

Spatially explicit vulnerability analysis of contaminant sources in a karstic watershed in southeastern Mexico

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Abstract

A water vulnerability assessment was performed on the Río Grande-Lagos de Montebello watershed, in southeastern region of Chiapas, Mexico. This is a karstic environment highlighted by well-preserved lakes, close to Guatemala border. We used multicriteria analysis to identify areas vulnerable to water contamination at subbasin scale using geographic information system and spatial analysis. Potential contamination sources were georeferenced and overlapped with precipitation and slope layers to identify areas prone to contaminant transport and infiltration. The results showed that both irrigation and rainfed agriculture were the main contamination sources, followed by wastewater discharge. Supported by land use and forest change analysis, agricultural activities were the most important drivers of change. A water vulnerability map at subbasin scale is presented as an outcome, which enables the ranking of water contamination potential in presence of different contamination sources using the weighted sum and linear normalization methods. Two subbasins were identified within the most vulnerable categories, Comitán and El Triunfo. No previous water vulnerability analyses have been performed for this region. We propose this vulnerability map as a decision-making tool for sustainable water management at watershed scale in areas with scarce information and increasing water quality degradation processes. © 2021 Elsevier Ltd

Author keywords

Contamination sources; Karstic system; Land use change; Montebello lakes; Multicriteria analysis; Water vulnerability