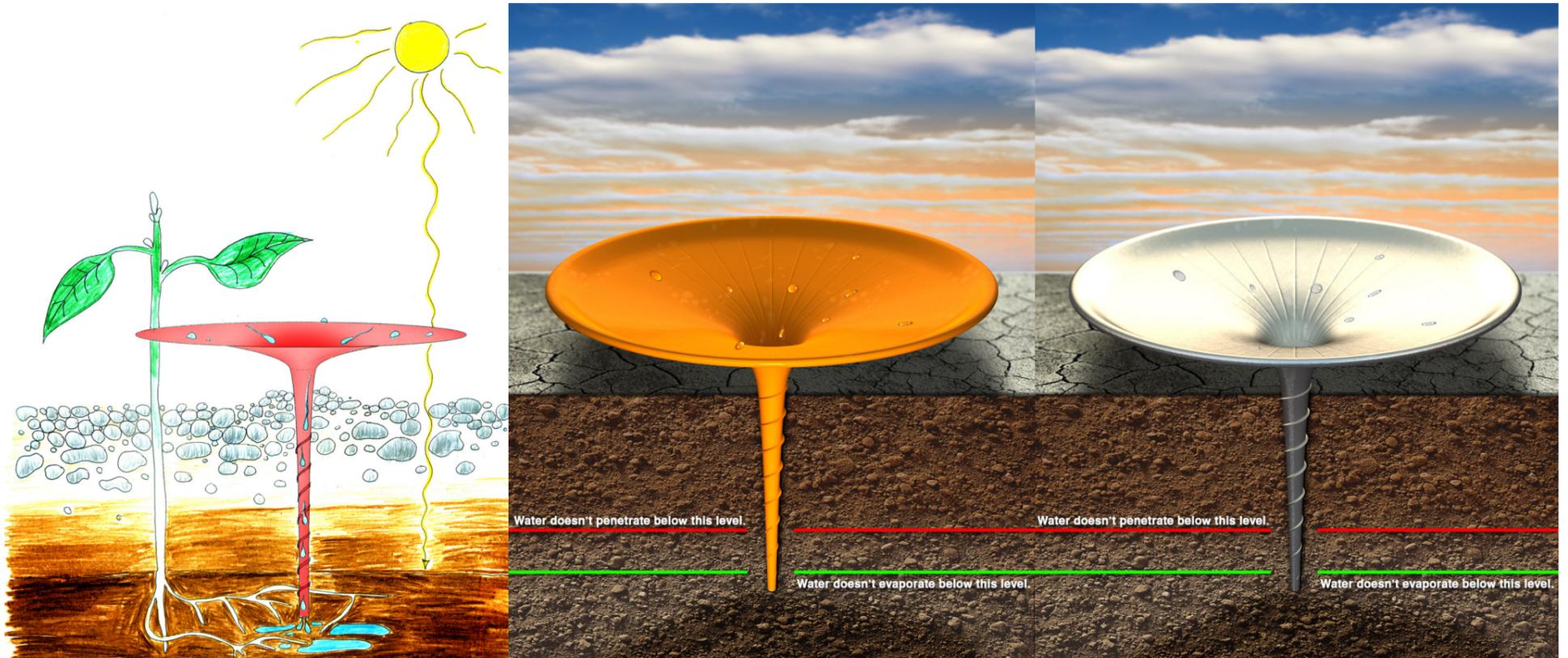


## DRIPS: Deep Root Irrigation Precipitation System



In an arid environment where there is humidity and a temperature gradient between night and day, dew forms. However, this moisture soon evaporates before it reaches the roots of thirsty plants. If there was a way to transport that water directly to the roots before it evaporated, many plants could thrive where they would otherwise perish. The Deep Root Irrigation Precipitation System (DRIPS for short) addresses this problem.

DRIPS is a funnel that gathers water from the air through either condensation or collection, and then channels water droplets below the evaporation level. In its dew condensation form, DRIPS would consist of a shallow and broad dish, about 15 inches (40 centimeters) in diameter, made from a material designed to hold the cold temperature, together with a thin cone that extends about 2 feet (.6 meters). Optional spiral threads surrounding the central shaft enable the funnel to be screwed and anchored into hard soil. From the air, DRIPS condenses droplets of water on the broad surface of the dish and channels

the droplets down the central cone, deep below the surface where it no longer evaporates. Small channels embossed on the DRIPS surface help draw the water down by capillary action and gravity.

