

Warren J. Baker Endowment for Excellence in Project-Based Learning Robert D. Koob Endowment for Student Success

FINAL REPORT

I. Project Title

PolyPonics – Living Lab

II. Student(s), Department(s), and Major(s)

(1) Alex Hill, Civil and Environmental Engineering, Environmental Engineering

(2) Dylan Robertson, Civil and Environmental Engineering, Civil Engineering

(3) Erik Hoffnagle, Civil and Environmental Engineering, Environmental Engineering

(4) Erik Pinuelas, Civil and Environmental Engineering, Civil Engineering

III. Faculty Advisor and Department

Gregory Schwartz, BioResource & Agricultural Engineering Department

IV. Cooperating Industry, Agency, Non-Profit, or University Organization(s)

California Polytechnic University, San Luis Obispo

V. Executive Summary

Cal Poly San Luis Obispo once lacked an adequate facility that could support the growing interest amongst the student population and faculty for Aquaponics. Aquaponics is a rapidly expanding field that requires research and development in engineering, biology, agriculture, architecture and business. PolyPonics has expanded Cal Poly's aquaponic garden (Living Lab) into one the largest of any within the California State University system. The expansion of this system has provided Central California the opportunity to tour its facilities, learn about aquaponics, and enjoy it for the safe, beautiful learning environment it is.

VI. Major Accomplishments

(1) Construction of the aquaponic system

(2) Development of a community

(3) Road for future learning at "Zion"

The objectives of this project included: (1) Group formation, (2) Location Selection, (3) Campus wide outreach, and (4) Educational cultivation. We have achieved all four of these objectives.

The construction of the aquaponic facility included finding and moving to a bigger location. A greenhouse connected to the student experimental farm (SEF) was located, and we were granted permission to use the space. As seen in the following figures the greenhouse was transformed into a living lab for the purposes of working with plants and fish as well as developing a community and a place to learn.



Figure 1. Greenhouse at the SEF. New location for the Poly Ponics – Living Lab.

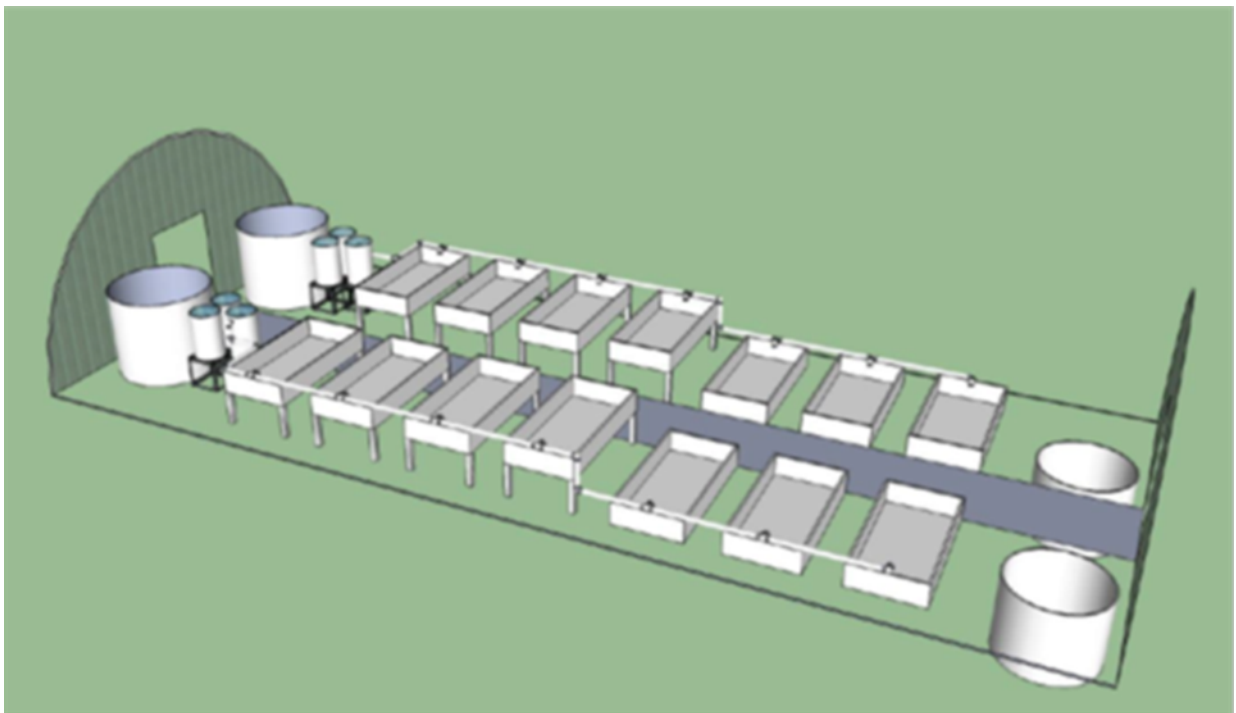


Figure 2. Preliminary conceptual design of the new system.



Figure 3. Actual polyponics configuration. (from left to right) Fish tank, solids settling tank, biodiversity pond, grow bed number 1 and sump reservoir.



Figure 4. Construction of grow beds 2, 3 and 4.



Figure 5. Construction and final design of biodiversity pond.

A community has been developed at the SEF to promote unity, and embrace differences among community members. This “living lab” also allows people to express themselves as they see fit. This has promoted independence and leadership and has helped to develop communication between students, faculty and administration.



Figure 6. Activities include work days and play days. Tye die day (top), polyponics living lab day (middle), one of many weekly work days (bottom).

Active learning continues at the SEF with the Polyponics living lab at the center of the activity. Without the Baker / Koob funding this would not have been possible. Workdays are on Sundays, every week. We hope to see you out there.

VII. Expenditure of Funds

Total expenditures amounted to \$3,574.59. This comprised mostly of building materials for the construction of the grow beds. A small fraction was used to purchase fish, fish feed and supplies to measure water quality. There are hopes to purchase an inverter, and charge controller to begin

running the system off of a solar panel that was donated to Polyponics. The ability to demonstrate net-zero energy food production would provide a potential solution to current food production problems.

VIII. Impacts to Student's Learning

This funding has been an integral part to the living lab set up at the SEF. Workdays are held every Sunday when school is in. There are typically 6-12 students that participate week in and week out to help develop this community. There are over 40 active members in the polyponics club that was only able to form because of the facility that was built with the funding.

The culmination of the Baker Endowment has led to an expanded aquaponics facility deemed the "*PolyPonics Living Lab*," it is conducive to interdisciplinary collaboration and community outreach. The space now provides ample opportunity for future student-led projects to be conducted. We aim to raise awareness about the technology involved in aquaponic farming and bring that invaluable knowledge to the Cal Poly community.