



Monitoring, modeling, and assessment of water quality and quantity in River Pinios, using ARIMA models

A. Sentas^a, A. Psilovikos^a, L. Karamoutsou^{a,*}, N. Charizopoulos^b

^aDepartment of Ichthyology and Aquatic Environment, School of Agricultural Sciences, University of Thessaly, Fytokou Str., 38445, Nea Ionia, Magnesia, Greece, Tel./Fax: +302421093154; emails: lkaramoytsoy@gmail.com (L. Karamoutsou), antsentas@yahoo.gr (A. Sentas), psiloviko@uth.gr (A. Psilovikos)

^bLaboratory of Mineralogy-Geology, Agricultural University of Athens, Ieraodos 75, 118 55 Athens, Greece, Tel. +306947129767; Fax: +302231352664; email: nchariz@gmail.com

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ABSTRACT

The purpose of this study is to analyze surface water quality and discharge data samples from River Pinios at Region of Thessaly, Central Greece. The statistical samples of each one of the variables consisted of a maximum of 188 monthly observations over a period of 16 years. For these measurements stochastic modeling algorithms were used by ARIMA Models in order to assess water quality and quantity parameters and to compare the measurements with the legislation standards. By using ARIMA to prewhiten each time series, relationships between the parameters were demonstrated. Moreover, the time response between the fluctuations of water temperature (T_w) with the ones of (1) dissolved oxygen (DO), (2) ammonium (NH_4^+), and (3) nitrates (NO_3^-) and the fluctuations of discharge (Q) with that of water electrical conductivity (ECw) was assessed. Also, (1) an evaluation of the status of river water quality according to the Hellenic and International Legislation and (2) a comparison with other corresponding studies in the area of River Pinios watershed were performed. Finally, in this study the necessity of multivariate statistical assessment of extended databases in combination with reliable and real-time monitoring data is presented, in order to “extract” information about the quality and quantity parameters and to apply managerial strategies for pollution control.

Keywords: Monitoring; Water quality assessment; Stochastic modeling; ARIMA; Prewhitening; Cross-correlation function; Water management

* Corresponding author.

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