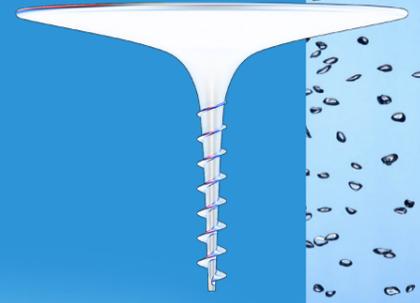
DRIPS funnels are designed to be cheap and easy to manufacture from recycled plastic, clay, or aluminum. The funnels are one piece with no moving parts. They are designed to be stackable for shipping and storage. And they are easy to use—just screw them into the ground next to a plant. They serve to deliver precious water to plants with no further human intervention or energy usage. With no moving parts or complicated technology, DRIPS just works.

Dew can be a small but reliable source of clean water. DRIPS would help subsistence farmers living in semi-arid environments with little or irregular precipitation. These people have difficulty growing food due to a lack of clean water. DRIPS could change that and allow more nutritious plants to grow in areas where it was not previously possible.

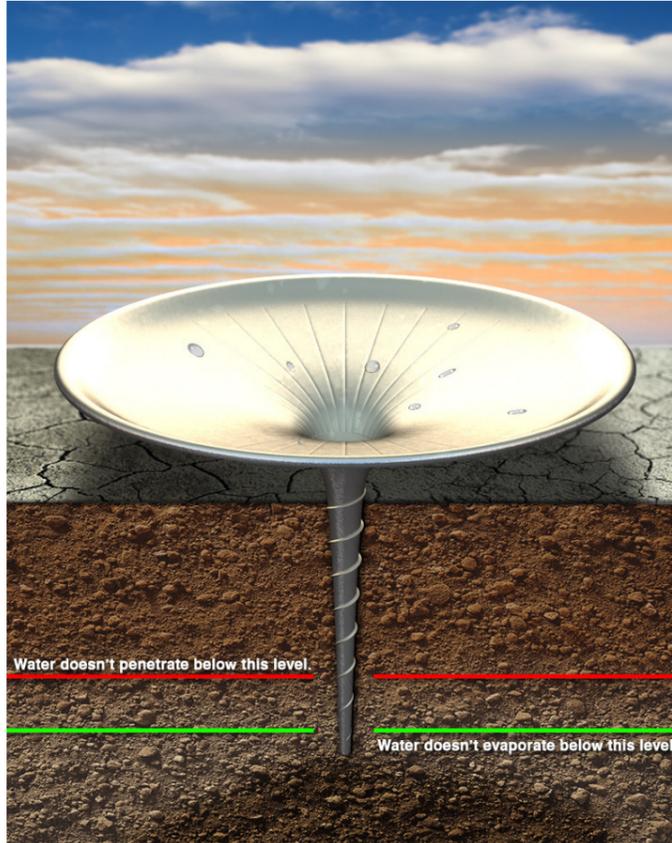
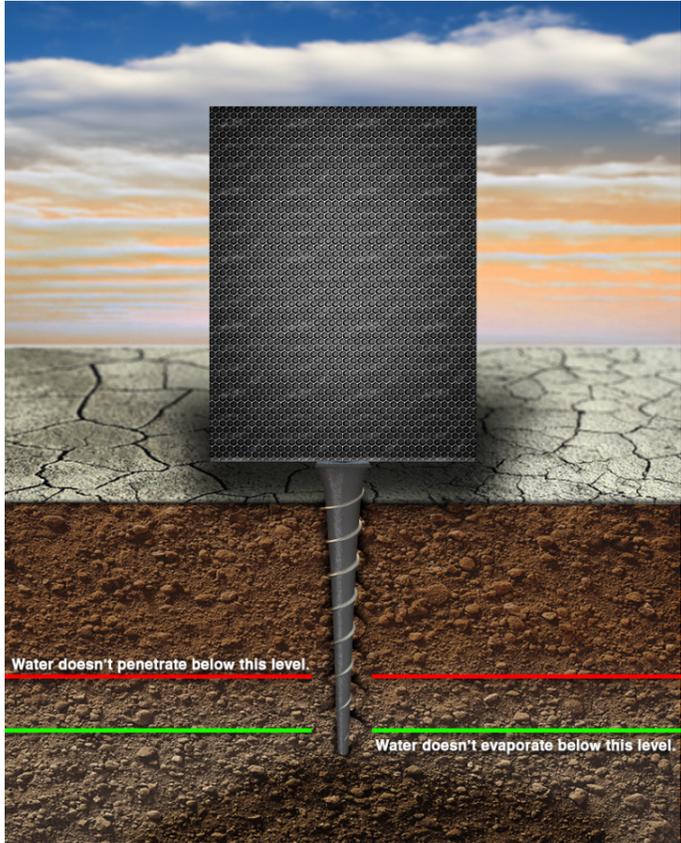


