



Affordable Greenhouses

WORLD HOPE

CHALLENGE

Approximately 70% of Sierra Leone and Mozambique's populations are employed in the agricultural sector, growing, selling, buying, and preparing food for their families. However, with global climate change affecting water availability, agriculture is not always a reliable source of income.

SOLUTION

In partnership with Pennsylvania State University, World Hope is producing and distributing Affordable Greenhouses that enable a year-round growing season and reduction in water consumption. These greenhouses can be constructed in just two days at a price point of \$500. The greenhouses are durable and last over five years.

MILESTONES AND ACHIEVEMENTS

World Hope's Greenhouses Revolutionizing Output (GRO) project was able to install dozens of greenhouses in Mozambique and Sierra Leone in year 1 of its participation in the Securing Water for Food program. These greenhouses are actively growing produce and within the next several months, the innovator expects to have nearly three tons of crops. The affordable greenhouses have reached almost 2,000 beneficiaries and resulted in more than 770,000 liters of water savings. Based on their first harvest, World Hope estimates that farmers will see a full payback in the cost of greenhouse expenditures in 2-3 growing cycles. Additionally, the innovator is seeing an unexpected fledgling industry of seedling production that is rapidly growing.

GOALS

1. Support in simplifying highly scientific and complex calculation methods for tracking and reporting on water consumption and reduction results.
2. Review of the innovator's business model to ensure sustainability and viability going forward. Key questions include identifying the most appropriate customer bases, sales and marketing approaches to reach rural farmers, and how to evaluate and select potential partners.
3. Guidance on best practices in marketing to bottom-of-the-pyramid consumers. Expand funding sources and make connections with potential investors.

OBSTACLE

Approximately 70% of Sierra Leone's and Mozambique's populations are employed in the agricultural sector, growing, selling, buying, and preparing food for their families. However, with global climate change, agriculture is not always a reliable source of income.

INNOVATION

Affordable Greenhouses

ORGANIZATION TYPE

Non-Profit

COUNTRIES

Mozambique, Sierra Leone

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AgroSolar Irrigation Technology

ISLAMIC RELIEF KENYA

CHALLENGE

There are 5.4 million hectares of arable land in Kenya, but 83% of that land is unsuitable for rain-fed agriculture leaving it in need of irrigation and water pumping technology. Unfortunately, only 4% of the land is currently under irrigation, mainly using diesel, electric or treadle pumps for furrow irrigation. These processes are inefficient, environmentally unfriendly and costly. This trend is not isolated in Kenya, but persists across Africa.

SOLUTION

Islamic Relief Kenya, in partnership with SunCulture, is transforming the status quo with their affordable solar-powered drip irrigation technology, AgroSolar Irrigation. This innovation is designed to meet the needs of smallholder farmers and improve productivity and profitability. AgroSolar Irrigation is both low-maintenance and long-lasting, providing farmers with high-value fruits and vegetables for just a fraction of the cost of traditional irrigation technology.

HOW DOES IT WORK?

AgroSolar Irrigation is a solar powered drip irrigation system built to support the cooperatives in Kenya. SunCulture links potential users to training and financial service providers, who in turn offer loans to cooperative members to acquire the technology. The system is ultra-efficient, saving about 80% of the water used in furrow irrigation, and delivering water and fertilizer directly to crop roots. Farmers can expect yield gains of over 300%.

Utilizing clean energy services over current diesel water pumping practices results in a cost and labor savings of almost \$14,000 per acre. This unique business model takes a whole value chain approach to improving upon the fragmented value chain currently found in Kenya and ensures that barriers for smallholder farmers are removed.

OBSTACLE

There are 5.4 million hectares of arable land in Kenya, but 83% of that land is unsuitable for rain-fed agriculture leaving it in need of irrigation and water-pumping technology.

INNOVATION

AgroSolar Irrigation

ORGANIZATION TYPE

Non-Profit

COUNTRY

Kenya

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Aquaponics Farming

WATER GOVERNANCE INSTITUTE

CHALLENGE

Declining water availability due to climate change paired with limited access to commercially viable farmland are just a few of the challenges facing growers in Uganda. Additionally, the food system in the nation faces hurdles with a declining fish eating culture resulting from dwindling fish supply in lakes, high local and international demand, and high costs. Without access to protein-rich foods like fish, many Ugandans, especially children, cope with nutritional deficiencies.

SOLUTION

Water Governance Institute's Aquaponics system closes the loop between fish and horticultural crop farming to provide much needed nutritional supplements and alternative incomes to Ugandan citizens and farmers living in rural, urban or peri-urban household settings. The all-in-one system uses less water and allows for crop production and fish rearing at home.

HOW DOES IT WORK?

The Aquaponics system is an integrated technology that involves growing crops like sweet pepper and tomatoes in a permeable tray. The tray is filled with a growth medium such as husks or loamy soil, and underneath is a water tank for rearing fish. Wastewater from the fish is routinely introduced to the growth medium via the tray through an irrigation process.

Organics in the water decompose, releasing nutrients that are taken in by the crop, making it a closed loop system. The water in the tanks is recycled several times, so less water is needed to rear the fish and to grow crops. With enough water, farmers and system owners can grow crops all year round. The system is low-cost, gender and disability friendly and yields high value, premium price produce.

OBSTACLE

Declining water availability due to climate change paired with limited access to commercially viable farmland are just a few of the challenges facing growers in Uganda.

INNOVATION

Aquaponics Farming

ORGANIZATION TYPE

Non-Profit

COUNTRY

Uganda

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Biodegradable Seed Tape

REEL GARDENING

CHALLENGE

Planting a home garden can be a daunting task requiring access to large volumes of water, start-up capital, and at least some gardening knowledge. For many low-income communities, committing precious resources to seeds, fertilizer, and water just to have a garden fail can be a deterrent to growing your own produce, which can feed a family or be sold for extra income.

SOLUTION

Reel Gardening has developed a unique seed system that can be grown into a vegetable or herb garden in nearly any climate. The innovator pre-packages a paper strip with seeds and fertilizers so it can be easily planted at the correct depth and maintained. It takes just 5 minutes to plant, uses 80% less water and provides hours of joy and months of food.

