EFFECTS OF BOTTOM SEDIMENTS RE-SUSPENSION ON PHOSPHORUS FORMS IN THE PRUT RIVER (MOLDOVA)

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EXTENDED ABSTRACT

INTRODUCTION
Bottom sediments play the essential role in the processes of phosphorus transformation and accumulation in aquatic systems [Lee et al. 2003, Krogerus and Ekholm 2003]. Mobilization-immobilization processes on the surface of sediments occur through and/or participation of the interstitial water. During the desorption process from sediments, phosphorus compounds are accumulated in interstitial water and then can be mobilized in the water horizon overlying the bottom sediments [Kowalczewska-Madura et al. 2007]. Reverse process, the immobilization from water on sediments, also occurs through interstitial water [Rusu and Lupascu 2004]. The direction of mobilization-immobilization processes determines pollution - self-purification processes of water bodies.

MATERIALS AND METHODS
Re-suspension of bottom sediments of the Prut River was performed in natural conditions by „aquarium” method - carefully mixing the sediments in a glass cylinder (without bottom, about 20 cm in diameter) implanted in the sediments at a depth of 5 cm [Rusu and Lupascu 2004]. The content of phosphorus forms in interstitial water of bottom sediments was determined after centrifugation of fresh (wet) sediments. After that interstitial water was filtered through membrane filters (0,45 μm pore diameter) and stored in the dark at 4°C until analysis. Samples of water and interstitial water of bottom sediments were analyzed for orthophosphates, condensed and organic phosphorus content using recommendations of World Health Organization [Madera et al. WHO 1982].

The objective of this paper was to establish the desorbed amounts of phosphorus forms during re-suspension of bottom sediments from the Prut River performed in field conditions.

RESULTS AND CONCLUSIONS
During turbulent moments (e.g. winds), the bottom sediments are fretted and suspended in water horizon above sediments, i.e. re-suspension phenomena takes place. In such conditions the content of phosphorus-orthophosphate in the water layer above the sediments can increase by 1.5-3 times, compared with its content in natural conditions (Fig. 1).

The content of condensed forms of phosphorus (poly- and pyrophosphates) is also increasing during the re-suspension of bottom sediments, by 1.6-2.6 times, which constitute 28-40% of its content in interstitial water. The content of organic phosphorus is increasing by 1.4-2 times, compared with its content in natural conditions (Fig. 2).
Fig. 1. Dynamics of orthophosphates and poly-, pyrophosphates in water (W) and interstitial water of sediments (IW) along the Prut river during 2009. Phosphorus mobilization during re-suspension of sediments (ReS) performed in field conditions.

Fig. 2. Dynamics of organic phosphorus in water (W) and interstitial water of sediments (IW) along the Prut river during 2009. Phosphorus mobilization during re-suspension of sediments (ReS) performed in field conditions.
The results suggest that during the re-suspension, bottom sediments can become a relevant source of phosphorus forms which are mobilized in the water horizon overlying the bottom sediments.

REFERENCES


