

Fall 2026 Portland Monitor

A Green Mill Press Publication

“Fresh Water” Managing The Fresh Water Crisis

A Japanese company has developed a system for providing a nearly seamless flow from any water source and even thin air.

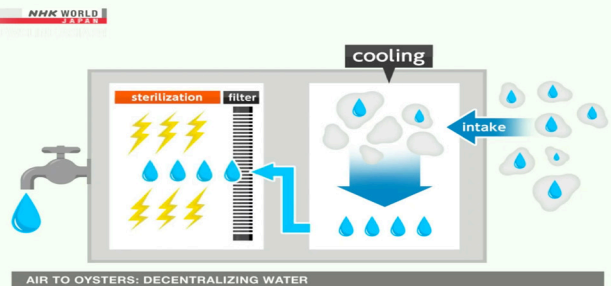
The smallest off-grid water source made by Enell Inc. is the mugen-sui (“infinite water”). At a glance, it looks like a standard water server, but it can provide potable water with no water bottle or connection to a water tap. It can even run on solar power.

In Japan, the true potential of ENELL’s technologies will be demonstrated in disaster-stricken areas or regions with decreased populations, where existing infrastructure may be struggling to function. The mugen-sui dispenser requires around 350 watts of electricity to produce water from the air, but only 30 watts when purifying and disinfecting river water or rainwater and storing it in a sterilized state.

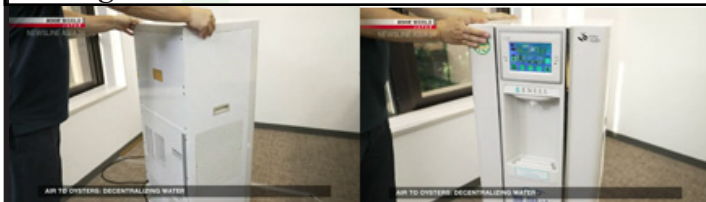
It means the unit can be run on about the same amount of power as charging two smartphones. With a combination of solar panels or rechargeable batteries, it can be operated steadily for an extended period of time, even during blackouts.



disinfect river water and rainwater to safe drinking water standards without using chemicals. A single mugen-sui unit can generate up to 33 liters of drinking water from the air and purify 600 liters of river water per day. An institute certified by the Tokyo Metropolitan Government conducted a test by pouring water from a river running under Miyashita Park in Shibuya into mugen-sui every day for a month to purify. A month later, they tested the water and found that it met drinking water standards without the use of chlorine. The generated water remains sterile despite being exposed to air in the tank. Even after six months of storage, the water is free of bacterial contamination.



The company’s products are also starting to be used on Tokyo’s remote islands, where they can be installed in new facilities like trailer hotels. ENELL’s off-grid dispensers can serve as a “last line of defense” to provide water



The mugen-sui dispenser can generate water from water vapor in the air, depending on humidity and temperature, without requiring a conventional water source or plumbing. In addition, it incorporates proprietary technologies that can purify and



See more at these links

[JapanGov Kizuna](#)

[Tokyo Updates](#)

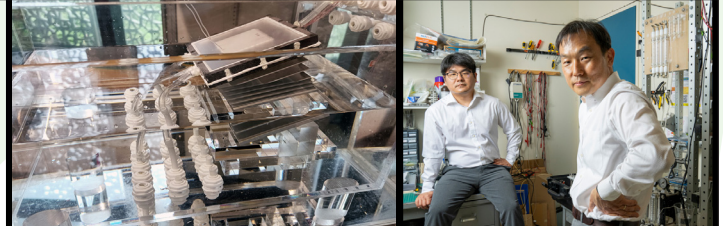
LATEST ADVANCES IN DESALINATION: TURNING SALT WATER INTO FRESH WATER

New desalination system could produce freshwater that is cheaper than tap water...

MIT engineers and collaborators developed a solar-powered device that avoids salt-clogging issues of other desalination designs.

Recent advances in multistage solar distillation are promising, for the sustainable supply of freshwater. However, significant performance degradation due to salt accumulation has posed a challenge for both long-term reliability of solar desalination and efficient treatment of hypersaline discharge.

Inspired by a natural phenomenon, thermohaline convection, they demonstrate a solar-powered multi-

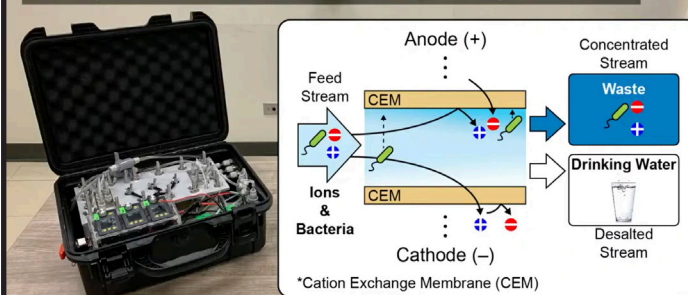


MIT researchers have created a portable desalination unit that can automatically remove particles and salts simultaneously to generate drinking water. "This is really the culmination of a 10-year journey that I and my group have been on," says senior author Jongyoon Han, above, pictured with Junghyo Yoon, seated.

