EcoSwell Solar Distiller Project

Project name

EcoSwell solar distiller

Contact persons for the project

Name: Alejandro Pizarro
Role/engagement in the project: Project leader
Whatsapp number: +51 975 157 540
e-mail: alejandro.pizarro@ecoswell.org

Other point of contact

Name and position: Project Manager Andres Bustamante	Phone number and email: +51 959 578 765 andres.bustamante@ecoswell.org

Project summary

For some families in Lobitos, access to safe drinking water is limited by its availability or cost. This situation can be particularly severe during El Niño weather events, which can disrupt the water supply to the whole town for days or weeks at a time. Our aim is to develop and build solar distillers that will give families the means to replace or supplement other sources of water, using just the freely available and locally abundant resources of seawater and sunshine.

Timeframe and location

The project has been in development since 2016, culminating in the first working version of the distiller being delivered to a family in Lobitos in May 2021. The future duration of the project is likely to last several more years as the distiller design is refined and improved based on feedback from families using it, and then manufactured for release to other families.

Initially the project work and use of solar distillers will take place in Lobitos, but subsequently we anticipate supplying solar distillers to other nearby communities in this arid region of Northern Peru.

Context analysis

Lobitos is a small coastal town in the arid northern region of Peru, with a population of about 1,300. Annual rainfall is typically less than 10mm per year and in some years there is no rainfall at all. This means that there are limited natural resources from which safe drinking water can be obtained.

A further problem is that the water infrastructure in the region is very limited. The majority of houses in Lobitos are connected to a piped water distribution system but the supply is typically active for just a few hours per week. This means that a continuous supply is only available to families that have the space for, and can afford, several large water storage tanks.

The result of this is that, for some families in Lobitos, access to water depends on them having to either buy bottled water from local stores or rely on frequent purchases from tanker drivers, which is expensive and is sometimes drawn from contaminated sources.

This precarious situation can be made even worse during heavy rains or severe El Nino weather events, either of which can disrupt the water supply to the whole town for days or weeks at a time.

The provision and use of solar distillers can offer vulnerable families of fishers an alternative or supplementary source of drinking water using only the freely available and locally abundant resources of sea water and sunshine.

Project objective

The objective of this project is to provide some of the most vulnerable families in Lobitos and other local communities with safe and clean drinking water, distilled from seawater using an economically available solar distiller.

Project activities & expected results

Activities	*Expected Results*
Monitor the use and performance of the first solar distiller put into service in Lobitos	Qualitative data relating to the social appropriacy of the technology for use by families in Lobitos. Quantitative data relating to the performance of the distiller. Identification of social and/or technical challenges that need to be addressed to improve the effectiveness of the project.
Develop and test an improved version of the distiller	Production of a second distiller with improved social and technical performance using information from the activity monitoring described in the previous answer.
Manufacture distillers to provide to vulnerable families in Lobitos and other local communities	Quantifiable improvements in the availability of drinking water to families
Develop and roll out to the local communities information and training about the solar distiller.	Improve knowledge and awareness of the health and benefits of clean water, as well as the sustainability benefits of the solar distiller. Train local suppliers to build more distillers.

Global Giving's contribution

Funding obtained through Global Giving would be used to support the project activities. Specifically funding would be spent on materials, training, and hiring local carpenters and project management (EcoSwell staff time) to construct further distillers. Funds will also be used to ensure that the project is effectively monitored, and that qualitative and quantitative data is collected and analysed to ensure that the distiller is optimised both from a technical and a social perspective.

5 reasons why should you donate

- Access to safe drinking water should not be restricted by income
- Safe drinking water is in short supply in arid coastal towns worldwide
- Solar distillers are low-cost, reliable, and easy to use.
- Manufacturing distillers will create local employment
- Solar distillers provide resilience during water shortages and natural disasters

Local ownership

There is good local awareness of the project:

- The testing of the development models of the distiller took place in a visible location at the front of the EcoSwell premises in Lobitos and attracted interest from local residents and passers by.
- Local carpenters have assisted with the fabrication of the development models.
- There have been workshops conducted during the development of the solar distillers.
- The first production distiller is in position behind the recipient family's house in a prominent location within Lobitos.
- As training and information is developed and shared, the solar distiller will provide a valuable example of sustainability in the water supply

Project monitoring & Evaluation

At the development stage the project is monitored by recording (a) the costs incurred for time and materials during fabrication and (b) the performance of the distiller during testing. By measuring and comparing fabrication parameters (e.g. the size of the distiller glass cover), environmental parameters (e.g. the ambient temperature) and performance results (the quantity of distilled water produced) a rigorous process of product improvement can be followed.

