Current Climate Change Innovation

Photos curtesy Science Museum, London England

FUEL CELL FAN

The bugs in this microbial fuel cell produce the electricity to power the fan. The genius of this idea is that the desalination fuel cell could use the same system to produce electricity and desalinate sea water.

Source: Bruce Logan, Penn State University (USA), King Abdullah University of Science & Technology (Saudi Arabia), Newcastle University (UK) and VITO (Belgium).

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SALT SUCKER

How does Bruce's bug battery work? Millions of bacteria are packed into a microbial desalination fuel cell, along with nutrients from sewage. As the bacteria eat the sewage they produce charged ions, which draw out the oppositely charged ions – the salt particles – from the sea water, leaving fresh water behind.

Source: Bruce Logan, Penn State University (USA), King Abdullah University of Science & Technology (Saudi Arabia)

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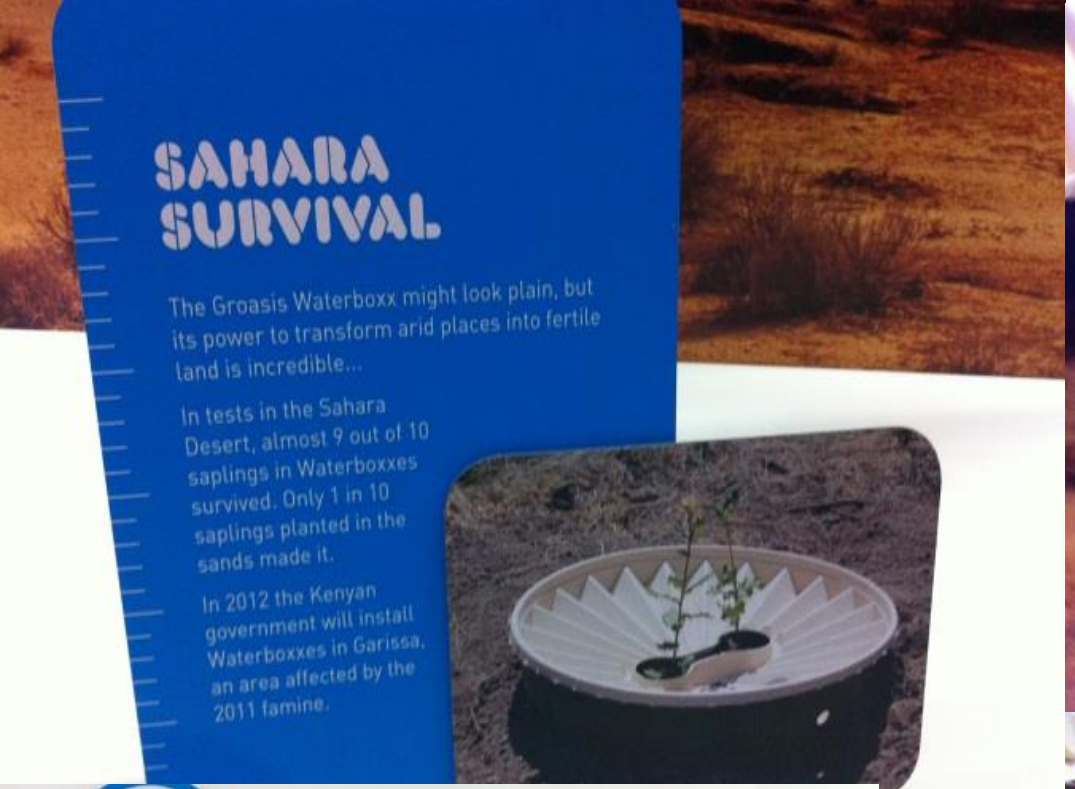
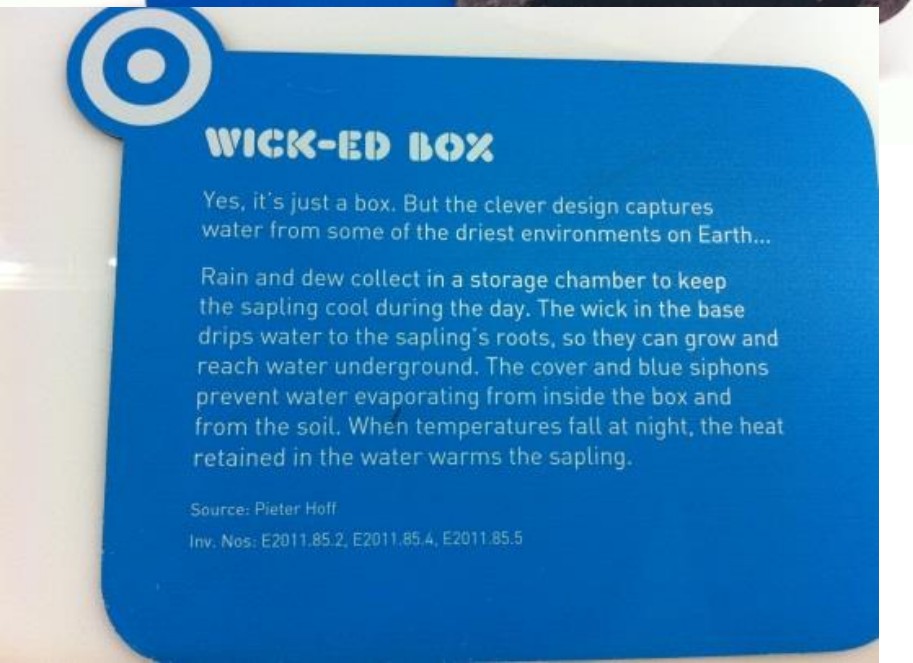
DOUBLE WHAMMY
Bruce noticed that the ions produced while the cell makes electricity could desalinate water.
His bug battery is still a baby. So far it can only desalinate one teaspoon of water every three hours. But Bruce thinks it could work on an industrial scale in a decade from now. When it does, his idea will create fresh water from sea water, clean waste water and generate electricity at the same time.


