Bass Connections: Harbor Clean Up How can we build a human-powered device to clean Baltimore Harbor?



BASS CONNECTIONS

PROJECT SUMMARY: Our goal was to create a device that would improve water quality in Baltimore's polluted Inner Harbor. We designed and built a human-powered bicycle pump that feeds a slow sand filter to be used around urban water systems.

PROJECT OBJECTIVES

- Design a human-powered working prototype that is easy to use
- Meet EPA standards for swimmable and fishable water during filtration
- Identify potential locations and stakeholders in Baltimore area



PROJECT PARTNERS

- Living Classrooms Foundation, educational non-profit organization
- Baltimore Museum of Industry lacksquare

Acknowledgements: Thanks to Bass Connections, Dr. Klein, Dr. Knight, James Keffer of the Museum of Industry, Steve Bountress of Living Classrooms Foundation, and Darin Smith

Design and Innovation | Energy

Kirsten Lew | Environmental Science / B.S. Gi Jung Lee | Mechanical Eng / B.S. Cheng Ma | Mechanical Eng and Comp Science / B.S.E. Megan McGufficke | ICS / B.A. Daniela Radvak | Mechanical Eng / B.S.E. Liam Regan | Energy and Environment / M.E.M. Molly Rosenstein | Earth and Ocean Sciences / B.S.



METHODOLOGY

Since our device needs human input to function, we designed it to be appealing to passersby, and also durable, efficient, economical, safe, and aesthetically pleasing.

- Developed two separate designs for the main system parts: one for the bicycle and one for the filter
- Created a design concept in SolidWorks for the bicycle
- Chose a design for the filtration barrels based on ease of construction and cost
- Tested feasibility of bicycle pump system in Baltimore Harbor
- Tested filtration barrels' efficiency using pond water at Duke's Chilled Water Plant

The efficacy of the filtration system will be assessed through future water quality tests of the barrels' output.

CONCLUSIONS

- in Duke's Chilled Water Plant

INSIGHTS

- constant communication





• Bicycle pump prototype is fully functional and has been tested on location in Baltimore

• Filtration barrels are currently undergoing testing

• System is effective for urban water systems

• Freezing temperatures in Baltimore could potentially render system unusable • Filtration barrels could prove difficult to transport \rightarrow easier to be constructed onsite

• Three subteams working together: Engineering, Environmental, and Outreach/Marketing

• Interdisciplinary approach = dynamic

• Able to play to everyone's strengths through