



Proposing buffer zones and simple technical solutions for safeguarding river water quality and public health

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Alfeios River Basin (ARB) constitutes one of the major hydrologic basins ($\approx 3650\text{km}^2$) of Peloponnisos peninsula in Southern Greece. It is drained by Alfeios River and its tributaries, such as Lousios, Ladhon, Erymanthos, Kladheos, Selinous etc. The present manuscript takes a closer look at the importance of tributary basins and focuses on Erymanthos sub-basin that covers about 360 km^2 . Erymanthos River springs from Erymanthos Mountain that reaches altitudes of 2200 m and discharges $10\text{ m}^3/\text{sec}$, approximately, during the winter period, presenting a sound decrease from half to about an order of magnitude during summertime.

Two factors stand out as reasons to select Erymanthos sub-basin as a case study. First, the sub-basin presents a significant variety of ecosystems and comprises a very important river system, since Erymanthos Tributary satisfies, among other uses, drinking water supply for a great majority of citizens in the region. Second, authors' experience of the study area in Research Program Pythagoras II, funded by the European Social Fund (ESF) and the Operational Program for Educational and Vocational Training II (EPEAEK II) of Greece, offers a basis for better understanding of the real problems in the area.

Erymanthos watershed, in fact, faces a lot of pressures, in several levels, provoked by human activities and Erymanthos Tributary is vulnerable to pollution. Recognizing the importance of clean water for healthy people, a developing economy, and a sustainable environment, the challenge of the present paper is elaborating human-induced pressures in the study area, analyzing their effects, estimating pollution factors and proposing integrated solutions/tools and a number of methodologies/initiatives used to overcome the problem of contaminating water supply in a catchment that lacks of wastewater treatment and disposal systems. The preservation of a good ecological status in Erymanthos River is not only a necessity for achieving the goals of EU Water Framework Directive (WFD) 2000/60, but a practical necessity for the safeguarding of public health and ecosystem health, in general.

The present study aims at developing a simple methodology for assessing spatial distribution characteristics of pollution in Erymanthos catchment. Pollution loads at various sites in Erymanthos watershed were illustrated with Geographical Information System (GIS). Flow rates of Erymanthos River were also taken into consideration. Based on previous studies, in situ river discharges have been compared to simulated discharges in order to calibrate the rainfall-runoff model ENNS which can then predict future scenarios regarding the river flow rates with consideration of climate change effects.

The goal of this study is to detect the pertinent points and suggest a) suitable buffer zones in areas with high pollution risk and b) simple technical works in order to prevent the main channel of Erymanthos River from direct polluting discharges. The above systems could also act supportively in groundwater enrichment, forest protection and soil erosion prevention. Authors believe that the results of the study could assist authorities and engineers to design and develop strategies of improving river water quality and safeguarding public health. The proposed measures may be applicable to other catchments as well.