MICROBE MUNCH
Bruce Logan has already made a fuel cell that cleans waste water. It uses microbes to munch on organic matter in the water to make it clean enough to top up rivers. It even produces a small amount of electricity.
He hopes to produce the first ever fuel cell to remove salt from sea water.


SAHARA SURVIVAL
The Groasis Waterboxx might look plain, but its power to transform arid places into fertile land is incredible...
In tests in the Sahara Desert, almost 9 out of 10 saplings in Waterboxxes survived. Only 1 in 10 saplings planted in the sands made it.
In 2012 the Kenyan government will install Waterboxxes in Garissa, an area affected by the 2011 famine.


WICK-ED BOX
Yes, it's just a box. But the clever design captures water from some of the driest environments on Earth...
Rain and dew collect in a storage chamber to keep the sapling cool during the day. The wick in the base drips water to the sapling's roots, so they can grow and reach water underground. The cover and blue siphons prevent water evaporating from inside the box and from the soil. When temperatures fall at night, the heat retained in the water warms the sapling.
Source: Pieter Hoff
Inv. Nos: E2011.85.2, E2011.85.4, E2011.85.5

BIRD DROPPINGS

How can a box inspired by bird droppings get fruit tree saplings off to a steady start?

Dutch inventor Pieter Hoff has devised the Groasis Waterboxx, a stunningly simple and affordable innovation for individual farmers. It nurtures saplings until their roots reach soil water, in the same way that bird droppings offer seeds a moist, cosy environment.

CLOUD-CATCHERS

One-third of the world's population rely on fresh water from summer glacier melt to survive. But experts predict that, because of climate change, Peru's glaciers will disappear within 30 years.

Farmers need a new source of fresh water.

Fog might not seem an obvious place to look, but in every cubic metre there's a teaspoon of fresh water! And in parts of Peru there's a dense fog called the Camanchaca.

But how can you catch fog?

