EMAS

WATER FOR EVERYBODY

Water and Basic Sanitation Mobile School

(Wolfgang E. Buchner)

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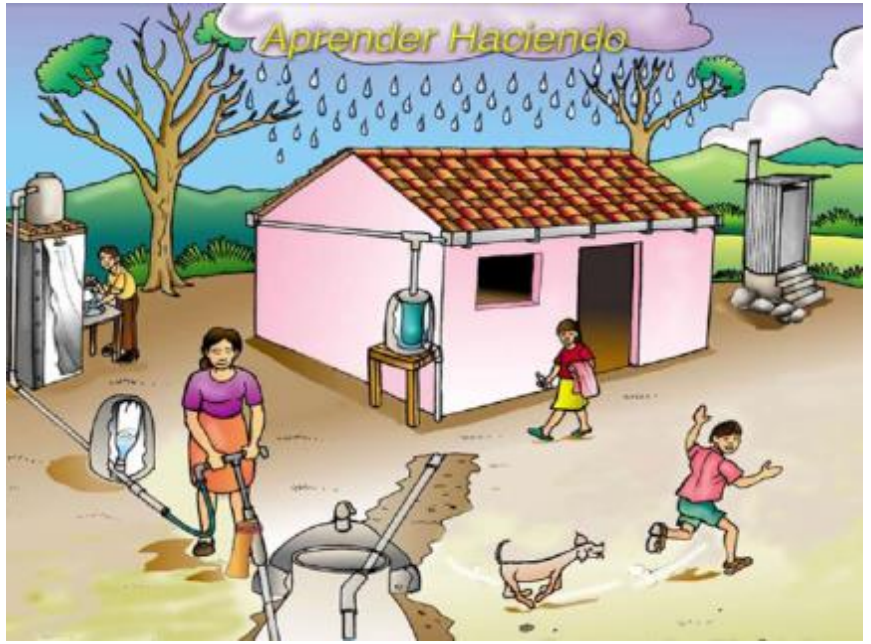
• EMAS-Introduction

- Water and Basic Sanitation Mobile School (https://vimeo.com/album/1549081/video/8454000)
- Its founder and academic director is Mr. Wolfgang Eloy Buchner
- EMAS → " **learning-performing**" method
- EMAS is based on : a variety of simple technologies such as
  - Manual drilling of deep wells,
  - Manual pumps built by users themselves,
  - Small impounding from spring,...
- The users learns these simples technologies, therefore he can maintain and reproduce them himself→ **User level**
- Training of drillers who are suppliers of drinkable water at local level → **Advanced level**
- Webs:
  - Official EMAS website: http://www.emas-international.de/
  - Videos channel: https://vimeo.com/emas
  - General introduction of the technologies: https://vimeo.com/album/1549081/video/8454303