The performance indicators that are used to determine the most efficient distiller design are:

- The average daily distiller water output;
- The 'size efficiency' of the distiller (measured as litres of daily distilled water output per square metre of glass cover);
- The cost of the distiller (measured as US$ per distiller); and
- The cost of the distilled water output relative to the cost of the distiller (measured as US$ per litre of daily distilled water output).

During the deployment stage, a qualitative monitoring approach is used to assess how well the distiller has been received by the recipient family and the extent to which it's output has been incorporated into their normal water supply. A quantitative analysis is also performed to investigate whether the expected output is being achieved, by measuring the average daily water output.

Sustainability & Exit

- EcoSwell has the Solar distillers as a core project and will ensure its sustainability over time.
- Exit plan - Construction designs will be available to local residents and governments for anyone to build themselves. All files will be uploaded online for easy access.
- Training of local carpenters to ensure local capacity remains for distiller construction
- Distribute the plan to local institutions (regional, local governments)
- Volunteer program - this doesn't end with the GG financing. Every intern collaborates with the development of projects through their financial contribution.

Project budget

In the below table, specify the costs of the project. Please be as specific as possible. All budgets need to be in USD and current exchange rate needs to be specified using the specified exchange rate converter.

Milkywire does not have a minimum or maximum budget, but as the funding is based on donations through the platform which means that a smaller budget (up to 20 000 USD) is more probable to be achieved than a larger budget.

If the funding goal is not met, the organization will not be required to repay any of the funds, and all funds raised for the project will still be dispersed. In the final reporting we will require information on how the funds have been used and how they have contributed to the objective. As such, it might be that only a partition of the equipment has been procured, or that only a proportion of the intended staff have been supported. In planning the budget, it is important that you have an idea of how to approach this and how the use of the funds should be prioritized.

Item	**Units** (list salaries in hours)	**Cost Per Unit** (USD)	**Total Cost** (USD)
1. Solar Distiller Build			
Building materials	5	$500	$2500
New tools for building materials Electric drill and electric saw	1	$350	$350
Workbench	1	$500	$500
Local Carpenters	50	$15	$750
EcoSwell staff	250	$15	$3750
Project Management	40	$50	$2000
Sum Equipment		**$9,850**	

2. Monitoring/ Research			
Project Management	30	$50	$1500
Instrument design and piloting	24	$15	$360

Research Materials (printing, utensils)	1	$30	$30
Interview application and analysis	70	$15	$1050
Indicator report writing	16	$15	$240
Sum monitoring/research		**$3,180**	

3. Transportation			
Flights for project supervisor (Lima Lobitos)	2	$200	$400
Local travel (trips to Talara city)	20	$20	$400
Sum Transportation		**$800**	

4. Training & Workshops			
Training hours for local carpenters	10	$15	$150
Community workshops	2	$250	$500
Sum Other		**$650**	

5. Marketing & Communications			
Graphic designs for communications (social media, press articles, etc.)	10	$30	$300
Updating website hours	20	$15	$300
Sum Other		**$600**	

Project Total	**$15,080**

Local Ownership, Sustainability and Exit Strategy

The development and production of EcoSwell's solar distiller project has been a compilation of many years of research work, design iterations, and evaluations to get to where the project is today. Through help from community leaders and local suppliers and craftsmen, Darwin and Justo, the distiller is making its way to changing the concerns of water scarcity in the area. As of May, there is one trial distiller within the community of Lobitos being used on a daily basis by Jacky. Thanks to the ease of use and electricity not being needed, she is able to substitute her home's poor water provisions with clean drinking water. She has been able to provide this water to her children and even states that it tastes better than the rest of her drinking water. Through additional funding, we at EcoSwell hope to scale the project to make clean drinking water regularly available to all who struggle in Lobitos.