MILESTONES AND ACHIEVEMENTS

Reel Gardening has manufactured and delivered over 300,000 household gardens. They have implemented their Garden in a Box technology in 200 schools and have secured the matching funds to meet their Year 1 Securing Water for Food obligations. Reel Gardening has saved 19.5 million liters of water, farmed 30 hectares of land, and produced approximately 1,000 tons of produce from their seed tape. The innovator has established two new partnerships and finalized their first international partnership with an organization based in Kenya.

GOALS

1. Support in developing and implementing an agent distribution model to roll out school gardens and in establishing a process for follow-on sales within a community.
2. Assistance in efficient and effective forecasting and cash flow management processes and help in finding tools to enable the capture and reporting of backup documentation that will support cost share obligations.
3. Aid in developing a buy-one-donate-one retail model to help Reel Gardening determine how this model could be marketed and implemented without overpricing the product and how they can size the market to assess potential uptake for this kind of model.

OBSTACLE

For many low-income communities, committing precious resources to seeds, fertilizer, and water just to have a garden fail can be a deterrent to growing your own produce, which can feed a family or be sold for extra income.

INNOVATION

Biodegradable Seed Tape

ORGANIZATION TYPE

For-Profit Social Enterprise

COUNTRY

South Africa

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BioEnsure®

ADAPTIVE SYMBIOTIC TECHNOLOGIES

CHALLENGE

Some of the greatest threats facing agricultural sustainability are abiotic stresses including drought, rising salinity, and poor water quality, all of which are exacerbated by climate change. Simultaneously, increasing populations, urbanization, soil degradation, and the reduction of arable farmland are decreasing global agricultural growing capacity.

SOLUTION

Adaptive Symbiotic Technologies' BioEnsure® is a fungal seed and plant treatment that, when sprayed onto seeds, helps plants to adapt to water-related stress. By applying BioEnsure®, crops can grow in suboptimal conditions and use 50% less water. BioEnsure® is the only product on or soon to be on the market that can confer stress tolerance.

MILESTONES AND ACHIEVEMENTS

In the first year of its participation in the Securing Water for Food program, BioEnsure® users in India saw a 29% increase in crop yields. Even those farming in difficult growing conditions are seeing an increase in plant resiliency. Currently, BioEnsure® is being applied to 4 food crops—okra, maize, wheat, and millet. Securing Water for Food isn't the only program that believes in Adaptive Symbiotic Technologies' innovation. The innovator has leveraged more than \$2 million in outside funding in the first year.

GOALS

1. Expand funding sources and make connections with potential investors.
2. Support in identifying partners in target countries to set up in-country testing facility and conduct seed tests.

OBSTACLE

Drought, rising salinity, poor water quality, and climate change threaten the sustainability of agriculture.

INNOVATION

BioEnsure®

ORGANIZATION TYPE

For-Profit

COUNTRIES

United States, India

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Broad Bed and Furrow Maker

AYBAR ENGINEERING

CHALLENGE

Vertisols are important to Ethiopian agriculture. In the Ethiopian highlands alone, there are about 7.6 million hectares of vertisols out of which farmers use only 25% for crop production. In traditionally cultivated fields, farmers' crops are suffocated by water and yields are significantly reduced.

SOLUTION

Aybar's Broad Bed and Furrow Maker (BBM) is used at planting time in order to drain excess water away from crops. It is a multi-purpose ridger and bed maker used to drain excess water and conserve moisture in dry areas. The innovator is currently working primarily in Ethiopia, where only 25% of the land is cultivated due to waterlogging. The BBM has been developed to build the optimum BBMs using lighter-weight materials appropriate for Ethiopian farmer needs. The use of their BBM has improved wheat yields from 0.5 tons per hectare to 3.8 tons per hectare.

MILESTONES AND ACHIEVEMENTS

In Year 1, Aybar has been busy manufacturing their BBMs. The innovator is working with farmers in both the wet and dry areas of Ethiopia to help local smallholders adopt their technology. Aybar seeks to train farmers on their BBMs, so that those farmers can, in turn, act as future trainers themselves.

GOALS

1. Support in navigating the Ethiopian small-plot farmer market and agricultural economy.
2. Review of Aybar's business model with accompanying feedback that will help them solidify and expand their value proposition and operations.
3. Aid in communicating with local government officials to increase engagement with Aybar.

OBSTACLE

In the Ethiopian highlands alone, there are about 7.6 million hectares of vertisols out of which farmers use only 25% for crop production.

INNOVATION

Broad Bed and Furrow Maker (BBM)

ORGANIZATION TYPE

For-Profit

COUNTRY

Ethiopia

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Ecorangers and Meat Naturally

CONSERVATION SOUTH AFRICA

CHALLENGE

Nearly 90% of South Africa's water for agriculture comes from surface catchment areas that are vulnerable to alien plant spread and bush encroachment, often triggered by communal livestock. Degradation of rangelands across Africa is destroying water catchment functions and driving poverty for livestock farmers. Restoring catchments infested by non-native species is a national priority in South Africa for efficient water management.

SOLUTION

Trained cattle herders and communal herding techniques minimize the negative impacts of climate change and alien plant invasions to wetlands and riparian zones. Conservation South Africa uses an innovative business model, Meat Naturally Pty, to implement communal grazing systems that result in improved water and food availability. The business model is based on training herders and supporting market access in a way that improves livestock condition, croplands, rangeland ecosystems, and, by working at scale, ensures sustainability in formal private sector markets.

HOW DOES IT WORK?

Meat Naturally Pty uses ecological science, a government job creation program, and market interest in sustainable meat to implement communal grazing systems that result in improved water and food security. The system provides a scalable vehicle for African communal farmers to enter into a growing niche market for grass fed and sustainably-produced meat.

The enterprise will have two key revenue streams: one focusing on production and land restoration support by Ecorangers paid by the government, and another focused on sales and auditing support paid by farmers and retailers.

