

Modeling Future Scenarios to Decrease Nonpoint Source Pollution in a US-Mexico Border Watershed

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The twin cities of Nogales, Ariz., and Sonora, Mexico, known collectively as Ambos Nogales, lie astride the Arizona-Sonora section of the US-Mexico border in a shared watershed. Decades of rapid population and economic growth in Ambos Nogales have resulted in degraded ground-water quality. Residents on both sides of the border share an ecosystem, a watershed, and an airshed—all subject to pollution. These neighbors have been shown to suffer disproportionately from many environmental health problems, including waterborne and respiratory diseases.

Procedures were taken to forecast the nonpoint-source pollution effects of urban development in 2030 on water quality in a binational watershed around *Ambos* Nogales. Changes predicted in urban extent by the Clarke urban growth model, SLEUTH, were retrofit to the erosion-sedimentation models, Universal Soil Loss Equation (USLE) and the Spatially Explicit Delivery Model (SEDMOD), to quantify the amount of sediment predicted to be eroded, transported, and deposited in the future. Sediment has been identified as the number one nonpoint-source pollutant in surface waters and affects both air and water quality when eroded.

Using techniques designed to protect erosion ‘hot spots’, alternate scenarios were generated based on levels of management, depicting better water quality. In this study, we provide (1) a new methodology for assessing future erosion impacts in urbanizing watersheds, (2) a quantification of urban sprawl and its implications for water quality,

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and (3) the generation of alternative future scenarios for management of downstream sedimentation.