Annals of the Academy of Romanian Scientists
Series on Chemistry Sciences
Online ISSN 2393 – 2902 Volume 1, Number 1/2014

A STUDY ON PHOSPHORUS FLUX FROM SEDIMENT IN A SHALLOW HOMOGENEOUS LAKE

Paolo VIOTTI[1], Luigi GALEOTTI[1], Elisa MARTORELLI[1] and Vincenzo TORRETTA[2*]

Abstract. *A study on phosphorus release dynamics was conducted into a shallow homogeneus and mesotrophic lake. The purpose was to investigate physical- chemical factors which contribute to the nutrient release-adsorption from sediments. Water and sediment samples were analyzed under different conditions: aerobic and anoxic, static and mixed. Results in both last cases (anoxic/aerobic conditions) show that the nutrient release- sorption dynamics are strictly linked to the iron- manganese associated phosphorus contents within the sediments but the low overall phosphorus release is largely linked to the sediment's calcareous nature (phosphorus precipitation as hydroxyapatite and co-precipitation/adsorption with carbonates). In the mixed tests cases, as expected, the release is higher compared to static aerobic ones: the sediments re-suspension allows for a higher contact surface area with water leading to a higher phosphorus desorption. In case of shallow lake the wind can therefore play an important role in influencing phosphorus balance in the waters. This aspect can be even more important when suspended fine clay particles are involved since they can be considered a support for phosphorus forms. It follows that surficial sediments when re-suspended play a double role: they can redistribute phosphorus along the water column but they can re-adsorb it.*

Key words: *Phosphorus release; Shallow Lake; Aerobic-anoxic conditions; Lake sediment.*

Introduction

Eutrophication, which is characterized by a massive and harmful algal bloom and an excessive nutrient loading, is a common but problematic phenomenon in freshwater ecosystems (Zhu M. et al., 2013). More specifically, this issue can be linked to excessive phosphorus loading, which can be identified as external loading from wastewater treatment plants (Raboni M. et al., 2013; Zhang Y. et al., 2013; Raboni M. et al., 2014a; Torretta V. et al., 2014; Raboni M. et al., 2014b) and/or from uncrotrolled discharged, or from its release from lake sediments (internal loading) (Wang C. et al., 2012). In fact,

[1] Dept. of Civil, Building and Environmental Engineering, "Sapienza" University of Rome, Via Eudossiana 18, 00184 Rome, Italy
[2] Dept. of Biotechnologies and Life Sciences, Insubria University Via G.B. Vico 46, Varese, Italy. Author to whom correspondence should be addressed; E-Mail: vincenzo.torretta@uninsubria.it; Tel: +39- 0644585512