

# Lake Zapotlán, Mexico

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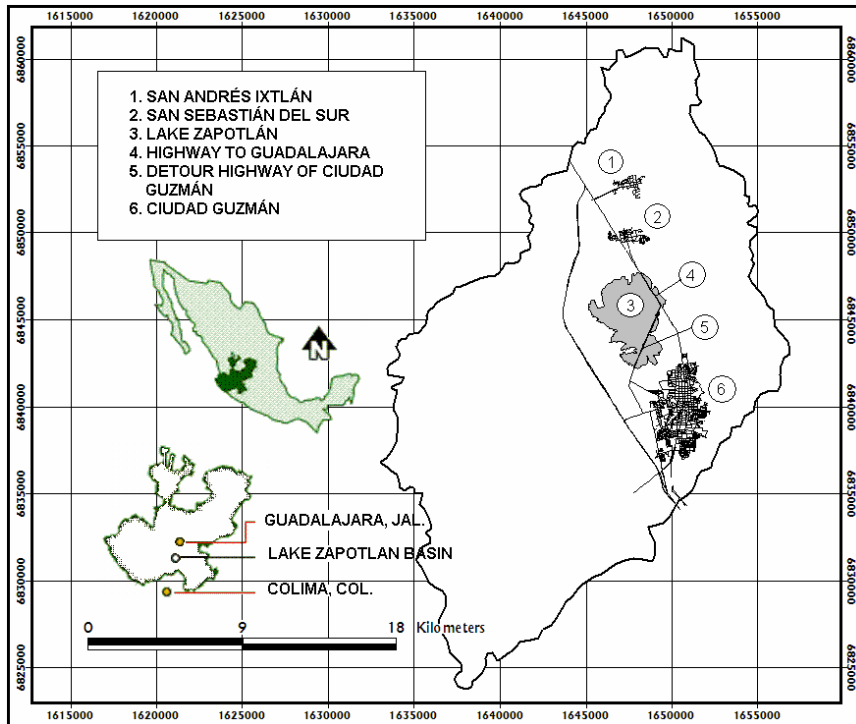


Figure 1. The Lake Zapotlán basin (Ortiz-Jimenez et al. 2005).

## Background Information:

The Lake Zapotlán basin is located in the southern region of Jalisco State, Mexico, between N 19°34' – N 19°53' and W 103°24' - W 103°38' at an elevation of 1490 m. The lake is approximately 11 km<sup>2</sup> and is fed primarily by an array of ephemeral and intermittent streams originating from the mountains that bound the lake. The total area of the Lake Zapotlán Basin is approximately 455 km<sup>2</sup>. Lake Zapotlán was declared a Ramsar site in 2005.

## Main Research and Management Problems:

The Lake Zapotlán Basin supports a variety economic activities including agriculture, fishery production of two non-native species: common carp and tilapia, and the direct harvesting of tule (*Typha latifolia*) for use in local crafts. This basin supports the second largest city in Jalisco State, Ciudad Guzmán, with a population close to 100,000. The city lacks an efficient sewage treatment system, with on average 48% of wastewater being treated before entering the lake. This, coupled with direct discharge of municipal and agricultural runoff, has increased the nutrient load into Lake Zapotlán. Other major problems include deforestation and sediment loading and the illegal extraction of water from the lake and nearby wells for irrigation.

Ongoing research is being conducted in Lake Zapotlán basin through partnerships between the Western University and The University of Guadalajara. Western University,

through Dr. Brian Branfireun, is working to investigate hydrological and nutrient loading in the lake and surrounding watersheds. Dr Mario A. Ortiz-Jimenez, Dr. Jose de Anda and Dr. Harvey Shear have worked on water, heat and nutrient balance models of the lake, and Dr. Shear continues to collaborate, through the University of Toronto and Western University on research in this basin.

### **Possible End-Users:**

In addition to the researchers mentioned in the previous section, research on Lake Zapotlán would be of interest to the following stakeholders: **Fishing Co-operative:** Pescadores de Gómez Farías and the **Municipalities** of San Andrés Ixtlan, San Sebastián del Sur and Ciudad Guzmán.

### **Site Conditions:**

Lake Zapotlán is located in a closed basin and is bordered by the Usmajac hills to the north, the Los Manzanitos and El Tigre Mountains to the east, the Media Luna Mountain to the west and the Apaxtépetl and Nevado de Colima volcanoes to the south. The climate is fairly warm, fairly wet with rains during the summer season, and with average winter rain less than 5% of the annual total precipitation. Rainfall is about 813 mm annually and is variable within the basin while the average annual temperature is 19.6°C. Soils are haplic feozem, chromic cambisol and eutric regosol. The surrounding mountains are covered primarily by coniferous and tropical deciduous forests, while the land closest to the lake has been converted for pasture and agricultural use.

### **Monitoring and Data:**

Meteorological, hydrological, physicochemical, land use and land cover from the Lake Zapotlán basin are available.

### **Publications:**

Ortiz-Jimenez MA, De Anda J, Shear H (2005) Hydrological balance of Lake Zapotlan, Mexico. *Journal of Environmental Hydrology* 13: 1-16.

Ortiz-Jimenez MA, De Anda J, Shear H (2006) Nutrients/food chain model for Lake Zapotlan (Mexico). *International Journal of River Basin Management* 45: 125-135.

Ortiz-Jimenez MA, De Anda J (2007) Heat balance and water-nutrient food chain interactions in Lake Zapotlan, Mexico. *Agrociencia* 41: 447-458.