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2.500 Desalination and Water Purification

Spring 2009

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2.500: Bringing potable water to Phaeton and Paulette.

OUTLINE

- Our framework for evaluation the project
- Proposed solutions:
 - short term solutions
 - Bringing RO in third world countries
 - SEE
 - Solar still
- Conclusion and recommendations

FRAMEWORK

Defining the criteria to assess the project

■ Cost of system

- **Investment** cost
- **Operating** cost
- **Repairing** cost

Our assesment:
10L/family/day
(drinking)

■ Easiness of operation

- Level of expertise required for the **maintenance**
- Level of expertise required for the **operation**

Our units:
Cost: \$/family/year

■ Reliability of the water produce

- Bacteria/ viruses removal.
- Final level of salt.
- Contamination after treatment
- Sensitivity of the system to **variation of feed water quality?**

Existing solutions

Assessment of the existing situation

What?

Buying the sweet water
(for cooking/ drinking/
domestic use).

Specifications?

•5 bucket /family /day

How much?

•45 \$ / year / family

Why not?:

- There is no distinction in quality between drinking water and domestic use**
- It costs too much for some families**
- It may not be safe**

45\$ / year /family

Short term suggestions

Education

- Importance of the education -> water problem awareness classes.

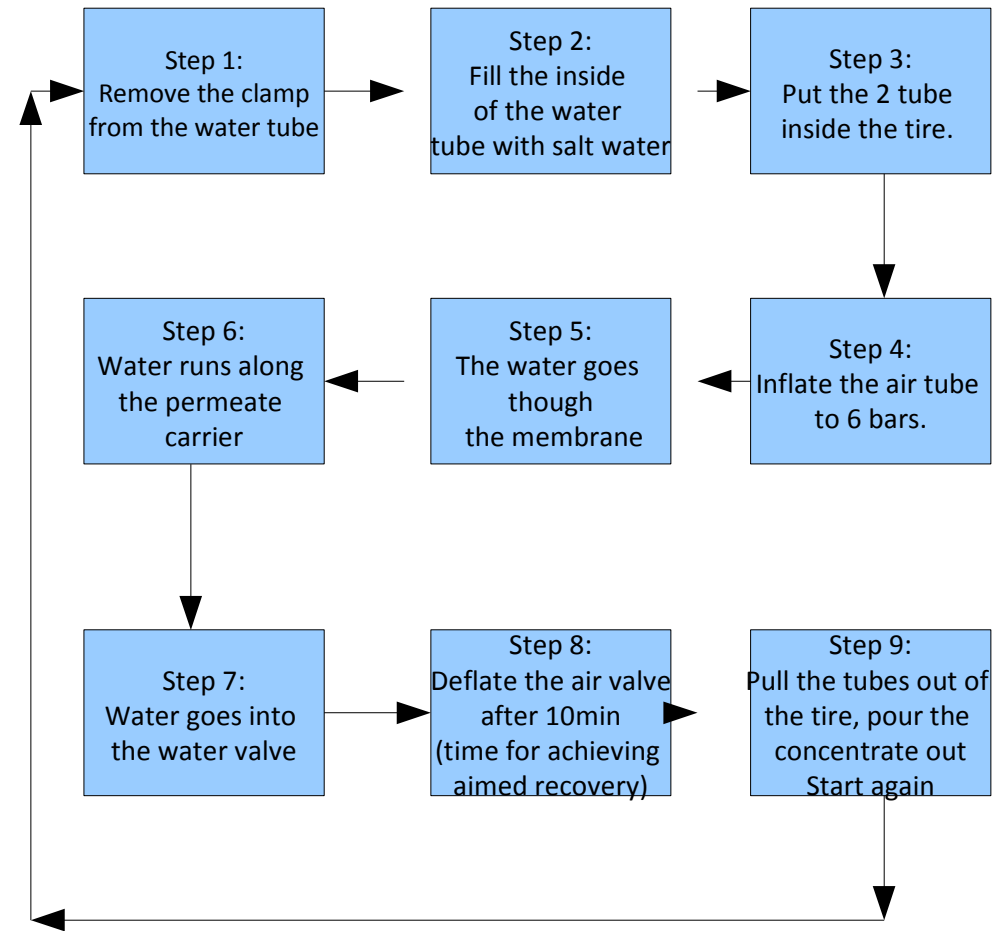
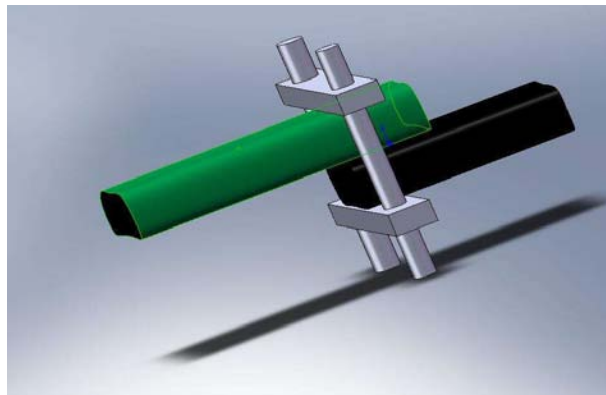
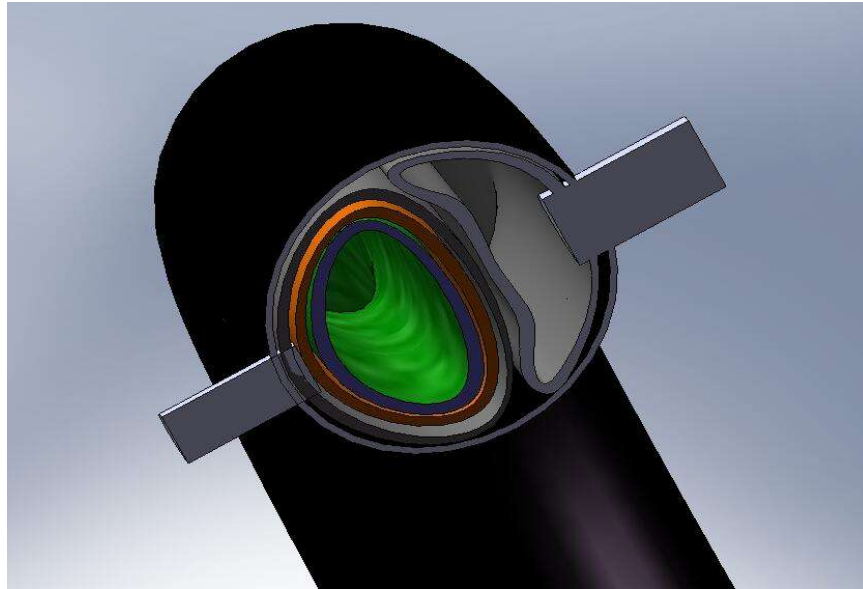
Aim 1: drinking water vs cooking water vs other uses