Photo Credits: M. Scott Brauer

Watch on YouTube: youtube.com/watch?v=xofpwlRPZRY
@JWAFS_MIT

ICP (Ion Concentration Polarization) Process

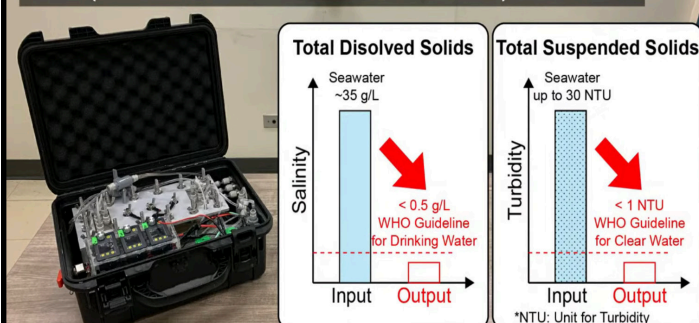


stage membrane distillation with extreme salt-resisting performance.

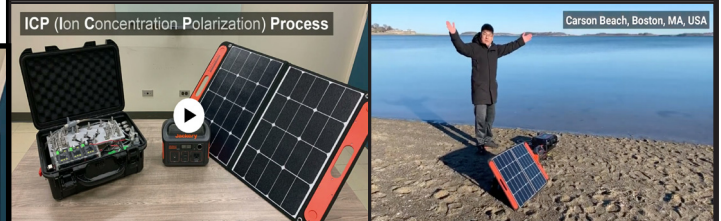
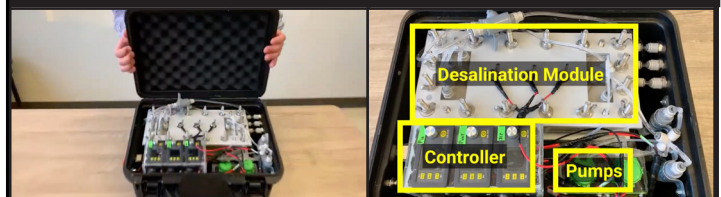
Using a confined saline layer as an evaporator, they initiate strong thermohaline convection to mitigate salt accumulation and enhance heat transfer.

With high freshwater production and extreme salt endurance, this device reduces the water production cost, paving a pathway toward the practical adoption of passive solar desalination for a sustainable water economy.

ICP (Ion Concentration Polarization) Process



Continuous record-high efficiencies of seawater distillation is achieved using thermohaline convection in confined-saline-layer evaporation.



MIT News Massachusetts Institute of Technology ON CAMPUS AND AROUND THE WORLD

From seawater to drinking water with the push of a button: a portable desalination unit that generates clean drinking water.

news.mit.edu/2022/portable-desalination-drinking-water-0428

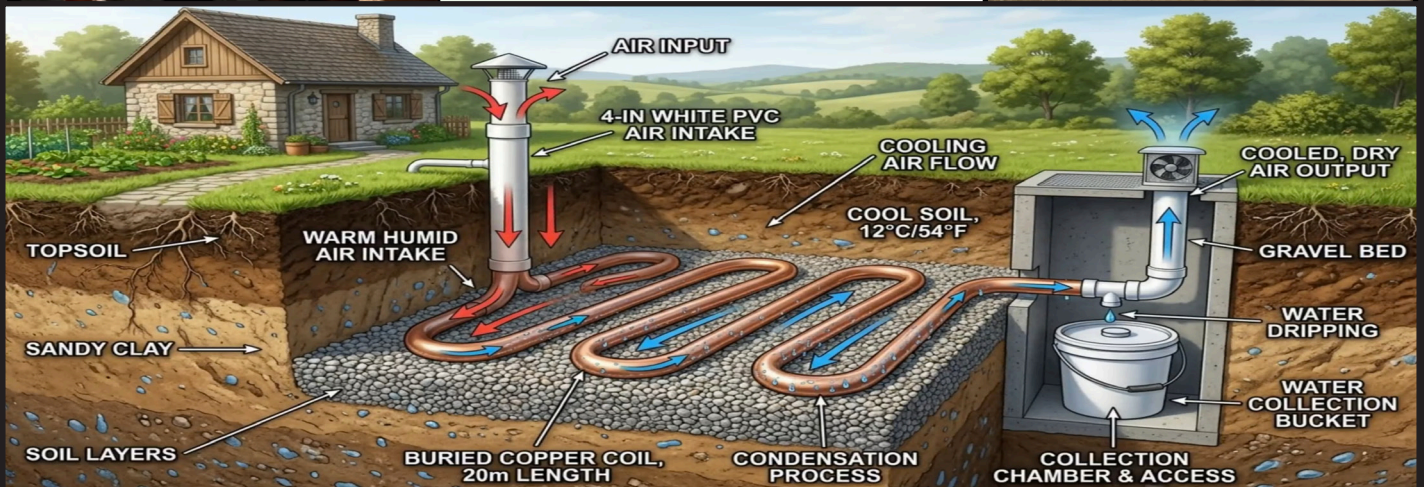
Using the large amount of free water in the atmosphere...

