



Possible use of electric and electromagnetic methods for the investigation of eutrophic phenomena

G. Ranieri ⁽¹⁾, G. Cassiani ⁽²⁾, A. Godio ⁽³⁾, P. Buscarinu ⁽⁴⁾

⁽¹⁾Dipartimento Ingegneria del Territorio, University of Cagliari, Italy, ⁽²⁾Dipartimento di Scienze Geologiche e Geotecnologie- University of Milano Bicocca, Italy, ⁽³⁾Dipartimento di Georisorse e Territorio- Politecnico di Torino, ⁽⁴⁾Ente Autonomo Flumendosa, Cagliari, Italy

Eutrophication caused by excess of nutrients (nitrates and phosphates) impacts the vast majority of lakes and artificial reservoirs. This phenomenon can lead to the progressive worsening of water quality and to serious environmental damage, also with economic consequences. It is therefore very important to identify techniques that allow for a fast and inexpensive monitoring of water quality, and others that may contribute to limit the phenomenon.

In this work we analyse the mechanisms that lead to the formation and development of eutrophication, with particular focus on the mechanisms that can lend themselves to the identification of the phenomenon via large-scale, non invasive geophysical techniques. We also present the results of laboratory tank experiments, and field experiments on artificial lakes in Sardinia, Italy, using both electric and electromagnetic methods.

Electrical resistivity tomography and induced polarization tomography were performed on the Simbirizzi lake (near Cagliari), with the support of temperature and pH measurements, confirming the hypothesis that geophysics could be used to detect eutrophication. Areas of possible eutrophication show geophysical signatures different from non-affected areas.

In deeper lakes (e.g., lake Omodeo, Sardinia), where electrical resistivity tomography is difficult to operate, TEM-FAST soundings can be usefully applied.

A complete system of sampling and acquisition is still to be developed to obtain full repeatability and reliability. However, the technique seems to be a promising tool to

be applied for the monitoring of eutrophic areas and especially during the subsequent phase of remediation assessment.