# Deep Root Irrigation Precipitation System

# DRIPS PROJECT



## Culturally Appropriate, Sustainable, and Transformative



*“In the absence of significant rainfall, many regions still have surprising amounts of water available from fog. Fog collection has been shown to be a viable source of good quality water in many arid parts of the world. [...] Suitable fog conditions are found in both extremely arid parts of the world and in seasonally arid regions.”*

— “Complementary Aspects of Fog, Rain and Dew Collection,” Dr. Robert S. Schemenauer, presented at the International Conference on Fog, Fog Collection and Dew.

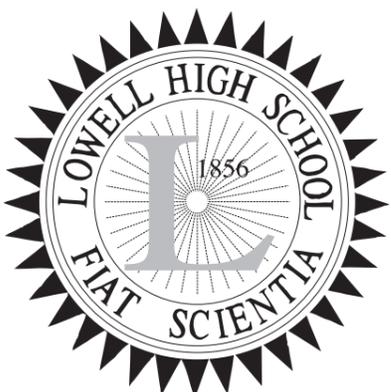


In different areas of the world, people need flexibility in

their approach to collecting dew for plant irrigation. Some places have a lot of fog and would benefit from using nets-based DRIPS to catch the water from the air. Some places have easy access to clay, making a clay DRIPS a viable option. Some areas have a lot of recyclable materials, and both plastic and aluminum are good materials for DRIPS manufacturing. Every area that adopts DRIPS needs to pick its own approach to above ground dew collection, its appropriate method of manufacturing, and its own materials that make sense locally.

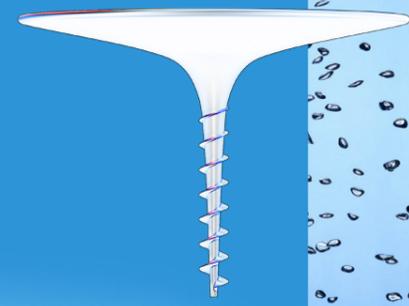


Cheap to produce, DRIPS provides a desirable service that is valuable to the communities where it is implemented. The water is clean and uncontaminated. People will no longer need to spend hours each day just ferrying water from wells to crops. The extra time and energy saved can be applied to other endeavors: education, family, art, community service, or work.

