



Onsite Differentiable Treatment System: the System for achieving Sustainability in the Sanitation System

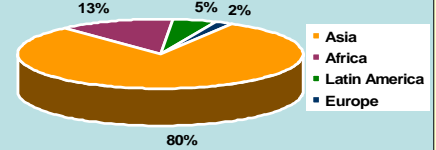
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Why do we have to develop new sanitation system ?

- Achieve the Millennium Development Goals
 - 2,4 billion people have inadequate sanitation and/or no means of wastewater disposal
 - Increasing scarcity and degrading quality of freshwater
 - 80 % of all diseases and 25 % of all deaths in developing countries can be attributed to polluted water (WHO)
 - Up to 5.5 billion people suffer poor sanitation by the year 2035, that is, if sanitation provisions continue to be installed based on the current standards.
- It becomes evident that the capacity of the global money market would not be sufficient to cover the need for investment capital for centralized system (Peter Wilder, 2002)

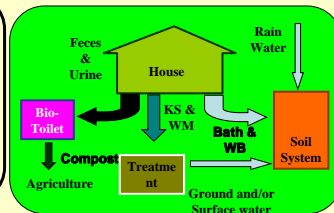
Distribution of the global population not served with improved sanitation (WHO, 2001)



Onsite Wastewater Differentiable Treatment System

Don't collect

- The rehabilitation cost for the piping system for centralized system is estimated to be very huge.
- A significant amount of the drinking water is used as a means to transport the pollutants in centralized system.



Don't Mix

- The wastewater effluent from a house hold is made of contributions from various appliances.
- The fractioning of household wastewater into Black, higher loaded gray water (Kitchen Sink and Washing Machine) and lower loaded gray water (Bath and Wash Basin) is essential.
- Black water (feces and urine) contains 97% of NH3-N, 80% of PO4-P, 44% of organic load and this fraction is treated by Bio-toilet (composting toilet).

Benefits of Onsite Wastewater Treatment System

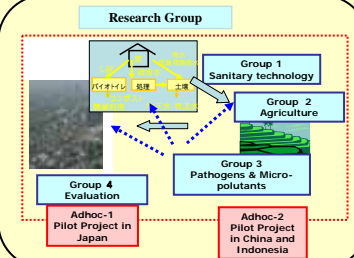
- Separating black water gives
 - Recovery and recycle of nutrients
 - Elimination of micro-pollutants in urine
 - Elimination of sources of pathogens
- Reduction of wastewater flow
- Conservation of water resources
- Stabilization of micro-pollutants

- On-site treatment eliminates pipe system
- The system creates Material cycle and New social system such as M&O NPO or company.

An Interdisciplinary research project has launched With 6 research groups from Japan, China, and Indonesia

Goal of the project are

- Developing the Onsite Wastewater Differentiable Treatment System (OWDTS)
- Proposing tactics for implementation of this system to the developing countries
- Based on The concept of sustainability and Bio- and eco- technology from Japan
- The Project is supported by Japan Science and Technology Agency: Core Research for Evolution Science and Technology (CREST)



Group 1 Sanitary technologies

- (1) The bio-toilet is an essential treatment unit.
 - Aerobic fermentation system achieved by mixing and heating system
 - Sawdust plays an important role as an artificial soil matrix

- Developing design procedure and operation criteria by considering fate of organic matter, pathogen, water, nitrogen, pharmaceutical residues, and estrogen
- (2) Physical and Biological processes are being investigated for gray water treatment. These include membrane bio-reactor; soil treatment system; and combined system with soil and vegetations



Group 2 Agriculture

- The final product is compost
- Recycling nutrients and organic matter is essential part of this project.
- This group studies the application compost.

Group 3 Pathogens & Micro-Pollutants

- Pathogens in feces are main concern in protecting public health
- Research work for assessing health risks and setting operational criteria is an important part of our project .

- It is well known that hormone is present in urine. Pharmaceutical residues is also discharged from human body through urine.
- Studying the fate and transport of these micro-pollutants and development of bio-assay technologies and LC/MS/MS protocols are also our important topic.

Group 4 Evaluation

- Introducing new system will change the water and material flow in the watershed.
- We will evaluate the sustainability of the system in terms of social, economical and environmental aspects, which includes human risk assessment by DALYs concept, Life cycle.

Adhoc-1,2 Pilot project

- The purposes of the pilot project are
 - Evaluating the performance of the OWDTS
 - Confirming the maintenance and operation protocols
 - Displaying the OWDTS to public and let them know the validity of the system
 - Obtaining feedback from the public

- We have already started to operate the OWDTS in Japan and in China (Changchun, Nangjing, and Xi'an) and at Indonesia (Bandong).



Research sites in our CREST Project

