Vulnerability of water systems: a comprehensive framework for its assessment and identification of adaptation strategies


School of Chemical Engineering, National Technical University of Athens, Iroon Polytehneiou 9, Athens 15780, Greece, Tel. +302107723799; email: pstathatou@chemeng.ntua.gr (P.-M. Stathatou)

Department of Natural Resources Development and Agricultural Engineering, Agricultural University of Athens, Iera Odos 75, Athens 11855, Greece

Department of Hydraulic and Sanitary Engineering, Polytechnic School of the University of Sáo Paulo, Av Prof. Almeida Prado Travessa 2, 271, 05508 900 Sáo Paulo, Brazil

School of Engineering, Pontifical Catholic University of Chile, Avenida Libertador Bernardo O’ Higgins 340, Santiago 8331150, Chile

Research Development and Consulting Areas, Tecnología de Calidad, S.A. de C.V., Guadalquivir 115 Ote, San Pedro Garza García 66220, Mexico

Departments of Hydraulic Works and Environmental Engineering, National University of Córdoba, Vélez Sáisfield 1611, 5000 Córdoba, Argentina

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ABSTRACT

Most climate projections predict that average surface temperature and precipitation variability will increase at the global scale, triggering hydrological variations and alterations in river flows and groundwater table levels. Climate change impacts on freshwater resources are likely to affect freshwater availability and quality and by extension, the ability of water systems to support natural processes and ensure population needs. As a result, the vulnerability of water systems to adverse conditions (e.g. water shortages, overexploitation, and quality deterioration) is intensified; hence, methods and tools for vulnerability assessment and identification of adaptation measures are necessary. This paper proposes a comprehensive framework for the assessment of water systems’ vulnerability to adverse water related conditions and the identification of potential adaptation strategies. The proposed methodology is applied in the four study site areas of the FP7 COROADO project (selected river basins in Argentina, Brazil, Chile, and Mexico), and an indicator-based framework is adopted, expressing natural, physical, socio-economic, and institutional attributes of the examined areas. The vulnerability assessment was conducted following a disaggregated analysis (use of proxy indicators). The vulnerability profiles of the four study sites were formulated, describing the factors shaping vulnerability and the aspects that need improvement. Additionally, the anticipated contribution of alternative strategies to vulnerability
mitigation was assessed. The systems’ response to alternative strategies (what-if scenarios) was analyzed following an aggregated analysis (estimation of an overall vulnerability index).

*Keywords:* Vulnerability; Water systems; Adaptation strategies; Water recycling and reuse; Latin America