

# Appropriate Biowaste Treatment Technology for Aquitania, Colombia

A Swiss student at a local NGO, Fundación Montecito, applied the organic waste treatment decision support tool (SOWATT) in Aquitania. In-vessel composting was found to be the most promising technology; yet, marketing the produced soil amendment would require special emphasis. Adeline Mertenat<sup>1</sup>, Imanol Zabaleta<sup>1</sup>, Chris Zurbrügg<sup>1</sup>



Photo 1: Lake Tota and its onion residues.

## Introduction

The Lake Tota Basin, located in the tropical Andean highlands of Colombia, is a Páramo watershed [1] with a unique rich ecosystem. Given its uniqueness, it has attracted a lot of interest. Institutions and NGOs have made its development into an integrated and sustainable watershed area a priority as it could serve as a model for other areas of Colombia and for other highland Latin American countries.

The area's economic output is estimated at 200 million US\$/year and Aquitania is the biggest municipality (15000 inhabitants). However, intensive onion farming, trout farming and overall unsustainable waste and wastewater management in Aquitania pose a significant threat to this important lake ecosystem [2]. The local authorities recognize the need to improve waste management around the lake, and agreed to be a test-site for the application of SOWATT.

## Applying SOWATT in Aquitania

SOWATT (Selecting Organic Waste Treatment Technologies) is based on the "Multi Attribute Value Theory". It promotes a structured decision making process that considers social, economic and technological conditions when comparing and choosing from organic waste treatment alternatives [3]. The application prioritises six technologies: windrow composting, in-vessel composting, vermicomposting, anaerobic digestion, black soldier fly processing and slow pyrolysis.

Assessments in Aquitania determined that 150 tons/week of organic waste (OW) are produced. This comprises 105 tons/week of the aquatic plant, Elodea, which is harvested from the lake, 31 tons/week of onion residues from processing facilities and 14 tons/week of municipal organic waste. SOWATT was applied to determine the most adequate form of OW treatment for Aquitania. Slow pyrolysis was ruled out from the start because of the overall low lignocellulosic content of the biowaste.

The other five technologies were assessed against the array of SOWATT criteria or objectives: technical reliability, economic sustainability, social acceptance, environmental pollution, hygiene and community health. Each objective was weighted through a participatory process involving local stakeholders. In Aquitania, four stakeholder groups were consulted: 1) local authorities (Mayor's office, governmental entities, etc.), 2) entities managing or with OW management experience, 3) productive sectors related to OW management and 4) local NGOs.

## Results

Results showed that NGOs prioritized environmental and social aspects, whereas local authorities favoured environmental and economic objectives, and the OW managers prioritised economic issues (Figure 1).

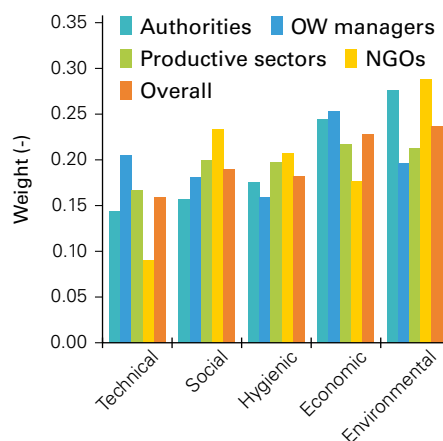


Figure 1: The weight of the objectives given by the stakeholders.

The soil amendment was of major interest to all stakeholders as a replacement for the fresh chicken manure and large amounts of pesticides currently in use, which severely pollute the surface waters. The composting technologies selection criteria were: a low level of human resources, minor mechanisation, and the need for a technology that provides easy control of the process parameters with few emissions. Given these requirements, the highest ranked choice for Aquitania was in-vessel composting.

Important challenges were identified, however, concerning the possible use of the soil amendment by local farmers. Currently, only 25 farmers among the 7000 in the watershed are certified and committed to sustainable agricultural practices, and showed interest in it. Enhancing awareness among the local authorities and farmers is necessary to increase market demand. If this cannot be ensured, anaerobic digestion was the next best choice for OW treatment.

## Conclusion

SOWATT is a promising tool for evaluating organic waste treatment options if used as a first step. Including the local authorities in the decision-making process enhances their interest in OW management. Its main weakness is the lack of evidence regarding the performance and costs of the six different treatment technologies, as some are still in the early development phase. With more documented case studies, we will be able to better judge how the technologies perform and to make more reliable cost projections, furthering the improvement and reliability of the SOWATT model.

- [1] Páramo are "alpine tundra ecosystems".  
 [2] Mertenat, A., Velasco, F.A., and Meulemans, J. (2015): Lake Tota Basin - Water, Managing the source of life. Report produced for Fundación Montecito.  
 [3] Zabaleta, I., Scholten, L., and Zurbrügg, C. (2015): Selecting Appropriate Organic Waste Treatment Options in the Philippines, 16, 4–5.

<sup>1</sup> Eawag/Sandec, Switzerland  
 Contact: adeline.mertenat@eawag.ch