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ENVIRONMENTAL ASSESSMENT AND REHABILITATION OF THE LERMA RIVER MEANDER IN LA PIEDAD, MICHOACAN, MEXICO

Miguel Martínez-Trujillo, Yazmín Carreón-Abud

*Facultad de Biología, Universidad Michoacana de San Nicolás de Hidalgo Morelia, Michoacán, México,
e-mail: codigogenetico@gmail.com*

Abstract

The Lerma-Chapala basin is located in central Mexico, covering an area of 53,501.3 km², which is affected by organic and industrial waste. In the city of La Piedad, Michoacán, the Lerma River receives large amounts of organic waste from human population and hog farms. In the region, the agricultural areas use the river water for irrigation of crops, which is afterwards consumed by humans and livestock. Also, because part of the urban area is located along the Lerma River, there is a direct contact of villagers with water and there is potential risk for them to contract diseases (Aparicio, 2001; Hydrology of the Lerma- Chapala watershed, New York).

To establish a strategy to rehabilitate the area, it was necessary in a first phase to perform an environmental study over an annual cycle. The characterization of the microbial populations in water (total bacteria, total coliforms, fecal coliforms and enterobacteria) was performed. The main physicochemical parameters and heavy metals were also determined.

The results obtained revealed that bacterial populations are abundant, with values of 100000 to 1300000 CFU/100 ml. Consequently the biochemical oxygen demand is high (50 mg/L) and dissolved oxygen concentration is less than 2 mg/L in most samples analyzed. Total and fecal coliforms were always higher than 1000/100 ml. Enterobacteria were common and pathogenic species such as *Klebsiella pneumoniae* and others were identified. Although the concentration of nitrates was variable, it was usually high, with values up to 10 mg/L, due to agricultural runoff, sewage, detergents and waste from hog farms. Heavy metals except Fe were below allowed limits. According to the Mexican Official Standard NOM-001-SEMARNAT-1996, these waters are unfit for any use, so it is necessary to perform an environmental rehabilitation.

The characterization performed in the first phase allowed the detection of the main problems of water pollution, so it was decided to establish an adequate treatment plant before the water enters the urban area and from this site reduce the water flow to decrease the risk of contact with the population of microorganisms. Illegal sewage discharges sites were located and will be canceled and channeled to other sites. This proposal will be accompanied by a program of urban redesign.