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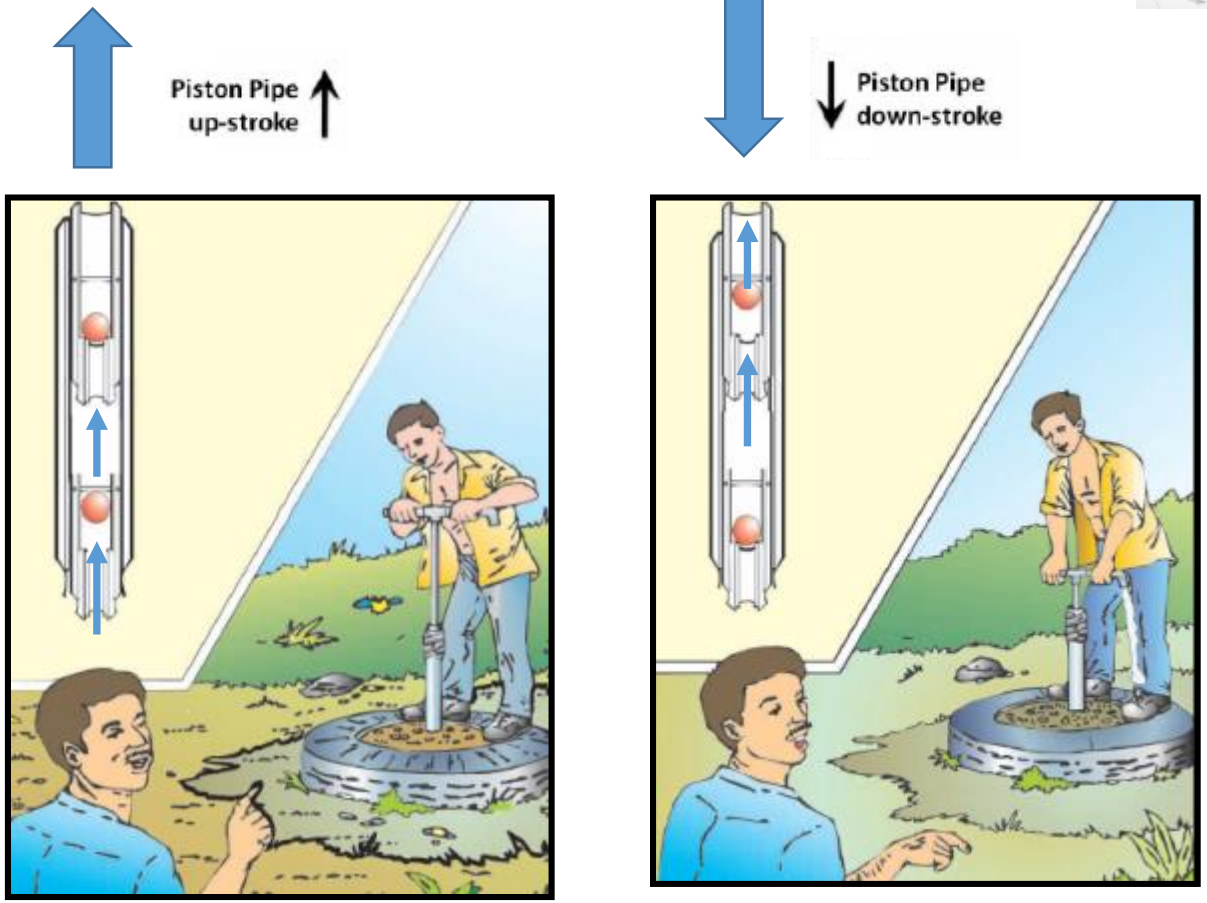
• EMAS pump

- Sustainable:
  - Cheap
  - Easy to built
  - Local materials
  - Reliable
  - Easy to maintain
- Features:
  - Operating: Cylinder –piston
  - Caudal aprox . 15 a 30 liters/minute
  - Max 5 bar pressure (50 meters/2km)
- Materials:
  - PVC
  - Marbles
  - Nylon part of old car tires
- Building:
  - https://vimeo.com/8365884



Suction **Ejection**

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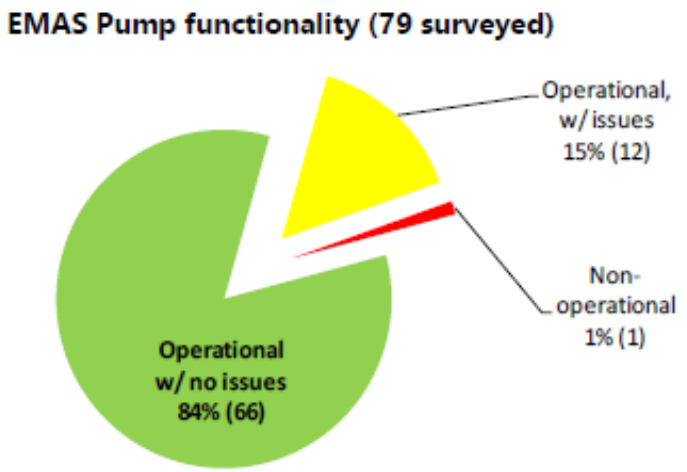
- **EMAS pump… data:**
  - Cost: 12 meters aprox . 20 € (in Bolivia , including material and builiding cost)
  - Operation: report by RWSN (Rural Water Supply Network)

