

Using GIS to locate critical resources of water reservoir pollution from agriculture

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Soil erosion is the most important form of physical destruction of soils in Slovakia. Under the action of erosion factors it comes to topsoil layer eroding, the loose soil particles are further transported and accumulated in other positions down slope or they reach water streams. But the damage does not occur only in agriculture but also in other economy sectors, particularly in water management. Transported eroded soil particles can negatively influence the place of their accumulation not only by their volume (clogging of water reservoirs), but also by their physical, chemical and biological properties which differ significantly from the original soil (by means of nutrient concentration, heavy metals, pesticide residues, etc.). This is one of the reasons why the protection of soil and water should be integrated (Antal, 2005).

The aim of this paper was to propose a methodical process of determining the major sources of water streams and water reservoirs pollution coming from agriculture in the Širočina basin (Western Slovakia) using GIS. By means of GIS analysis tools, the average annual soil loss in the basin was calculated according to USLE (Wishmeier-Smith, 1978), which was reduced by sediment delivery ratio (Williams, 1977, in Janeček et al., 1992). We determined the estimated amount of loosened soil particles transported into water streams and 3 small water reservoirs in the basin (Kondrlová, 2009). The amount of nitrogen applied to arable land was estimated based on the data of crop rotations in 2004 and 2005. By the combination of input layers it was possible to determine the parcels within the basin with the highest application of nitrogen fertilizers and soil loss in the both years. This approach allows to locate and to focus our attention to the potential sites of sources of surface waters nonpoint pollution. It should be noted that even with high quality input data available, a modeled situation provides only a general idea about response of river basin management on the soil loss due to water erosion and sediment quality and quantity.

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