



Desalination

Water is Life

Kiromo Secondary School, Bagamoyo



UNICEF: "every day 5000 children die as a result of diarrhea caused by drinking unsafe water."



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Abstract:

Water is becoming one of the largest industries in the world! Our biggest problem, being 6 Km from the coast is our well water is quite salty. Our aim is to investigate some simple methods of desalination to produce the recommended 2 L per person per day.

Desalination is used to produce potable water from water sources containing dissolved chemicals, and is most often used when water sources are salty; producing fresh water from sea water or brackish water. Waters may be classified approximately according to their total dissolved solids values:



Type of water	TDS value (mg/l)
Sweet waters	0-1000
Brackish waters	1000-5000
Moderately saline waters	5000-10 000
Severely saline waters	10 000-30 000
Seawater	More than 30 000

Experiment 1.

Solarcone:

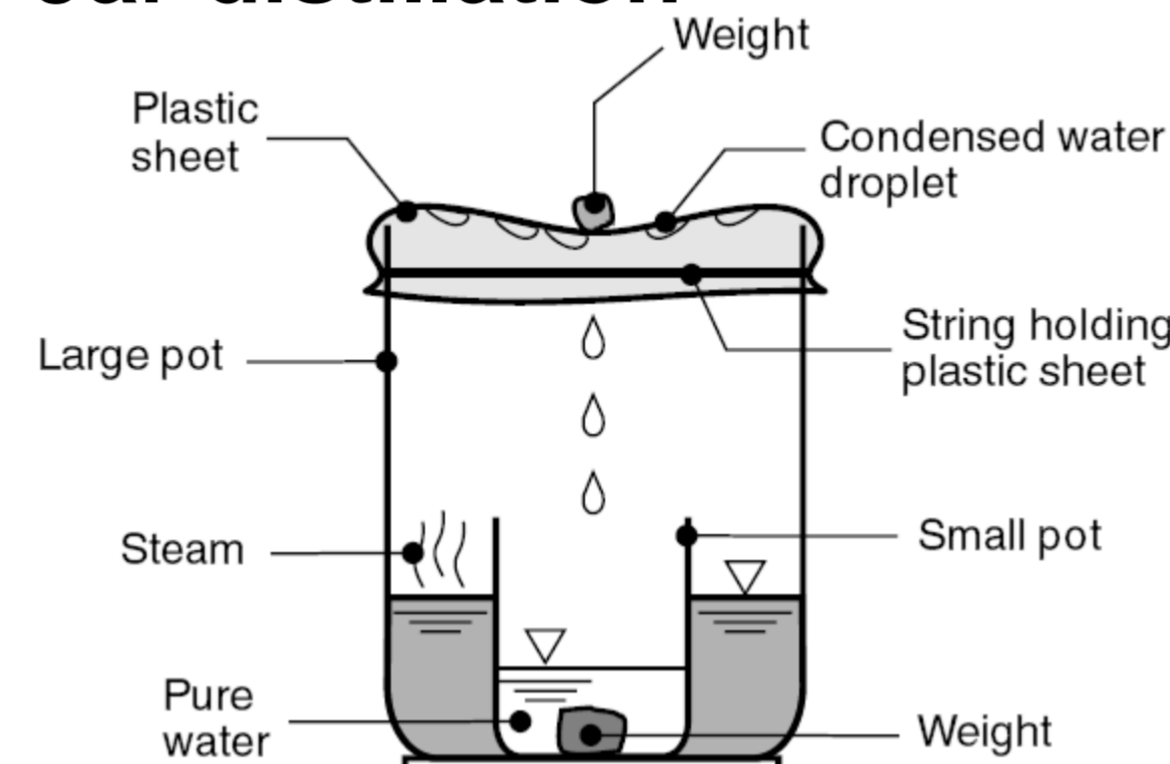
A simple solar water condenser producing **0.75 L** per 24 hrs. The outer consists of a 20 L water bottle and the inner a 5 L. Many small de-centralised units could ensure a constant supply of drinking water. The design challenge is to have as wide and shallow inner container as possible.



- Cheap, simple design
- Small surface area, low evaporation rate
- Could improve design by using a sloping outer container and reducing loss of vapour.

Experiment 2.