Using Ecorangers to intensely manage grazing will improve soil and allow for crop planning and fertilization to be integrated into resilient food systems. Once established in South Africa, this model can be the driver for development for much of Africa's drylands.

OBSTACLE

Nearly 90% of South Africa's water for agriculture comes from surface catchment areas that are vulnerable to alien plant spread and bush encroachment.

INNOVATION

Ecorangers and Meat Naturally

ORGANIZATION TYPE

For-Profit

COUNTRIES

Botswana, Kenya, Lesotho,
Namibia, South Africa

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Electrodialysis Reversal System

MIT-JAIN

CHALLENGE

All too often, groundwater is brackish and not suitable for human consumption or crop irrigation. Irrigation with brackish water is not sustainable and ultimately leads to low crop yield and salinization of the soil. In India, 60% of the land is underlain by salty water. The nation is in need of freshwater supplies for crop, human, and animal consumption. Further, electric grids that can run conventional reverse-osmosis desalination plants are not widely available in India.

SOLUTION

MIT and Jain Irrigation Systems designed a photovoltaic-powered electro dialysis reversal (EDR) system that desalinates water. This system uses electricity to pull charged particles out of the water and further disinfect it by using ultraviolet rays. The system was designed for low energy consumption, limiting costs especially in off-grid areas.

HOW DOES IT WORK?

Photovoltaic-powered (PV) electro dialysis reversal (EDR) desalinates water through a simple, robust design that uses electricity to pull charged particles out of the water and then further disinfect with UV. The system has low energy consumption, leading to lower system costs and capital expenses, especially in off-grid areas. Jain Irrigation Systems' capabilities in large-scale manufacturing, marketing, distribution, and servicing in rural areas increase this innovation's potential.

As their test pilot period begins, MIT plans to automate their system with electronic valves, so it can automatically turn on and off. Additionally, this automated system would allow for reversal of the electro dialysis process, as well as automatic separation of potable from agricultural water. Jain will roll out training activities for farmers during their test pilot period in India.

OBSTACLE

All too often, groundwater is brackish and not suitable for human consumption or crop irrigation.

INNOVATION

Electrodialysis Reversal (EDR) System

ORGANIZATION TYPE

For-Profit

COUNTRY

India

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Flying Sensors

FUTUREWATER

CHALLENGE

In Mozambique, some of the most common crops—maize, cassava, and sorghum—have very low yields per hectare. Most farmers do not have access to reliable information on the status of their crops and are afraid to risk using costly inputs such as high-quality seeds, on-time irrigation, and fertilizer for fear of wasting these precious resources.

SOLUTION

FutureWater provides smallholder farmers with insights that are critical to improving their application of limited resources such as water, seed, and fertilizer. The Flying Sensor provides high-resolution spatial information beyond the visual spectrum. Flying Sensors are equipped with near-infrared sensors that detect crop stress up to two weeks before it is observable by the human eye.

MILESTONES AND ACHIEVEMENTS

The first year of FutureWater's project had promising results. In Year 1, the Flying Sensor benefitted approximately 2,000 households and conducted flyovers on 660 hectares of land. A subset of beneficiaries reported that using the Flying Sensor resulted in a 39% water reduction.

This year also saw the innovator focused on navigating Mozambique government regulations, increasing public visibility, and resolving a few remaining technical issues with the Flying Sensor. The innovator has now obtained the necessary clearance from the Ministry of Defense and has learned from the Civil Aviation Authority that there are no regulations applicable to their product.

GOALS

1. Support to navigate and accelerate the Mozambique government's approval process so that in-country sales can begin.
2. Create a marketing and communications strategy, which includes channel identification, corporate messaging, customer research, and partner research.
3. Help to establish baseline metrics for water consumption reduction and productivity.

OBSTACLE

Most farmers do not have access to reliable information on the status of their crops and are afraid to risk using costly inputs such as high-quality seeds, on-time irrigation, and fertilizer for fear of wasting these precious resources.

INNOVATION

Flying Sensors

ORGANIZATION TYPE

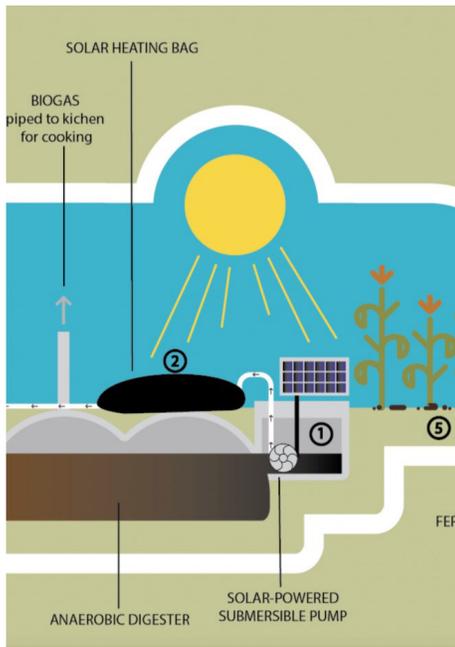
For-Profit

COUNTRY

Mozambique

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Slurry-Separation System

GREEN HEAT UGANDA LTD

CHALLENGE

Anaerobic digestion transforms organic wastes into methane and fertilizer, which saves money while improving energy security, air quality, public sanitation, and crop yields. Unfortunately, in Uganda, 50% of digesters are abandoned within a year because farmers find the process unsustainable. Current designs require every kilogram of waste to be mixed with a kilogram of water for the system to function. Women and children must fetch more than 80 liters of freshwater a day to feed their digesters, wasting precious natural and labor resources.

SOLUTION

Green Heat Uganda Ltd.'s innovative slurry-separation system greatly reduces water demand. The system creates an easily managed fertilizer product while increasing gas production. Utilizing a solar-powered sewage pump and innovative heating process, slurry is dewatered and converted into solid fertilizer that can be packaged, stored, or applied directly to the fields. Water by-products are separated during the process and re-used to mix with organic wastes later in the system. Green Heat Uganda increases the potential of success by enabling all farmers to enjoy the benefits of digesters, regardless of their water access.

