

ANALYSIS OF THE RISK OF CONTAMINATION OF THE PATIÑO AQUIFER

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SUMMARY

The waters of the Patiño aquifer supply the largest and most densely populated urban area of the country. Currently there is no more information about the possible pollutants, the quality of their waters and the points that need to be monitored to find possible sources of contamination. Therefore, it is very important to evaluate the risk of contamination of its groundwater.

Based on an analysis of existing data, a modification of the DRASTIC vulnerability model was made by adding anthropogenic parameters such as: land use (L), density of cesspools (P) and major transport routes (VP) as indicators of contamination risk. The model was calibrated with the values of total nitrogen concentrations (N_T) and total coliforms concentrations (C_T). The correlation coefficients before and after the calibration were 0.07 and 0.5 respectively for the risk map of N_T , while the pre and post calibration correlation coefficients for the maps of C_T were 0.3 and 0.7 respectively. The maps revealed that 42 % of the aquifer has a medium to high contamination risk (60-100), mainly in Asunción and Gran Asunción².

In view of the need to carry out a water quality analysis campaign in the areas of greatest risk, 70 wells of the 2,830 known wells were selected, using the NSGA-II algorithm. In addition, a remote monitoring design was presented, combining the Wireless Sensor Network (WSN), to automatically monitor, through reliable evaluations, dispatch and collection of data in real time; and Citizen Monitoring (MC), in order to reduce costs, cover a larger area of monitoring and expand the number of parameters to be evaluated.

²Luque, Fernando de la Mora, San Lorenzo, Villa Elisa, Lambaré, Mariano Roque Alonso, Ñemby, Capiatá, Limpio y San Antonio