A typical cumulus cloud could contain up to 500 tonnes of water!
Increasing temperature of the atmosphere increases the water stored in the air.

The forgotten water harvesting method that works without electricity.



Rediscover an ancient method to produce potable water directly from the atmosphere even in dry climates without any external power source. This method can achieve what expensive machines do but for a fraction of the cost. Persian engineers figured it out in 500 BC and built versions of it that are still producing water to this day.



Watch on YouTube: youtu.be/y6jU_7yltvs
@Sidney_Explains_Money



Here are the parts you will need to build this yourself. You can also add a solar powered fan to the air input that will enhance the air intake.

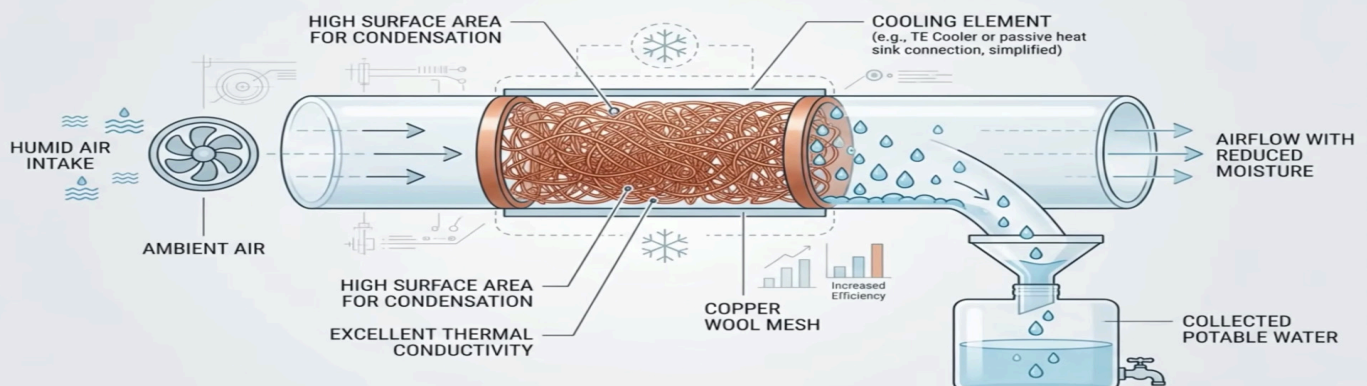


CONCEPTUAL DIAGRAM: COPPER WOOL-ENHANCED ATMOSPHERIC WATER HARVESTING

1. AIR INTAKE

2. ENHANCED CONDENSATION

3. WATER COLLECTION



Using the large amount of free water in the atmosphere...

Globally, the atmosphere contains approximately 7 times more than all the world's rivers combined. Scientists are harvesting fog to secure the world's water supply.

Scientists around the world are leveraging familiar, ancient scientific principles with modern technology to harvest water from the moisture in fog. Even arid environments experience frequent fog.

Fog nets are harvesting water from fog in the arid mountains of southwest Morocco on the edge of the Sahara desert. On Mount Boutmezguida, 870 square meters of fog net capture 19,140 liters per day.



In total we have 870 square metres of nets.



They produce on average 22 litres per square metre per day.



Watch on YouTube: youtu.be/GreePOBXdtg @ThomsonReutersFoundation

Harvesting Fresh Water from Fog in Chile



Researchers at MIT's School of Engineering, working with colleagues at the Pontifical University of Chile in Santiago, are harvesting potable water from the coastal fog that forms on the edge of one of the driest regions on earth. Using a simple system of suspended mesh structures, placed on hilltops in areas with persistent fog and prevailing westerly winds, local Chilean communities collect fog water for drinking and agricultural use.



Watch on YouTube: youtu.be/h8vlzZ25vtg @MITMechE

The Metal Trick That Kills All Bacteria in Water: Copper and Zinc can purify water naturally

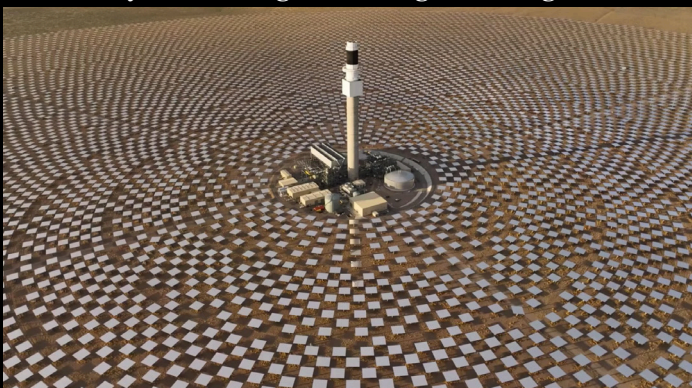


A piece of copper and a piece of zinc sitting at the bottom of the container touching together do the trick. Copper and Zinc ions kill the bacteria. The Copper/Zinc contact galvanic reaction releases ions faster.