A solar-powered submersible chop pump transfers slurry into a black bag that absorbs UV radiation. Heat is applied to kill pathogens and stimulate microbial activity to increase gas production. Solids are removed from the slurry using dewatering fabric, and can then be used or sold as fertilizer. The remaining liquid is mixed with wastes entering the digester, replacing freshwater. The system is eco- and gender-friendly, efficient, and a true cost-saver.

OBSTACLE

In Uganda, 50% of digesters are abandoned within a year because farmers find the process unsustainable.

INNOVATION

Slurry-Separation System

ORGANIZATION TYPE

For-Profit

COUNTRIES

Ethiopia, Rwanda, Uganda

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Groasis Waterboxx

INSTITUTE FOR UNIVERSITY COOPERATION

CHALLENGE

In MENA countries, a rising demand for agricultural products combined with a fragile natural environment is rapidly adding pressure on scarce land and water resources. This unsustainable balance between production limitations and demand calls for a meaningful change in water efficiency in the region.

SOLUTION

The Groasis Waterboxx (GW) is an integrated planting technology that allows fruits, trees and shrubs to grow in degraded farm and rangelands. The GW surrounds the bases of a plant to collect water necessary for crop survival. This innovative and inexpensive technology revitalizes degraded ecosystems, while simultaneously providing valuable nutrient sources of fruits and feed to both humans and animals.

HOW DOES IT WORK?

The GW is a 20-liter box that is placed around a young seedling at transplanting. The box builds up a water column under the plant by collecting dew and rainwater, and distributes it over a long period of time to avoid evaporation.

In practice, the transplanted seedling will receive just enough water from the GW to survive while it searches for water deep in the soil to develop a strong taproot. The taproot developed in this way will make the whole plant resilient to prolonged drought periods. The GW requires less inputs and management when compared to other water-saving technologies such as drip irrigation—and farmers may see a 95% money saving per hectare over a period of ten years.

OBSTACLE

In MENA countries, a rising demand for agricultural products combined with a fragile natural environment is rapidly adding pressure on scarce land and water resources.

INNOVATION

Groasis Waterboxx

ORGANIZATION TYPE

NGO and Non-Profit

COUNTRY

Jordan

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Irrigation Scheduling System

INSTITUTE FOR UNIVERSITY COOPERATION

CHALLENGE

In Peru, access to information about climate and weather patterns is both limited and expensive. Data that is collected and provided by the public authority covers only a small portion of the country. Marketing companies that sell climate stations exist, but only provide services to large farming institutions because of high costs.

SOLUTION

ICU offers Peruvian smallholder farmers an innovative technology that permits widespread sharing of information on climate and irrigation at an accessible cost. Their innovation consists of an irrigation scheduling system that helps farmers know when and how much to irrigate.

HOW DOES IT WORK?

The irrigation scheduling system provides farmers and agriculture technicians with direct indications on the best irrigation practices. Through a climate station, the system measures air temperature, humidity, wind speed and direction, intensity of solar radiation, and rain. These data points are then processed in a GIS platform. Additionally, this platform considers soil characteristics and the type of food produced, and finally provides recommendations directly to farmers through texts, e-mails or notifications to their tablet. This game-changing solution permits farmers to switch from turn driven irrigation to a demand driven system.

OBSTACLE

In Peru, access to information about climate and weather patterns is both limited and expensive.

INNOVATION

Irrigation Scheduling System

ORGANIZATION TYPE

NGO and Non-Profit

COUNTRY

Peru

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M-Fodder

CENTER FOR SUSTAINABLE DRYLAND ECOSYSTEM AND SOCIETIES (CSDES) – UNIVERSITY OF NAIROBI

CHALLENGE

There is an urgent need for change in the agricultural and livestock systems of Africa. Livestock feed prices are escalating due to water scarcity caused by lack of space and the effects of climate change and remain unaffordable to poor smallholder farmers. These farmers comprise 80% of the agricultural workforce in East Africa. With high feed prices, large-scale livestock and crop production are stunted.

SOLUTION

M-Fodder, a mobile phone application, connects smallholder livestock farmers to high-quality fodder through SMS messages. This technology is game changing in two ways. First, it promotes production of high quality affordable hydroponic fodder, which utilizes about 10% less water than traditional fodder. Second, the production, technology dissemination, and marketing of the fodder utilizes the fastest and most affordable means of communication—mobile phone technology.

MILESTONES AND ACHIEVEMENTS

M-Fodder's SMS system enables farmers to access a reliable source of low-cost, sustainable hydroponic fodder right through their phones. Livestock farmers send the distributor an SMS with the fodder quantity required and their location. The farmer will receive a call from the fodder producer within minutes and receive a delivery of hydroponic fodder within seven days.

M-Fodder is capitalizing on the rapid uptake of mobile technology by farmers and creates a gateway for communication between growers and fodder producers. Hydroponic fodder is water efficient and sustainable and may help decrease the number of farmers out of work due to drought and feed price.

OBSTACLE

Livestock feed prices are escalating due to water scarcity caused by lack of space and the effects of climate change, and remain unaffordable to poor smallholder farmers.

INNOVATION

M-Fodder

ORGANIZATION TYPE

For-Profit

COUNTRIES

Kenya, Tanzania, Uganda

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Mobile Weather Forecasts

IGNITIA AB

CHALLENGE

Extreme weather variability due to climate change hinders farmers from capitalizing on rainfall for crop production, especially in regions near the equator. Predicting the weather based on traditional forecasts is often insufficient for small-scale farmers living in these weather volatile regions. Of the estimated 1.4 billion hectares of cropland worldwide, around 80% is rainfed and accounts for about 60% of the global agricultural output. Reliable and accurate weather forecasts help farmers sow, fertilize and harvest at the ideal time to realize greater yields.

SOLUTION

Ignitia AB has developed a highly accurate weather model to help small-scale farmers in West Africa manage their daily activities to predict water availability and improve their yields to optimize food production. Working in partnership with major telecommunications firms, Ignitia sends daily, customized weather forecasts to farmer's phones.