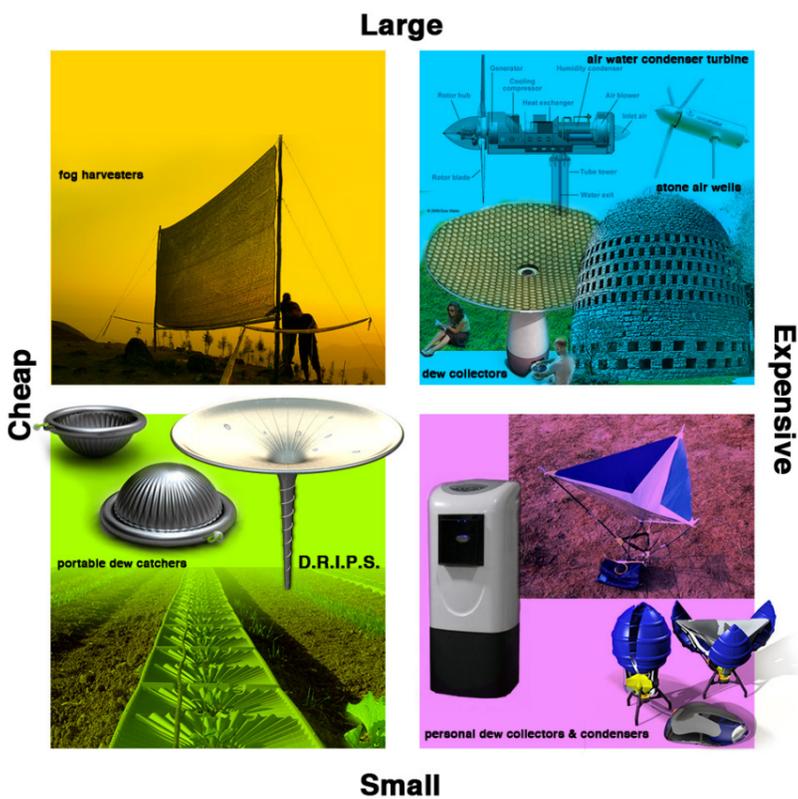


LEADING THE ENERGY CHANGE



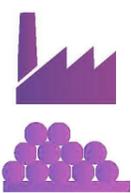


## Where Does DRIPS Fit In?



Fog Harvesters and Dew Collectors are good solutions in areas without reliable water sources. Interest is growing in harnessing this source of water; the *6th International Conference on Fog, Fog Collection and Dew* is to be held in Japan in 2013. Many approaches are being explored. So what is the niche occupied by DRIPS?

Plotting the approaches on a four square grid with axes of cost versus size clarifies the intended uses and audiences for these different atmospheric water collection solutions. DRIPS is in the “small and cheap” quadrant.



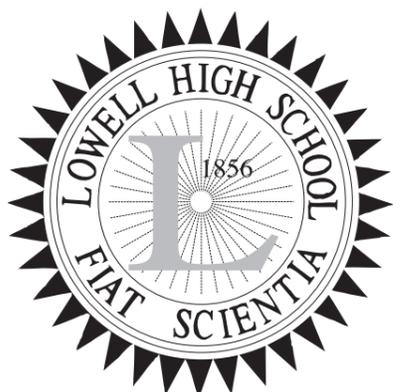
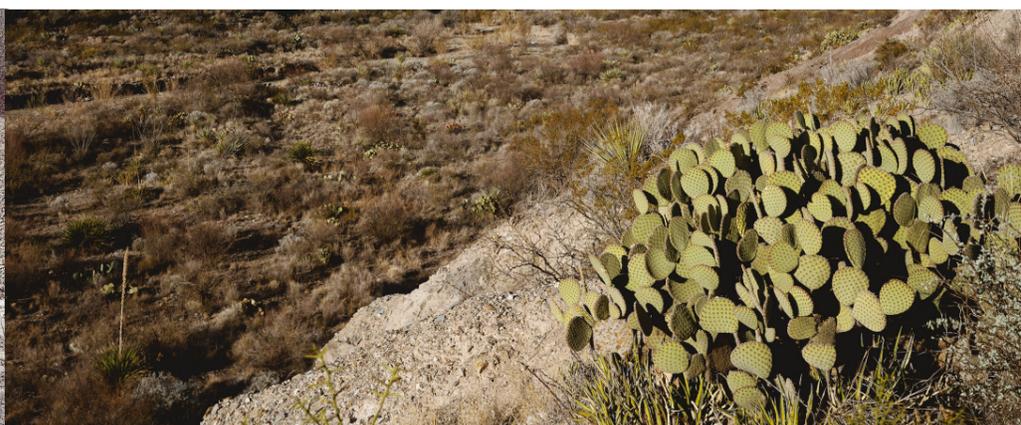
The **large and expensive** quadrant is geared toward serving entire communities. Some models require electricity (via an electrical grid or a wind turbine). Some are large architectural structures: air wells. The cost of manufacturing for these solutions is high and some require ongoing maintenance.

The **small and expensive** quadrant is targeted to two different markets. One is for outdoor enthusiasts—backpackers and hikers who wish to be able to use light-weight but expensive devices to reduce the necessity of carrying water. The other is for providing drinking water in areas where there is little water but there is electricity. They work something like dehumidifiers and suck the air through a series of electrically cooled coils, condensing water from the air.

