

Water and Waste Reuse

Margarida Marchetto

Department of Sanitary and Environmental Engineering, Federal University of Mato Grosso, Brazil

Introduction

The most important demographic trends in the world are the urbanizations. Billions of people in rural and urban areas do not have access to adequate sanitation services. Among the biggest problems is related to the growth demographic is the sanitation.

Beijing the capital of China in 2008 being listed among the world top ten cities suffering from lack of adequate water resources [1]. Beijing is one of the most water-scarce cities in the world.

For many of the developing world, ground water and surface water have already been developed. In most of the developing world like China, all the easily exploitable sources of water such as ground water and surface water, which are easy to be developed geographically, technologically and environmentally, have been over-exploited. And the remaining resources are more complex or too costly to bring to the urban areas.

Wastewater produced in urban area, irrespective of whether it is used or not. Equally, it is essential that wastewater be treated adequately in order to reduce environmental and health hazards for the people. In developing countries as Brazil, China, Mexico and others, the wastewater treatment and disposal facilities exist usually only in the large cities, with its particularly rapidly growing in developing countries.

The new goal of urban wastewater management is not only the safe disposal of human residuals, but also safe reuse of nutrients from sanitary systems and organic parts of solid wastes in agriculture without a harmful accumulation of toxic substances in soil, surface water bodies and groundwater.

Sustainable Sanitation Alliance said in 2014 that poor sanitation continues to kill more people than HIV/AIDS, malaria and measles combined. The majority of the projects are run in India and Sierra Leone, with a growing number in East and West Africa. Ebola is spread through the transmission of blood, secretions and other bodily fluids – including human waste. Without proper toilets people have to use open fields and these can become a breeding ground for the virus, spreading from person to person through both hands and feet. Sanitation and water facilities are facilities crucial in reducing the spread of Ebola [2].

In places with scarce water resources, the practice is to use the previously used water. Residential wastewater are classified as follows:

- ✓ black water : Effluent from toilets, as urine, feces and toilet paper
- ✓ greywater: wastewater, excluding effluent of toilets;
- ✓ Yellow waters: effluent represented only by urine;
- ✓ brown waters: effluent represented only by feces.

The household greywater, which is generated from different sources, e.g., kitchen, shower, bath, and washing machine, usually vary significantly in characters.

According to World Health Organization (WHO), different requirements of recycling water for household use have been established.

The extent of greywater treatment will depend largely on the final discharge and use of the water. If discharged to the sea, no treatment or a simply primary treatment is required, and if discharged to the lakes or rivers, a secondary treatment step is often needed. A further treatment that is aimed to reduce levels of organic pollutants and heavy metals is especially important when greywater is used for groundwater recharge and for irrigation. For in-house reuse and drinking water, a sophisticated tertiary treatment may be necessary.

The main objectives of ecological sanitation are: [3]

- To reduce the health risks related to sanitation, contaminated water and waste [4].
- To prevent the pollution of surface and ground water.
- To reuse nutrients or energy contained within wastes.

An ecological sanitation (ecosan) viewpoint sees human waste and wastewater as an opportunity. When properly designed and operated, ecosan systems provide a hygienically safe, economical, and closed-loop system to convert human wastes into nutrients to be returned to the soil, and water to be returned to the land.

In the Figure 2 are the Maps showing the location of Guangxi Zhuang, Autonomous Region, Tanum-Sweden, Frankfurt-Germany, Haiti earthquake.

Tanum Municipality (Tanums kommun) is a municipality in

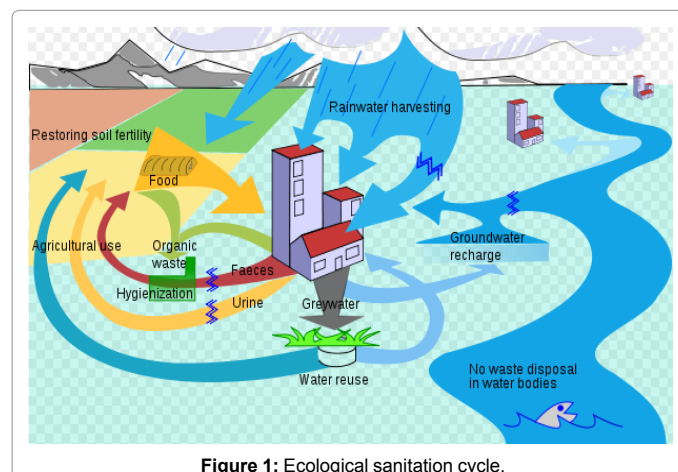


Figure 1: Ecological sanitation cycle.

***Corresponding author:** Margarida Marchetto, Department of Sanitary and Environmental Engineering, Federal University of Mato Grosso, Brazil, Tel: 6584275693; E-mail: marchetto.ro@gmail.com

Received September 29, 2014; **Accepted** September 30, 2014; **Published** October 01, 2014

Citation: Marchetto M (2014) Water and Waste Reuse. Int J Waste Resources 4: e109. doi: 10.4172/2252-5211.1000e109

Copyright: © 2014 Marchetto M. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.



Figure 2: Maps of different regions showing the location of 1. Tanum- Sweden, 2. Guangxi Zhuang Autonomous Region 3. Frankfurt-Germany 4. Haiti earthquake, 5. Tamil Nadu -India and .6. São Paulo-Brazil.

