Evolving Water Resources Systems: Understanding, Predicting and Managing Water–Society Interactions
Proceedings of ICWRS2014, Bologna, Italy, June 2014 (IAHS Publ. 364, 2014, 339-344).

Along-the-net reconstruction of hydropower potential with consideration of anthropic alterations

A. MASOERO, P. CLAPS, E. GALLO, D. GANORA & F. LAIO
DIATI, Politecnico di Torino, Corso Duca degli Abruzzi 24, Torino, Italy
pierluigi.claps@polito.it

Abstract Even in regions with mature hydropower development, requirements for stable renewable power sources suggest revision of plans of exploitation of water resources, while taking care of the environmental regulations. Mean Annual Flow (MAF) is a key parameter when trying to represent water availability for hydropower purposes. MAF is usually determined in ungauged basins by means of regional statistical analysis. For this study a regional estimation method consistent along-the-river network has been developed for MAF estimation; the method uses a multi-regressive approach based on geomorphoclimatic descriptors, and it is applied on 100 gauged basins located in NW Italy. The method has been designed to keep the estimates of mean annual flow congruent at the confluences, by considering only raster-summable explanatory variables. Also, the influence of human alterations in the regional analysis of MAF has been studied: impact due to the presence of existing hydropower plants has been taken into account, restoring the "natural" value of runoff through analytical corrections. To exemplify the representation of the assessment of residual hydropower potential, the model has been applied extensively to two specific mountain watersheds by mapping the estimated mean flow for the basins draining into each pixel of a the DEM-derived river network. Spatial algorithms were developed using the OpenSource Software GRASS GIS and PostgreSQL/PostGIS. Spatial representation of the hydropower potential was obtained using different mean flow *vs* hydraulic-head relations for each pixel. Final potential indices have been represented and mapped through the Google Earth platform, providing a complete and interactive picture of the available potential, useful for planning and regulation purposes.

Key words hydropower potential, mean annual flow, anthropic changes