

Eco-Engineering: Greywater Recycling



Background

Water shortage has been a long running issue in the state of California. Fortunately, most of our indoor water usage, such as that from faucets, showers, and washing machines, can be reused.

Goal

Design a residential-scaled filtration system to store and re-use residential greywater and rainwater for tirrigation purposes

Objectives

- Research, design and fabricate a working plant-based, outdoor filtration system that is self-sustainable, aesthetically pleasing, and easy to maintain.
- Ensure that the final product of the system is safe to use according to state water quality standards.
- Develop Arduino controlled system to monitor pH levels in the final product and redistribute water to appropriate locations.
- Implement the system into a house to conduct tests and analyze the effectiveness of the system.
- Treat water well enough so that it can be stored for long periods of time

Water Usage Information

- ➤ CA household shower usage: 36 gal/day
- ➤ CA household faucet usage: 38 gal/day
- ➤ CA household indoor water usage: 150-300 gal/day
- ➤ 50-80% of indoor water usage comes from potential greywater sources

Small-Scale Model

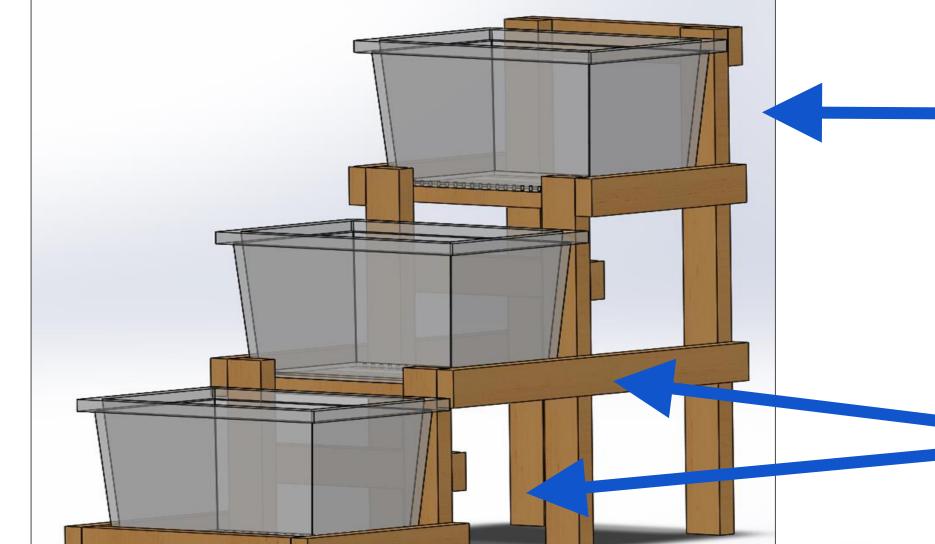
Grass

Rice Hulls

Wood Mulch

Gravel

Soil



Greywater

Source

Irrigation and

Storage

February

Concept refinement, order

purchase forms

Top Bin
Plant (grass)
Soil
Wood Mulch
Rice Hulls

Middle/Bottom Bins

Gravel

Plant (grass, lavender)
Soil and mulch

Logistics

- > How will it handle soap?
 - Some plants and dense filter media like sand can take care of soap
- ➤ How will it handle oil?
 - Wood mulch and earthworms living within soil have been known to eliminate oils
- > How much water can it handle?
 - The small-scale model can filter 1-2 dozen gallons of water at a time.
 The full-scale model will take as much water as desired

Budget





Currently under-budget.
Future purchases include pumps, plants and piping.

Full-Scale Model

- Will incorporate pumps to get water from a home to the system
- ➤ Will include storage tank to store water until user wishes to use it
- Will exist primarily underground to take advantage of plants and large space
- Will be able to filter as much water as user desires
- ➤ Will use stored greywater for irrigation purposes

What's next?

- Experiment with different filter media to optimize water quality
- ➤ Complete design of full-scale sytem
- ➤ Incorporate small-scale system into a home



Brandor Marcone



Daniel Huvnh



Thomas Ho

JanuarySplit into subteams, consult

industry experts, develop CAD

model and gather code

Timeline:

G

R

A

March 2017

Build system model, perform experiments about water flow and water quality

Future

Spring Quarter

Design hypothetical full-scale system,

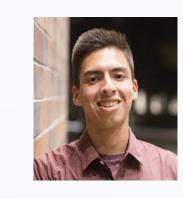
incorporate model into a home

Consider putting system up on the market, continue optimizing system

Advisor



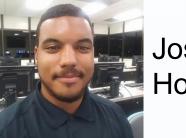
Mark Walter, P.h.D



Daniel Santiag



Anthony Pham



Contact: Brandon Marconet Email: bmarcone@uci.edu