**PROJECT GOALS**
- Design a sustainable & affordable aquaponic system for use in developing nations
- Utilize an interdisciplinary approach
- Install an aquaponic system for a community in need

**WHAT IS AQUAPONICS?**
- Combination of Hydroponics + Aquaculture
- Recycles water in a closed, recirculating loop
- 10 times more productive than traditional agriculture

**RESEARCH GOALS**
- Decrease the power required to operate the system
- Use recycled, universally available materials (allowing design to be easily replicated)
- Run on renewable energy
- Maximize nutritional yield
- Create user-centered design

**REFERENCES**
3. PELUM Uganda, “Growing Crops on Stones; the Future of Urban Agriculture!”, Participatory Ecological Land Use Management, 2013

**ENGINEERING: REDUCING OPERATIONAL COSTS**
- OpenFOAM computational fluid dynamics software used to model flow patterns
- ADV velocity validation yielded mean difference of 34%
- 10 series of point measurements averaged over 60 sec
- Energy Considerations: Air-lifts & solar power

**BIOLOGY: MAXIMIZING YIELDS**
- Tilapia are resilient and universally available, and grow rapidly (FCR of 1.6-1.8)
- Combined, gravel and raft beds offer variety & ample nutrients

**BUSINESS: FEASIBILITY STUDY**
- Market niche for affordable “backyard” systems
- Little research has been conducted to optimize small-scale systems for energy efficiency
- The market potential for small-scale aquaponics is $1.5 Billion in the U.S. alone

**CONCLUSIONS**
- Flow improvements and use of air-lift pumps dropped energy consumption 40% when compared to a traditional system of the same size
- Using local and recycled materials where possible decreased the cost of the UNH pilot system by 27%
- Januaty assessment trip provided useful data for user-centered design
- Experimental data validation differences can be attributed to turbulent flows close to the inlet

**FUTURE PLANS**
- Install system for our nonprofit partner Forjando Alas, an after school program for kids in Uvita, Costa Rica

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