Aim 2: pollution water (bacteria vs salts vs taste and odor) and assessment of safe water water

Aim 3: Importance of drinking enough water to stay healthy

Long term solutions

Bringing RO to Third World countries



Long term solutions

Bringing RO to Third World countries

What?

Building a RO plant from bicycle parts.

Specifications?

- 1L/30min (not a continuous process)
- Can run for 1 family drinking water (10L/day)

How much?

- 10\$ investment.
- 5\$ for membrane replacement every year.

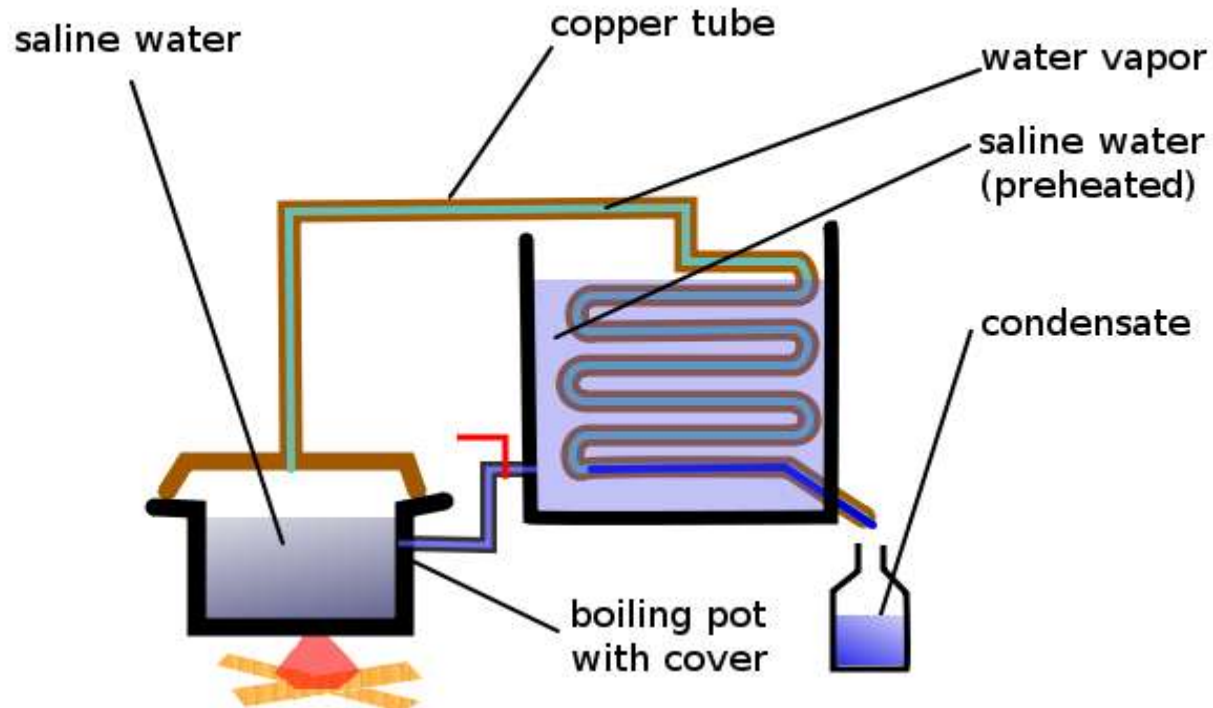
Why not?:

- No prototype have been build
- Not a good estimation of the membrane life time

?? 15\$ / year /family

Long term solutions

Single effect evaporation



Long term solutions

Single effect evaporation

What?

