Sainsbury Mentors 30 Competition

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Essay: How do we protect the environment for the future?

The increase of population, expected to reach 9.5 billion people by 2050, and how to produce enough food to feed them, is pointed as one of the main global challenges. The 90% increase in food production must take place in the only 5% of available land, which also has a limited potential for being converted in arable lands, as some of them should be preserved due to their importance to ecological functions. Additionally, approximately 10% of the global land is degraded by incorrect use or overuse in the agriculture industry, resulting in waterlogging, salinization, soil erosion, nutrient depletion and desertification. Thereby, many studies argue that it is not feasible to continue producing food using traditional agriculture methods.

This matter becomes even more complicated when other variables are considered. For instance, the impact caused by the unsustainable use of natural resources, such as water and energy, represents another threat for future generations. Therefore, encouraging solutions to increase food production at a lower environmental cost is of vital importance.

Regarding other associate threats, the extensive amounts of greenhouse gases related to power supply and transport-storage-packing processes should also be taken into consideration. Indeed, proposing a solution that does not address these concerns, would not be considered a 'complete' solution. As stated by the HM Government Report (2011) 'Human activities have now become a dominant driver of the Earth system: decisions made now to mitigate their detrimental effects will have a very great influence on the environment experienced by future generations, as well as the diversity of plant and animal species with which they will share the planet'.

Following on from the above, the idea of the project is to develop a reliable, affordable, energy independent, family-sized device for fresh food production, anywhere in the world. In an ideal scenario, each family would have access to the device, capable of producing enough food without relying on external sources. The device aims to decentralize the production of fresh food, allowing more locally-focused answers, and consequently providing access to more people.

The domestic standalone system would be capable of producing fish, mushrooms and vegetables; the waste of the vegetables and mushrooms would supply the needs of the fish and the wastes of fish would supply the vegetables and mushrooms, as used in an aquaponics system. In this way, all the waste is reused within the loop, mirroring the natural ecosystems. Moreover, the device

would be coupled with artificial lighting and sensors, providing the conditions for continuous year-round production despite the weather conditions.

The energy used for growing the plants, in the form of artificial lighting, and to maintain and monitor the system, in the form of pump, filters and sensors, would be supplied by photovoltaic panels and stored in batteries coupled to the system. Currently, systems powered by renewable energy sources are becoming more common due to environmental benefits and social economic factors.

These suggested techniques already exist; however, they have been used separately, or combining 2 or 3 of them. The combination of them in one single standalone device is yet to be developed, therefore resulting in an original concept to tackle the challenges presented. Moreover, coupling advanced agricultural systems to a renewable energy system, would close the loop of a sustainable solution. In this case, sustainable is regarded in a broad perspective, as balancing demand and supply for present and future without compromising the future ability to meet the needs.

In summary, this project proposes a solution aligned with current global issues and tackling them from a broad perspective. Firstly, the solution reduces limitations on the fresh food production, as the system would allow a continuous year-round production. Secondly, it provides access of fresh food anywhere in the planet, through a standalone device. Thirdly, it proposes a way of reducing the fuel consumption and emission of pollutants related to transport-storage-packing processes, therefore reducing emissions of greenhouse gases associated with global warming. Furthermore, supplying the power through renewable systems would bring the missing component to a full sustainable model and would reduce the dependence of connection to grids supplied by fossil fuels; hence also contributing to reduce greenhouse gas emissions. Finally, it proposes a novel decentralized business model to the traditional farming industry, therein aligned to the sustainable development.