Weather forecasts are delivered daily via text message to mobile phones and depict the predicted weather for the next 48 hours specific to the subscriber's location. Farmers receive updates on the likelihood of rain, timing of rainfall, and intensity of precipitation. Messages are low-cost at \$0.03/day and constructed to be user-friendly so that even low-literacy subscribers are able to extract useful information after very little training.

Current global weather forecast models all fail to provide accurate forecasts in the tropics. Ignitia's forecasts are accurate 84% of the time compared to its competitors, which are accurate only 39% of the time. Designed with end-users in mind, Ignitia delivers highly localized, accurate forecasts and a lightning-fast warning system to alert farmers in case of sudden storms.

OBSTACLE

Extreme weather variability due to climate change hinders farmers from capitalizing on rainfall for crop production.

INNOVATION

Weather Model

ORGANIZATION TYPE

For-Profit

COUNTRIES

Ghana, Mali, Niger, Nigeria, Senegal

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NewSil

SI TECHNOLOGIES INTERNATIONAL

CHALLENGE

Worldwide droughts cause severe agricultural losses. Prolonged lack of rainfall from climate change inhibits the photosynthesis of plants, causes chlorophyll changes, and damages of the photosynthesis apparatus. Plants are inhibited from photochemical activities and see decreased enzyme activities.

SOLUTION

Si Technologies found a way to stabilize silicic acid to strengthen crop resilience against droughts and extreme weather. With their product, NewSil, food crops can absorb silicon, resulting in a reduction of water consumption of 30-50%. Applying silicic acid to food crops is an affordable and environmentally friendly solution to reduce drought stress so crops can overcome periods of water shortages, which saves harvests.

HOW DOES IT WORK?

Silicic acid, an important element in plant growth, is highly unstable. In the creation of NewSil, Si Technologies stabilized silicic acid in its monomeric form and added the element boron—making it the first and only product that found a way to increase silicon uptake by plants. NewSil is simply sprayed over crops, allowing for rapid uptake of the product. Plants will have increased drought tolerance by maintaining proper water balance, photosynthetic activity, and erectness of leaves and structure of xylem vessels under high transpiration rates. The best part: NewSil is a completely safe and natural product, with ingredients found widely in nature.

OBSTACLE

Prolonged lack of rainfall from climate change inhibits the photosynthesis of plants, causes chlorophyll changes, and damages of the photosynthesis apparatus.

INNOVATION

NewSil

ORGANIZATION TYPE

For-Profit

COUNTRY

India

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Sandbar Cropping

PRACTICAL ACTION

CHALLENGE

After the rainy season ends each year in Bangladesh, large barren sandy islands appear in the main rivers. These sandbars usually disappear after five months and thus cannot be cultivated year-round. However, during the dry season these lands can be used by extremely poor farmers to grow high-nutrition crops.

SOLUTION

Practical Action's sandbar cropping technique enables landless families in Bangladesh to diversify their incomes by growing pumpkins and other crops on previously barren land. Farmers can overcome seasonal food shortages and reduce risks that threaten their livelihoods with sandbar cropping. Practical Action teaches farmers how to identify suitable sandbar cropping space, dig pits, fill them with compost, and add pumpkin seeds. Crops thrive and the pumpkins last for up to a year, enhancing food security and improving earning potential amongst extremely poor farmers.

MILESTONES AND ACHIEVEMENTS

In Year 1, Practical Action has reached 750 beneficiaries, 150 of which were families of female farmers. Their unique sandbar cropping technique has led to a 54% reduction in water usage and produced approximately one million kilograms of pumpkins. The innovator has made 30 hectares of land farmable and seen a 100% repayment rate from pumpkin farmers to-date. The project team has identified five sandbar locations managed by five irrigation entrepreneurs in the Rangpur district.

GOALS

1. Support in water quality testing to ensure that water supplies downstream from the sandbar cropping are not adversely affected by the pumpkin growing process.
2. Assistance in creating a business and marketing strategy at the national and international level and identifying opportunities for pumpkin export to other countries.
3. Help in exploring the potential for growing and exporting other pumpkin varieties and vegetables using the sandbar approach.

OBSTACLE

Practical Action's sandbar cropping technique enables landless families in Bangladesh to diversify their incomes by growing pumpkins and other crops on previously barren land.

INNOVATION

Sandbar Cropping

ORGANIZATION TYPE

Non-Profit

COUNTRY

Bangladesh

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Rainmaker

MYRAIN LLC

CHALLENGE

In India, 41 million small-plot farmers rely on flood irrigation, a method that stunts crops and washes away valuable soil nutrients. Drip irrigation increases the efficiency of water and fertilizer by 20% to 50% and increases yields by 30% to 100%. Drip irrigation also preserves nutrients in the soil and increases land longevity. Due to weak distribution chains and product complexity, drip technology has proliferated to only 5% of these farmers.

SOLUTION

MyRain is a wholesaler of drip irrigation products. MyRain's Rainmaker (patent-pending) is a point-of-sale and design application that makes it easy for retailers to customize drip irrigation systems for small-plot farmers based on entering a few parameters. This intuitive app removes the barrier of retailer engineering expertise and increases the ease and opportunity to advise, sell, and order drip irrigation components.

MILESTONES AND ACHIEVEMENTS

In year one, MyRain has focused on increasing access and usage of micro irrigation in India. To date, the innovator has seen over 235 million liters of water savings and reached 660 beneficiaries. Farmers have used MyRain-supplied irrigation products on 162 hectares of fields. Additionally, sales have been good. MyRain sold more than \$80,000 worth of irrigation and hardware products at a gross profit margin of more than 21%.

GOALS

1. Support to better understand the agricultural retailer market in the Indian states of Tamil, Karnataka, Andhra Pradesh, and Telangana.
2. Assist in making connections with local Indian banks to link MyRain's retailer network to working capital and financing.
3. Introductions to potential investors.

OBSTACLE

In India, 41 million small-plot farmers rely on flood irrigation, a method that stunts crops and washes away valuable soil nutrients.

