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Extended Abstracts

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title: **New contributions on the presence of ions nitrate and nitrite in the region of the Coast of Hermosillo, and Valley of Sonora River, to the Northwest of Mexico**

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INTRODUCTION

The coast of Hermosillo aquifer is located to the southwest of Hermosillo city between the coordinates 28°14' and 28°57' of latitude North and 111°15' and 111°45' of length West of Greenwich, includes an approximate surface of 3200 km^2 (Fig. 1). It is an exorreic basin located to the northwestern of Mexico, limited to the east by the recharge area of the valley of the Sonora River, and to the west with the Gulf of California.

Figure1. Location of the study area.

In December 2005, and April and December 2006, and December 2009, we got nitrate and nitrite ions concentration and were analyzed on 35 (nitrite) and 50 (nitrate) water samples collected from wells, springs, surface and irrigation waters of the coastal aquifer and its recharge zone in the valley of the Sonora River (Fig. 2). The study area follows a transversal line from west to east of 160 km since the Gulf of California to the upgradient of the Sonora river basin.

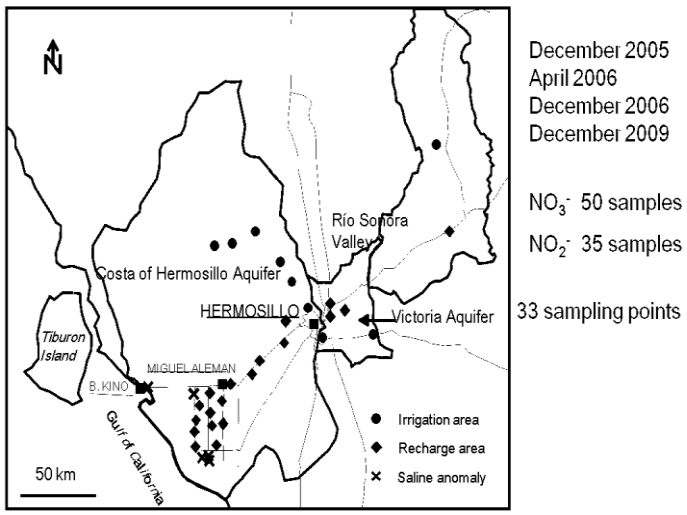

Figure 2. Sampling location.

THE PROBLEM

Groundwater from the Costa de Hermosillo aquifer has been used extensively for irrigation by over the past 60 years. The cultivation area reached 120,000 Ha in 1967 and actually this area has been reduced in no more than 40,000 Ha. Also it is well known the groundwater response in quan-

tity and quality because of the over pumping in the aquifer area; the result was a large depression cone and contamination of the groundwater system by the sea water intrusion in more than 32 km inland. In this escenary it is possible to imagine that the intensive application of $(NH_4)_2SO_4$ fertilizers and raw sewage (untreated domestic effluents), made possible the increasing in concentration of highly conservative compounds in the groundwater system, such as nitrate, which has been observed in a regional scale. Steinch et al. (1998) reported important excess of nitrate content in the Costa de Hermosillo aquifer, with values up to 17 mg/L reached in 1995.

RESULTS

In 2005 and 2006 we noted three categories: 1) 1.2–99.94 mg NO_3^-/L and 5.99–12.15 mg NO_2^-/L in groundwater and surface water from the recharge zone; 2) 6.35–38.52 mg NO_3^-/L and 0.11–10.47 mg NO_2^-/L in groundwater from agricultural areas where the intensive irrigation takes place; and 3) 0.00–114.49 mg NO_3^-/L and 13.93–22.67 mg NO_2^-/L in groundwater, in zones where the high salinization due to seawater migration has occurred.

High concentration of nitrate ions in all types of analyzed water (especially in the recharge and saline intrusion zone) showed that anthropogenic pollution influence on the natural chemical water cycle in all groundwater systems of Costa de Hermosillo and nitrates are now high conservative, still increased groundwater components. Additionally very high concentration of nitrite ions (comparing to irrigation water — 0.33–0.77 mg NO_2^-/L) implies that reduction and/or strong evaporation processes could be responsible for containing this very harmful form of nitrogen in groundwater and surface water of Costa de Hermosillo region.

We continue working with the interpretation of our new chemical results from December 2010 (samples in lab), we want to observe the evolution and verify or to confirm the actual conditions. Unfortunately the generated environmental impact will require ability to modify agronomical practices since it will have a high social and economic cost and several decades to give back to revert the water quality conditions.

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