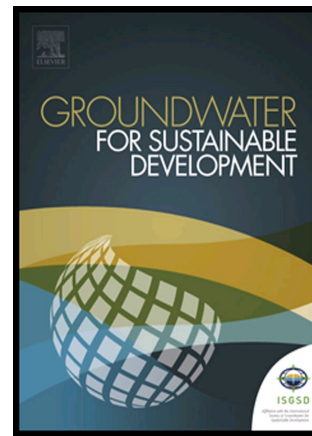


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# Potential for aquifer contamination of anthropogenic activity in the recharge area of the Guarani Aquifer System, southeast of Brazil

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## Highlights

The area reflects the potential contamination at an outcropping area of GAS.  
69.23% of the area has groundwater contamination potential.  
The sugarcane and citriculture are the main driving forces.  
The territorial planning should be carried out on a more refined scale.  
This method can be applied to define areas to be protected.

## Abstract

Understanding the response of physical environment to anthropogenic activities assists land use planning aimed at protecting water resources, which prevents society from incurring major economic and social costs. This paper aimed to identify the potential contamination of groundwater by human activity at an outcropping area of Guarani Aquifer System (GAS), the most important hydrogeological unit in South America. The methodology used was based on a multi-criteria analysis using decision matrices to analyze, from algebra mapping in a GIS environment, the influence of rock units, aquifer units, soil classes, steepness, slope shape, and land cover and use in contamination potential. Overall, medium to very high potential for groundwater contamination predominates in the area, amounting to 69.23%. In such areas, when the absence of federal or state law which defines the areas of protection for recharge, the master plans of the municipalities located in the GAS outcropping regions play an important role in complementing the legislation. São Carlos, has its own legislation that aims to control land use in areas of springs, and thereby to protect them. However, the GAS recharge areas near the surface are not contemplated, and specific regulation and standards for deployment of human activity in these areas, have not been established. Therefore, it is suggested that territorial planning to be carried out on a more refined scale. Given that the natural conditions and anthropogenic activities performed in the area of study are reflected in many other periurban wellheads, as well as that of the Guarani Aquifer outcropping are, the decision matrices designed can be applied and serve as an agile tool to define the recharge areas to be protected on a preliminary basis.

**Keywords:** Groundwater contamination; Land use planning; Thematic cartography; GIS.

## Graphic summary

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