INNOVATION

Rainmaker

ORGANIZATION TYPE

For-Profit

COUNTRY

India

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www.myrainindia.com



Salt Tolerant Potato

METAMETA & SALTFARMTEXEL

CHALLENGE

The UN estimates that at least 1 billion hectares of land are currently affected by salinity and the world loses at least 3 hectares of arable land every minute due to salinization. In Pakistan, 4.2 million hectares of land are affected by salt. With limited freshwater resources available, farmers are forced to use brackish groundwater to water their crops, reducing overall yields and quality.

SOLUTION

MetaMeta is a Netherlands-based development consultancy that partnered with SaltFarmTexel to introduce salt-tolerant potatoes to the Pakistani market. In Pakistan, floods and sea water intrusion wipe out crops with increasing regularity. Their salt-tolerant potato crop offers an alternative to 250 million people globally that live on salt-afflicted soil.

MILESTONES AND ACHIEVEMENTS

After the first year, MetaMeta has produced 16 tons of salt tolerant potatoes and saved nearly 10.3 million liters of water. The innovator successfully grew their crop in water with a salinity of 8.7 dS/m. In 2014, MetaMeta planted demonstration crops in Pakistan. The innovator held two "open days" this year, attended by USAID, Al Jazeera, the Dutch ambassador to Pakistan, local farmers, distributors, and sales representatives. The first potato crops were successfully harvested in April of 2015. MetaMeta is building a cohort of farmers interested in testing their potato varieties, and have 10 beneficiaries so far. Numerous restaurants and hotels have also expressed interest in testing the quality.

GOALS

1. Advice in creating a legal structure upon which the three partners in the innovator's consortium can operate and conduct business.
2. Assistance in building brand awareness among potential growers of the salt-tolerant potato and promotion of partnership opportunities with local growers.

OBSTACLE

With limited freshwater resources available, farmers are forced to use brackish groundwater to water their crops, reducing overall yields and quality.

INNOVATION

Salt Tolerant Potato

ORGANIZATION TYPE

For-Profit

COUNTRY

Pakistan

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Salt-Tolerant and Resilient Crops

INTERNATIONAL CENTER FOR BIOSALINE AGRICULTURE

CHALLENGE

The West Asia and North Africa regions are two of the most water-scarce regions in the world with agriculture consuming over 75% of freshwater resources. Many of the groundwater-based agro-ecosystems and river-based irrigated agricultural lands in this region are affected by salinity and water logging, which is a major constraint to crop production.

SOLUTION

ICBA is working to establish salt-tolerant seed production and exchange chains in Yemen and Egypt, where freshwater is scarce.

Specifically, the innovator is looking at key crops such as barley, triticale, fodder beet, pearl millet, sorghum, safflower, and quinoa. They seek to improve the livelihoods of small-scale farmers.

MILESTONES AND ACHIEVEMENTS

The primary objective for ICBA in the first six months of their SWFF award is shifting their focus from production in the Sinai to scaling in the New Valley region of Egypt. Partner meetings took place in early May to ramp up activities in the New Valley. The innovator's efforts are now centered on recruiting farmers for seed production. In the second year of the award, they intend to turn towards seed sales.

GOALS

1. Advisory support to help ICBA work through a business model that will be most successful in Egypt and Yemen.
2. Support in helping the innovator establish a better understanding of developing an integrated supply chain.
3. Consulting on sales and marketing to help ICBA clarify the value proposition to better engage and mobilize the private sector.

OBSTACLE

Many of the groundwater-based agro-ecosystems and river-based irrigated agricultural lands in this region are affected by salinity and water logging, which is a major constraint to crop production.

INNOVATION

Salt-Tolerant Quinoa

ORGANIZATION TYPE

Not-For-Profit

COUNTRIES

Egypt, Yemen

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SWAR

CENTRE FOR ENVIRONMENT CONCERNS

CHALLENGE

Half of the arable land in India is subject to low rainfall and prone to frequent drought. Risk derived from unfavorable weather patterns drives debts and leaves farmers vulnerable to financial and mental disrepair—farmer suicides are not uncommon. Irrigation sourced from canal and groundwater has a limited scope and current pressure on natural resources leaves irrigation practices in India in need of improvement.

SOLUTION

The Centre for Environment Concerns introduces SWAR: the world's first sub-surface drip irrigation system that release moisture when 'asked' for by the crop. This underground, gravity-based irrigation system provides moisture to plants at the root level. SWAR enhances soil nutrients, uses harvested or stored water, provides irrigation to low rainfall areas, and in turn, transforms the livelihoods of poor farmers to help them grow more food.

HOW DOES IT WORK?

SWAR technology consists of low-pressure drip irrigation components like overhead tanks and drip lines, but is extended with adapted and permeable clay pots. Pots are placed at the root zone and connected to drip lines. Water oozes out of the pots and wets the soil and then 'sweats' to maintain a favorable soil moisture condition. This method assures moisture is spread at the plant's root zone to cultivate vegetables, flowers, fruit and forestry trees using only one fifth of other drip irrigation systems in India. SWAR is automated but doesn't require electricity and results in huge water savings.

OBSTACLE

Half of the arable land in India is subject to low rainfall and prone to frequent drought.

INNOVATION

SWAR

ORGANIZATION TYPE

Non-Profit

COUNTRY

India

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The Barsha Pump

AQYSTA HOLDING BV

CHALLENGE

For small and medium-sized farmers in the Himalayan Mountains of Nepal, watering crops can be a challenge. Irrigation solutions such as diesel and solar-powered pumping exist, but are not sustainable, requiring constant repairs, refueling, or large upfront investments. Simple solutions are needed to help farmers keep crops watered.

SOLUTION

aQysta's Barsha pump is a low-cost, innovative solution for smallholder farmers to irrigate their fields without using any fuel or electricity. The hydro-powered pump is easily implemented anywhere there is flowing water nearby and requires little maintenance.

