water for people

From excrement to pines to mushrooms to money in Bolivia

This paper describes the idea of using urine and dried feces from UDDTs to fertilize pine plantations where commercially valuable mushrooms grow, to generate income for Bolivian villagers.

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Abstract

Ecological sanitation has been promoted by many institutions in Bolivia for the last decade, but the country has yet to make a dent in the millions of Bolivians who continue to practice open defecation. While the high percentage of unattended rural Bolivians should serve as a call to action, what is more disturbing are the results from post-implementation evaluations that show that 50% of toilets are not used as intended. But there is a silver lining to the problems of sustaining sanitation investments, if organizations are willing to think outside the box. Experience from the field has shown that people are often equally, if not more, interested in improving their income, not just their health. This paper will describe the experience of an emerging rural sanitation business in Bolivia that uses composts from ecological toilets to produce pine trees, under which grow a highly marketable form of mushroom.

Introduction

The benefits of ecological sanitation are well-known: it does not need water to function; it protects the environment; and allows the nutrients in human feces and urine to be returned to the soil as fertilizer (Winblad and Simpson-Hébert, 2004). Ecological sanitation has been promoted by many institutions in Bolivia for the last decade, but the country has yet to make a dent in the millions of Bolivians who continue to practice open defecation or some other form of unimproved sanitation. In Latin America, just Bolivia and Haiti have sanitation coverage of less than 50%, and unsurprisingly, Bolivia is also not on track to meet the 2015 Millennium Development Goal for sanitation (WHO/UNICEF, 2010). Only 9% of rural Bolivians have safe, private toilets to take care of their needs, a number similar to many countries in sub-Saharan Africa (WHO/UNICEF, 2010). While the high percentage of rural Bolivians who still practice open defecation (50%) or continue to use an unimproved facility (25%) should serve as a call to action, what is more disturbing are the results from post-implementation evaluations that show toilets are not used as intended in over 50% of the samples (WSP, 1999; UNICEF, 2006; WFP, 2009; WHO/UNICEF, 2010).

While post-implementation evaluations and/or sustainability monitoring are notoriously weak in the water and sanitation sector, the studies that have been conducted in Bolivia highlight the challenges of maintaining an Urine-Diverting Dry Toilet (UDDT) long after the inauguration has ended. An evaluation by UNICEF of a multi-year ecological sanitation program (approximately 6,000 UDDTs constructed in over 400 communities) showed that only 21% of the beneficiaries were using the toilets frequently and correctly (UNICEF, 2006). An ethnographic study of

Key Messages:

- It is time for a paradigm shift in the sanitation sector from project-based charity towards sustainable sanitation services
- Inclusive business strategies potentially include the local private sector in sanitation services
- A rural Bolivian cooperative is experimenting how to increase their incomes by applying fertilizers from UDDTs to pine trees, under which highly valuable mushrooms grow
- The potential to make money by marketing the fertilizers is driving innovation in ecological toilet design
- Economic incentives to use sanitation facilities end up meeting multiple goals: public goal of improved health, personal goal of improved incomes, the environmental goal of increased forestation and protected groundwater; and the sustainability goal of indefinite toilet use

peri-urban areas in Bolivia's largest cities showed the most common advantage eco-san users found in their toilet was that it had been free to acquire (SNV, 2009). Water For People's own internal mid-term evaluation of a multi-community ecological sanitation program found that approximately half of the toilets were being used and optimally maintained, and that the re-use of excreta and urine was the last reason people cited as an advantage of having an ecological sanitation toilet (WFP, 2009).

But there is a silver lining to the problems of sustaining sanitation investments, if organizations are willing to think outside the box. Experience from the field has shown that people are often equally, if not more, interested in improving their monetary income, not just their health. Because of the challenges of behavior change by adopting sanitation practices and maintaining a toilet indefinitely, Water For People—Bolivia and its partners have decided to stop marketing toilets as a health solution, and look for innovative ways for people to make money off of their 'wastes.' In a small, rural municipality several hours outside of the city of Cochabamba, a team of players is determining if we can, in fact, close the loop, by making money from poop.

