Geophysical Research Abstracts
Vol. 13, EGU2011-14045, 2011
EGU General Assembly 2011
© Author(s) 2011

The role of salt marshes as heavy metal sinks in cantabrian seaboard (Bay of Biscay)

Susana Fernández, Manuel Antonio González, Cristina Santín, and Miguel Angel Alvarez
INDUROT, Natural Resources Institute of Oviedo University. Campus of Mieres s/n. 33600. Mieres. Asturias. Spain

Estuarine sediments are at the same time important sinks and potential sources of heavy metals. Under natural conditions the geochemical composition of the suspended fluvial sediments, which arrive to the estuarine systems, mainly depend on the rock substrata composition of the river basin.

Land reclamation in salt marshes has led to intense physical and chemical changes in sediments and soils, triggering serious environmental problems. The development of acid sulphate soils and toxicity caused by the release of trace elements are the main environmental problems arise from the ripening of the reclaimed tidal lands.

In order to elucidate the capability of the estuarine sediments to accumulate and/or release of heavy metals, two estuarine- river basin systems were analysed: Nalón and Sella. The Nalón River has 815, 8 km of channels with fluvial sediments and daily flow average of 56,4 m^3/s. More than 3500 km^2 of the river basin bedrock are compound by siliceous rocks (metamorphic slates, quartzite sandstone and sedimentary slate). At the mouth, develops a large estuarine system with more than 527 ha of extension. Many parts of this saltmarsh have been drained and used to human developing purposes. The Sella River has 192,6 km of fluvial channel with a daily flow discharge is about 42,8 m^3/s. The development of fluvial sediments is lesser than in Nalón River due to the overdeeping of the channels which cross mainly calcareous bedrock with a very strong topography. This river develops in the mouth an estuarine area with 271 ha of extension. This area suffers an important urban and tourist human pressure which gave rise the reclamation of more than 200 ha.

A total amount of 102 soil fluvial samples spread over the 9 sub- watersheds of the Nalón river basin were taken. In the estuary 3 samples in natural mud sediments and 3 in reclaimed mud were taken. In Sella River basin 21 fluvial soil samples spread over 3 sub watersheds and 6 samples more, 3 in estuarine mud and 3 in reclaimed one were taken.

In each sample the concentration of Mn(ppm); Zn(ppm); Cr(ppm); Pb(ppm); Ba(ppm) V(ppm) Co(ppm); Ni(ppm); Cu(ppm); Tl(ppb); Sn(ppm); As(ppm); Mo(ppm); Ag(ppb); Cd(ppb); Sb(ppb); Hg(ppb) using a ICP-MS and other soil variables as pH; MO%; Clay%; Silt%; Sand% and EC(mS/m3).

In order to compare fluvial, natural and reclaimed mud soils, average of metals concentration in each sub watersheds were calculated. In Nalón basin one population of 9 fluvial soil values (one per sub watershed) were compared to 3 samples of mud and 3 samples of reclamation mud. In Sella basin one population of 3 fluvial soil values (3 subwatershed) were compared to 3 mud and 3 reclaimed one.

The highest concentrations of some toxic heavy metals are found in the natural estuarine sediments (e. g. Sella muds: 1195ppb Hg, 528ppm Cr, 385 ppm Cd, 114 ppm Ag, etc). The desiccation of estuarine sediments seems to promote the leaching of heavy metals. Their mobility may be increased by the significant drop of pH. The recovery of large areas of currently reclaimed salt marshes and, therefore, the accumulation of metals in their natural sediments could be one of the solutions to decrease the high heavy metal concentrations in the transitional water of the Cantabrian Sea.

Key words: heavy metals; salt marshes; reclamation; salt marshes restoration