World Food Prize Paper

A landlocked country in the eastern part of Africa that is limited by poverty, Uganda, like many third world countries on today's planet, has the perfect agricultural environment to produce food for its people, but also the world. Having some of the most fertile soil in Africa and plenty of water you can't help but wonder what else do you need to be successful in agriculture? Where Uganda falls short is the utilization of their tools because of their lack of wealth. If there was a way to put a tool in the hands of the hard-working farmers of this country for them to produce more food for themselves, their family, and for the market it would enable them to create profit and pull themselves out of poverty. While many people working on this problem have come up with a multitude of ideas to solve it, there is one that seems very practical and beneficial to many minds including myself. This product is called, the Future Pump, a solar-powered water pump aimed to help farmers bring water to their fields.

Nineteen point seven percent; this is the percentage of people below the poverty line in Uganda. Compared to the United States Uganda has almost twice the percentage of people below the poverty line. There are 45,741,007 people living in the nation of Uganda as of the 2020 census. "By the year 2040, the population of Uganda is expected to reach 75 million people, making them the third fastest-growing population in the world." (Population Matters U.N.) Eighty percent or more of these people live in rural areas. The rich agriculture environment of the country means that the majority are either actively employed in farming or are farmers themselves. With so many people living in a rural area a person would think most of the land would be utilized. But in reality, only 35% of the tillable ground in Uganda is being cultivated. A question that could be asked is, what if just 70% of the tillable ground was cultivated and planted with crops? Essentially this would double their yield of produce in a year and double the amount of food people can eat. The reasoning behind not having more ground tilled isn't that farmers don't want more land to farm, it's that they can't. The number of small farmers amounts to half a million people which accounts for eighty-five percent of all the farmers in Uganda. These small farms are approximately 2.5 hectares in size and managed by the farmer and his family. In Uganda the climate and weather patterns are tropical in nature, however, there are not efficient ways to get water to crops in times of drought. With the Future Pump, it would become possible for them to pump water to those fields during drought times, thus helping eighty-five percent of the farmers become more productive. I'm here to explain why this invention is one of the keys to solving the Uganda poverty problem and how it will better the lives of their people, while also making them more sustainable in the long run.

Let's take a look at the coffee plant. Coffee is one of the products that Uganda produces that is also one of their top export commodities. However, coffee takes a lot of water to produce.

If a farmer produced double the amount of coffee beans, their number one crop, that farmer could, in theory, make twice the money he had before. "This is where the great opportunity lies. It is estimated that Uganda's arable land could produce enough food to feed 200 million people" (Future Pump Uganda). In addition if a farmer could produce more coffee on more land and was able to pump the needed water to that crop, they could

also take part in one of the Fair Trade coffee programs to assist them in marketing their products.

To understand who I am trying to help in Uganda, you need to better understand their family dynamic and what their daily life is like. The average family size in Uganda is five or six people. To put it into perspective, in the U.S. this is almost double our average of approximately three. Meaning, the families here are quite large and with that come larger food requirements. Many times larger families result from extended family households. Most dwellings in Uganda are rather small and house these five to six people in one room with a toilet generally outside. "Most families eat two meals a day. The two meals are lunch and supper. Breakfast is just a cup of tea or a bowl of porridge" (Cuisine and Etiquette in Uganda). Many families produce their own food to eat and sell for a living. Often with an agricultural livelihood such as farming, comes many labor requirements. "At least 20 million children aged from five to seventeen years are engaged in child labor in Uganda.

It's very common that children can get forced out of school to help supplement the income of their families and are denied the opportunity to acquire necessary knowledge and skills to aid them to get decent employment in the future, leading to the poverty cycle" (Growing up in Uganda). The more people in poverty results in hungry children and farmers using most of the food they produce to feed their family and being unable to sell it for profit. For these farmers, the future pump can solve these problems and many more. The Fs1 Pump is the first of its kind. "A new prototype with a PV panel attached to a DC motor and a reciprocal piston pump." (Future Pump) In layman's terms, it is a solar-powered water pump designed to help farmers bring water to their fields. Like mentioned earlier farmers have access to the water and soil they just need to put the two together. This is what the future pump does. After setup, there is no labor required in running the pump. The warm and tropical climate of Uganda allows farmers to capture the sunlight for power in this type of water pump. Unlike its predecessor the diesel water pump, there is no fuel involved meaning farmers that purchase the pump don't have to spend money on fuel and waste countless hours attending to it. In a sense, the future pump really has a one time cost, thus saving them money and labor costs in the end. If a farmer could get water to any plot of land within a reasonable distance from his home he could farm the land.

Farming more land means more areas to plant a crop resulting in more hectares of the crop to harvest and sell at the market. Since a majority of farming families all work on the farm the labor requirements of farming more land are possible. If they were able to better water their crops the opportunity for better yields is broadened. When yields are higher you have more products to sell. With more products to sell, the room for profit grows, and raises the farmer's bottom line. Being able to pump water from lakes and rivers eliminates the effects of dry spells and drought. Another benefit to the solar-powered pump is that there is little to no negative impact on the environment, which makes the power source and the land more sustainable for future generations.

Having a product to sell is the second most important benefit to the future pump. If farming families can produce more commodities and market these commodities their standard of living will increase. More money in the pockets of poor families results in less poverty and fewer people below that poverty line, which accounts for almost a fifth

of the country. In addition, being able to produce more food for their country will help them to feed their growing population, a problem that will become all too evident in the next twenty years if food scarcity due to poverty is not addressed. These are just some of the beneficial effects of the solar water pump, Future Pump. It's solving two problems for this country at once. Bringing irrigation to fields that need it or to land not tillable without access to water, and enabling the farmers to grow a marketable abundance of produce to make a profit. This profit can go to improve their family's everyday life and future; from being able to afford more nutritious food, improving their health and overall wellbeing, and enabling them to purchase or build a bigger home. The possible benefits and positive things that can come from distributing such a simple tool to people that really need it are limitless.