Inclusive Sanitation Business in Theory

An inclusive business strategy looks for economic opportunities in a variety of non-traditional income-generating sectors, such as sanitation, that can improve human development by including poor people in the value chain as consumers, producers, business owners or employees (UNDP, 2010). There is a small, but growing movement in the sanitation sector calling for a more entrepreneurial approach to sanitation, recognizing that 'business as usual' is not resulting in significant numbers of people accessing improved sanitation (Cairncross, 2004; SDC, 2004; Lane, 2008; Bramley and Breslin, 2010; Doné, 2010).

Figure 1: Map of Bolivia within South America

Inclusive business strategies are a marked change from conventional social development programs, especially when it comes to sanitation programming. The norm in the sanitation sector has been for an implementing agency (government, NGO, etc.) to design a toilet program (However, this is starting to change with methodologies like community-led total sanitation in certain parts of the world). The donors or implementing agency assume people want toilets for health, typically design a single toilet option, and the number of beneficiaries depends directly on their budget. Toilets are completely or heavily subsidized by the implementing agency. Little consideration is given to long-term maintenance or how new community members will be able to build toilets, thus limiting the long-term sustainability of these interventions.

In the case of sanitation, an inclusive business strategy starts by looking at the problem of lack of sanitation by viewing people as potential clients and customers, not passive beneficiaries who simply wait for development to happen to them. There are potential business opportunities all along the sanitation chain: from the purchasing of products and services to construct a toilet, to on-going maintenance (i.e. pit-emptying services, cleaning, etc), to re-use of final products. Inclusive sanitation businesses aim to work with consumers, providers, and local authorities to co-create a win-win situation.

The Growing Inclusive Markets Initiative of the United Nations Development Program (UNDP, 2010) is based on five main principles, and provides a useful framework for analyzing the Bolivian example:

- Core business emphasis
- Developing world focus
- Human development framework
- Locally-led agenda
- Partnership and multi-stakeholder agenda.

Inclusive Business in Practice

Located about one and a half hours from the state capital of Cochabamba, Cuchumuela is like many small, rural, Bolivian municipalities (Figures 1 and 2). About 3,000 people in 14 communities live off subsistence farming and the cultivation of cash crops like potatoes, peaches and prickly pears. Some women have taken advantage of microenterprise ventures to purchase livestock and specialty fowl. The remote location and lack of development also contribute to

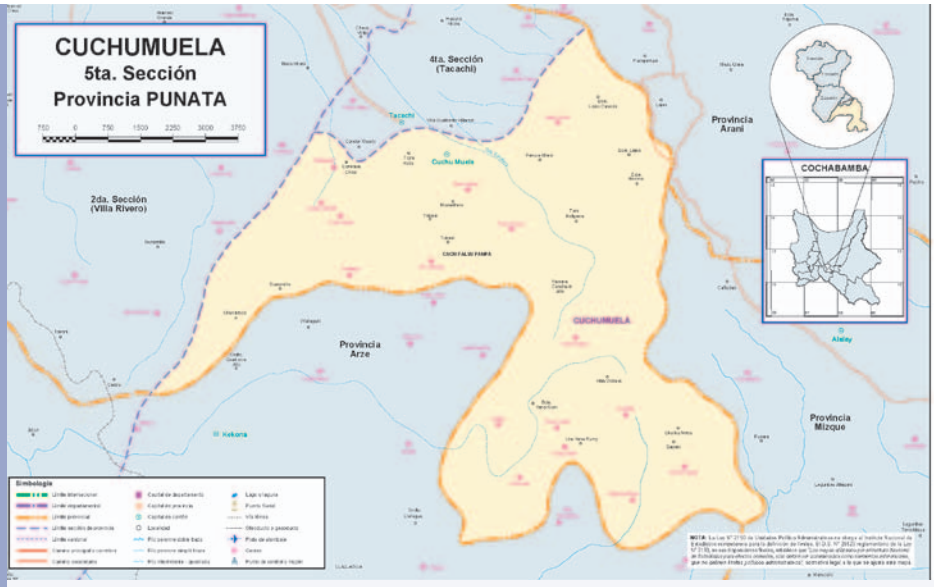

Figure 2. Map of Cuchumuela's location in Cochabamba (SNV, 2010).

the marginalization of these communities and Bolivia is one of the least densely populated countries in the world (6 people per square kilometer), making per capita investments quite high. Cuchumuela thus provides a useful case study for the potential for a rural sanitation business. Although it would be easier to carry out an inclusive sanitation pilot project in densely populated areas, the fact is that seven out of ten people who lack improved sanitation call the rural areas home (WHO/UNICEF, 2010). Innovative models for sanitation business development in rural areas are thus timely and necessary.

