

Composting Toilets in Nogales, Sonora

Managing Human Waste Disposal: A Demonstration of Composting Toilets

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If you would like to donate to the composting toilet program, please send a check to FOSCR, PO Box 4275, Tubac, AZ 85646, and put "composting toilets" in the memo line. FOSCR will match donations, up to \$500 per six months.

The Problem



Many homes in Nogales, Sonora lack connections to potable water supplies and wastewater collection systems. Residents in the outlying, marginal *colonias* (neighborhoods) are least likely to have either piped water or sewer connections.

A 1999 study by Arizona State University researchers found that fewer than 20 percent of residents in some parts of the city received these services.

Households lacking connections to the sewer system were found to use latrines or open pits for the disposal of human waste, though many of those latrines were situated in dense, rocky soil with poor drainage characteristics. Researchers concluded that the widespread use of latrines constituted one of the most significant environmental hazards in the region.

Since the study was conducted, the problems of improper human waste disposal have continued to plague Nogales. Many residents still use latrines or open pits. These overflow during periods of heavy rainfall and discharge raw sewage directly into the communities, the Nogales wash, and other portions of the Santa Cruz watershed, ultimately flowing through Nogales, Sonora as well as Nogales, Arizona and other parts of Santa Cruz County. In addition to contributing to water quality problems in the region, the raw sewage dries on roads, in parking lots, and in other open spaces where it is then readily converted to airborne particles as people drive and walk across these places. Furthermore, each year several children drown in the open pits.

A Proposed Solution

Given that it is estimated that as many as 80 percent of Nogales, Sonora households lack water 24 hours a day and many neighborhoods lack sewer systems, it is unlikely that the residents in the marginal *colonias* will receive sewage service in the near term.



Therefore it is critical that alternatives be identified and implemented. One solution is to develop and install alternative household-level systems for human waste disposal. Beginning in 2002, Borderlinks Mexico, through its Casa de la Misericordia community center located in Colonia Bella Vista in eastern Nogales, began developing a pilot project to install and test composting toilets. Composting toilet systems (also called biological

toilets, dry toilets, and waterless toilets) work by providing a closed environment for excrement and a carbon additive (usually sawdust) and then relying on aerobic bacteria and fungi to break wastes into safe and valuable compost, just as they do in a yard waste composter. In some countries, such as China, composting toilets have been in use for thousands of years. In others, such as Canada, composting toilets are being incorporated into large, modern urban buildings.

During the summer and fall of 2006, under the supervision of Dr. Diane Austin Bureau of Applied Research in Anthropology (BARA) of the University of Arizona, Andrea Herbert, a student intern, completed an evaluation in Nogales of composting toilets that had been constructed and installed at seven households and at the community center at least three years previously. She learned that residents perceived the composting toilets to be a positive advancement over the open pit system, that the toilets can be operated inexpensively and safely in Nogales, and that there are a number of steps that can be taken to improve residents' understanding and use of household composting toilets. She also learned that residents perceived the composting toilets to be a stopgap measure until their neighborhoods received wastewater services.

The Colinas del Sol Project for Nogales, Sonora

With the support of the municipal government of Nogales, Sonora, project leaders sought and obtained funding from the U.S. Environmental Protection Agency/ Border Environmental Cooperation Commission to develop a project that would apply the lessons learned in the evaluation and extend the successful pilot projects to at least 40 households in one Nogales, Sonora *colonia*. The goal of the project is to demonstrate the feasibility of using composting toilets to augment existing municipal wastewater services and offer a long-term alternative—rather than a stopgap measure—for managing human waste in this arid region.

Municipal government officials suggested that the project be initiated in Colonia Colinas del Sol (Hills of the Sun), a neighborhood of around 2,500 homes on the eastern side of Nogales that is not expected to receive wastewater services. The

colonia has been constructed in a bowl, and runoff from the *colonia* flows north across the U.S.–Mexico border into Arizona. To be incorporated into the existing wastewater management system in Nogales, sewage from the *colonia* would have to be piped over steep hillsides; this is unlikely to occur.



Project leaders met with the leaders of the neighborhood committee for Colinas del Sol to discuss the project and their interest in participating. The leaders were very enthusiastic about the project and agreed to participate on the Project Advisory Board. The binational Advisory Board, which includes representatives from government, academia, business, and not-for-profit organizations, held its first meeting on April 12, 2008. The Advisory Board members helped select the final designs for the composting toilets and developed a plan and criteria for selecting the households that would receive composting toilets. To make the project resources go farther, among the requirements for households is that they

contribute materials and/or cash equivalent to US\$200 toward the cost of their toilets. The Advisory Board meets quarterly to review the progress of the project and make decisions about designs, resources, and continuation of the project.

Households become aware of and involved in the project through a series of meetings and household visits, beginning with introductory meetings that are held periodically within the *colonia* and advertised within the *colonia* via flyers and word-of-mouth. Following the initial meeting, household representatives who wish to participate in the project meet with students and faculty from BARA and local high schools to sign up for a household visit. The students visit the households to complete a Household Assessment, enter the assessment data into a database, and prepare a summary for the members of the Advisory Board. Once a household is selected for participation, the students visit the household to inform its members of the decision and confirm when they will have their contribution to the project (money or materials) and be ready for construction to begin. Construction team members then visit the households and establish the schedule for building the toilets. When construction has finished, the students visit the households and being monitoring, weekly for the first month and then monthly for the next 11 months.

Construction of the toilets began in May 2008 and continued throughout the summer. Twenty-six toilets were completed by the end of August. Results of the first few months of monitoring have been very positive. All households reported that they were satisfied with their toilets and had shown them to someone else, often a neighbor. Though in

some households it took a week or two for the members to begin using their new toilet regularly, in all cases after a couple of weeks the toilet was being used daily. The primary reasons that the toilets were not used immediately after construction was completed were lack of sawdust and minor problems with cracks and seals. During August, the construction workers stopped new construction in order to revisit each household and repair any minor problems. The *colonia* leaders arranged for bags of sawdust to be available at the community center for purchase for a small fee. A major indication of the general acceptance of and satisfaction with the toilets is that by the end of September four households had requested composting toilets in bathrooms within their houses. This move from seeing the composting toilet as latrine, which would be located some distance from the house, to seeing it as a regular bathroom within the house is a significant one for the adoption of this technology as a long-term alternative to flush toilets.

Extending the Project

Plans are currently underway to extend the project to more households. One concern of the project and community leaders is that some of the poorest households have been unable to participate in the project because they cannot come up with the \$200 to contribute toward the construction of their toilets. With daily wages of as little as US\$7, \$200 is simply out of the reach of many families within the *colonia*. The project leaders have been writing grants to both US and Mexican organizations. ***We are also seeking donations to help families meet their \$200 goal. If you would like to donate to the composting toilet program, please send a check to FOSCR, PO Box 4275, Tubac, AZ 85646, and put "composting toilets" in the memo line. FOSCR will match donations, up to \$500 per six months.***

For more information, contact:

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- 1) Sadalla, Edward, Tod Swanson, and Jose Velasco. 1999. Residential Behavior and Environmental Hazards in Arizona-Sonora colonias: A Continuation Project. Southwest Center for Environmental Research and Policy. SCERP Final Report Project EH98-2. Accessed at www.scerp.org.
- 2) For example, the Choi Building at the University of British Columbia in Vancouver has 5 composters with 10 flushless toilets and urinals. Each composter has an annual user capacity of 45,000 visits. See jscms.jrn.columbia.edu/cns/2005-04-05/mccandlish-composttoilet/.