

Diorama of Low-Cost Water Supply, Sanitation and Hygiene (WASH) Technologies



Philippine Center for Water and Sanitation
WASH Coalition Pilipinas
www.itnphil.org.ph



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The Philippine Center for Water and Sanitation (PCWS) teaches communities and NGOs about [low-cost alternative wastewater treatment for communities and households \(LOCAL WATCH\)](#) made of ferro-cement.

The [LOCAL WATCH](#) technology includes [biogas digester septic tank](#), [baffled reactor](#), [anaerobic filter](#), [gravel filter](#), [planted gravel filter](#) and [small pond](#) so that the wastewater is treated for re-use in food production and horticulture.



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The ferro-cement **biogas digester septic tank** is an underground structure that could also take in other biodegradable wastes and convert them into methane gas for cooking meals. The **biogas digester septic tank** is fed by the pipe from the toilet bowl. Another pipe brings biodegradable solid waste, manure and livestock waste-water into the **biogas digester septic tank**.

Effluent from the **biogas digester septic tank** is still very dirty so other technologies such as **baffled reactor**, **anaerobic filter**, **gravel filter**, **planted gravel filter** and **lotus pond** further clean the wastewater before it could be reused or released into the environment.



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A **baffled reactor** is a four- to seven-chamber vertical-flow tank. The partially treated wastewater from the **biogas digester septic tank** enters the **baffled reactor** to be removed of up to 90% of its biochemical oxygen demand (BOD).

Like the **biogas digester**, the ferro-cement **baffled reactor** and the **anaerobic filter** are also built underground to save on space, while the **planted gravel filter** and the **small pond** are integral parts of the garden.



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The **anaerobic filter** is a tank that further treats the wastewater coming from the **baffled reactor** to bring BOD down to as little as 5ppm, and e-coli count to as few as 5 per 100ml. **Anaerobic filter** reduces the odor in wastewater. Much of the ammonia load is also converted to nitrate.

The **gravel filter** and the **planted gravel filter** further clean the wastewater coming from the **anaerobic filter**. The **planted gravel filter** is usually planted with extensive-rooting hydrophytes to increase cleansing effectiveness.



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The **pond** receives the wastewater cleansed by the gravel filters. It could be planted with lotus and water lilies and also stocked with fishes. The **pond** allows air and sunlight to do their part in wastewater treatment.

The thriving fishes in the **pond** indicate that the **LOCAL WATCH** technology -- from the **biogas digester septic tank, baffled reactor, anaerobic filter, gravel filter, planted gravel filter** up to the **pond** -- is functioning well. It shows that the wastewater had been treated and could already be re-used for gardening or could now be safely disposed of to the creek or other water bodies.



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Below ground shows biogas digester septic tank, baffled reactor and anaerobic filter. Above ground shows a planted gravel filter and a rainwater harvesting tank.



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Hog manure goes to the biogas digester and gets converted into methane gas cooking fuel.



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Top view of biogas digester serving as the septic tank of the toilet next to it. The biogas digester is connected to a baffled reactor, which is then connected to an anaerobic filter, from where the wastewater gets transported to a planted gravel filter.



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From the planted gravel filter, the treated wastewater goes to the pond where it gets aerated and exposed to sunlight.



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Methane gas produced by the biogas digester is used as fuel to cook meals.



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The LOCAL WATCH technology that converts human and livestock wastes into methane gas for cooking fuel and treats wastewater for re-use or safe disposal.



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Low-cost water supply technologies shown on this diorama:

1. rainwater harvesting system with a ferrocement tank
2. gravity flow water system with a spring box made of ferrocement, a transmission pipe, a distribution pipe, and a tap stand
3. hand pump with iron removal filter



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A ferrocement rainwater harvesting tank collects roof run-off.



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Spring box with transmission pipe, distribution pipe and tap stand.

