Exploring Sustainable Methods of Ocean Surface Agriculture

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As a result of rising temperatures and sea levels, our available land space, freshwater, and food supplies are shrinking, just when they are most needed to support a growing population. Commercial agriculture takes up 50% of the planet's land and 70% of available freshwater. In order to survive these challenges, agriculture must look to the oceans. The goal for this project was to create a self-regulating, completely passive, environmentally friendly device that will distill and collect ocean water to grow commercial crops. After researching previous ideas for both solar stills and sustainable agriculture, a prototype for a floating still was designed and constructed. The prototype was floated in saltwater under a heat lamp to test effectiveness of distillation and collection, and experiments for possible improvements were run. These results were used in the creation of a second prototype, tested in a similar manner. A third prototype was designed and constructed to solve problems encountered with the second. This prototype contained a wick, exposed to the ocean, in an inner trough. Heat from the sun caused water to evaporate off the wick and condense inside a chamber cooled by the ocean water. The distillate collected and flowed into adjacent hydroponic greenhouses, which held floating hammocks of hydroponic potatoes. In the future, the design can be scaled up and modified to improve environmental and long-term impacts, such as preventing hazards for animals, creating artificial coral reefs, using sustainable materials, and passively collecting nutrients from the ocean to avoid the addition of fertilizer.

Awards Won: