

## Analysis on the Feasibility of Landsat 8 Imagery for Water Quality Parameters Assessment in an Oligotrophic Mediterranean Lake

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**Abstract :** Lake water quality monitoring in combination with the use of earth observation products constitutes a major component in many water quality monitoring programs. Landsat 8 images of Trichonis Lake (Greece) acquired on 30/10/2013 and 30/08/2014 were used in order to explore the possibility of Landsat 8 to estimate water quality parameters and particularly CDOM absorption at specific wavelengths, chlorophyll-*a* and nutrient concentrations in this oligotrophic freshwater body, characterized by inexistent quantitative, temporal and spatial variability. Water samples have been collected at 22 different stations, on late August of 2014 and the satellite image of the same date was used to statistically correlate the *in-situ* measurements with various combinations of Landsat 8 bands in order to develop algorithms that best describe those relationships and calculate accurately the aforementioned water quality components. Optimal models were applied to the image of late October of 2013 and the validation of the results was conducted through their comparison with the respective available *in-situ* data of 2013. Initial results indicated the limited ability of the Landsat 8 sensor to accurately estimate water quality components in an oligotrophic waterbody. As resulted by the validation process, ammonium concentrations were proved to be the most accurately estimated component ( $R = 0.7$ ), followed by chl-*a* concentration ( $R = 0.5$ ) and the CDOM absorption at 420 nm ( $R = 0.3$ ). *In-situ* nitrate, nitrite, phosphate and total nitrogen concentrations of 2014 were measured as lower than the detection limit of the instrument used, hence no statistical elaboration was conducted. On the other hand, multiple linear regression among reflectance measures and total phosphorus concentrations resulted in low and statistical insignificant correlations. Our results were concurrent with other studies in international literature, indicating that estimations for eutrophic and mesotrophic lakes are more accurate than oligotrophic, owing to the lack of suspended particles that are detectable by satellite sensors. Nevertheless, although those predictive models, developed and applied to Trichonis oligotrophic lake are less accurate, may still be useful indicators of its water quality deterioration.

**Keywords :** landsat 8, oligotrophic lake, remote sensing, water quality

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