Jacky with the solar distiller and EcoSwell interns

The population of Lobitos and Water Scarcity

Lobitos is a small community with a population of just around 1,300 people that rely primarily on fishing and surf tourism to maintain their economy. 30% of the population of Lobitos live below the poverty line with 14% within extreme poverty and less than half the youth graduating from high school. Additionally, the town is located in one of the driest arid deserts in the world with no reliable water source and regular blackouts creating a grave water shortage. With little to no rainfall during the year and the local river (Rio Chira) needing to provide for the 1.1 million people in the area, water is a prized commodity. Water that is utilized in houses must be stored in tanks above or below the house, these tanks store the water that is unreliably supplied by local utilities. In the winter months, water may be supplied three times a week for less than two hours, while in the droughts of summer water may only be supplied once a week. For homes that can not afford multiple tanks, this leads to water being in scarce supply. The little water offered via tap can not be used for human consumption due to contamination of bacteria and coliform. Access to reliable and safe water is a human right which is what we hope to provide via our solar distillers

Community Involvement in Planning, Implementing, and Evaluation

The community is involved in regular surveys that are conducted by the EcoSwell team to receive feedback from the users of the distiller for quality assurance purposes along with potential design improvements. Allowing the community to give feedback gives the team an opportunity to implement changes for future model designs based on what is wanted by those who are using the project. During the construction of the distiller, local suppliers and tradesmen were contacted to assist in making the design a reality. Prior to the design and construction of the solar distiller, community leaders were contacted to allow us to better understand what the people of Lobitos are in need of and how we could assist them in their goals.

Community Appropriation of the Distiller

So far there is one solar distiller in use within the community serving as a test unit. Jacky, who currently uses the distiller, loves the technology and the fact that it allows her family to have more drinking water which is vital to human life. She also promotes the distiller around the community and creates excitement towards the possibilities this technology could provide Lobitos. Through Jacky's marketing of the distiller it has created a greater dialogue around the community over the importance of clean drinking water and to take initiative towards possible solutions. Currently, Jacky is the only person in the entirety of Peru using a household solar distiller. Additionally, there is the goal of scaling the project to provide more potable drinking water to other communities in the area. Through the EcoSwell team teaching local craftsmen how to build and maintain the distillers, the people of Lobitos will be able to take charge in the security of their water sources.

Local Ownership

As with all projects at EcoSwell, a thorough analysis of what the community of Lobitos needs and what the people want is completed. Currently, the community has the ability to take ownership of the solar distiller through utilizing it and assisting in our evaluation of the current design. At the moment monitoring is being conducted on a pilot unit that is being used by Jacky, an active community member. She is ecstatic with the results from the distiller thus far, and she often garners excitement from her neighbors as she shares the amazing quality of the water that she says tastes better than the other drinking water she has. During the initial design and construction phase of the distiller, Darwin and Justo, local suppliers and construction workers assisted us in creating the prototype. As a component of the exit strategy, local craftsmen will be trained in the construction and maintenance of the solar distiller providing an additional product for income and ownership of the project in the future. Meanwhile, EcoSwell will continue to monitor the project for efficiency potential and assist in the appropriation of future distillers.

Benefits of the System

The solar distiller has many benefits for those in Lobitos to create more drinkable water for themselves and their families because the only form of energy is harnessing the sun's power which is free. All that is needed for the distiller to properly work is sunlight and a water source which allow for the unlimited opportunity for the creation of potable water. Additionally, upkeep costs of the distiller are low and the labor is minimal allowing users to dedicate their time and funds towards other necessities. The water from the distiller has also been rigorously tested and proven to be safe and reliable, which is a rare commodity in the arid desert of Lobitos. A potential benefit also includes that the distiller has the ability to be created on larger or smaller scales along with being replicated to provide more communities accessible drinking water. The solar distiller has also begun to serve as an opportunity for community engagement as the current design sits in a local's yard and garners much discussion over the opportunities present.

Economic Sustainability and Exit Strategy

The project has the ability to be economically sustainable due to the inexpensive materials and labor of the solar distiller, along with the ability for most components to be locally sourced. Not having to specially order materials allows community members to maintain the system with little to no money and there are no monthly costs as there are no electricity requirements. The distiller is designed to be simple and easy to maintain ensuring recipients of the system can keep it running smoothly with little time commitment. The strategy remains to train local craftsmen on how to build and maintain the distillers for wider community distribution of this essential tool. Before the exit strategy begins, different iterations of the distiller will be designed and evaluated to ensure maximum efficiency and water output. Additionally, the team aims to create a distiller manual explaining the construction and utilization for widespread use, allowing anyone to make their own water source without the help of EcoSwell.