

# Composting Toilets in Cochabamaba, Bolivia

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### Abstract

The purpose of the work done in Cochabamba, Bolivia was to improve upon the usage process of dry, urine-diverting toilets. Specifically improving the method of eliminate pathogens in human feces using a solar oven followed by composting. As this overall process took too much time and the compost piles attracted pests. To fix these problems, various types of solar ovens and modifications were researched in addition to various methods of composting. In order to make an oven that most was inexpensive, durable, and capable of high temperatures, a solar box cooker was deemed to be the best design, and was also currently in use. Two differently modified ovens were constructed, one with larger reflective panels, and one with a modified angle and addition glass panes. In addition, one oven was refurbished so it could be used again, and another was purchased. A composter was also constructed that could compost the feces in less than one month while using minimal space and materials while also protecting from pests.

### Project Description

- The original time necessary to eliminate pathogens in feces = 2 weeks
- New prototypes were constructed that had larger panels to reflect more light in the first, then with additional glass panels to trap more heat and an opening at a great angle to block less entering sunlight

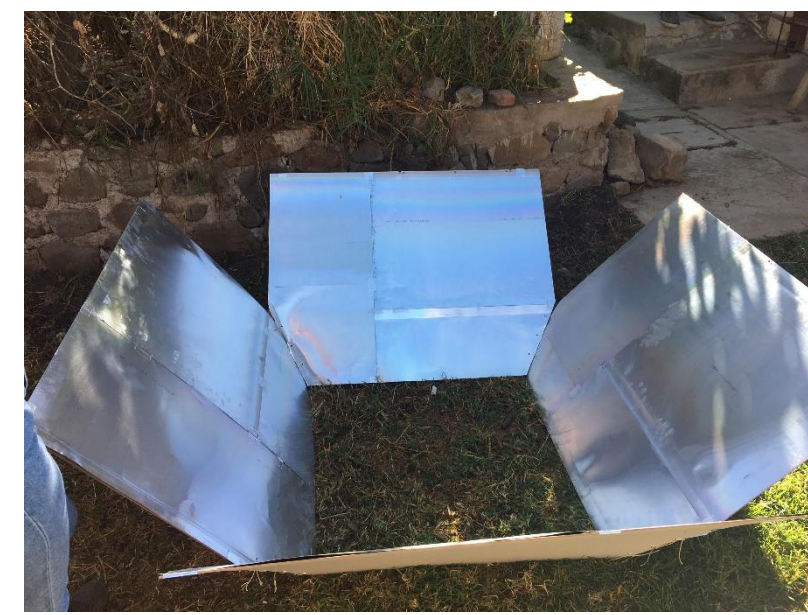


Figure 4. Modified reflectors



Figure 5. Modified angle solar cooker prototype

### Introduction

- The majority of Bolivia either lacks access to water or the water available is not fit for human consumption
- Bolivian cities do not have the infrastructure to effectively treat contaminated water
- Construccion Civil y Saneamiento Ecologico Sostenible (CONSES) is located in Cochabamba, Bolivia and has created a prototype urine-diverting toilet to prevent further contamination of water sources and to modify human waste to be used as fertilizer

### Results & Discussion

- Composter effectively composted organic material in predicted 1-month time, with low odor and pests
- Preliminary tests indicate a more rapid heating period in newer solar cooker prototypes

### Project Description

- A chemical process had already been developed to safely treat urine
- For the feces, purification using a solar cooker then composting into fertilizer, but not very efficient

