

# Cochabamba Eco-Toilet Project

## Gabriela Campa - CONSES

### Cochabamba, Bolivia

Cochabamba, Bolivia is located in the heart of Bolivia. The center of the city falls on the valley of the same name in the Andes mountain range. CONSES addresses the problem of scarce water resources, little access to sewage and the poor health problems that arise with these issues. CONSES wanted to eliminate the pathogenic cycle related to lack of proper sanitation and reintroducing human waste back into the environment without contaminating local water sources and spreading disease.



**Figure 1:** Periurbano on the South Side of Cochabamba

Around 60% of the inhabitants of Cochabamba have no access to proper sanitation. The government does not provide sewage systems, and most people get their water by independent sellers, a process that can be very expensive and not clean.

### CONSES

*CONSES* is an organization founded in Cochabamba, Bolivia which stands for Construcción Civil y Saneamiento Ecológico Sostenible (Civil Construction and Sustainable Ecological Sanitation). CONSES is dedicated to the development and implementation of ecological and sustainable sanitation systems.



**Figure 2:** Pit-style bathrooms found in the communities in the South of Cochabamba

The ecological toilet composed of two chambers that were meant to divide the liquid waste from the feces. Feces cannot be introduced into the environment without proper treatment to remove these pathogens without infecting anybody involved. By separating the urine from the feces, the toilet can allow the people of the community to properly treat their solid waste before continuing the pathogenic cycle.

The project focused on: including research on various methods for removing pathogens, uses for minerals extracted from urine, solar ovens, creating a fundraising campaign, and determining the proper community to implement the toilets. Various tests were implemented in order to determine the best way to reach the highest temperatures in the solar ovens.

### Eco-Toilets Project

The volunteers working in CONSES helped with the research, design, testing, and implementation of dry waste ecological bathrooms to be delivered to people with little access to water and proper sanitation.

By heating samples of human fecal waste for long periods of time in a dry, sealed environment we were able to achieve deactivation of parasite eggs. CONSES decided to use solar ovens as a way to destroy the pathogens.



**Figure 3 (left):** Picture of Gabriela Campa along with the solar oven

**Figure 4 (right):** Picture of the eco-toilet

For the first few weeks of the project, research was conducted on the information discussed before; solar ovens, making compost out of human waste, and the overall understanding of the situation in Cochabamba. After this period, several tests were done on the existing solar oven.

We tested the solar oven using (1) a sealed, (2) plastic 5 gal. bucket, (3) a sealed metallic bin spray-painted black, and an (4) open metallic bin spray-painted black. Then, 5 tests were done on samples of feces to see if we could remove the pathogens using the solar oven.

### Results & Discussion

The solar oven proved to reach the highest temperatures using an open metallic bin. The lab results proved that after one day of exposure, we were able to destroy life forms in the samples. However, there were still pathogens in the other samples. This can be due to two factors: either an error occurred when submitting the samples to the laboratory, where they could have been tampered with or even mislabeled, or the samples obtained simply had more parasites than the other, showing that the pathogen life was distributed unevenly through the matter.

### Recommendations

One recommendation for future experimentation would be to research into developing some type of exhaust valve or dehumidifier that would expel the water that evaporated from the waste. This way, they could potentially dry the feces and remove the pathogens faster. Also, it is very important to recognize and respect safety precautions during the handling of parasitic matter.

### Acknowledgements

Thank you to the ETHOS group that was able to provide this experience for me. Thanks for all of the support and help while preparing for this trip. Thanks to Bolivia Sostenible for connecting the ETHOS group with CONSES.