Introduction
The purpose of this project is to review and develop water resources sustainability within the Lake Atitlán watershed by analyzing water quality data, evaluating current water-related sustainable projects, and recommending future sustainable initiatives. Lake Atitlán is the most valuable resource in Guatemala and considered to be one of the most beautiful lakes in the world. The indigenous Mayan people living on Lake Atitlán depend heavily on this resource. Unfortunately, water pollution and the general environmental decline of the region have led to a number of threats to water quality. Deforestation, soil erosion, invasive species, fertilizers, solid waste, and raw sewage are major problems throughout the watershed. Significant increases in nitrate and phosphate concentrations from sewage and fertilizers that enter the lake are particularly concerning. Nutrient pollution causes eutrophication, hypoxia, and toxic algal blooms. This leaves water bodies as dead zones lacking sufficient oxygen for aquatic life to survive, and is detrimental for the ecosystem. High concentrations of these nutrients also result in the transmission of waterborne diseases to those who depend on the water and its resources for consumption.

Solutions
1. Banana Circles - Tropical Permaculture
Irrigating banana palms with greywater is a sustainable method for managing waste water in developing countries. Banana palms require a large amount of water to be productive, making them a good fit for this system. Banana palms are native to Guatemala and provide highly nutritious fruits. Banana circles transform waste into a valuable food source and an economically profitable product for local and global markets.
- Food production
- Compost Pile
- Greywater management
- Habitat production
- Encouraging community interaction

2. Constructed Wetlands
Constructed wetlands are a sustainable and energy efficient method for waste water treatment. Many native wetland plants are highly effective at removing nitrogen and phosphorus from water. Constructed wetlands are well suited for developing countries because they are cost-effective and simple to construct and operate, unlike many other technical solutions to waste water treatment.
- Erosion Control
- Sedimentation
- Water Purification and filtration
- Nutrient Removal

Acknowledgements
Thank you to the Student Grant Program and the Committee on Research for funding this project.

References