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GIS-based identification of representative catchments to support the management of hydrometric networks

C. Laize

Centre for Ecology and Hydrology, Wallingford, Oxfordshire OX10 8BB, United Kingdom
(clai@ceh.ac.uk / Fax: +44 1491 692424 / Phone: +44 1491 692479)

We have recently developed [1] the Representative Catchment Index (RCI) which quantifies how representative a catchment is of a specified area, in relation to a selection of spatial characteristics. This index addresses the need for decision support tools for network appraisal rising from the increased pressure on hydrometric monitoring programmes to match a wide range of application-focused information requirements ($e.g.$ Water Framework Directive).

Within a Geographical Information System (GIS) and given an area of interest, raster datasets are integrated as matrices describing the relationship between spatial characteristics of the area. The index uses three datasets: elevation, land use, and soil type. Firstly, a catchment and a reference area are characterised. Both matrices are then compared on a cell-by-cell basis in order to calculate the catchment score relative to the reference area. The methodology is applied to a selection of gauged catchments to rank them. The gauging station's ranking is used as an indicator of its strategic value.

This study illustrates that the index is a valuable component of station reviews. Its use as a cost-effective tool to address both operational and strategic information needs is currently being considered within the UK hydrometric agencies. Alongside with the RCI, the reviewing procedure combines spatial datasets ($e.g.$ rainfall, geology), time series ($e.g.$ length of record), descriptive material ($e.g.$ hydrometric performance, artificial influence), and operational issues ($e.g.$ logistics, maintenance) in order to provide measuring authorities with an objective assessment of the gauging station long-term strategic value.

[1] Laize, C.L.R. (in press). Integration of spatial datasets to support the review of hydrometric networks and the identification of representative catchments. *Hydrology*

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