The **large and cheap** quadrant is also geared towards serving entire communities. These are very interesting solutions for places that have a lot of fog. In the coastal mountains of Peru and in monasteries in Tibet, fog nets are being used to deliver clean drinking water. And in India, rooftops are being used to condense water inexpensively. On the project website, we list many examples and include links to manufacturers.



The **small and cheap** quadrant, where DRIPS resides, also is occupied by a few other devices. The beetle dew collector, designed using biomimetic principles after observing the Namib Beetle’s dew collection technique, is intended to collect small amounts of drinking water. The Tal-Ya irrigation system, which is targeted to agriculture, differs from DRIPS in that it doesn’t transport water below the evaporation level. Tal-Ya, made from thin plastic, is mostly about water concentration and conservation, and isn’t designed to maximize condensation. DRIPS is the only system that collects dew for irrigation and transports the water below the evaporation layer.



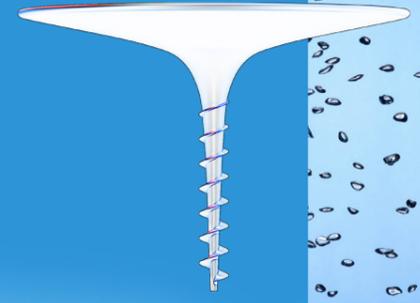
LEADING THE ENERGY CHANGE





# Deep Root Irrigation Precipitation System

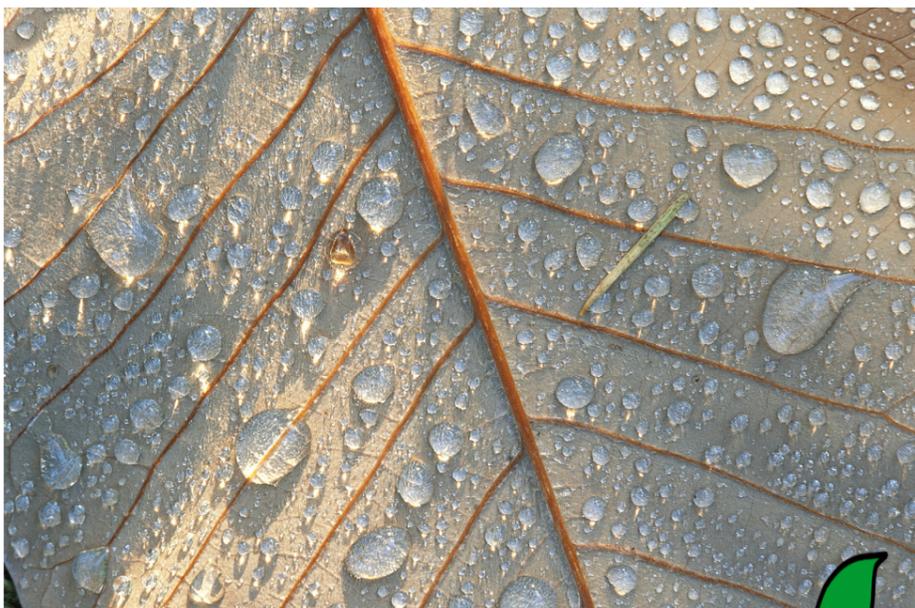
# DRIPS PROJECT



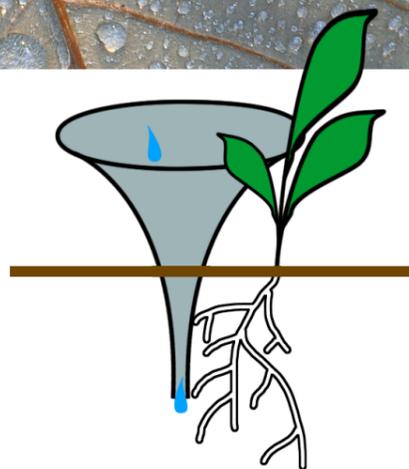
## Water is Life

Most plants and animals living in a desert environment evolved to take advantage of dew—in many cases their sole source of water. DRIPS allows people living in arid conditions to plant food they couldn't grow without irrigation, thus improving nutrition. The water which would otherwise evaporate is preserved as moisture below the surface.

DRIPS provides a cheap, desirable, and easy to use solution to a problem faced by many communities of people around the world.

