

## Aiken Center Eco Machine

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### WHAT ARE ECO-MACHINES?



An example of an eco-machine

Eco-machines are a series of linked man made ecosystems that can remediate many different types of industrial and household effluents. These effluents can include but are not limited to: sewage, textile dyes, and food processing. Eco-machines can come in many shapes and sizes.

According to John Todd Ecological Design, “An Eco-Machine™, can be a tank based system traditionally housed within

a greenhouse or a combination of exterior constructed wetlands with Aquatic Cells inside of a greenhouse. The system often includes an anaerobic pre-treatment component, flow equalization, aerobic tanks as the primary treatment approach followed by a final polishing step, either utilizing Ecological Fluidized Beds or a small constructed wetland. The size requirements are entirely dependent on the waste flow, usually determined during our preliminary engineering phase and site visit.”

Bio-mimicry is the principle idea behind living machines. The natural world has been cleaning dirty water for many millennia. The Earth has already figured out how to clean water in the most effective and efficient way possible. Building on this efficiency, the Eco-Machine offers a more cost effective option to traditional wastewater treatment centers. Traditional systems are expensive, energy intensive, and not very pretty to look at. As for eco-machines, they can be designed in such a way as to bring form and beauty to such an ugly process.

## WHAT IS OUR ECO MACHINE?



A view of the Aiken Eco Machine from above

Our Eco-Machine was designed and built by our supervisor, Research Technician **Matt Beam**, as a part of his Master's degree project. With the use of living ecosystems, the Eco-Machine is an engineered system that treats all of the wastewater generated by the Aiken Center. The ultimate goal is to purify the water enough to be reused for flushing the building's toilets.

On top of treating the Aiken Center's black waters, Matt explains, "the purpose of the Eco-Machine is to inspire and nurture a

worldview that works with — and not against — nature, to provide reliable treatment of the Aiken building's wastewater, and to serve as a research and learning tool." The Eco-Machine, in essence, is a centerpiece for the Aiken building; exposing the Rubenstein School along with the greater Burlington community to the effectiveness of natural wastewater treatment under the philosophy of ecological design.

## WHAT DO WE DO AS INTERNS?



The 2013 Greening of Aiken Interns Eco-Machine Group

As interns of the Eco-Machine laboratory, the group will be working directly with Matt Beam to gather essential data that will be used to analyze the Eco-Machine's progress and efficiency. All interns were required to complete BS2-level training before entering the laboratory to ensure that all safety precautions are properly taken.

Throughout the semester each intern is responsible for performing a different laboratory test, as well as creating a comprehensive procedure summary for future interns to reference. These parameters include settle-able solids, turbidity, biological oxygen demand, as

well as others. As a final project, each intern will create a laboratory safety notebook that will include: how to set up the lab, all of the procedures completed, and how to perform them.

**CONCLUSION**

This project is a part of the Greening of Aiken Internship class. It's a service-learning project that truly benefits both the interns and the director of the project. Matt Beam will receive usable data that will contribute to the success of the Eco-Machine, eventually allowing for the water purified by this system to be used for non-potable purposes throughout the Aiken Center. Not only do the students get a hands-on experience working in the Eco-Machine laboratory, interns will finish the semester with an extensive knowledge of how to complete a water quality test and will be certified in administering that test.