Watch on YouTube: youtu.be/PZfJdSaol8M @Sidney_Explains_Money

China Just Built a Machine That Pulls Drinking Water Out of Dry Air running on nothing but sunlight



Research coming out of Shanghai Jiao Tong University's ITEWA team, led by Global Energy Prize laureate Wang Ruzhu — have developed a super-hygroscopic gel loaded with several grams of moisture-hungry salt per gram of polymer, which finally beats the "salting-out" sponge problem of wet salt clumping. Roughly one kilogram of their dry gel can pull in over a kilogram of water even in arid air, and up to several kilograms when the air is humid. Then sunlight — not a compressor — drives the water back out.

They designed a 2-cycle passive system that uses this gel to keep fresh water flowing continuously. In their 2-cycle system, the design leans on the sun. Through the cooler part of the cycle, the gel drinks vapor from the air. Then solar heat warms the gel, driving the captured water back out as pure [music] vapor, which condenses on a cool surface into clean liquid water, ready to collect.

Continued on next page

Using the large amount of free water in the atmosphere...

Globally, the atmosphere contains approximately 7 times more than all the world's rivers combined. Scientists are harvesting fog to secure the world's water supply.

The global water supply is threatened by climate change, overconsumption and poor management. Scientists around the world are leveraging familiar, ancient scientific principles with modern technology to harvest water from the moisture in fog. Even arid environments experience frequent fog.

A team in China just built a box that makes drinking water out of thin air. Not just humid, tropical air but dry, desert air. Using nothing but the sun.

Continued from last page

Soak in the shade and cool. Release in the heat and light. The energy that does the heavy lifting is simply sunlight, which is one thing the world's driest regions are never short of.

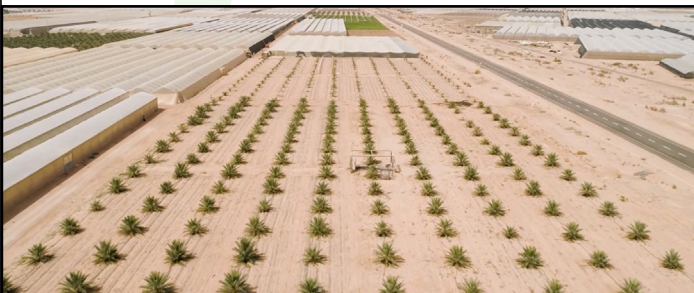
Their design uses a rotating strategy where the



Roughly the size of a small bus stop. It needs zero built infrastructure. You place it, the sun powers it, and it can produce up to around 50 L of drinking water a day.

system is split into several modules. While one module is being heated to release its water, the others are still busy drinking moisture from the air. Nothing sits idle. The machine catches and releases at the same time, so water keeps flowing rather than coming in slow batches. No chilling needed, no membranes to clog, no power plant bolted to the side, just a smart salt charged sponge, using the daily rhythm of cool and warm and the sun.

When the machine starts, there is no water anywhere near it. The air around it looks and feels completely empty. The sponge is quietly stripping water molecules out of what seems like nothing, one invisible drop at a time, and the sun is footing the bill.



A long line of these panels running along the edge of an advancing desert, each one quietly making its own water, helping hold the sand back a few meters at a time

Watch on YouTube: youtu.be/oZ1zig8EdSg
@TomorrowForged

Puerto Rico Is Running Out of Water



Governor Gonzalez has publicly attributed this crisis primarily to weather conditions, telling reporters "This situation is out of our hands."

She has also separately acknowledged years of neglect within Puerto Rico's broader water infrastructure.



Watch on YouTube: youtu.be/ozhPLPkOu4Q
@StormReport456

Puerto Rico rations water supplies due to intense drought. Puerto Rico experienced its driest July on record, with 68% of the island currently facing drought conditions.



Puerto Rico is facing yet another crisis as major cities are rationing water for residents due to severe drought conditions. This problem is also exposing the island's aging water infrastructure and lack of immediate government action.

Watch on YouTube: youtu.be/9ZcYkG3eD_w
@PBSNewsHour

***Using the large amount of free water in the atmosphere...
A typical cumulus cloud could contain up to 500 tonnes of water!
Increasing temperature of the atmosphere increases the water stored in the air.***

DIY Dew Collector. Atmospheric water generator pulls drinking water directly from air while you sleep—no electricity, no plumbing, no moving parts.



This fog catcher uses ancient principles to provide a sustainable water supply, addressing water scarcity in an innovative way. It's a fantastic example of ancient technology applied to modern needs.

 Watch on YouTube: youtu.be/K6C2bPVEuBw
@AgricultureCentral

A simple piece of bent copper can turn contaminated water into something far safer to drink — without filters, chemicals, or fuel.



For over a century, scientists have known that copper releases natural ions capable of destroying bacteria like *E. coli* and reducing pathogens such as *Giardia*. This phenomenon, called the oligodynamic effect, was first documented in 1893 and later tested in real-world conditions — from military field operations to refugee camps.

Metals like copper, silver, and brass shed microscopic ions when in contact with moisture or microbes. These metal ions bind to the cell membranes and walls of microorganisms. The ions enter the cells, break down vital proteins, and destroy DNA, stopping the germs from multiplying and causing them to die.

