Some Lessons

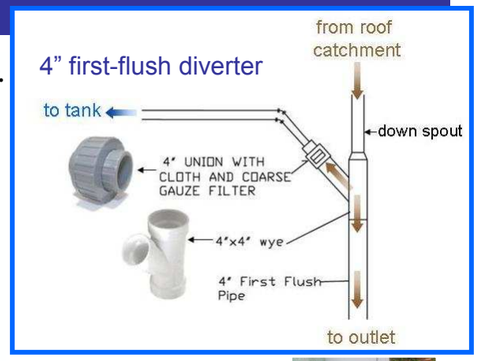
Ease of system operation: Servicing of the filter could be made easier. The use of a bolted coupling could present challenges in dismantling.
Recommendation: Use wye and union (with filter inserted) fittings to avoid use of bolted coupling (see diagram).

Availability of components: The 6" pipes and fittings used are not easily available. The 6" piping and fittings may be more useful for large-scale water harvesters, such as schools, hospitals, industries and other institutional buildings rather than households.
Recommendation: For smaller structures and homes it may be preferable to use 4" pipes and fittings for the system.

Filter maintenance: The cloth filter in the first-flush diverter restricted the flow of the water in the case of the school and in the household. In the case of the school, the volume of water was high (given the large roof area) and exceeded the rate at which the water could be filtered though the cloth. For the household, given its location in an urban environment with heavy vehicular traffic, the dust and soot in the water quickly clogged the pores in the cloth, restricting water filtration.
Recommendation: Experiment with different fabrics depending on catchment area and pollution exposure. The system needs to be monitored and the filters cleaned/replaced on a regular basis.

Water quality monitoring: Target properties found that the new first flush diverter seemed to improve the quality of the water. This claim has to be verified through the systematic testing of the water prior to and after the installations.
Recommendation: Follow-up testing of the water quality in the target systems and compare quality to RWH systems in close proximity that use similar catchment, conveyance and storage systems.

Operation of the first-flush diverter: The effectiveness of the initial rainfall in removing hardened-on deposits on the roof depends on the nature of the material on the roof (depth of the deposits and its cohesiveness, which in turn is related to the duration of the rainless period), the intensity and duration of the subsequent rainfall. Animal droppings and resins from trees for example can be difficult to dislodge and the volume of first flush that will be required to satisfactorily remove these deposits will depend on these factors.
Recommendation: In cases where the roof has remain unwashed for a long period, then the first flush diverter should remain in a open position for the first several minutes of rainfall before being manually closed off.




6" coupling


Contamination residue on the first-flush cloth filter

A collaborative effort between the
Caribbean Environmental Health Institute (CEHI), the Antigua Public Utilities Authority (APUA), and the United Nations Development Programme (UNEP)

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Rainwater Harvesting in the Caribbean
Improving Water Quality

Project to Promote Rainwater Harvesting in the Caribbean Phase 2

The **Caribbean Environmental Health Institute** (CEHI) and the **United Nations Environment Programme** (UNEP), are collaborating on a Project to demonstrate best practices for **Rain Water Harvesting** (RWH) in the Caribbean. RWH is an old practice that is gaining significant attention because it can enhance water security in light of stresses on the region's freshwater resources. These stresses result from pollution, issues with water supply and the threats of climate change. Climate change will likely result in changing rainfall patterns and rising sea levels, both of which will impact fresh water resources; reduced rainfall will lessen the amount of water in ground water aquifers and rivers, while rising sea levels will cause saline water to intrude into wells.

Demonstration models showing best practices for RWH in Antigua and Barbuda were developed. These models show RWH practitioners and the public how to improve the quality of harvested and stored water by incorporating certain elements into the design of the systems.

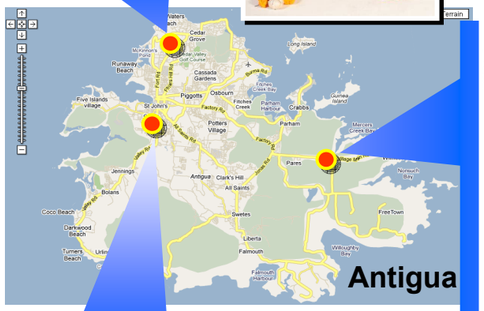
This Project is a follow-up to a first phase of the CEHI-UNEP initiative to promote the practice of RWH in the region. Grenada was used as a pilot to develop a National Programme to promote RWH. During that phase, a Regional RWH Programme was developed for the Caribbean and it included the production of public awareness material such as posters, radio public service announcements, a feature-length video and a technical brochure.

