Case study

Restoring biodiversity in Nicaragua's national reserve with ultrasound

Eutrophication

In the scenic Tiscapa Lagoon, Nicaragua's national reserve, a longstanding threat has loomed over biodiversity due to prolonged eutrophication caused by discharge activities. Now the Municipality of Managua steps up with a resolute mission to restore life to the aquatic ecosystem, wielding the power of ultrasound.

Biodiversity loss

Tiscapa Lagoon was a true paradise. With its volcanic origins and rich ecosystem, it attracted tourists and locals alike. It used to be a center of life, where people came to relax, fish, and have a good time. This magical lagoon played a crucial role in the development of the capital.

Unfortunately, approximately four decades ago, the Tiscapa Lagoon became a discharge site for various pollutants, ranging from solid waste to untreated sewage. This alteration in water quality led to an accumulation of organic matter, resulting in eutrophication of the lake.

The consequences of eutrophication were severe, setting off a domino effect that degraded water quality. The proliferation of algae formed a thick green layer on the water's surface, blocking sunlight from reaching the bottom of the lake.

This disruption in the ecosystem meant that fish and turtles could no longer survive, leading to a rapid decline in biodiversity. The lagoon lost its former charm, transforming into a polluted body of water unfit for human use and enjoyment.

The sound solution

In response to the environmental crisis facing Tiscapa Lagoon, the Municipality of Managua has made a profound commitment to address the issue and implement a sustainable solution. After conducting extensive research, the LG Sonic MPC-Buoy emerged as the chosen remedy to restore the lagoon's complex ecosystem.

Fig 1. Tiscapa lagoon before treatment in November 2019.

Introduced by the Water Resources Research Center and the CIRA of the UNAN, Managua, the MPC-Buoy represented as the perfect solution for the lake. Installed in September 2022, this innovative system has helped restore the water quality in the Tiscapa Lagoon, heralding the first signs of rejuvenation in over four decades.

Low-power ultrasound

MPC-Buoy operates through low-power ultrasound, specifically targeting and controlling the growth of algae without causing harm to other aquatic life. By affecting the buoyancy of the algae and restricting their access to nutrients and sunlight, the system successfully stops harmful algal blooms.

One of the most remarkable aspects of this solution is its environmentally friendly nature. The targeted approach of ultrasound treatment ensures that only harmful algae are affected, leaving the rest of the aquatic ecosystem unharmed. As algae levels are brought under control, oxygen levels in the water improve, creating a suitable environment for aquatic animals to thrive once more.

Mauricio Diaz, the general director of the Directorate of Environmental Management of the Mayor's Office of Managua, expressed his delight at the successful outcomes of this endeavor. "As the water quality has improved, it also allows life on the bottom. We can see everything now – fish, turtles, and more – all with the naked eye. The improvement in watercolor and transparency has been a resounding success in caring for and preserving this natural resource-protected area."

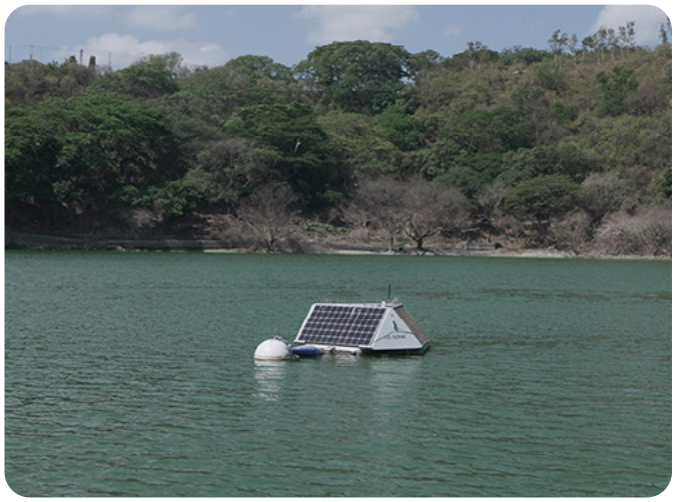

Fig 2. LG Sonic MPC-Buoy installed in September 2022.

Fig 3. Mauricio Diaz, the general director of the Directorate of Environmental Management of the Mayor's Office of Managua.

Real-time monitoring

The system provides real-time water monitoring data accessible through a user-friendly web-based software called MPC-View. This data indicates significant reductions in algae concentration and turbidity levels.

The ultrasound treatment helps restore the lagoon's natural balance, leading to higher levels of dissolved oxygen in the water. This increase in oxygen supports aquatic life, and as a result, the whole ecosystem in the lagoon becomes revitalized and healthier. drought. In 2020, two severe forest fires broke out. Helicopters could land on the Pirque Mega Ponds and collect water to extinguish the fire.

Forging the Future

The successful application of ultrasound technology in the Tiscapa Lagoon serves as a powerful example of how innovative and sustainable solutions can restore and preserve biodiversity in even the most challenging environments.

The Mayor's Office of the Municipality of Managua is determinedly working to reestablish the Tiscapa Lagoon, with aspirations to restore it to its original state. "We envision a future where Tiscapa Lagoon could potentially serve as a vital drinking water source for all residents of the Municipality," Mauricio added thoughtfully.