 Watch on YouTube: @psyeroboscamping
youtube.com/watch?v=D7gT__nLmug

DIY: Making a survival water filter and testing it using muddy water.



Drip the water through three bottles: the first with charcoal then one with gravel then finally one with fine sand in that order. This will filter the dirt from the water. The water should still be boiled before consuming.

 Watch on YouTube:
youtube.com/shorts/MQWosAbsxLc
@WoodsboundOutdoors

Xylem Water Filter: MIT engineers make filters from tree branches to purify drinking water

MIT engineers have been investigating sapwood's natural filtering ability, and have previously fabricated simple filters from peeled cross-sections of sapwood branches, demonstrating that the low-tech design effectively filters bacteria.

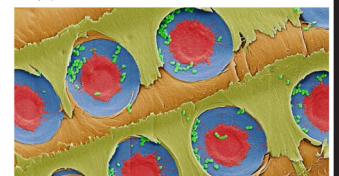
Now, the same team has advanced the technology and shown that it works in real-world situations. They have fabricated new xylem filters that can filter out pathogens such as *E. coli* and rotavirus in lab tests, and have shown that the filter can remove bacteria from contaminated spring, tap, and groundwater. They also developed simple techniques to extend the filters' shelf-life, enabling the woody disks to purify water after being stored in a dry form for at least two years.



Tests in India filter 1 liter per hour

Need a water filter? Peel a tree branch
MIT group shows xylem tissue in sapwood can filter bacteria from contaminated water.

Jennifer Chu, MIT News Office
February 26, 2014



 Watch on YouTube: @QPT youtu.be/3MpNLbPEhwQ

MIT News Massachusetts Institute of Technology **ON CAMPUS AND AROUND THE WORLD**
MIT engineers make filters from tree branches to purify drinking water
news.mit.edu/2021/filters-sapwood-purify-water-0325



SOLAR WATER DISINFECTION (SODIS)

— SAFE DRINKING WATER USING SUNLIGHT —

SODIS is a simple, low-cost method that uses sunlight (UV-A) and heat to inactivate harmful microorganisms in water.



A PROVEN METHOD.
A POWERFUL RESOURCE.
THE SUN.

Source: SODIS.ch
(www.sodis.ch/en)

1 USE A CLEAR CONTAINER



Use transparent, colorless PET bottles (up to 3 liters). Glass bottles and special bags can also be used.

Replace heavily scratched or damaged containers.

Water depth should not exceed 10 cm (about 4 inches) for effective UV-A penetration.

2 USE CLEAR WATER



SODIS works best with clear water. If water is cloudy or turbid, filter it through a clean cloth, let it settle, and decant the clear water.

Turbidity should be below about 30 NTU for best results.

3 FILL THE BOTTLE



Fill the bottle with the clearest water available and close tightly.

Shaking is not required under current SODIS guidance. (Older SODIS materials recommended shaking a partially filled bottle to increase oxygenation.)

4 PLACE IN FULL SUN



Lay bottles horizontally in an area that receives direct sunlight all day. Make sure they are not in the shade at any time during treatment.

TIP: Orient bottles east-west (cap to the east, bottom to the west) for more even sun exposure.

5 MAXIMIZE SUNLIGHT & TEMPERATURE



Place bottles on a reflective surface such as corrugated metal to increase sunlight and raise water temperature. Protect from cooling wind.

Higher temperatures accelerate disinfection.

Reflective surfaces and warm, calm conditions speed up the process.

6 EXPOSURE TIME

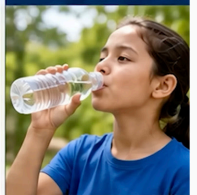
Expose for the recommended time based on the weather.

LESS THAN HALF THE SKY IS CLOUDY
6 HOURS
One full day (6 hours of strong sunlight)

MORE THAN HALF THE SKY IS CLOUDY
2 DAYS
Two consecutive days (at least 6 hours of sunlight each day)

Prolonged rain is not suitable for reliable treatment.

7 PREVENT RECONTAMINATION



The water is now safe to drink!

Store in the same clean bottle with the cap on. Drink directly from the bottle or pour into a clean cup. Use within 24 hours for best taste.

WHY SODIS WORKS



UV-A Radiation
Damages the DNA of harmful microorganisms, preventing them from reproducing.



Heat
Warmer water enhances the effect of UV-A and helps inactivate microbes faster.

BEST CONDITIONS FOR SODIS



Strong sunlight is the key. (12:00 the key.)



(10 a.m. – 4 p.m. is ideal)



Higher temperatures improve effectiveness.



Better at higher altitudes due to UV radiation.



Protect bottles from cooling wind.

IMPORTANT NOTES

- SODIS improves microbiological quality, but does not remove chemicals, heavy metals, or other pollutants.
- Always start with the cleanest water available.
- Keep bottles clean. Replace if they become scratched, cloudy, or damaged.
- SODIS is designed for household use in emergency or daily life.

SIMPLE. SUSTAINABLE. LIFE-SAVING.

