Evaluating Flow Regime Alterations Of Intermittent Rivers Due To Point Sources: A Modeling Approach

De Girolamo A.M. a,\* Ricci G.F. b, Zahi F.c, D’Ambrosio E.a, Parete G.a, Debieche T.H.c, Gentile F.b

a Water Research Institute, National Research Council, Bari, Italy, V.le Francesco de Blasio, 5, 70132 \* annamaria.degirolamo@ba.irsa.cnr.it

b Department of Agricultural and Enironmental Sciences, University of Bari Aldo Moro, Bari, Italy

c Geological Engineering Laboratory (LGG), University of Mohamed Seddik Benyahia – Jijel, Algeria

**Keywords.** Flow regime, flow regime alterations, intermittent rivers, hydrological indicators, SWAT Model

**Abstract.** Anthropogenic activities and climate change may severely alter the natural flow regime of rivers. In intermittent streams, hydrological regime alterations influence river morphology, water quality, river ecosystem. The divergence between “impacted” and “un-impacted” hydrological condition is needed to support ecological status assessment as required by the Water Framework Directive.

The aim of the present paper was to define an integrated modeling framework for analyzing the hydrological regime alterations induced by point sources (PSs) discharges in regions with limited data availability through two case studies: the Canale d’Aiedda (Italy) and Nil wadi (Algeria). At this aim, long time series of daily streamflow in natural and impacted (current) conditions were generated by applying the Soil and Water Assessment Tool (SWAT) model and the hydrological regime was characterized by using several hydrological indicators (HIs) computed by using daily streamflow data.

Flow regime alterations due to PSs were assessed with the range of variability approach. Results showed that the PSs induced alterations of some components of the flow regime (i.e. magnitude, duration, and timing). Hydrological regime classification of the river reaches receiving wastewaters from PSs shifted from intermittent to perennial. All the components of the low flow (1-, 3-, 7-, 30-, and 90-day minimum flow, zero-days) and the monthly flow recorded in summer were severely altered. Minor hydrological alterations were assessed for high flow components (1-, 3-, 7-, 30-, and 90-day maximum flow) and mean monthly flow in the wet period. The timing of minimum flow was found to shift later in the year. This study may support river ecologists in the ecological status evaluation.