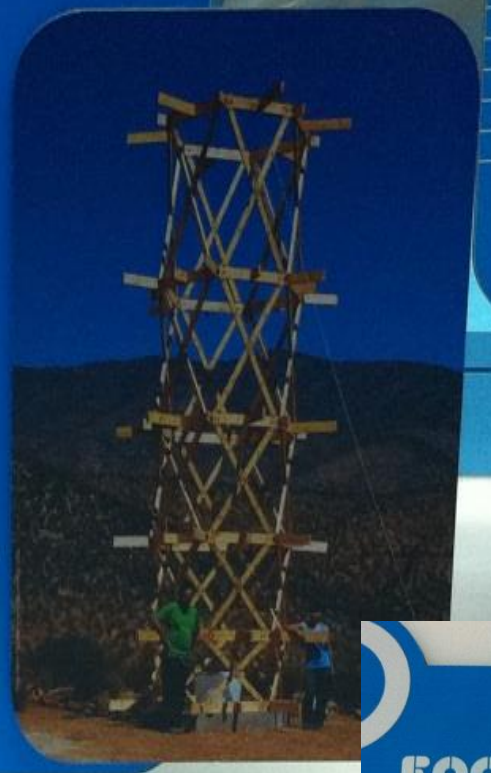
PASSING THROUGH

Fog nets have been used to collect water for years, though they only catch around half the fog water that passes through them.

But the next generation of fog-catcher is coming...

American chemical engineers have created a new generation of fog nets inspired by the toktokkie beetle.

Chilean architects have redesigned flat collectors as spiralling fog-catching towers. Can these creations collect enough water for whole communities?



FOG TOWER

A fog tower, five times bigger than this one, is being tested in the field by two Chilean researchers. Unlike nets now in use, it will be able to capture fog from any direction and channel fresh water into storage at its base.

Source: Alberto Fernandez Gonzalez and Susana Ortega Gomez

Inv. Nos: E2011.117.1, E2011.116.1

SUN WORSHIPPERS

Cyprus is drying out. Rainfall has dropped 17% in the last 100 years. And underground stores of fresh water are depleting fast. In 2008 the government was forced to ship in billions of litres of fresh water from Greece.

The island is surrounded by sea, but salt water is toxic to crops. Desalination – the removal of salt from sea water – needs a lot of energy from non-renewable fossil fuel that contributes to climate change.

So, can we power desalination with energy from the Sun?

SOLAR SAVIOUR

Researchers in Cyprus are designing the first large-scale plant to desalinate sea water using solar power – a free and renewable source of energy. This novel piece of uber-engineering will have the potential to produce up to 5 million extra litres of fresh water a day. It will help prevent farmers' underground reservoirs from running out.

BRIGHT MINDS

The team will build a small experimental concentrated solar power station in Cyprus in 2012. It's an unprecedented engineering challenge, but there are issues to resolve first. For example, they need to ensure that the equipment doesn't corrode in the salty sea spray on the coast.

SALTED HONEYCOMB

How does honeycomb-shaped cardboard remove salt from the sea?

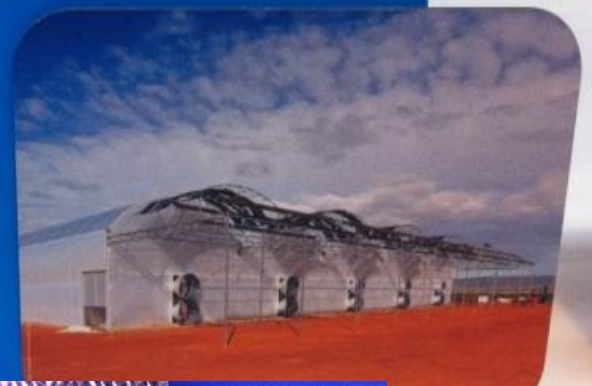
Eighty evaporator sections like this form a wall in the Australian Seawater Greenhouse. When they're soaked in sea water, the wind simply evaporates the fresh water off them to leave the salt behind. The honeycomb structure increases the cardboard's surface area for evaporation 30 times over. The water vapour condenses into fresh water inside the greenhouse.

Source: Seawater Greenhouse Ltd

Inv. Nos: L2011-4055, L2011-4056

ELEMENTARY POWER

British engineer Charlie Paton has come up with a clever invention – the Seawater Greenhouse. It creates an oasis for crops in dry places by exploiting the power of the wind and sun to desalinate sea water.



AUSSIE TUCKER

The first commercial Seawater Greenhouse, on the edge of the Australian outback in Port Augusta, is the size of half a football pitch. In its first year it successfully produced 100 tonnes of tomatoes on land that was previously inhospitable for crops. Plans are afoot for a greenhouse 20 times larger in 2012.