Sustainability, a word used a lot in this day in age and a little earlier on in the paper. Common questions regarding this word are what does this word mean or how does it affect my life? Sustainability is defined as: the avoidance of the depletion of natural resources in order to maintain an ecological balance. Being sustainable is more important now than it has ever been. My experiences with sustainability and its importance began on my family farm. We raise cattle on our farm, and to be sustainable we not only raise all the feed sources for our cattle, but we also process it and mix into feed rations that they consume. All manure produced is also put back on the land to help with fertilizing next year's crop. In addition we use rotational grazing practices in pastures to help keep the land and grass in good condition. All of this is sustainable and helps our operation move forward. In addition if Ugandan farmers can be more sustainable as they move forward it will allow their land to be useful and sustain their way of life.

As our population continues to grow farmers, engineers, and innovators are faced with new problems and situations to every invention and plan they have. Farmers around the world today are feeding more people than ever, which makes it that much more important that we consistently check to make sure what we are doing is done in the most sustainable way. The decisions and agricultural practices we use today and tomorrow will affect the land ten years down the road and later. We are only given so many natural resources on this planet and must use them sparingly.

The importance of making farmers sustainable is why the future pump is so perfect for this situation. The sun is a readily available resource that isn't going anywhere and can be used by anyone with the correct supplies. Water, very available in a tropical climate full of rivers and streams just waiting to be used for the production of crops. This is where the future pump comes in and ties the knot. It takes these two natural resources and puts them to good use. The solar panel grabs the sunlight in turn running the pump and moving the water from the stream, river, or creek to a field or channel to water crops. This water can then be directed precisely where the plants need it at the root level so water is not wasted. When you look at the definition of sustainability and compare and contrast the definition with the requirements of the future pump to move water it just makes sense. It takes nothing that needs to be replaced therefore avoiding the depletion of natural resources and continuing the ecological balance. If the future pump is sustainable the next problem that needs to be answered is how does a farmer pay for the pump and if there is financial aid out there and available to the farmers of Uganda.

A proposed solution to solve the initial cost of the $650 dollar purchase price for an fs1 pump is through a grant program. The John Deere Foundation grant program "is 2.5 million dollars to create a sustainable framework for increased food security." (John Deere Foundation) This grant is open to multiple African countries with one of those countries being Uganda. The initiative is named Banking on Africa. The creation of this project is to establish a savings based finance service for small farmers in Africa. "According to Opportunity International an estimated 80-85 percent of rural clients access savings and insurance services; this shows the large need for financial services in rural areas due to seasonal agricultural cycles."(John Deere Foundation) The main goal of the foundation is to help subsistence farmers convert to commercial farmers all while eliminating hunger.

What this means, is that in subsistence farming the farmer is producing enough food to meet he and his family's needs with little left over to market. By becoming a commercial farmer through an increase in land tilled and planted, the farmer not only produces enough to meet his family's needs but has products left over to market. The creation of a sustainable framework for enhanced food security through an increase in food production is also a correlating goal with the future pump. Since John Deere is pledging to take on 500,000 new agricultural loan clients, farmers in Uganda have a perfect opportunity to purchase a pump. When realizing the 650 dollar cost of the pump may be quite a task for a farmer without much financial wiggle room; the search began for a financial program to solve that very problem. Searching all over multiple websites none seemed to really fit the situation as the one listed here. The John Deere Foundation grant, worth 2.5 million dollars willing to take on 500,000 new clients is the solution for a Uganda farmer to purchase a future pump.

Being efficient at what we do is important in the agriculture industry, one other struggle Ugandan farmers have is having updated and efficient equipment and tools to use for their farming operations. This expected increase in production, which hopefully leads them to an increase in their income, will eventually assist with this as well. An increase in a farmer's income allows them to look into new farming methods, tools, and equipment that can help them continue to be productive and thus profitable. If something as simple as a solar-powered water pump allows them the capability of getting water to more acres of land that they can farm, then why would we not as a society want to help them get there. This ability to provide better for themselves will allow them to continue to feed their growing population into the future, and better tools and equipment will help exponentially with that.

All of these benefits from the solar-powered water pump, Future Pump, can have many positive and far-reaching effects on a family in Uganda and on future generations. With financial aid from the John Deere Foundation program families can create interest bearing savings accounts to plan for the future and apply for grants to purchase a future pump for their crops. Farmers are able to make these financial gains all while being sustainable and ensuring their farm will be here for the future generations of their families.

This increased standard of living will change many things in the lives of the family, from the parents to children. A parent will be better able to feed their children and produce an income for their family from the surplus in crops they produce. A father and

mother won't have to worry about whether or not their livelihood will be in danger this year or if they will be able to feed their children, because of a lack of water in their fields. If the farmers become more efficient, have better tools and equipment to use, then I am hopeful that the children will be able to then go back to school and get their education so that they can become the next generation of productive farmers in their country. The possibilities and future are limitless for the farmers in Uganda, and it can all be done through a simple six hundred and fifty dollar water pump, the Future Pump.

Where do you see Ugandan farmers in 10 years with the use of the Future Pump? I see a more modern, more motivated, and more successful way of life for many. This pump and grant program will see these farmers well into the future and will allow their children to flourish. More importantly their future generations will continue to be the innovators and will continue to solve the food insecurity problems that their country will face as their population continues to increase well into the future.

Citations

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