triggered by the fact that at that time the literature reported a large number of studies on FDC regionalization, presenting several different approaches to this problem; nevertheless, no study compared the reliability of the different regional approaches, and in fact the indications on the reliability of any of these regional models for the prediction of FDC's in ungauged sites were still very sparse.