



Monitoring water quality alteration in River Tagus (Spain) after implementing temporal and spatial flow regulations at the head basin during the last century

Antonio Gascó (1), Javier de la Fuente (2), and Daphne Hermosilla (3)

(1) IE University, B.Sc. in Biology, Cardenal Zúñiga 12, 40003 Segovia, Spain., (2) Dept. of Agricultural and Forest Engineering, University of Valladolid, E.U. de Ingenierías Agrarias, Campus Universitario Duques de Soria, 42004 Soria, Spain, (3) Dept. of Chemical Engineering, Complutense University of Madrid, Facultad de Ciencias Químicas, Ciudad Universitaria s/n, 28040 Madrid, Spain.

Water resources quality is a wide concept accepting different meanings, from the composition and properties of the water dissolution to the diversity of priority uses (e.g. human consumption, ecological or urban-industrial); and it may anyhow be affected by both natural and artificial causes. Particularly, natural water flows may be artificially regulated in time (reservoirs) and space (transfers) in order to raise water availability; so flow regulations may also affect natural water properties. Even though regulation by reservoirs may even produce a better water quality because ombrogenic water (winter rain) is greatly predominant over pedogenic (drainage through soil) and lithogenic (spring forth aquifers) ones in the flow configuration; regulation by transfers is expected to mainly affect water quality in the middle river basin via a greater mineralization of the water flowing through the course. Particularly, Entrepeñas (803 hm³) and Buendía (1639 hm³) reservoirs, closed in 1956 and 1957 at the head of River Tagus' basin, respectively, plus Bolarque dam (31 hm³), built in 1910, make up the temporal regulation system that makes possible the transfer from River Tagus to River Segura, which has been designed for a flow of 33 m³•s⁻¹, and a future maximum transfer forecast of 1000 hm³•year⁻¹ (600 granted). In short, this assessment essay shows how these temporal and spatial regulations at the head of River Tagus have affected water quality downstream. In order to achieve this scope assessing water quality figures, a sampling point located upstream Aranjuez (Madrid, Spain) was chosen from those belonging to River Tagus' water quality integral network; so water quality would neither be affected by wastewater from big cities such as Madrid, Alcalá de Henares, and Guadalajara. Available data for three timely considered time periods were considered: (1) before temporal regulation through reservoirs was performed (1942); (2) after temporal regulation was fully operative (1972-1974); and (3) after spatial regulation was initiated (1978 onwards). In conclusion, water quality analyses at the middle of the River Tajo stream before and after these temporal and spatial flow regulations show significant quality deterioration in terms of increased salinization and sodification hazards; and water result brackish every month of the year even though certain improvement may be shown during summertime due to the influence of the release of ombrogenic water retained along raining seasons. Reducing water flow by water transfer aggravates these hazards, and that potential eutrophication and contamination trouble that may be derived after receiving wastewater inflowing from Aranjuez, Madrid, Alcalá de Henares and Guadalajara.