While millions of Bolivians grow potatoes, quinoa, and corn, thus saturating the markets for these products, the municipality of Cuchumuela has a comparative advantage with its mushroom production. Fifteen years ago, a state government program reforested part of the rural municipality with pinus radiata pine trees (Los Tiempos, 2007). An unintended consequence of this partial reforestation program was the seasonal production of boletus mushrooms. Once a year, this cash crop brings people from near and far to purchase the mushrooms. Their value is such that middlemen will come to the municipality and go house to house, selecting the best quality product for internal and external markets. The idea for the inclusive sanitation business is to capitalize on this market and the logic is simple: composting toilets produce fertilizers; the fertilizers can be used to increase pine production; more pines means more mushrooms; more mushrooms means more cash in the pockets of Cuchumueleños (Figure 3).

Core Business Emphasis

The business in this case is the use of urine and decomposed feces to create a highly valuable product. The current price for an arroba (25 kg) of unprocessed mushrooms is between 40 and 45 USD (280 to 320 Bolivianos). According to the ex-mayor of Cuchumuela, last year, each family that participated in the mushroom process sold, on average, 20 arrobas at 280 Bolivianos, which is equivalent to 800 USD, a significant amount for a rural Bolivian (SNV, 2010). Each year, approximately fourteen tons of mushrooms are collected, but it is expected that this amount would grow with increased pine production. The mushrooms do not require any type of chemical fertilizer and can thus be promoted as an organic product in both Bolivian and foreign markets. 80% of the families currently participate in the mushroom collection, processing, and sales (SNV, 2010). The majority of people benefiting from the production are women, thus increasing and improving production will directly benefit women in the region.

The initiative grew out of local communities and leaders seeking a way to maximize mushroom production,