Jar distillation

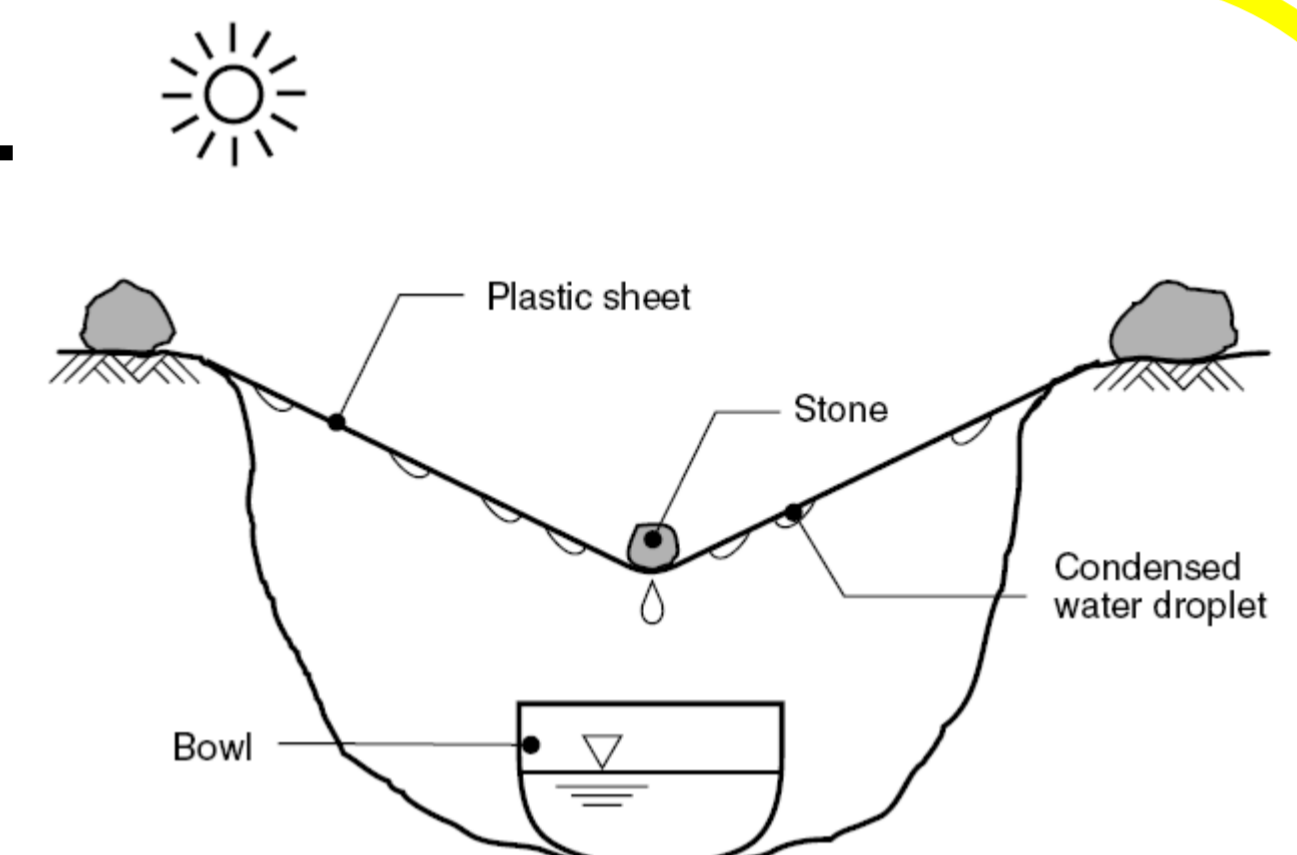


A simple design but limited by small surface area.

Produced **0.25 L** per 24 hrs

Experiment 3.

Plastic sheet:



Using a 2 X 2m plastic sheet and a 0.5m hole. Within 2 hours, the air inside the still became saturated with moisture and began to condense onto the underside of the plastic sheeting. Because of the angle of the plastic, water runs down towards the center. Finally, drops gather and fall from the apex down into the water container.

