Innovation for Change

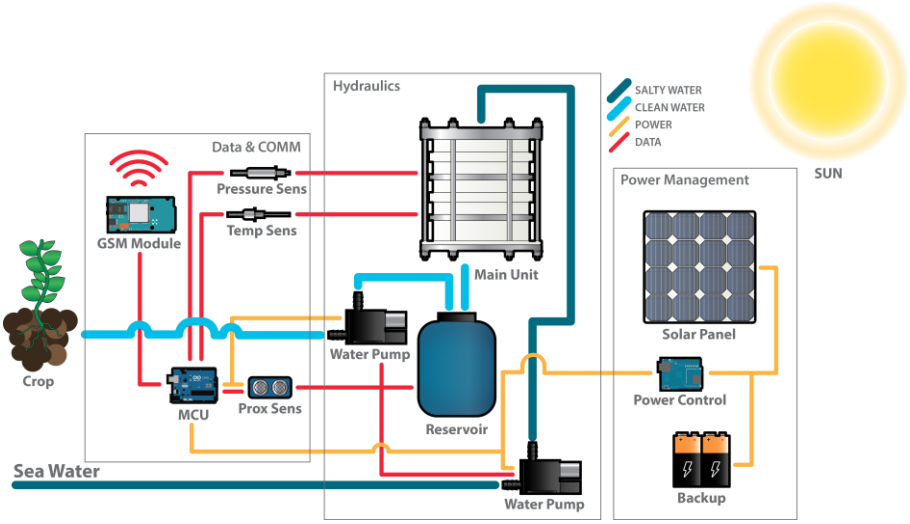
Young Talents | Real Challenges | New Tech

Hydropia

Sea-grown food from the sun to the table

Challenge: Water scarcity in agriculture
Proposed by: Aquasis Solutions

Members of the team:
Claudia Colella
Riccardo Ingenito
Emanuele Ingrosso
Alessandro Mistretta
Matteo Morciano
Vito Musci
Julia Robin
Alessandro Santilano
Tommaso Silvestri



Problem Statement and Solution proposed:
Our team proposes a feasible solution to tackle water scarcity for agricultural purposes in arid areas. Water shortage is going to reach the critical mass becoming a crucial problem in the years to come; the main reasons behind this are:

- Increasing water usage due to increasing population
- Decreasing water supply due to desertification

Our value proposition consists of providing an integrated, off-the-grid floating structure that combines hydroponic agriculture with solar-powered desalination to grow crops directly above the sea.

Our solution is a modular floating island to grow crops, able to purify seawater by using solar energy concentration. The technology behind the desalination process is patented and protected, which gives us an objective advantage over competition. The island will also be equipped with Arduino-controlled sensors that by monitoring operational conditions is able to optimize water production and waste. Through a GSM module, the island will be able to send us relevant data to predict maintenance intervention and allow remote control.

From a technological point of view, the main target is to fix the 'problems' related to the integration of the desalination technology on a moveable structure. The future on-board technology (i.e. Multi Effect Distillation device) has been installed few weeks ago in the laboratory at Politecnico and the first experiments are ongoing. Early results validate the MED technology, which is currently already able to produce a 33-centilitre water bottle in one hour with a very low power source. We are confident that these results will be effectively enhanced once the full potential of the technology is unlocked.
Up to now, in fact, we are testing only the first stage of the lab-scale prototype, moving toward the full characterization over the next month.

The experimental setup is not complete due to delays in the delivery of materials and components. In the meantime we are also performing a 3D rendering of the floating island we have in mind and in which the MED device must be embedded. Another critical issue is the amount of produced water but this quantity will be increased once the second stage of the device is made operative and by using the solar source instead of the current low power supply.

From a business point of view, our aim is to first sell the island to wealthy individuals in order to exploit high margins on low sales volumes. This profitability would allow us to develop our humanitarian vision of a low-cost version of the floating solution to be sold or leased to NGOs or governmental institutions.

We carried out a market analysis to assess our pilot market and we identified Californian area as the perfect place to start:

- long-standing drought conditions
- access to large coastal areas
- increasing consumer trends towards organic food (CAGR=15.7% over the period 2014-2020) and "farm-to-table"

A possible business model for the initial phase would be that of selling/leasing the floating island to restaurant owners along the coast in the context of the "farm-to-table" movement. Our preliminary analysis (to be confirmed until 20th June) showed a possible interest of this segment (Californian coastal restaurant owners) in this solution that would provide them with the following benefits:

- acknowledged local farmed food supply (they are currently trying to avoid the stigma of fraudulent farm-to-table restaurants)
- restaurant chain's rebranding and premium price opportunities
- minimal maintenance required thanks to the Arduino-based control system

Our team member Claudia Colella is currently abroad in California to assess the growing impact of these trends, gathering data directly "on the field" through local acquaintances and research.

- [Main to do before June 20th]: partnerships with Fondazione AVSI and Fondazione OIKOS - technological proof of concept – design prototyping
- [Action plan for next 20 months]: partnership with Californian restaurant owners – go-to-market strategy – integrated solution prototyping – low cost solution for humanitarian purposes – partnership with NGOs and governmental institutions
- [Vision for the future: 20 years ahead]: autonomously-moving islands - calamity intervention on a predictive and responsive basis – inland water supply (not only coastal, e.g. developing continental infrastructure and logistics)