



Identification of changes in streamflow characteristics in a Mediterranean basin

A.M. De Girolamo (1), A. Lo Porto (1), O. Oueslati (1,2), G. Santese (1,3)

(1) Water Research Institute – I.R.S.A., National Research Council, Bari, Italy (annamaria.degirolamo@ba.irsa.cnr.it) / Fax: +39-080-5313365 / Phone: +39-080-5820536, (2) University of Basilicata, Potenza, Italy, (3) University of Tuscany, Viterbo, Italy

The Mediterranean area is a climate-sensitive region, which is climatically stressed by limited water resources and extremes of heat. Especially high frequency (monthly, seasonal, annual and interannual) as well as low-frequency (interdecadal) variations of precipitation play a crucial role in the management of regional agriculture, ecosystems, environment, socio-economics and water resources. These climate characteristics have a significant influence over peak discharge and river flow regime that results very variable with a succession of drought and flash-flood periods.

Most of these rivers, dry during the summer season, become powerful torrential rivers during flash-floods episodes. Hence, the differences between low and high water discharges can be extreme. During the last decades, these rivers have been experiencing both a long-term accumulation of human induced modifications (change in land use) and abrupt changes (construction of dams) altering their flow regime. Moreover, there is also a high confidence that semi-arid areas such as the Mediterranean basins will suffer a decrease in water resources because of reduction in precipitation and an increase of heat waves. Nevertheless, until now the particular hydrological regime, which is altered due to human modifications and/or climate changes, and its trend are vaguely known.

In this work a set of procedures for identifying changes in streamflow characteristics at sites having continuous daily data is illustrated. Several hydrological indexes were evaluated using streamflow data from Celone River, located in the South of Italy. Data were analysed and compared to streamflow in an adjacent river to determine if the changes in flow regime are localized or are regional variations.

The annual ratio of streamflow to rainfall was analysed. Daily flow durations, low-flow and high-flow statistics were computed for each set of data. The base-flow was separated from runoff and each of these components was analysed to understand if changes in hydrological regimes are due to changes in runoff or in base-flow streamflow components. The flow variability was studied through the Richard and Baker Flashiness Index which reflects the oscillations in streamflow per discharge unit and, in general, has a relatively small inter-annual variability.

The analysis of data leads to several conclusions. The base-flow and runoff conditions seem to be changed in the study period. This is probably due to some human activity and climate changes, i.e. the construction of artificial drainage systems and an increase of extreme events in the last decades.