Using heat power source (wood, sugarcane charcoal from the “Ecole du charbon”) to evaporate water from a pot into a copper tube.

Specifications?

•6L/ 1Kg of wood

How much?

•30\$ investment (pot+ copper tube).
• 96\$ of wood a year / family

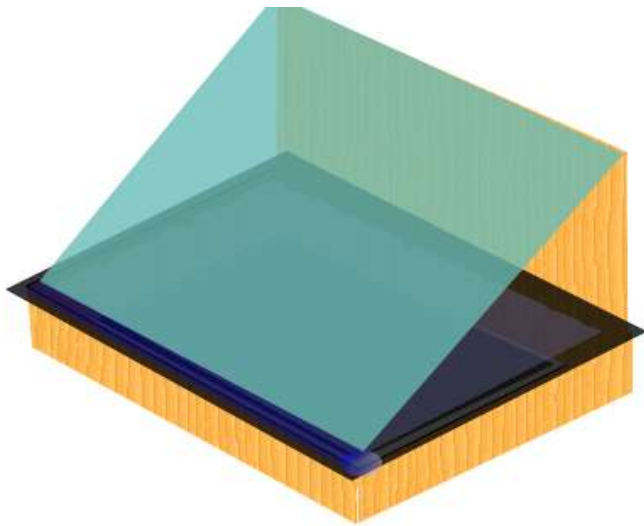
Why not?:

- Price of energy!!! (if no alternative combustible is possible)
- pollution

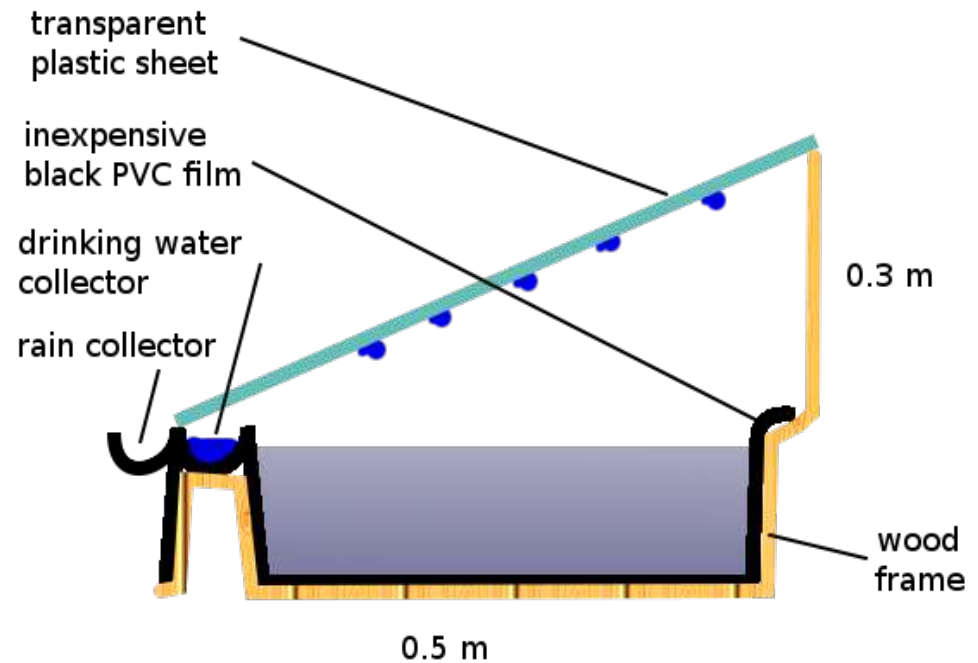
10-100\$ / year /family

Long term solutions

Solar still + Rain harvester



Whole view of the solar still



Section view of the still

Long term solutions

Solar still + Rain harvester

What?

Building a solar still + rain harvester (one per family).

Specifications?

- 4.3 m² of active area per family
- 10L of water a day (for the solar still)

How much?

- 65\$ investment (black PVC film + wood frame + Transparent film).
Running rime: 5years.

Why not?:

- Contamination of the solar still by dust / rain
- Rely on the sun → what about drinking water an a cloudy day

13\$ / year /family

CONCLUSION- RECOMMENDATIONS

INFORMATION/ EDUCATION of the population and need to separate drinking water to domestic use

Evaporation using sugarcane charcoal

RO self made system: a further assessment of the lifetime of membrane need to be done

Solar Still: our prefer solution, but variability of sunshine

QUESTIONS?
