

# Capturing and Treating Storm Drain Water to use as Gray Water

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**Abstract** — Storm drain water is normally ignored. Left to flow into oceans and rivers or to sink into ground water. However, there is great potential in using this resource within households and communities. Storm drain water can be treated and used as gray water, un-potable water that is utilized for gardening, flushing toilets, etc.

**Keywords**—grey water, storm drain water, water

## I. INTRODUCTION

Water is one of if not the most important resource on Earth. The water that we use can be categorized into two main categories. Water that is safe for consumption and gray water. Gray water is not safe for consumption but can be used for gardening, toilet flushing and other household needs. Recapturing and treating storm drain water could be a potential source of gray water to increase our sustainability and water security.

## II. CAPTURING STORM WATER

There are several ways to capture storm drain water. The first is a storm water sewage system. This infrastructure is common in highly populated and urbanized areas such as Los Angeles. Another way to capture storm drain water is through rain barrels. As the

name suggests, it is a barrel that captures rain for possible use in the lawn, garden, or plants. [1] There are large rain barrels called cisterns which can be placed above or below ground. [2] Some buildings have green roofs. Plants are placed on top of buildings so that rain-water can fall directly into the plants. These roofs may not capture storm drain water for treatment, but the end use is the same. [3]

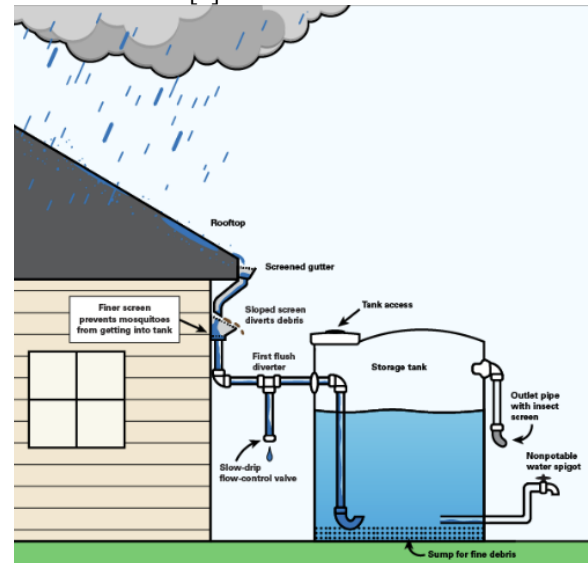


Fig 1. A diagram of a simple roof modified to collect storm water. There are also a number of filters to do simple filtration for insects and large sediments. [7]

### III. FEASIBILITY

A constraint of using storm water drains is building the drain itself. These drains have to reach hundreds of thousands of points in a city to efficiently capture rainwater. This is also a constraint in some cities that already have a storm drain water system because many of these systems let the rainwater flow directly into the ocean. Modifying the systems to redirect rainwater to a treatment plant or system may be difficult and unrealistic.

### IV. TREATING STORM WATER

Many cities have water treatment plants. They contain multiple filters that span hundreds of acres. There are slow sand filters, screen filters, disc filters, membrane filters, etc. However, these plants tend to only treat wastewater and not storm water. The main reason is because treating storm water and wastewater may exceed the limit of treatment plants quite easily. [4] Thus, the treatment of storm water must be accomplished through other methods. At a household level, one can use a septic tank. These tanks provide basic sewage treatment, separating solids and oils from storm water. [5] The storm water can be filtered further through media filters, which filter sediments and pollutants. [8] The treated water may not be clean enough for consumption, but it can be used as gray water, which is the goal of this study.

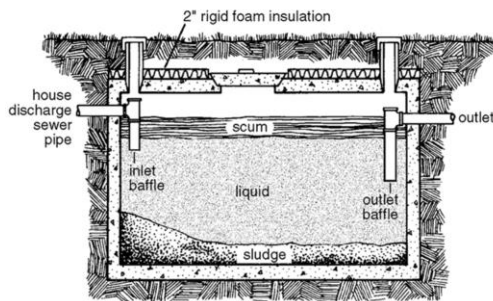


Fig 2 A diagram of a septic tank. Scum floats to the top of the tank and sludge sinks to the bottom. [5]

### V. COMBINING CAPTURING AND TREATING STORM WATER INTO ONE SYSTEM

Thus, a wholistic system for the household would be to capture the storm water using cisterns and green roofs, which then feeds into a septic tank underground. The water from the septic tank enters a media filter and then into a reserve that is connected into systems in the household that can use grey water (toilets, sprinklers, etc).

### VII. OVERALL FEASIBILITY

Thes systems are a sustainable way to reuse storm water as gray water, but it has many constraints. Aside from the limitations of building the system with systems that are already in place, there are many other constraints. Firstly, not all households have enough space for these systems. Secondly, septic tanks come at a hefty price, anywhere from \$10,000 to \$30,000. [6] People may not want to spend this much money just to treat storm water for gray water. Because of this, the possibility of capturing and treating storm water is low. It may only be possible within affluent communities. If the government implements subsidies for using a storm water capture and treatment system, the possibility of implementing this system will be much higher.

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