MILESTONES AND ACHIEVEMENTS

To date, aQysta has reached 241 beneficiaries with its hydro-pump technology. The innovator has installed 5 Barsha pumps across Nepal in diverse socioeconomic conditions. In Year 2, aQysta hopes to install 40 new pumps. Additionally, the innovator has leveraged more than \$200,000 in outside funding, and has seen a profit margin of 21%.

GOALS

1. Counsel on aQysta's overall business model in order to identify the most optimal path to scale.
2. Help collaborating with USAID's Nepal projects and help positioning the pump technology to local farmers.
3. Recommendations on connecting with relevant investor audiences such as venture funds, impact funds, and family foundations.
4. Support in developing a micro-financing option model to approach micro-financing institutions.
5. Help in designing a complete irrigation and pump system for packaged sales.

OBSTACLE

For small and medium-sized farmers in the Himalayan Mountains of Nepal, watering crops can be a challenge. Simple solutions are needed to help farmers keep crops watered.

INNOVATION

The Barsha Pump

ORGANIZATION TYPE

For-Profit

COUNTRY

Nepal

CONTACT

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The Buried Diffuser

INSTITUTE FOR UNIVERSITY COOPERATION

CHALLENGE

In Tunisia, 43% of the families are completely dependent on agriculture for their means of survival. Unfortunately, agriculture-based incomes can be unreliable as smallholder farmers are often affected by droughts, especially in disadvantaged rural areas. Drip-irrigation systems, currently the most efficient irrigation system spread on the market, can be costly and energy inefficient for smallholder farmers struggling to survive.

SOLUTION

The buried diffuser is a new underground irrigation technique for trees, shrubs, and vegetables in fields and greenhouses. This innovative technology allows for water and energy savings as well as drought mitigation. In center-south Tunisia, the buried diffuser can keep trees alive during dry periods and improve olive yields that constitute the main source of income for the farmers in the region—thus contributing to poverty reduction.

The buried diffuser provides underground irrigation that delivers water to plants at the root level, and lessens the likelihood of water loss from evaporation. The system is comprised of diffusing parts, which facilitate water infiltration of the soil. A connection to a water distribution pipe helps regulate water flow to plants.

The buried diffuser works with gravity, as well as conventional water pressure to ensure that crops are efficiently getting the water they need. This innovation performs better than currently widespread irrigation methods, and should allow farmers to decrease production costs up to 30%. Additionally, the buried diffuser uses 30% less water to produce the same weight of crop.

OBSTACLE

In Tunisia, 43% of the families are completely dependent on agriculture for their means of survival.

INNOVATION

The Buried Diffuser

ORGANIZATION TYPE

NGO and Non-Profit

COUNTRY

Tunisia

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Waterpads®

METAMETA RESEARCH B.V.

CHALLENGE

Large inequities in water and food accessibility exists in Turkey. Farmers and refugees living in the arid regions of the southeast struggle to gain access to land and precious resources like freshwater. Currently, the region is home to two million Syrian refugees. With this demand for water and space, the pressure on groundwater sources during the six months dry period starting in April, is enormous.

SOLUTION

Waterpads, through the organization MetaMeta Research B.V., increases water efficiency in the international vegetable and fruit tree sector through their low-cost water buffering technology. This innovation is essential for water-deprived farmers who need to grow a lot of food with just a little bit of water. The low weight polymer pads are placed close to the roots of plants, avoiding evaporation and the loss of useful runoff water.

Waterpads are a sandwich of paper and jute with an inner layer of granular polymers in dry form. The polymer absorbs 100 times its own weight of water, retaining water at binding tension. Placed at root level, the pads increase farmers' irrigation efficiency by 40%, while increasing yields between 10 and 25%. With this technology, young plants and trees are significantly more likely to survive the dry times. Costing about mere pennies per plant with lifetime of 5 years, Waterpads are low-cost, easy to produce and reliable for farmers in arid regions.

GOALS

1. Increase the likelihood of young plants and trees to survive the dry times.
2. Provide low-cost Waterpads for farmers in arid regions.

OBSTACLE

Large inequity in water and food accessibility exists in Turkey.

INNOVATION

Waterpads®

ORGANIZATION TYPE

Non-Profit

COUNTRIES

Ethiopia, Turkey

CONTACT

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Zero Discharge Desalination

UNIVERSITY OF TEXAS – EL PASO

CHALLENGE

By 2050, water demand is projected to increase by 55% globally, meaning that the number of people impacted by water scarcity and stress will continue to rise. Importantly, more than 70% of global water use occurs in the food value chain. By 2025, two-thirds of the world's population could be living in severe water stress conditions and developing countries will see the impact on human health and food production. To satisfy future water demand, we must augment traditional water supplies with brackish groundwater.

SOLUTION

The University of Texas at El Paso (UTEP) Center for Inland Desalination Systems (CIDS) designed a zero discharge desalination (ZDD) technology that reduces water waste in the desalination process.

HOW DOES IT WORK?

Zero discharge desalination (ZDD) technology provides an order-of-magnitude reduction in the amount of water wasted in the desalination of groundwater by conventional processes. Electrodialysis metathesis uses a DC voltage to remove undesirable ions from water and strategically pairs them with other ions to produce a precipitate that can then be used by farmers for soil augmentation. UTEP plans to optimize their technology primarily by simplifying their operational process to include control set points.

The team plans to go to a single electrodialysis stack and to feed sodium chloride precipitated from their system back into the process, forming a closed loop. The team plans to work with local agriculture extension agents affiliated with the university to provide farmer outreach and to coordinate farmer training at the pilot test location in Honduras.

OBSTACLE

To satisfy future water demand, we must augment traditional water supplies with brackish groundwater.

INNOVATION

Zero Discharge Desalination (ZDD)

ORGANIZATION TYPE

University

COUNTRIES

Honduras, Latin America

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Freshwater Management System

ARCADIS

CHALLENGE

Water demands in coastal Mexico are on the rise while fresh water resources are increasingly becoming limited. Economic growth, growth in population, and climate change exacerbate existing freshwater shortages and increase pressure on shallow fresh groundwater reservoirs. Additionally, saltwater intrusion is making aquifers unsuitable for irrigating agricultural lands.

