

## Spatial Analysis as a Tool to Assess Risk Management in Peru

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**Abstract :** A flood vulnerability index was developed for the Piura River watershed in northern Peru using Principal Component Analysis (PCA) to assess flood risk. The official methodology to assess risk from natural hazards in Peru was introduced in 1980 and proved effective for aiding complex decision-making. This method relies in part on decision-makers defining subjective correlations between variables to identify high-risk areas. While risk identification and ensuing response activities benefit from a qualitative understanding of influences, this method does not take advantage of the advent of national and international data collection efforts, which can supplement our understanding of risk. Furthermore, this method does not take advantage of broadly applied statistical methods such as PCA, which highlight central indicators of vulnerability. Nowadays, information processing is much faster and allows for more objective decision-making tools, such as PCA. The approach presented here develops a tool to improve the current flood risk assessment in the Peruvian basin. Hence, the spatial analysis of the census and other datasets provides a better understanding of the current land occupation and a basin-wide distribution of services and human populations, a necessary step toward ultimately reducing flood risk in Peru. PCA allows the simplification of a large number of variables into a few factors regarding social, economic, physical and environmental dimensions of vulnerability. There is a correlation between the location of people and the water availability mainly found in rivers. For this reason, a comprehensive vision of the population location around the river basin is necessary to establish flood prevention policies. The grouping of 5x5 km gridded areas allows the spatial analysis of flood risk rather than assessing political divisions of the territory. The index was applied to the Peruvian region of Piura, where several flood events occurred in recent past years, being one of the most affected regions during the ENSO events in Peru. The analysis evidenced inequalities for the access to basic services, such as water, electricity, internet and sewage, between rural and urban areas.

**Keywords :** assess risk, flood risk, indicators of vulnerability, principal component analysis

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