Geophysical Research Abstracts
Vol. 13, EGU2011-4028, 2011
EGU General Assembly 2011

A dynamic landscape evolution model for P export estimation from crops through sediment volume assessment: the case of the lake Bolsena watershed, Italy.

Raffaele Pelorosso (1), Federica Gobattoni (1), Antonio Leone (1), and Arnoud Temme (2)

(1) Tuscia University, Department of Environment and Forest - Engineering group, via S. Camillo de Lellis snc 01100 Viterbo, Italy (pelorosso@unitus.it), (2) Department of Environmental Sciences, Chairgroup of Land Dynamics, Wageningen University, the Netherlands (Arnaud.Temme@wur.nl)

Agriculture has been recognized as a significant contributor to the diffuse loading of P in fresh water systems (Sharpley et al., 2000) with transfers originating from both agricultural land as well as manure storage facilities and farmyard areas (Neal and Heathwaite, 2005, Ripa et al., 2006). The exact movement of nutrients in complex agriculturally dominated landscape is currently poorly understood (Sharpley and Rekolainen, 1997; Heathwaite et al., 2005b). The transfer of P from agricultural land involves hydrology, agronomic management and soil as the key components (Haygarth and Jarvis, 1999). Moreover, potential P transport to surface waters increases when P application rates exceed crop requirement (Sharpley et al., 1996; Sims et al., 2000). Soil P status plays an important role in P export (Oenema and Roest, 1998; Kurz et al., 2005) as accumulated soil P represents a continuous and long-term source of soluble and particulate P forms (Withers at al., 2003). The primary factors responsible for potential P delivery from an agricultural field to surface waters include P adsorbed to eroding sediments, soluble P in runoff water, soluble P in leaching water. Phosphorus adsorbed to soil clays and organic matter, leaving the field during and immediately after storms events through sheet and rill erosion processes, may constitute up to 90% of runoff P from cultivated fields (Sharpley et al., 1992).
As a consequence, the total P in the eroded sediment can be used to estimate particulate P loss from soil (Sharpley et al., 2002) and then to assess the maximum load of P available to reach the surface water bodies.
So that estimating erosion rate could be a useful tool to evaluate the total maximum P load from soil.
In this work, the dynamic landscape evolution model LAPSUS (Temme et al 2011,) has been modified to quantify the total P delivered from the field through the sediment yield estimation, with the aim to assess the contribution of each land cover type to P transfer and load. This model, considering the spatial distribution of crops and then of P sources, aims to provide a powerful tool for the optimal definition of planning strategies for lake management. A study case has been analyzed in Central Italy: Lake Bolsena watershed, the largest volcanic lake in Europe and a Special Protection Area and Site of Community Importance.