- No fuel.
- No cost.
- Just sunlight.

BE PREPARED. STAY SAFE.
THE SUN CAN SAVE LIVES.

www.sodis.ch/index_EN.html

One clear bottle. One sunny day. That's all it takes to save your family from waterborne illness when disaster strikes. Solar Water Disinfection (SODIS) is a free, science-backed method used around the world to purify drinking water using nothing but sunlight — and it's knowledge every prepper needs in their back pocket.



Watch on YouTube: [@TheProvidentPrepper](https://youtube.com/watch?v=W9DOKIYDJqQ)

Be safe and use this method with your harvested water. Follow the guidelines shown below

SOLAR WATER DISINFECTION (SODIS)

EXPOSURE TIME NEEDED TO DEACTIVATE BIOLOGICAL ORGANISMS

Nature's Power. No Fuel. No Chemicals. Just Sunlight.

6 HOURS OF STRONG SUNLIGHT

Effectively inactivates many disease-causing bacteria, viruses, and Giardia.

- BACTERIA**: Generally rapidly inactivated.
- VIRUSES**: More resistant, but generally inactivated within 6 hours.
- GIARDIA**: Cysts inactivated within about 6 hours.

EXCEPTIONS – NEED MORE TIME OR HEAT

CRYPTOSPORIDIUM (Oocysts) AT LEAST 10 HOURS of direct sunlight exposure required for inactivation. (May require up to 70 hours depending on conditions.)	WATER MUST REACH >50°C (122°F) for effective inactivation.
AMOEBAS	

IMPORTANT: Effectiveness depends on sunlight intensity, water temperature, water clarity, and bottle type. Clean bottles, clear water, and strong sun = the best results.

KEY TAKEAWAY FOR PREPPERS

6 HOURS OF STRONG SUNLIGHT inactivates many harmful microbes, but for total protection, remember the exceptions: **Cryptosporidium** needs **MORE TIME**, and **amoebas** need **HIGH HEAT**.

WHEN SHOULD YOU BE CONCERNED ABOUT CRYPTOSPORIDIUM OR AMOEBAS IN YOUR WATER SOURCE?

Know the risks so you can treat water the right way.

CRYPTOSPORIDIUM WORRY WHEN THERE IS FECAL CONTAMINATION RISK Surface water (streams, ponds, rivers) downstream or near livestock, pastureland, or wildlife. After heavy rain or snowmelt runoff, which washes contamination into surface water. Shallow or unprotected wells near septic systems or grazing areas. Any water source shared with wildlife (deer, beavers, etc. are common carriers).	FREE-LIVING AMOEBAS (MAIN CONCERN: NAEGLERIA FOWLERI) WHY IT MATTERS Cryptosporidium is notoriously chlorine-resistant and has a tough outer shell (oocyst). That's why SODIS needs longer exposure—UV and heat have to work harder to disrupt it.	WARM FRESH WATER, GENERALLY ABOVE 80°F (26°C), ESPECIALLY IN SUMMER STAGNANT OR SLOW-MOVING WATER—POND, POOLY CIRCULATED TANKS, WARM SHALLOW WELLS POORLY MAINTAINED OR UNDER-CHLORINATED STORAGE SYSTEMS WHERE WARM WATER SITS FOR A WHILE
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PRACTICAL TAKEAWAY

- Clear mountain spring or well with no nearby contamination risk? **LOW RISK** for Cryptosporidium and amoebas. Use standard SODIS: 6 hours in strong sunlight.
- Surface water, agricultural runoff areas, or warm storage for extended periods? **HIGHER RISK**. Use longer SODIS exposure for Crypto (10+ hours) and higher temperatures for amoebas (>50°C / 122°F for >1 hour).

SODIS (Solar Water Disinfection) – Simple. Effective. Lifesaving.

Source: SODIS.ch – Microbiology Information & Technical Manual

Protect your family. Understand your source. Treat your water.

SODIS is effective—but knowing when to use extra time or heat can save lives.

Source: SODIS.ch Technical Manual & Microbiology Information

Using the large amount of free water in the atmosphere... Harvesting this water with harps...

The fog harp received international attention when Virginia Tech professors Jonathan Boreyko and collaborator Brook Kennedy first debuted it. But what exactly is it and how does it work?



The Fog Harp was a bio-inspired invention specifically inspired by certain types of coastal redwoods where they extract water droplets from moving fog which end up rolling off their needles and onto the forest floor. Industrial design professor



Brook Kennedy is part of the team that developed the Fog Harp. It uses tightly placed vertical wires, as opposed to crisscrossing mesh. Removing the horizontal wires and prevents the water droplets from getting stuck. So they quickly, through gravity, drop away. Tests have found this design to be at least three times more effective at capturing water than traditional nets.