A collaborative effort between the
Caribbean Environmental Health Institute (CEHI), the Antigua Public Utilities Authority (APUA) and the United Nations Environment Programme (UNEP)

Demonstration Models

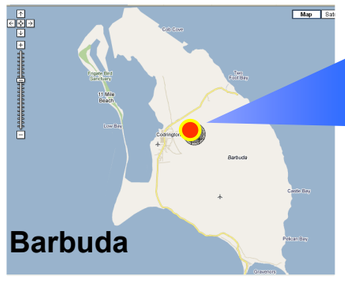
Agroprocessor: Suzie's Hotsauce, Marble Hill

Models were a typical household, small-scale commercial enterprises and a school.
These demonstrate best practices that can be used as standards by a range of operations.



Agroprocessor: Granma Aki, Glansville

Household: Beatrice Joseph, Ottos, St. Johns

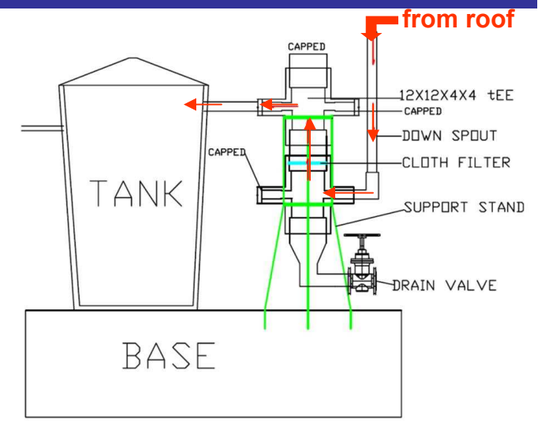


School: McChesney George Secondary School, Codrington

Improving Rain Water Harvesting Systems

The demonstration properties required the installation of guttering, downpipes and storage tanks. To improve the quality of the harvested and stored water. Improving the quality requires diversion of the dirty water that comes off the roof catchment during the first rains (called the **first-flush**). This is necessary following a dry period where pollutants (animal droppings, dust and soot) can accumulate on the roof and gutters.

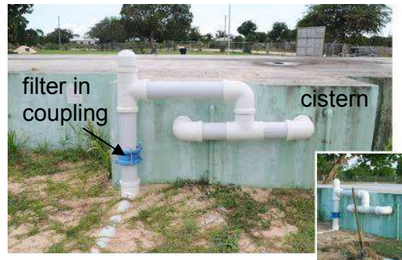
A key element is the installation of a **first-flush diverter device**.



Schematic of the upflow first-flush diverter

There are several basic designs for first-flush diverters, many examples of which can be found in printed literature and on-line sources. The first-flush works by capturing the initial dirty roof water, accumulating it within the chamber that ends with a drain valve. As the water accumulates in the chamber, it rises to meet a filter (cloth) where it is forced through, leaving sediment residue trapped in the cloth. The water that makes it past the filter to the tank is then relatively clean. The diagram and photos to the top right illustrate the concept.

The Water Division of Antigua Public Utilities Authority (APUA) was the local technical focal point for the initiative. The Planning Department was responsible for technological development and installation of the models.



McChesney George School

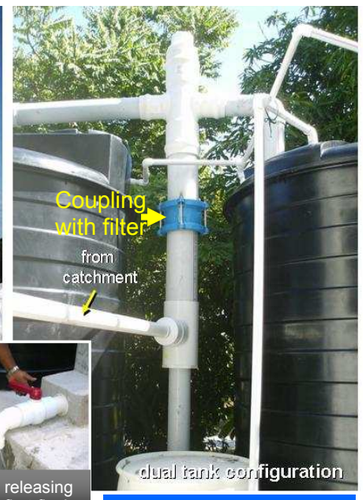
first-flush diverter and valve

The combination of the filter within the first-flush diverter is a novel approach as compared with the other first-flush designs that have been proposed or available on the market.

Dirty first-flush water

Granma Aki

releasing first-flush



Suzie's Hotsauce