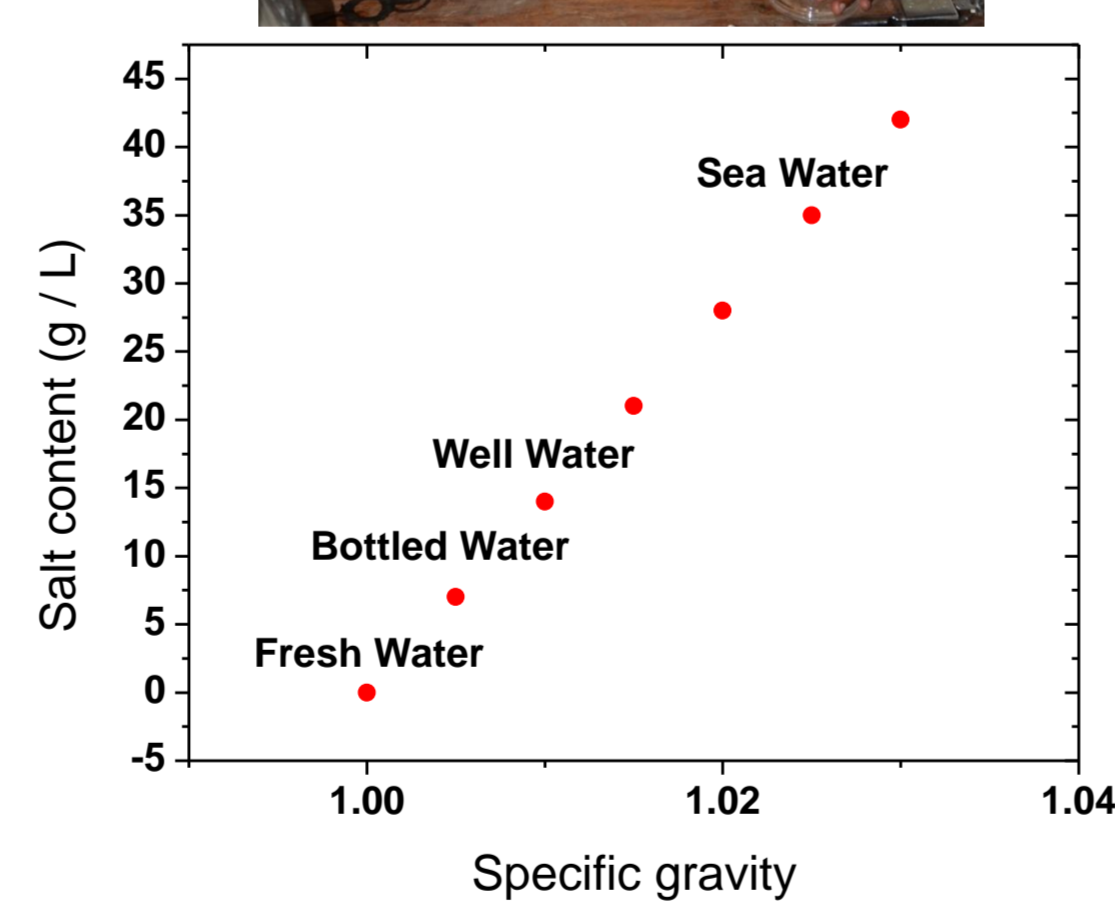
Produced average **1.5 L** per 24 hrs

Experiment 4.

