



Efforts in water quality monitoring: consequences due to lack of information and best management practices in Lake Atitlán

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Summary

The Atitlán Watershed Multiple Use Reserve is located in the Highlands of Western Guatemala, Central America. This is a protected area that aims to conserve the forest ecosystems of the surrounding mountains and volcanoes, the hydrological functioning of the Lake Atitlán watershed, the tangible and non-tangible cultural heritage of the region, and its spectacular natural beauty. The endorheic watershed of Lake Atitlán is one of 8 conservation targets in the Reserve.

In 2009 an Ecological Monitoring Protocol was revised and approved by CONAP, the National Council for Protected Areas and supported by Asociación Vivamos Mejor and The Nature Conservancy. Measurements for indicators of size, condition and landscape context were proposed for 4 terrestrial ecosystems, the Lake Atitlan hydrological system and the horned guan, *Oreophasis derbianus*, an endemic species of bird only found in Chiapas and Guatemala.

Water quality is one of the indicators of the Lake Atitlan hydrological system that has been measured in 11 points in the surface of the water body in the latter years. There has been a basic effort collecting physicochemical parameters by AMSCLAE, the Authority for Sustainable Management of Lake Atitlan Watershed and several academic institutions such as Universidad del Valle de Guatemala with the support from Asociación Vivamos Mejor and other organizations.

The protocol proposes to add biological data such as chlorophyll a, macro invertebrates and sedge population for water quality measurement that compliments physicochemical information and interpretation to know the health condition of the lake ecosystem. It is recognized by governmental authorities, academy and cooperation agencies that there is a lack of information regarding Lake Atitlan ecosystem dynamics, evidenced by the blooming of cyanobacteria and other algae the lasts 2 years.

Recently Global Nature Fund is supporting a project that aims to implement a water quality laboratory that addresses data interpretation for lake management. There is also a component based on green filters assessment and implementation on main nutrient point-source sites, awareness raising and dissemination campaign and an environmental education program to reduce water pollution and promote best management practices.

Other efforts aim to map the lake wetlands and repopulation of sedges, especially in the northern shore of Lake Atitlan to reduce nutrient concentration and enhance habitat for aquatic species

Our lessons learned are that information gaps have been identified but not analyzed that have lead to lack of management and best practices in lake Atitlan. We expose that:

- There is no proven evidence of lake mixing events that could lead to algal blooming and the main factor of this phenomenon has not been identified (temperature, nutrient concentrations, deep water volcanic activity).
- We have known that phosphorus concentration in Lake Atitlan is one of the main nutrients that supported the recent massive cyanobacteria blooms but there is need to identify which sources of contribution are the most critical (agricultural fertilization, wastewater from towns, soil runoffs) to propose the proper strategies to mitigate nutrient income.
- Physicochemical parameters have only been measured on Lake Surface, and the lake has a maximum depth of 320 m. There is a need to know the lake stratification and nutrients concentration at different depths and several times of the year.
- It is important to identify which water quality monitoring data interpretation will be the main purpose for directing the monitoring protocol results dissemination, whether will be for water consumption, recreation or ecosystem management.