

ECOLOGICAL SANITATION AND URBAN AGRICULTURE- TEPOZECO PROJECT, MÉXICO

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ABSTRACT

The establishment of sanitation systems that close the nutrient loop and help to conserve water are a guarantee for the sustainability of ecosystems and food security. A strategic link between ecological sanitation and urban agriculture will permit an appropriate application of these principles.

The TepozEco project, a pilot Urban Ecological Sanitation program for, seeks to demonstrate the possibility of using this approach as an alternative to conventional systems.

INTRODUCTION

Ecological Sanitation (EcoSan) takes as its example the sustainability of natural ecosystems, which establish closed or semi-closed loops through which most of the chemical and biological elements of the system are continuously recycled through the food chains and these elements are broken up into plant food which will then be integrated back into a new cycle.

The concept of Ecological Sanitation refers to a specific sanitation focus that permits the sustainability of the ecosystem and the human settlement where it is being implemented, by providing sanitary conditions for the local population, conserving water and closing the nutrient cycle.

The above is achieved through the water conservation, establishing barriers against pathogens present in human excreta (eco-toilets), the treatment of excreta (urine and feces) for its hygienization and reincorporation into the soil, as well as the management of organic residues in general (generated by the practices of the population) as elements of great agricultural value in the production of food and for the fertility and sustainability of the ecosystem.

Urban agriculture is defined as the kind of agriculture that takes place within an urban area as well as in its surroundings, and it differs from rural agriculture in that it establishes greater exchange with the economic sector (labor and product markets) and the environmental sector (organic material and water).

Urban Agriculture, within a system of Ecological Sanitation, becomes the perfect way to be able to reincorporate organic waste (close the nutrient loops), conserve water, establish a sustainable agriculture and guarantee food security.

The present work, started January of 2003 within the framework of a TepozEco Urban Ecological Sanitation Pilot Project, in the Municipality of Tepoztlán, Morelos, Mexico, proposes to establish a replicable model for other places in Latin America with similar characteristics. The Project promotes the use of ecological toilets (urine-diverting dry toilets, fossa-alterna, arborloo, and others), greywater filters, rainwater harvesting, and the recycling of the organic residues of these systems for household use and for the production of vegetables (close the nutrient loop).

METHODOLOGY

- The TepozEco project is established in a town with the following characteristics:
- Place: Municipality of Tepoztlán, State of Morelos, Mexico
- Total land area: 260 Km²
- Total population: 35,000
- Main centre: 18,000
- Family income: 2,000-7,000 USD/yr
- Water supply: nearly 50 % household connections

Sanitation systems: Substandard domestic septic system (60-70% in town); incomplete downtown sewage system; pit latrines and open-air defecation; and more than 100 ecological toilets.

TepozEco includes an intensive as well as an extensive strategy for the establishing of EcoSan throughout the area. It uses a particular participatory methodology (SARAR) in workshops and community trainings. It also helps to strengthen links with different institutions, the general population and local government authorities to guarantee the acceptance of the eco-technologies and the success of the project.

The reincorporation of organic residues as well as investigations around the handling, storage, treatment and use of these, are carried out at 3 levels: household (backyard orchards), municipal (Municipal Composting Centre) and in the field (field tests in agricultural cultivations).

Activities that are carried out in each one of these:

Orchards and gardens. - Production of backyard plants, trees and vegetables using "Orinoponics". Orinoponics consists of a bed of organic material (leaves and grass cuttings) to which fermented urine is applied. On top of this 10-15 cm of soil is applied and then something is planted or transplanted. (see Arroyo, 2003); urine application in trees, gardens and grass; homemade compost; urine application in compost; and backyard research.

Municipal Composting Centre. - Composting with tree prunings and garden cuttings; urine application in compost; secondary treatment of feces through thermophilic composting, above 50° C; and, in the near future, composting with household organic waste (fruits and vegetables).

Field tests - Application of different doses of urine alone, and compost and urine, on crops (*nopal* cactus, corn, pumpkin, and avocado).

RESULTS AND CONCLUSIONS

The following is a list of accomplishments of the TepozEco Project in 2003 and up to September, 2004:

1.- There is a Demonstration Center to promote the project. This Center serves to inform the general public. It has a demonstration area with orinoponics gardens, compost and urine storage. It has a dry toilet and other eco-technologies that the project promotes. The Demonstration Center has appropriate facilities for conducting workshops and courses. The Demonstration Center also seeks to promote the establishment neighborhood composting centers

2.- Urine harvesting – The project is developing the infrastructure and logistics for a system for urine collection, transportation, storage and application for agricultural use. Urine is being harvested through public urinals, as well as in schools, restaurants and other establishments.

3.- The establishing of an interinstitutional municipal composting centre that operates since August 2003, with technical support from the project.

4.- The carrying out of urine application tests with different doses in compost piles.

5.- Initiating tests for secondary treatment of feces in thermophilic composting temperatures above 50C to guarantee the sterilization of the material.

6.- The establishing of the appropriate framework so that the Composting Centre can be a place for receiving and transforming organic residuals in general, for its later use in crops, nurseries and gardens, as well as to become the impetus for municipal authorities to establish solid waste separation regulations and mechanisms.

7.- Links were made with local farmers who were willing to experiment in their parcels.

8.- Field tests are being done in relation to varying conditions and doses of urine applications in different kinds of local crops.

Food security can only be achieved through ecologically sustainable systems. Conventional sanitation systems represent a high economic cost; they use great amounts of water that later has to be treated; they tend to have a linear behavior (the nutrients and the water leave the system); and they contribute to serious problems of nutrient and chemical contamination through system leakage and direct discharge of untreated effluence.

The in situ EcoSan systems are a promising alternative to achieve the water and sanitation millennium goals. More than 30% of the world's population lacks adequate drinking water and sanitation, while the financial budget and available water resources to cover this demand by means of conventional sanitation systems would not be possible.

REFERENCES

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