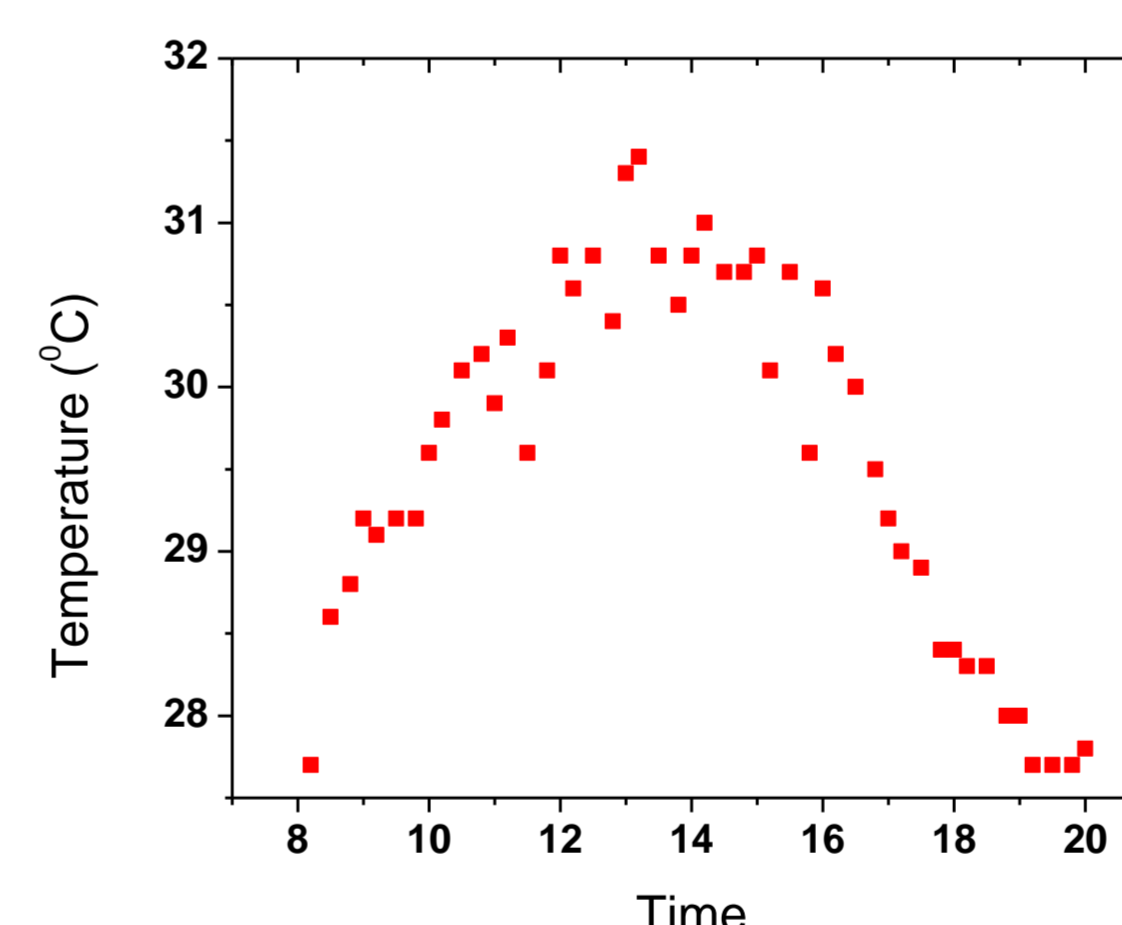
Advanced Jar Distillation



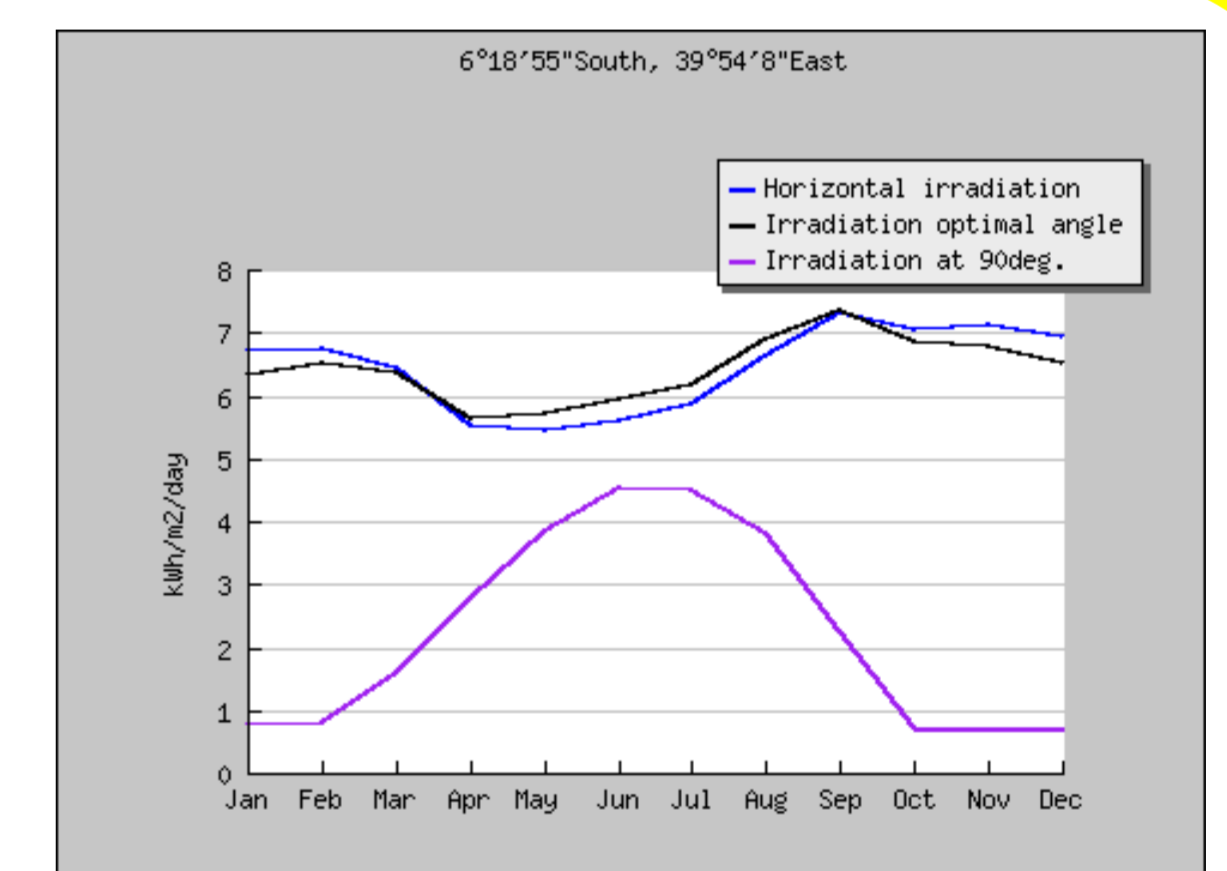
Included a vapour trap and top-up device to increase efficiency. Produced **0.25 L** per 24 hrs