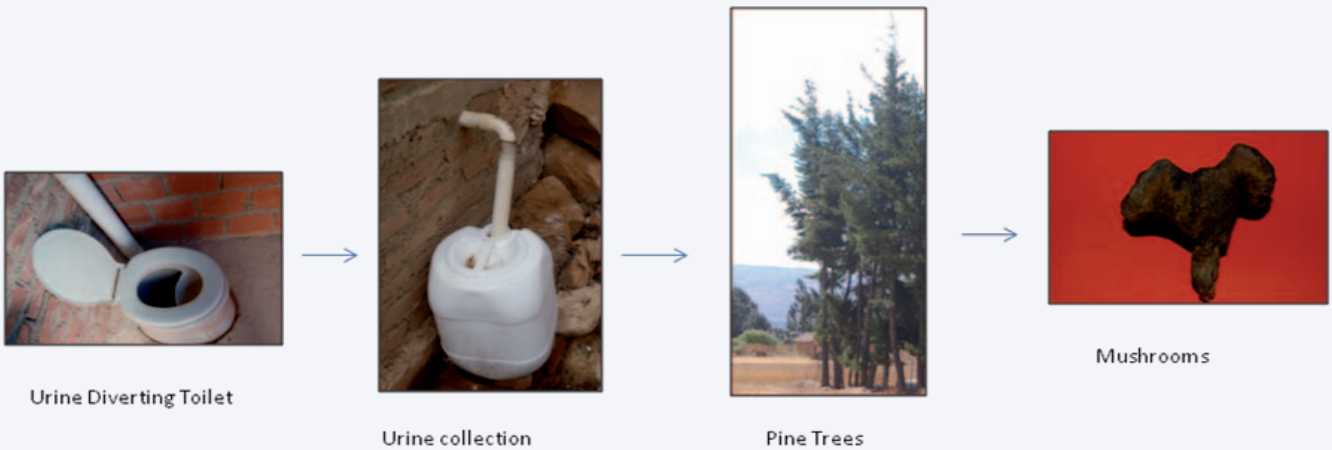

Figure 3: Visual Representation of Business Scheme

not to increase toilet construction or use. While mushroom production is the main potential product, additional products, such as the wood from the pine trees and organic fertilizers, are also being explored. The process for establishing the business is underway: the partner organization SNV is completing a market analysis, which includes both a feasibility analysis of a small, rural business to be self-sustaining and evaluating the potential internal and external markets for mushroom products. PROINPA FOUNDATION, a well-respected non-governmental agricultural investigation organization, is experimenting with ecological compost application and improving mushroom production. Water For People-Bolivia and the local government are supporting creative, women-led innovations that have the dual advantage of reducing toilet costs and re-using another waste product: plastic bottles. Single chambered toilets built with recycled PET bottles are being piloted, as there now exists a collection business (Figure 4). Two liter PET bottles were cut at the neck, filled with dirt, and woven closed with the plastic (Figure 5). Cement is placed between each bottle, which are used to replace adobe or brick walls. The cost savings of re-using bottles was approximately 20% of a similar toilet built with bricks. The goal is to develop a toilet model that can be built with household and government finance, thus reducing the dependency on outside organizations to fund toilets indefinitely. Promotion messages have already changed from positive health impacts to mushrooms and more and more residents are building composting toilets over water based ones.
Currently, the program is in the middle of the implementation process.

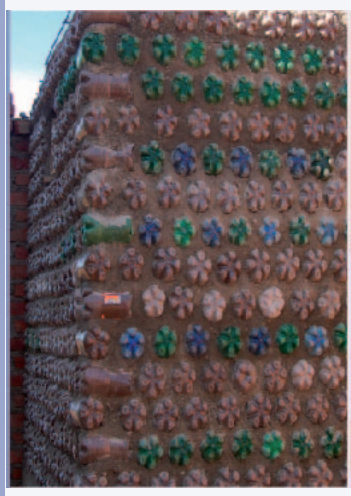

Figure 4: Single chamber toilet built with recycled PET bottles

Figure 5. Doña Margarita displays the bottle technique used in her toilet

Figure 6. Interior of bathroom with urine diverting toilet

- The first phase of this endeavor was the construction of UDDTs in the communities that compose the SubCentral (political unit of multiple communities) of Ura Yana Rumi, Cuchumuela. This phase has been completed.

- The second phase of the process includes several steps: understanding the market for mushrooms, and other potential products in their region; developing a sustainable business model; and testing the fertilizer applications on the pine trees. The program is currently in this second phase.

- The third phase will be planting the pine trees, harvesting the mushrooms, and improving mushroom production, which is expected to take place in late 2011.

Enterprising Cuchumueleños are actively driving the process. As the technology implemented in this area was urine-diverting, double chamber toilets (Figure6), urine collection has begun while the solid wastes continue to compost in situ until the construction of the vermicomposting site is completed later this year.

Urine is currently being diverted into 20 liter containers, which are collected by point people in each community (Figure 7) and stored in larger tanks

Figure 7. Urine collection containers.

for fermentation. The first round of urine collection involved going to each individual home, but this is expected to be too expensive, as homes are dispersed, and time consuming to be sustainable. The next round will include a centralized storage contained in each community, so that the transport to the fermentation site and nursery can be as efficient as possible. Community members are collaborating with the local government in the construction of the pine nursery and collection/treatment site, which will test vermicomposting as a secondary composting process for the dried feces. Experiments with urine application are underway to determine where the application of the diluted product provides the best results in the pine trees.

Next we will analyze the different aspects of Inclusive Market Strategy with respect to this excrement-to-pine-to mushroom endeavor".

Developing World Focus
This factor of the UNDP's Inclusive Markets Strategy does not merit much discussion, as it is taking place in Bolivia, one of the poorest countries in Latin America. Poverty is widespread in the rural Bolivian countryside, especially amongst indigenous communities, where the majority live on less than US$2 a day.

Human Development Framework
An inclusive sanitation business marries the goals of improved human development through access to toilets and improved economic development through increased incomes. Moreover, the job of mushroom collection has historically been a woman's job in Cuchumuela. Formalizing and increasing women's income is expected to have positive impacts on many other human development indicators.

