

# Rainwater Harvesting (RWH): Simple practices to safeguard human health and protect water quality

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## Project Background

A recent resurgence in interest in Rainwater Harvesting (RWH) in the Caribbean as a water augmentation technique to build climate resilience, has been coupled with a focus on water safety and water quality. Work done by regional agencies such as the Caribbean Public Health Agency (CARPHA) and the Global Water Partnership-Caribbean (GWP-C) has showcased the use of simple technologies to protect water quality including first flush filters, meshes and screens in RWH systems. These technologies have been adopted and used since 2011 in Trinidad through the Environmental Solutions for Sustainable Communities Project executed by the National Institute of Higher Education, Research, Science and Technology (NIHERST) in partnership with GWP-C, the Water Resources Agency (WRA), and the Ministry of Community Development, among others. Over time, improvements have been made to the original design of the system in order to better adapt rainwater harvesting technologies to local conditions, better protect water quality and improve the overall efficiency and quality of the rainwater harvesting process.

### Original GWP-C/CARPHA Rainwater Harvesting system design



#### The catchment area

Commonly, roofs are used as catchment areas. Chemically neutral materials such as aluminium or galvanized sheets are usually recommended as roofing materials suitable for catchments.

#### The conveyance system

This is usually composed of a series of gutters and pipes, leading from the roof to the tank. Size and length of pipes are determined by the volume of water collected and distance to the tank.

**INNOVATION:** Roof guttering: the systems in the Environmental Solutions for Sustainable Communities Project utilise gutters covered with mesh to reduce the entry of leaves and organic matter into the pipes and storage tank. Mesh integrity needs to be monitored on a regular basis and replaced if any signs of rust develop. Zinc-covered mesh is more resistant to weathering and is therefore recommended for this purpose.

#### The storage device

Storage is usually either by above ground tanks or below ground cisterns. Cisterns are more permanent, stable structures, usually made of concrete. Above ground storage is usually via plastic tanks.

**INNOVATION:** A tank water level indicator is now available. Initial water level indicators consisted of a strip of clear plastic embedded within the tank wall, however, due to light, heat and rainfall, the clear plastic strips had a tendency to warp and resulted in tank leaks. An improved version consists of a clear plastic hose, which is easy to remove and clean once installed.



Rainwater Harvesting installation at Fondes Amandes Community Reforestation Project (FACRP) in St. Ann's, Trinidad

**INNOVATION:** An additional plastic filtration basket was specifically designed for Rainwater Harvesting systems. The basket fits snugly on top of the tank and acts as an additional filter between the first flush diverter and the tank. It was created based on an international design but was modified to suit the local context. The basket is produced locally, is considerably cheaper than the international options, and can easily be adapted to any size water tank.

#### Acknowledgements

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#### The pump

A pump may be necessary to transfer water from the tank to taps. Solar-powered pumps are available and are well-suited for emergency shelters, where electricity is unlikely to be available immediately after extreme weather events. Elevation of storage tanks may increase water pressure, depending on the grade of the roof and the height of the house, thus reducing the need for a pump.

#### Additional filters and sanitation

It is recommended that once the water is to be used for drinking, it should be boiled or otherwise disinfected. Disinfection with chlorine (bleach) is one recommended method. In some cases, ultraviolet (UV) filters should also be used for further protection. Where rainwater is to be used for washrooms or irrigation of crops, additional filtration is not necessary.

