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The Effect of Hydrological Drought on Water Quality in Zanjanrud River

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The ZanjanRud Basin, in north-western Iran, Zanjan Province, has recently experienced the worst drought conditions in over 50 years of records. Watershed management decisions and climatic shifts resulted in hydrological drought in the middle reaches of the ZanjanRud River from 1999 to 2018. Average River discharge (0/49 m³/s at Sarcham Hydrometric station) in the drought period (2008-2018) were approximately 0.65 m³/s lower than the long-term average (1.2 m³/s) and represented a 54.16% reduction in water discharge. The purpose of this study was to increase understanding of the water quality and ecology of the river, provide additional information for investigation of watershed management options which are compatible with climate change.

Water quality was investigated at the middle part of the river (2 sites) which were regularly (fifteen-monthly) monitored from October 2016 to March 2018. This reach has experienced municipal effluent discharge and are at risk of acidification. The water quality parameters considered in this report were general water quality parameters (EC, temperature, pH, TDS, TSS, turbidity), nutrients (total nitrogen, TN; total phosphorus, TP), dissolved oxygen, chemical oxygen demands, color, and particle metals. Hydrological parameters were also assessed as potential drivers of water quality change. The concentration of dissolved and particulate material in the study sites increased during hot and dry months driven by evaporation and the associated large reduction in water volume. The lack of runoff also resulted in the observation of a high concentration of nutrients and green-algae during the low flow period. Turbidity also increased during the drought period. The results revealed that the middle part of the river is highly influenced by effluents from the municipal area (Zanjan City). Further assessment of water quality during future low flow events is recommended in our study area.