



Groundwater quality vulnerability assessment for two shallow aquifers under intensive fruit and vegetable production

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The aim of this study is to assess agriculturally derived pollutant transport from soil to ground and surface waters with nuclear techniques. The two pilot sites are located close to the capital Ljubljana, Slovenia, in a region where intensive agriculture on vulnerable areas of alluvial plains is leaving an impact on groundwater which is the main source of drinking water in the area. With the implementation of the EU Water Framework Directive, Slovenia, among many other EU countries, is facing a big challenge: how to meet the desired water protection thresholds by 2021. Agricultural activities on alluvial plains are often primary and obvious culprit, especially if the aquifer lies beneath areas where soil and unsaturated zone are very shallow. However, with growing urbanization and industrialization, other pollution sources are possible. Nuclear techniques provide an innovative and unique methodology to trace and monitor the movement of nitrates (organic and inorganic fertilizers) and pesticides from the soil to ground and surface waters. Based on this knowledge, effective and sustainable land management practices could be used in vulnerable spots to reduce agriculturally-derived pollutants. The combined application of stable isotopes of nitrate) and water isotopes will be used to trace the fate of applied fertilizers from the soil to ground and surface waters in vulnerable intensive agricultural areas. In Winter 2018 soil and water samples were taken and are currently analyzed for soil properties, isotopic compositions as well as micropollutants.

Results will help provide better understanding of where pollution originates from as well as determine possible mitigation measures, such as how current crop rotations and nitrogen fertilizer rates could be improved to reduce the effect of agriculturally-derived pollutants.