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## **GIS-based volcanic vulnerability estimation of populated places in Argentina**

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Using Geographic information systems (GIS), volcanological criteria were integrated with geographic information to identify populated areas in Argentina that are susceptible to the impacts of volcanic activity. This study used GIS to analyze the spatial distribution of geographic information such as water bodies, water courses, and populated places, along with the information about active volcanoes from the Global Volcanism Program to develop a map of volcanic hazard. Volcanic hazard potential was divided into two zones: Zone 1 are proximal areas of the volcano within a radius of 10 km from the central vent with the potential to be affected by direct hazards from an eruptions such as fall of ballistic ejecta of different sizes, collapse of the volcano edifice, and volcanic gas emissions as well by lava flows, lahars, and pyroclastic flows. Zone 2 are the distal regions to a radius of 70 km from the volcanic centre, which may be impacted by hazards such as lahars, pyroclastic flows and surges, as well as flood waters and tsunamis. In the distal regions are also included populated places located on the shores of the lakes and rivers and streams that originate from these water bodies. In these areas lahars can raise lake and river levels resulting in floods. This study established that 122 populated places in Argentina of different sizes may be affected by a volcanic eruption. The province with the highest number of volcanic hazard vulnerable places is Neuquén, with a total of 74 populated places. GIS is an important tool for determining volcanic hazard areas because it allows the integration of information regarding the distribution of active volcanoes and their volcanic products along with current geographic information such as population, rivers, and lakes. This tool can provide a low cost and easily implementable method for determining volcanic hazard vulnerability.