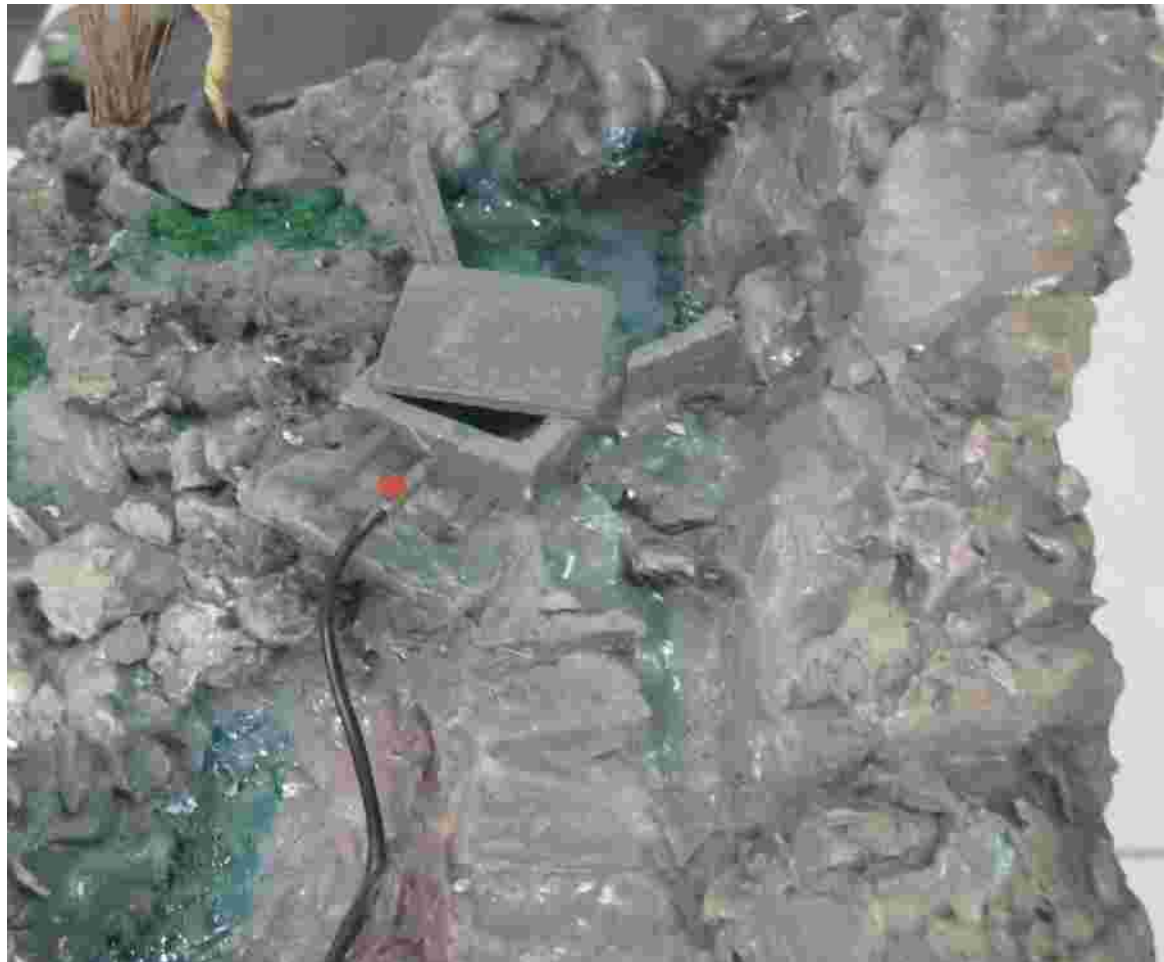


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Detail of spring box with transmission pipe



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Hand pump on the foreground and tap stand on the background.



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Hand pump and iron removal filter



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Scale models of biogas digester septic tank, moulds for iron removal filter, and an iron removal filter in the foreground; a diorama of low-cost WASH technologies in the background.



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Low-cost WASH Technologies





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The diorama and scale models of low-cost WASH technologies were made by Engr. Apol Jimenez, Adzlie Mohammadbakie and Mitch Doren.



For more information please contact



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