

DIY Desalination unit - Introduction

1. The Need

For a typical rural family in a developing country, self-sufficiency at tasks like baking bread and building simple houses is passed down through the generations. Yet some basic needs often remain unmet such as water that is safe to drink. CMS (the Church Mission Society) introduced the Home Made Biological Filter which makes it possible for families to become self sufficient at purifying dirty river water. The design was developed so that families can independently make their own high quality filters without the need for manufactured steel moulds or outside help. All the help needed is the idea and its design details which are simple enough to spread by word of mouth.

For the majority with this problem it is the breakthrough they most need, but for some there is no river water to filter. They drink water from wells which are sometimes too salty and salt can not be removed by filters. We have developed a design for families to become self sufficient at desalination within their very limiting financial and material constraints.

2. The Benefits

The DIY Desalination unit is for people who have only salty water to drink. It has been designed to enable families living in mud walled, grass thatched houses in the desert areas of Pakistan, to be self sufficient at desalinating well water. We release this design in the hope that people in need will also freely be taught in other places around the world, initially by development organisations, then by each other.

For those living in volatile and harsh conditions, or where corruption is a problem, becoming self-sufficient in new areas provides vital stability. By designing new ways to become self sufficient and passing on these ideas, we also pass on some excellent values. People discover hidden worth in what they already have and are able to grow in dignity and strength as they pass on their new skills to others. By introducing nothing more than an appropriate idea, we also help people become less reliant on outside materials and resources.

Such ideas offer a rare opportunity for people in less industrialised countries to improve their circumstances without involvement in the detrimental end of world trade. This too often draws people in, uses them and their natural resources, then abandons them, leaving them feeling a lot poorer than before.

3. The Cost

<input checked="" type="checkbox"/> Running costs	£0
<input checked="" type="checkbox"/> Initial outlay per person	£2*
<input checked="" type="checkbox"/> Annual maintenance cost per person	£2*
<input checked="" type="checkbox"/> Daily production per person	4 litres*

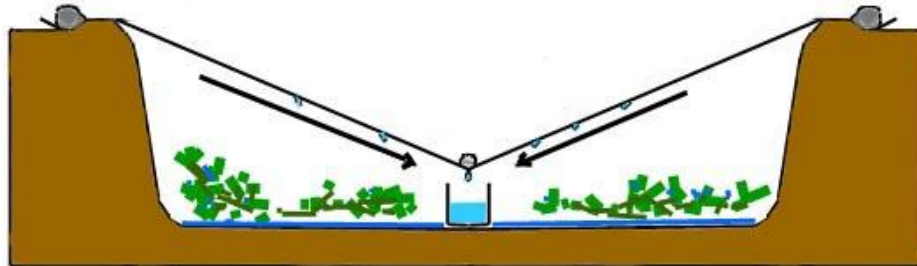
* Based on the prices and the climate in the South of Pakistan in 2006. The annual maintenance cost is for the polythene sheets to be replaced. Labour costs are none as the family is able to do the construction and maintenance work themselves.

Becoming self sufficient at desalination is now a real possibility for people with very few resources. This is affordable desalination for developing countries.

4. Method

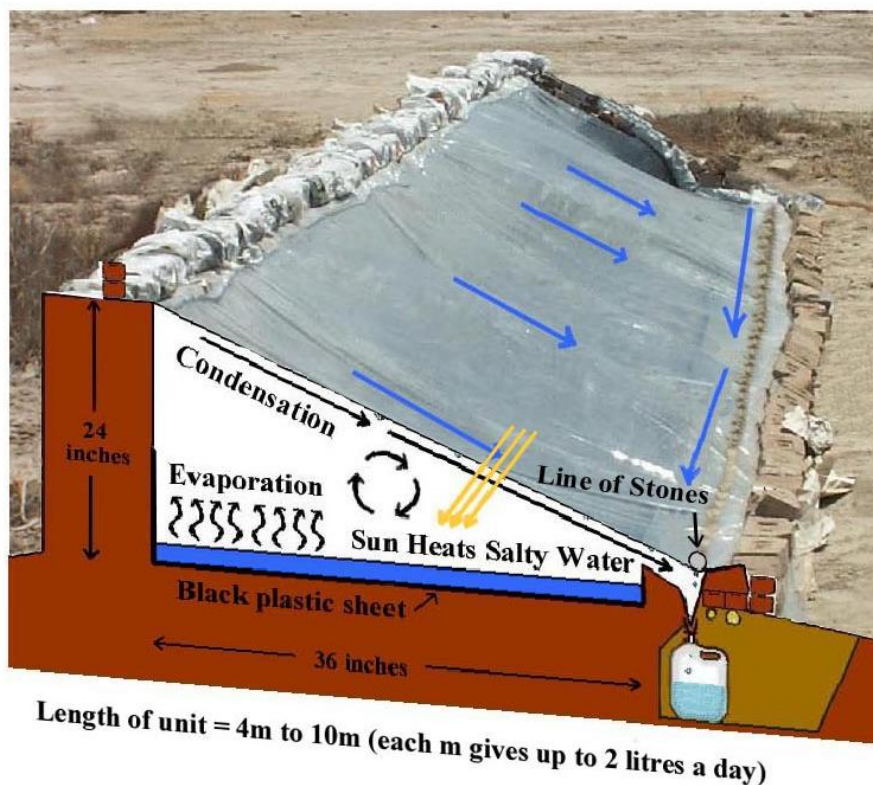
Glass, wooden frames and semi-permeable membranes are often too expensive for families to independently afford. Without these materials the only method remaining to desalinate water is as described in survival handbooks - solar distillation using polythene sheets. This is usually done by pouring the salty water on vegetation placed in a hole in the ground with a plastic sheet over it. A stone is put in the centre of the plastic so that condensation on the underside will run to the middle and drip into a collecting pot placed under the stone.

Diagram of survival handbook desalination pit



We have taken this design and developed it further within the constraints of the people who need it in the desert areas in the South of Pakistan. We looked at the local, affordable building techniques and the size, shape and type of plastic sheets that are affordable in the local market. Very thin polythene on rolls 54 inches wide and 100m long cost £0.20/m. The locals build with mud bricks and mud mortar and very occasionally with baked bricks. Science and trial-and-error were applied to find an easy to make and efficient design that would be most useful for people needing to process their own drinking water.

Diagram showing one half of the DIY Desalination unit and the flow path of condensed water to a collection container located at the centre of the unit.



5. Construction Summary

For full instructions see: DIY Desalination unit – Construction Manual

Walls are made of mud bricks which are mud plastered and covered in wet newspaper to protect the polythene sheets from being snagged.



The evaporation pan is made level with wooden stakes and string, levelled by using a clear hose with water in it as a gauge. Polythene sheets are joined with a line of staples from a normal paper stapler. All seams are above the water level so they don't leak. Polythene sheets are held in place by one or two continuous lines of bricks.

6. Ecological advantages of this desalination technique

- Runs on solar energy alone.
- uses no fuel for transporting water
- uses no fuel for transporting equipment
- no mining, de-forestation or CO₂ emissions required for manufacturing equipment (apart from in the production of polythene sheets).
- Uses only 10m² of polythene sheet for each 1000 litres of water produced if the polythene sheet is replaced annually (less than 3% of that used for bottling mineral water)

7. The design process photo journal

See: DIY Desalination Unit – Photos of experiments