Watch on YouTube: youtu.be/NBhFxXT9mUQ
@PBSNewsHour

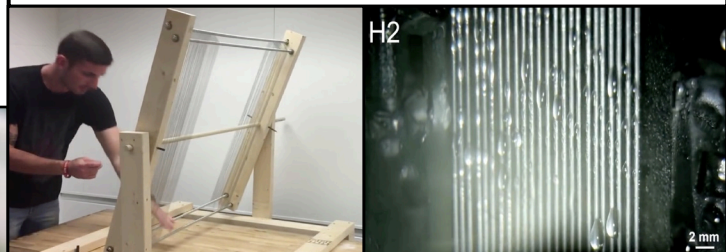
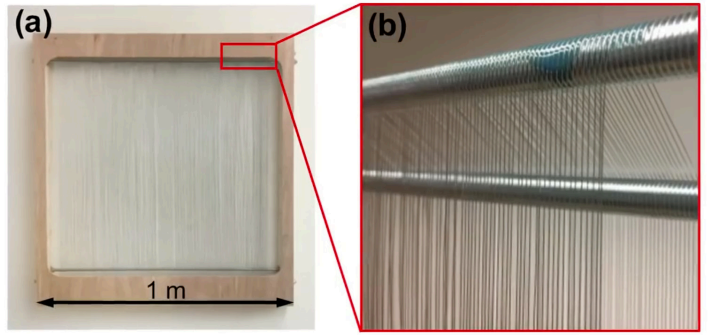


Weiwei Shi is a 2018 CIC Graduate Finalist from Virginia Tech. Her invention, Fog Harp, uses vertical wires instead of a mesh, allowing for efficient droplet collection and drainage without clogging.

Watch on YouTube: youtu.be/xZcp1Q71PKc
@NationalInventorsHallofFame

For those who live in arid climates year-round, water shortages are a constant concern, and residents must capitalize on even the smallest bit of moisture in the air. The type of “harp” now being developed harvests fresh water from fog more efficiently.

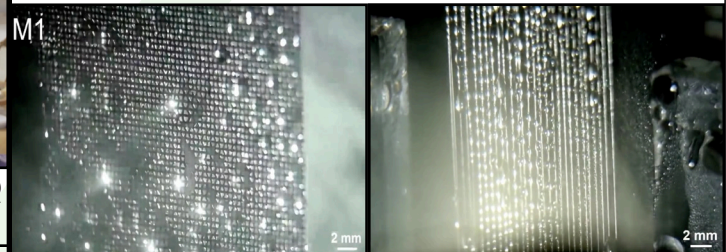
Harp structures that use only vertical wires avoid the complications that can plague normal cross wire mesh



of fog capture netting, such as clogging or lower capture rates.

Jonathan Boreyko and his colleagues wanted to optimize the harps and compare them with mesh devices. The researchers made three harp prototypes with vertical wires of three different diameters support frames. The harp with the finest wiring was composed of steel while the other two were made with aluminum.

They then compared these harps with uncoated steel meshes that had nearly the same thickness. The harps



consistently collected more water than the equivalent meshes at all wire diameters. In fact the fog harp with the finest wires collected more than three times the amount of water as the finest mesh. The researchers also show that the harp could be scaled up to a real-world size.

Watch on YouTube: youtu.be/hyI1dPjNj14
@AmerChemSociety

2028 INTERNATIONAL 3D PRINTER WORLD'S FAIR

3D PRINTING AND THE NEW INDUSTRIAL REVOLUTION



CREALITY



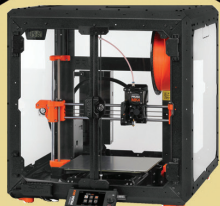
MIMAKI



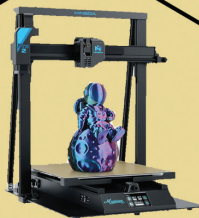
ELEGOO



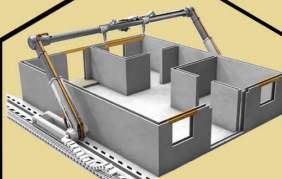
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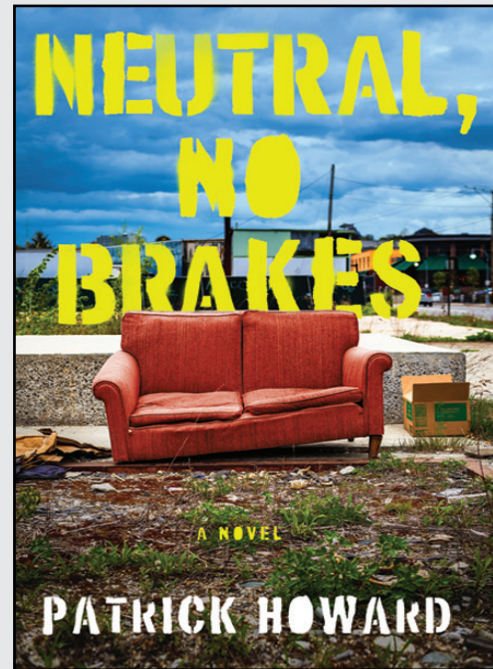
CREATIVEOUTLETPORTLAND@GMAIL.COM



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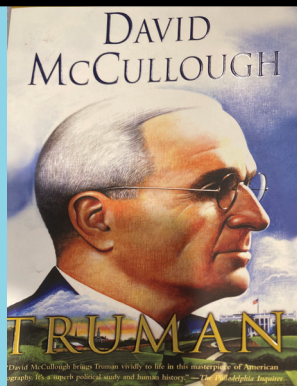
All Kinds of Books & Everything Collectible...

