Geophysical Research Abstracts
Vol. 14, EGU2012-12343-1, 2012
EGU General Assembly 2012

Monitoring Reservoirs Using MERIS And LANDSAT Fused Images : A Case Study Of Polyfitos Reservoir - West Macedonia - Greece

M. Stefouli (1), E. Charou (2), E. Vasileiou (3), N. Stathopoulos (3), and A. Perrakis (2)

(1) Institute of Geology and Mineral Exploration, IGME building Olympic Village-Acharnai, 136 77, Greece. stefouli@igme.gr, (2) National Center for Scientific Research – Demokritos, Institute of Informatics and Telecommunications, Computational Intelligence Laboratory, 153 10, Agia Paraskevi, Athens Greece. exarou@iit.demokritos.gr , perrakisandreas3@gmail.com, (3) National Technical University of Athens, School of Mining & Metallurgical Engineering, Laboratory of Engineering Geology & Hydrogeology, Heroon Polytechniou 9, 15780, Athens, Greece.elvas@metal.ntua.gr, nstath@metal.ntua.gr

Research and monitoring is essential to assess baseline conditions in reservoirs and their watershed and provide necessary information to guide decision-makers. Erosion and degradation of mountainous areas can lead to gradual aggradation of reservoirs reducing their lifetime. Collected measurements and observations have to be communicated to the managers of the reservoirs so as to achieve a common / comprehensive management of a large watershed and reservoir system. At this point Remote Sensing could help as the remotely sensed data are repeatedly and readily available to the end users.

Aliakmon is the longest river in Greece, it's length is about 297 km and the surface of the river basin is 9.210 km2.The flow of the river starts from Northwest of Greece and ends in Thermaikos Gulf. The riverbed is not natural throughout the entire route, because constructed dams restrict water and create artificial lakes, such as lake of Polyfitos, that prevent flooding. This lake is used as reservoir, for covering irrigational water needs and the water is used to produce energy from the hydroelectric plant of Public Power Corporation-PPC. The catchment basin of Polyfitos' reservoir covers an area of 847.76 km2. Soil erosion – degradation in the mountainous watershed of streams of Polyfitos reservoir is taking place. It has been estimated that an annual volume of sediments reaching the reservoir is of the order of 244 m3.

Geomatic based techniques are used in processing multiple data of the study area. A data inventory was formulated after the acquisition of topographic maps, compilation of geological and hydro-geological maps, compilation of digital elevation model for the area of interest based on satellite data and available maps. It also includes the acquisition of various hydro-meteorological data when available. On the basis of available maps and satellite data, digital elevation models are used in order to delineate the basic sub-catchments of the Polyfytos basin as well as the irrigation network in the area

We evaluate the possibility to merge two different resolution satellite data i.e. MERIS/ENVISAT and LANDSAT to facilitate the study of the Polyfitos reservoir. State of the art data fusion techniques, that preserve the best characteristics (spatial, temporal, spectral) of the two types of images are implemented and used to mining information concerning selected parameters. Summer 2011 Landsat and ENVISAT MERIS satellite images are used in order to extract lake water quality parameters such as water clarity –and sediment content. Assessment of the whole watershed of Polyfitos reservoir is carried out for the last 25 years.

The methodology presented here can be used to support existing reservoir monitoring programs as it gives regular measurements for the whole of the watershed area of the reservoir. The results can be made available to end-users / reservoir managers, using web/GIS techniques. They can also support environmental awareness of the conditions of watershed of Polyfitos reservoir.