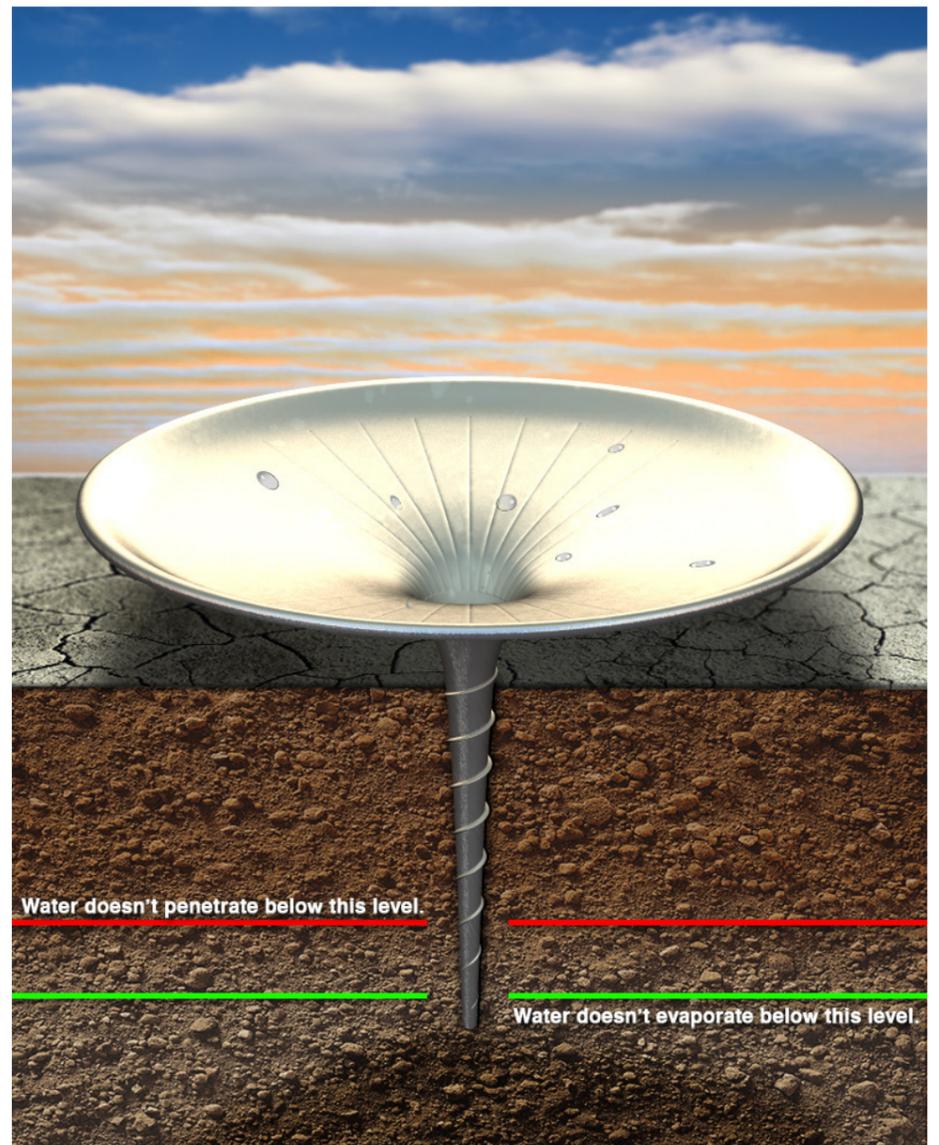


The use of DRIPS technology can be easily demonstrated through a simple pictogram. Without the need for verbal or written instructions, its simple installation method can be immediately understood by people of all cultures and ages.



## Open Source Project

DRIPS is open source and free. Different regions need different approaches to dew collection. Manufacturers anywhere in the world can freely adapt DRIPS to local conditions and sustainable materials. Information and designs are available on the Internet at [DRIPSproject.com](http://DRIPSproject.com).



DRIPS was developed by Timothy and Nicholas Werby, *Lowell High School* students from San Francisco, California. They worked with their science teacher Ms. Cole and with Dr. Agogino from *The University of California at Berkeley*. The project is part of the *EDF Sustainable Design Challenge* which focuses on the materialization of day-to-day energy efficient solutions for a better quality of life.