SOLUTION

Subsurface water technologies provide an innovative, practical approach to freshwater management in coastal areas. ARCADIS's Freshkeeper product stops and reverses salinization of aquifers and water wells by intercepting intruding brackish groundwater. Fresh and brackish water are pumped simultaneously from different depths, to control the fresh-brackish intercept.

MILESTONES AND ACHIEVEMENTS

ARCADIS has completed an analysis for a business case in Mexico that highlights opportunities for their product in the Mexican market. The innovator is exploring a potential customer base of both farmers and municipalities. Their first working visit to Mexico entailed establishing a coordinated effort among local stakeholders and gathering information on the local geohydrology and salinization problems.

OBSTACLE

Water demands in coastal Mexico are on the rise while fresh water resources are increasingly becoming limited.

INNOVATION

Freshwater Management System

ORGANIZATION TYPE

For-Profit

COUNTRY

Mexico

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Greenhouse

DEUTSCHE WELTHUNGERHILFE E.V.

CHALLENGE

From October to April, irrigation canals are closed for repairs, making water extremely scarce for food production.

SOLUTION

Deutsche Welthungerhilfe e.V. has combined a rainwater harvesting mechanism with greenhouse technology. In their focus country, Tajikistan, greenhouses enable vegetable production from October to April, which will significantly reduce the cost to consumers. Rainwater is captured by roof catchments. Greenhouses are sinotype and use an isolation system to capture heat.

MILESTONES AND ACHIEVEMENTS

Deutsche Welthungerhilfe e.V.'s primary goals were to increase broad knowledge of the technology among the potential customer base, select the initial group of farmers to implement the greenhouse, and construct and put into operation 10 greenhouses.

Deutsche Welthungerhilfe e.V. held 14 information sessions to build knowledge and conducted individual meetings with 45 farmers. They learned that their customers wanted a greenhouse twice their planned size so that multiple families could use the same one and cut down on running costs. To date, five greenhouses have been completed with two additional under construction.

OBSTACLE

Long winters reduce the amount of time for growing crops in Tajikistan.

INNOVATION

Greenhouses

ORGANIZATION TYPE

Non-Profit

COUNTRY

Tajikistan

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Lilypad

PURALYTICS

CHALLENGE

Man-made ponds and large diameter open tanks have chemicals and micro-organisms.

SOLUTION

Puralytics has pioneered a photochemical technology for water purification. The Lilypad provides both an environmentally safe and effective water treatment solution for cleaning ponds and managing catchment areas. This reusable, floating purifier continuously destroys chemicals and micro-organisms and works in man-made ponds and large diameter open tanks.

MILESTONES AND ACHIEVEMENTS

Puralytics has developed a strong relationship with Driscoll's, a berry producer in Mexico. Driscoll's has agreed to serve as a demonstration partner to prove out the Lilypad product. Puralytics is negotiating with Hidro Industrial to be a distribution and installation partner.

During the company's first year in Securing Water for Food, its goals included developing the value proposition for the small farmer, developing their business model, and identifying the minimum viable system that is affordable for their customers.

OBSTACLE

Man-made ponds and large diameter open tanks have chemicals and micro-organisms.

INNOVATION

Lilypad

ORGANIZATION TYPE

For-Profit

COUNTRY

Mexico

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Salt-Tolerant Quinoa

WAGENINGEN UR

CHALLENGE

In agricultural lands impacted by high salinity, smallholder farmers realize lower than average yields and reduced incomes. In these regions, improving food production and creating new opportunities for earning a livelihood are desperately needed.

SOLUTION

Researchers at Wageningen UR have come up with a non-genetically modified salt-tolerant quinoa that not only grows, but also thrives in saline soils. By making this high-value super grain available to farmers in areas impacted by high salinity, there is a potential to reduce fresh water consumption, reduce food scarcity, reclaim unused or underused agricultural lands, and create new livelihood opportunities for smallholder farmers.

MILESTONES AND ACHIEVEMENTS

Wageningen has sown field trials of the salt tolerant quinoa in China and Vietnam, as well as set up tests to determine maximum salt level tolerance. In Chile, they have harvested 60 hectares and, through their partner AbbottAgra, signed an agreement with SPS Chile, a production chain managing company that licenses them to use the non-bitter varieties in country. Wageningen has submitted an EU-H2020 project proposal aimed at improving productivity of quinoa under abiotic stress conditions and improving agronomy by extensively testing genotype, environment, and management interactions.

GOALS

1. Improve farmer adoption of salt-tolerant quinoa crops.
2. Enhance volume of seed sold.
3. Build networks in China and Vietnam.

OBSTACLE

In agricultural lands impacted by high salinity, smallholder farmers realized lower than average yields and reduced incomes.

INNOVATION

Salt-tolerant quinoa

ORGANIZATION TYPE

University

COUNTRIES

Chile, China, Vietnam

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Weather System

TRANS AFRICAN HYDRO-METEOROLOGICAL OBSERVATORY (TAHMO)

CHALLENGE

Without climate information, you cannot optimize crop selection or ensure it without knowing the risks.

SOLUTION

The TAHMO weather system is the first continent-wide weather network that allows free data to non-commercial users including researchers. The innovative, solar-powered sensor system delivers accurate, localized, and timely meteorological and water resource information to farmers multiple times per day via a mobile device. The network helps enhance food security and reduce the risk to smallholder farmers that rely on rain-fed agriculture to cultivate crops.

MILESTONES AND ACHIEVEMENTS

In addition to reducing agricultural water consumption in targeted areas, TAHMO tested alternative business modalities and is having some success with a direct-marketing approach to schools. The system was presented at the Addis GEF meeting, where weather observation was the focus of the meeting for East Africa. Ministers saw the stations and invited TAHMO to pilot in 5 countries.

OBSTACLE

Without climate information you cannot optimize crop selection or ensure it without knowing the risks.

INNOVATION

Weather System

ORGANIZATION TYPE

For Profit

COUNTRIES

Burundi, Kenya, Rwanda,
Tanzania, Uganda

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