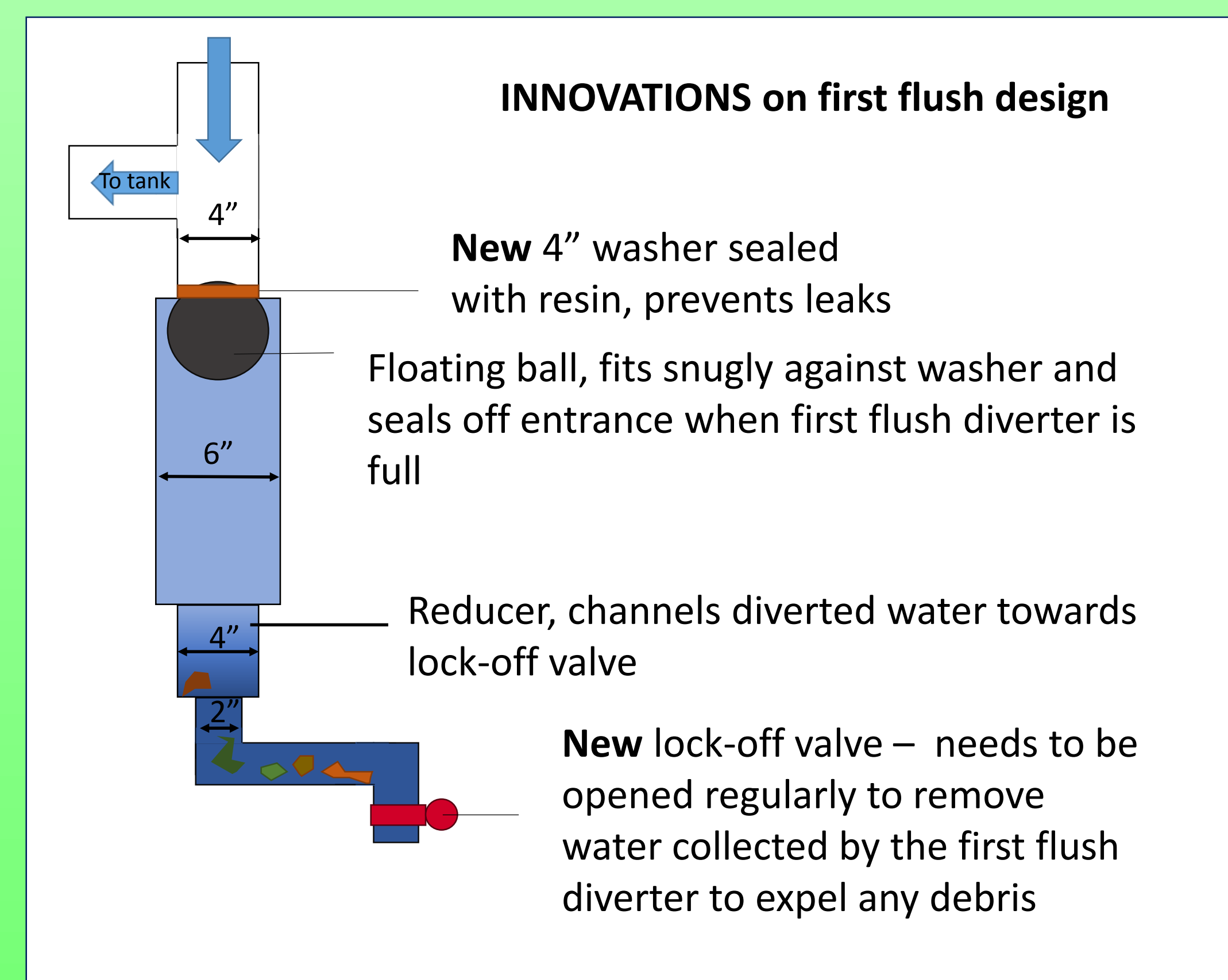


#### Measures to reduce vector-borne diseases

It is highly recommended that any open pipes are covered with fine mesh in order to prevent mosquitoes from entering the system. Tank covers must be secure. If mosquito larvae are discovered, it is recommended that the relevant environmental health department is contacted for further instructions.

#### The first flush diverter

The first flush diverter is a system designed to remove debris, animal droppings and other particulate matter, which may have accumulated on the roofs, from the harvested rainwater supply by diverting the first set of rainwater to a separate pipe, which can be opened, flushed and cleaned. The length of the first flush diverter depends on the size of the catchment area. Three designs are currently in use – the simple design, the float-ball mechanism design and the upflow design. The float-ball mechanism is currently the most widely used installation at a number of locations throughout Trinidad.



#### Innovations on original design