"An expansive, moving tale that illuminates the dangers of gentrification and the complexities of the human experience..."
- Kirkus Review

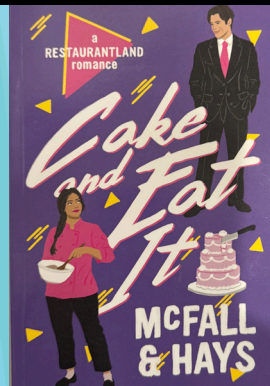


THE STORY OF A FADING TOWN, OVERCOME BY CORRUPT POLITICIANS AND BACKROOM DEALS, AND A COMMITTED BAND OF QUIRKY SOULS INTENT ON SAVING IT...

NEUTRAL, NO BRAKES PATRICK HOWARD

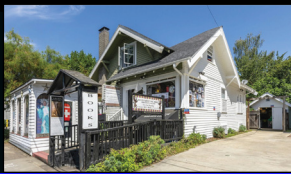


"It's not hoarding if it's books..."



1405 SE Tacoma Street, Portland, Oregon 97202
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Store Hours:
12 noon to 6pm



SuitsMeFine.org
All Kinds of Books & Everything Collectible...

PROP DEPARTMENT



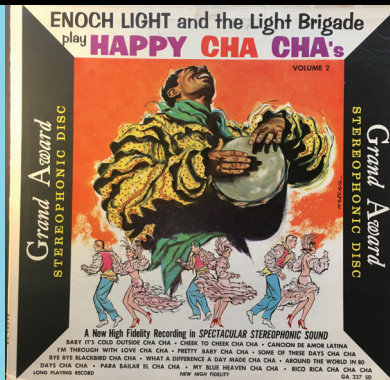
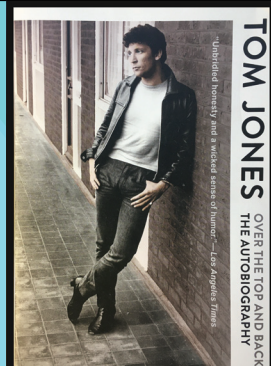
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12 noon to 6pm



SuitsMeFine.org

All Kinds of Books & Everything Collectible...



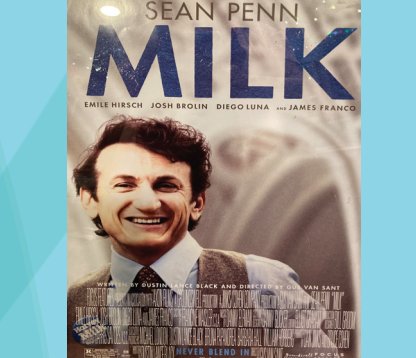
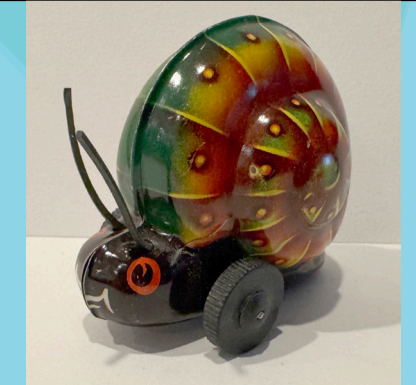
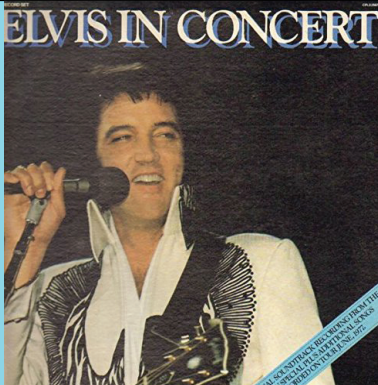
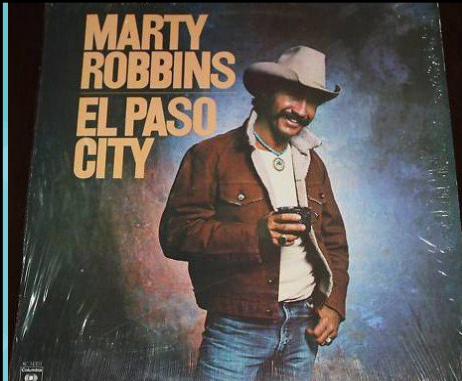
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Store Hours:
12 noon to 6pm



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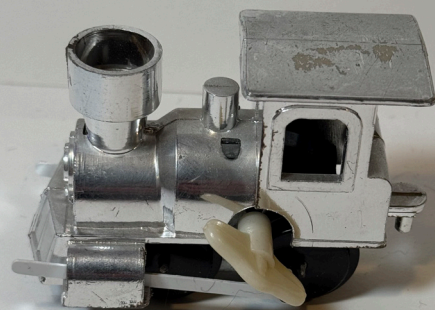
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Green Mill Properties Portland, Oregon

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