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Urbanization and its effect on runoff generation in the Ripoll River watershed, Spain

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The effect of urbanization on runoff generation in the Ripoll River watershed northwest of Barcelona (Spain), from 1966 to 2006, was studied. The Ripoll River watershed has an area of 223,41-km2 and comprises urban areas of twelve municipalities with a total population of 400000. Precipitation data of thirteen rain gauges located inside or within five kilometers from the watershed were obtained from Spanish National Institute of Meteorology (Instituto Nacional de Meteorología de España - INM). Flow data at the Montcada flow gauge (station number 101110) were obtained from Center for Studies and Experimentation of Public Works (Centro de Estudios y Experimentacion de Obras Publicas - CEDEX) and the Catalan Water Agency (Agencia Catalana del Agua). Annual impervious cover maps of the watershed for the 41-year analysis period were derived from urban cadastral cartography provided by the General Directorate for the Cadastre of Spain (Dirección General del Catastro de España). The most recent maps were contrasted with satellite images for verification. Based on these maps, the impervious area and the number of impervious patches were calculated for each year and correlated with annual precipitation and runoff data. Because of the different urbanization patterns between cities (some of which are highly developed commercial and industrial towns while others are lowly developed bedroom villages) and between downtown and suburban areas within the same city, the impervious cover figures were further disaggregated to better reflect the urbanization characteristics that most affect the hydrologic conditions in the watershed. Preliminary results indicate an increase of flow over time caused by urbanization. The effect of the connectivity of the impervious patches is a matter being studied by the researchers.