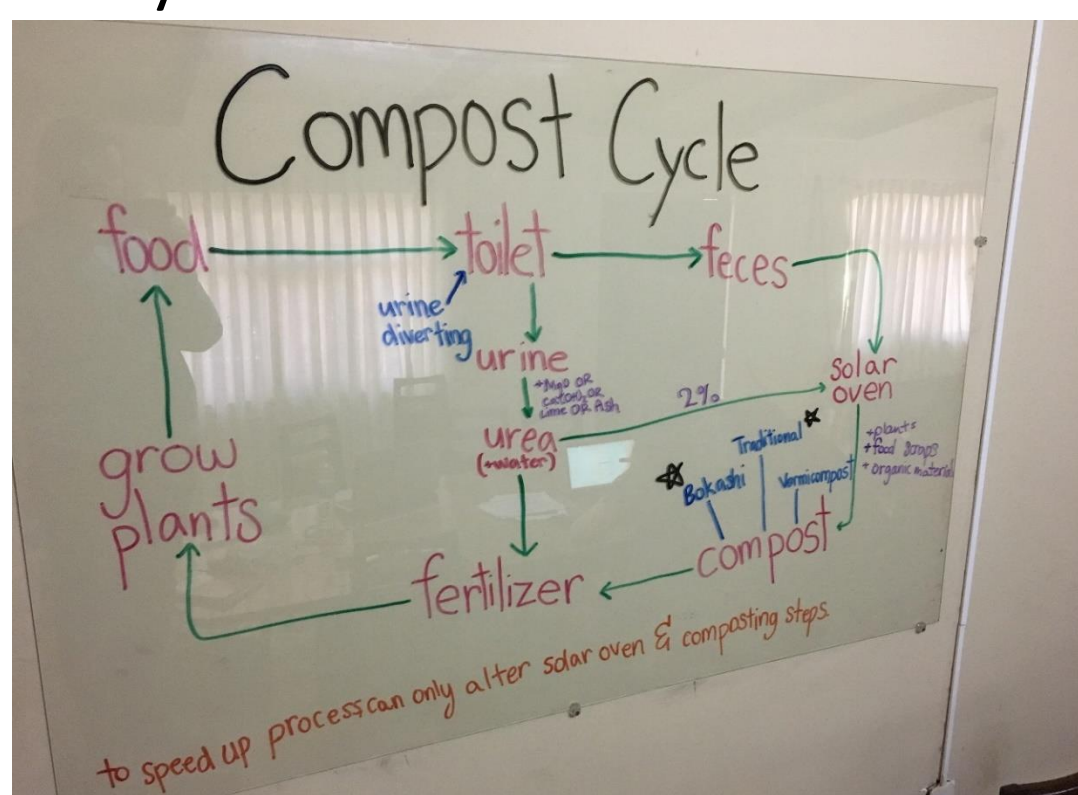


Figure 1. Compost Cycle

- A compost barrel was constructed, then thermophilic bacteria added to speed up process

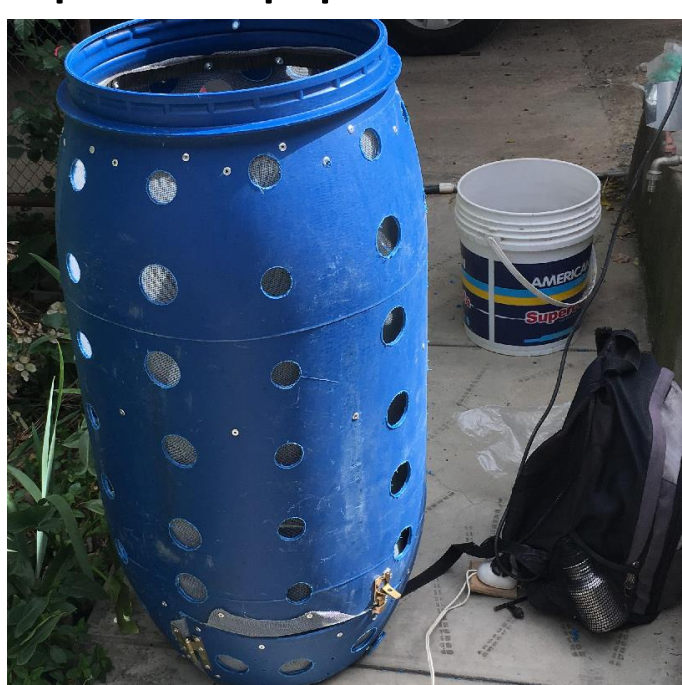


Figure 2. Completed Composter



Figure 3. Thermophilic Bacteria

### Recommendations

- Decrease in toilet height for easier use
- Comparative testing of solar cooker prototypes over at least 24 hr period, mass construction of most efficient design
- Implementation of composters and solar cookers alongside composting toilets



Figure 6. ETHOS Volunteers with other Sustainable Bolivia Volunteers

### Acknowledgements

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