Locally-led Agenda
The idea to close the loop by making money from poop emerged from rural communities and the local government of Cuchumuela. In its role as facilitator, Water For People has brought together key partners to participate in the pilot project. Cuchumuela has already made a national name for its mushroom production, as they have hosted an annual Mushroom Fair for the last five years, where merchants from La Paz and Peru come to purchase the product.

Partnerships and Multi-stakeholder Agenda
Partnerships are essential for Water For People's work, and perhaps even more so when trying a new methodology that requires the institution to seek new types of partners. Inclusive business strategies also require new business models that demand a multi-partner approach (Prahalad, 2006). The first step in the process was to work with the current actors involved in sanitation and agricultural production in the municipality. This initially included the local government, Water For People, communities, the Embassy of Belgium, SNV. Since then, another key partner, the PROINPA Foundation, which specializes in agricultural investigation, has also joined the working group.

Conclusion: Towards Sustainable Sanitation?

Sustainable sanitation refers to sanitation that protects human and environmental health, and is affordable, acceptable, and technologically appropriate (Winblad and Simpson-Hébert, 2004). One of the limits of current sanitation programming is its project-based approached; rather than looking at sanitation as a system. Short-term projects are often implemented that do little to reform the systematic challenges around sanitation in developing countries. But investigating the business opportunities around sanitation could provide a more sustainable approach to the global sanitation crisis, in which people can continue to replicate the system without dependence on outside intervention.

Economic incentives can be quite powerful, and in the case of sanitation promotion, could serve to meet multiple objectives:

- the *public* goal of improved health, as users are economically motivated to use and maintain their toilets;
- the *personal* goal of improved incomes, as the end products are not lost but captured in a productive manner
- the *environmental* goal of protecting the natural areas through increased forestation
- the *sustainability* goal of indefinite use of toilet facilities by economically motivated users and the adoption of safe sanitation practices and systems by others

This Bolivian example provides one case in which the end products of ecological sanitation may provide higher incomes for users. There are key obstacles to be overcome in this specific case, including weak distribution channels and high transportation costs, characteristic of dispersed, rural areas. Potential for replication in Bolivia and other agricultural-dependent areas is possible, and one of the key lessons learned at Water For People is to start new sanitation programs by identifying business opportunities along the sanitation chain, as opposed to waiting until toilet construction is completed. It is time for a paradigm shift in the sanitation sector, and not only in densely populated urban areas. This example shows that creative, innovative, inclusive business opportunities exist in rural areas, as well.

References

Bramley, S., Breslin, E. (2010): Sanitation as a Business: A new spin on the challenge of sanitation operation and maintenance. Sustainable Sanitation Practice 2(1), 10-14.

Cairncross, S. (2004): The Case for Marketing Sanitation. Water Sanitation Program, Nairobi, Kenya.

Los Tiempos (2007). El Champiñon de Cuchumuela sale de su escondite para gustar. http://www.lostiempos.com/diario/actualidad/economia/20070415/el-champinon-de-cuchu-muela-sale-de-su-escondite-para_8238_9118.html [date of visit: 3 September 2010].

Koné, D. (2010): Making urban excreta and wastewater management contribute to cities' economic development: a paradigm shift. Water Policy,12(4), 602–610.

Lane, J. (2008): Aid Effectiveness in the New Age of Demand-Driven Sanitation. Asian Water Journal (October 2008), 29-30.

Prahalad, C.K (2006): The Fortune at the Bottom of the Pyramid. Wharton School Publishing, Philadelphia, PA, USA.

SDC (2004): Sanitation is a Business; Approaches for demand-oriented policies. Swiss Agency for Development and Cooperation, Bern, Switzerland.

SNV (2009): Estudio Etnográfico sobre Agua y Saneamiento Básico en Regiones de Alta Concentración de Base de la Pirámide. SNV, La Paz, Bolivia.

SNV (2010): Plan de Negocios: Proceso de recolección y comercialización de hongo silvestres, en el municipio de Cuchumuela. SNV, La Paz, Bolivia.

UNDP (2010): Growing Inclusive Markets. Principles and Approaches. United Nations Development Program: http://www.growinginclusivemarkets.org/about/approach/. [date of visit: 31 July 2010].

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