Vastra Gotaland County in western Sweden. is a Scandinavian country in Northern Europe. Its seat is located in the town of Tanumshede, with 1,600 inhabitants. in Sweden has introduced urine separation toilets to recover phosphorus.

Paul Calvert, a British engineer and boat builder, who has lived in southern India for long, has been working on the development of dry compost toilets in southern India for over a decade [5]. The group provides technology and hand-holding for different ecologically sustainable solid waste management systems, of which the primary model is the ecosan toilet. This toilet separates the solid waste and converts it into compost-fertilizer, while using the urine and black-water (used for washing after defecation) for kitchen gardens.

Guangxi Province, China, is location in mountainous terrain in the far south of China, large-scale project of urine diverting dehydration toilets. The dissemination programme of ecological dry toilets for Hsinchu Country. One of the poorest provinces in China is a Chinese autonomous region in South Central China, bordering Vietnam. started in 1997 with support of United Nations Children's Fund UNICEF, SIDA and the International Red Cross and Red Crescent Movement is an international Humanitarian movement with approximately 97 million volunteers, members and staff worldwide which was founded to protect human life and health, to ensure respect for all human beings, and to prevent and alleviate human suffering) and has been expanded to 17 provinces until the year 2003. By this year, the scale of the project had increased to approximately 685,000 toilet units – today more than one million double vault urine diversion dehydration toilets (UDDTs) are installed in rural areas of China.

KfW, Frankfurt, Germany - vacuum toilets + greywater treatment GTZ. (2005) [6]. The sanitation concept of the modern office building “Ostarkarde” of the KfW (formerly KfW Bankengruppe (banking group), is a German government-owned development bank, based in FRankfurt. Its name originally comes from Kreditanstalt für Wiede raufbau, meaning *Reconstruction Credit Institute*) Bankengruppe in Frankfurt is based on a separate excreta and grey water collection. While urine and faeces are collected via vacuum

toilets and a vacuum sewerage using much less water for flushing, the greywater from hand washing and kitchen is collected and treated separately in a compact activates Sludge reactor combined with membrane filtration. The treated greywater is then reused for toilet flushing and cleaning water. The amount of grey water can be reduced by 76% by this cost-efficient system which could be one of the prior choices for sanitation systems of newly constructed office buildings

The Sustainable Organic Integrated Livelihoods - SOIL in Haiti built ecological dry toilets as part of the emergency relief effort following the 2010 Haiti earthquake. More than 20,000 Haitians are currently using SOIL ecological sanitation toilets and SOIL has produced over 400,000 liters of compost as a result. The compost is used for agricultural and reforestation projects [7]. Similar project by UNDP [8] and Earth Aid Finland [9] has built composting toilets provided by Biolan in Haiti to fight cholera in to improve the general sanitary conditions. Earth Aid Finland delivers the first Compost Toilet Centers to Haiti.

- The **United Nations Development Programme (UNDP)** is the United Nations' global development network. Headquartered in New York City- UNDP advocates for change and connects countries to knowledge, experience and resources to help people build a better life.

Wherever the Need build ecosan facilities in various parts of the developing world. They predominantly work in Tamil Nadu (India), where the Tamil Nadu State Government provides subsidies for their work. Wherever the Need have also constructed ecosan in other parts of rural India, Kenya and Sierra Leone. Their ecosan projects have positively affected 50,000 people in the developing world.

- **EcoSan Education.** In 2011, The document, SOIL published The SOIL Guide to Ecological Sanitation, describes SOIL's five years of ecological sanitation experience in Haiti. It covers topics such as toilet designs, management strategies, composting techniques, and lessons learned.

According to the biggest expert in the field of reuse in Brazil prof Ivanildo Espanhol (2014) [10] are produced in São Paulo metropolitan region, about 60 thousand liters of sewage per second. With water

scarcity registered in the state of São Paulo and he ONU technicians argue that the technique is used and what it takes "to look at sewage as a resource."

Reference:

1. Zhang Dongqing (2008) Reuse-oriented Decentralized Wastewater Treatment based on Ecological Sanitation in fast growing Agglomerations Technische Universität Dortmund, Germany.
2. <http://www.wheretheebola.org/ebola/>
3. International Water Association (2003) 10 Recommendations for Action. International Ecosan Symposium, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ). Lübeck, Germany.
4. Donaldson, Ross (2009). The Lassa Ward. St. Martin's Press, New York, USA.
5. Property Plus Kochi : Study this plant fertilizer (2007) The Hindu.
6. GTZ (2005) Vacuum sewerage and greywater recycling, office building "Ostarkade" of the KfW Bankengruppe, Ecosan project data sheet #001, Frankfurt am Main, Germany.
7. Dell'Amore Christine (2011) "Human Waste to Revive Haitian Farmland?", The National Geographic,
8. United Nations Development Programme (UNDP)
9. Earth Aid Finland delivers the first Compost Toilet Centers to Haiti.
10. Espanhol Ivanildo (2014) <http://www1.folha.uol.com.br/cotidiano/2014/09/1519477-com-agua-de-reuso-grande-sp> Retrieved 2014-09-28.