Determining salt content (TDS)



Daily temperature variation. Recorded hourly and averaged over 5 days. Obtained using Vernier datalogger from 10 – 15 August 2011.



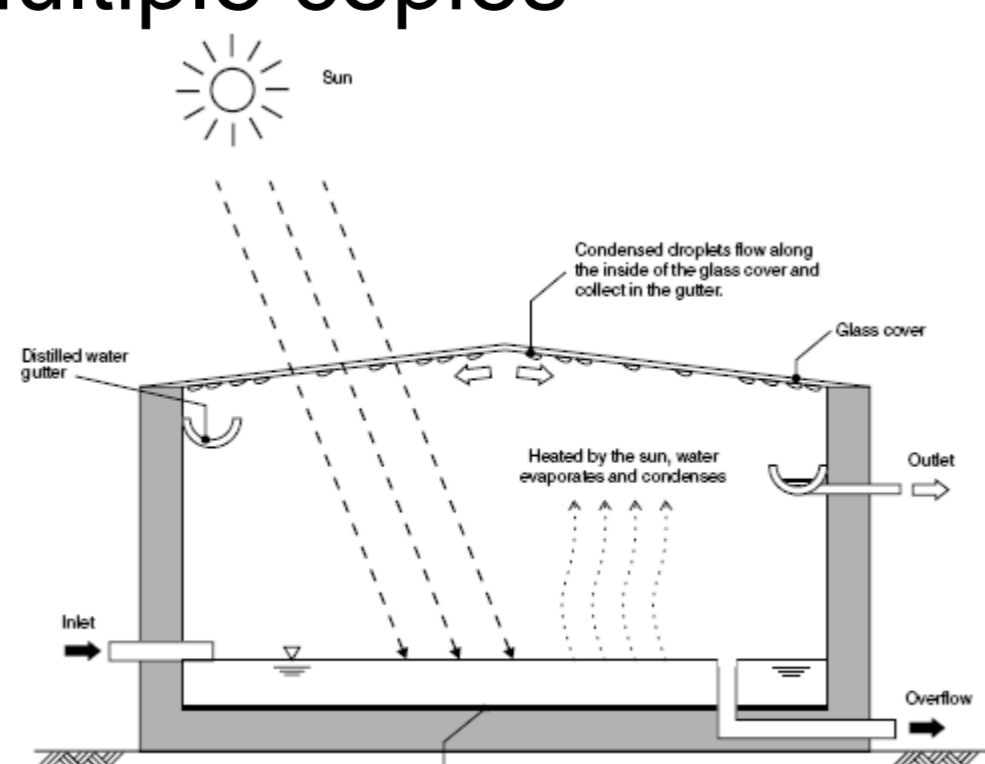
Solar irradiation incident on the east coast of Tanzania over 12 months. The average daily rate is 6.8 kWh per 24 hrs²

Conclusions:

- Simple methods can produce sterile water
- No single method could produce our aim of 2 L per day
- Combine techniques or use multiple copies

Future work:

Design and build a complete solar still



References:

1. European Solar Test Installation <http://re.jrc.ec.europa.eu/pvgis/>
2. <http://www.solaqua.com/solstilbas.html>
3. <http://www.solarstill.net/>
4. <http://www.dkit.ie/waterislife/>

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