EMAS Pump age (years)	No. of pumps surveyed	No. operational w/ no issues	Percent operational w no issues	No. operational w/ issues	Percent operational w/ issues
0-3	20	19	95	1	5
4-10	39	32	82	6	15
11-15	13	11	85	2	15
16-20	4	1	25	3	75
over 20	1	1	100	0	0
unknown	2	2	100	0	0
TOTAL	79	66	84	12	15

Table 3: Reported EMAS Pump age distribution and inspected functionality



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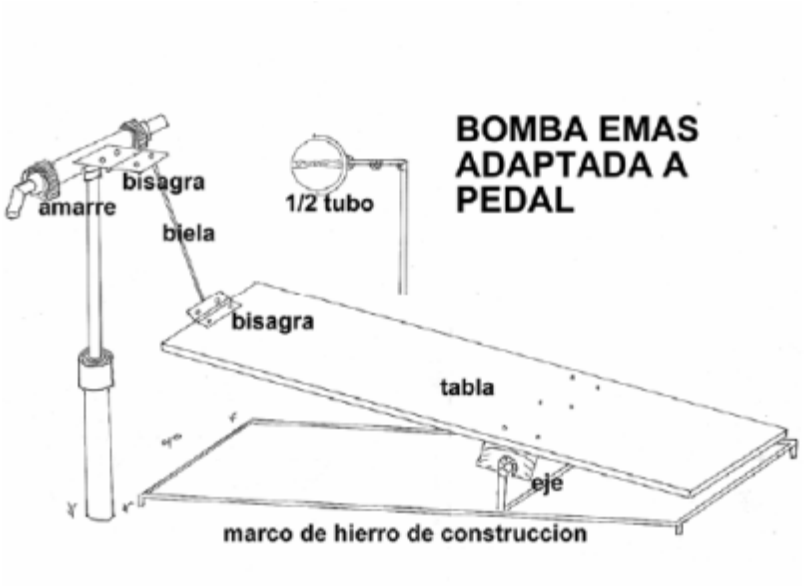
- **EMAS pump… more:**

  - Types:
    - Connection premanufactured,
    - High flow,
    - High pressure,
    - Mud pump,
    - …
  - Improvements:
    - Air chamber to ensure continuity on the water flow (plastic bottle)
    - Pedal adapted
    - ….



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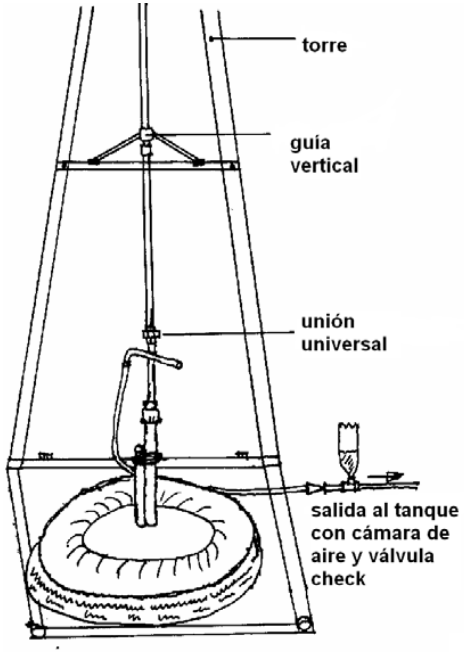
- **EMAS pump. Powered by:**
  - Diesel engine coupled to an inertial wheel
  - Photovoltaic panel
  - Wind pump
  - ….



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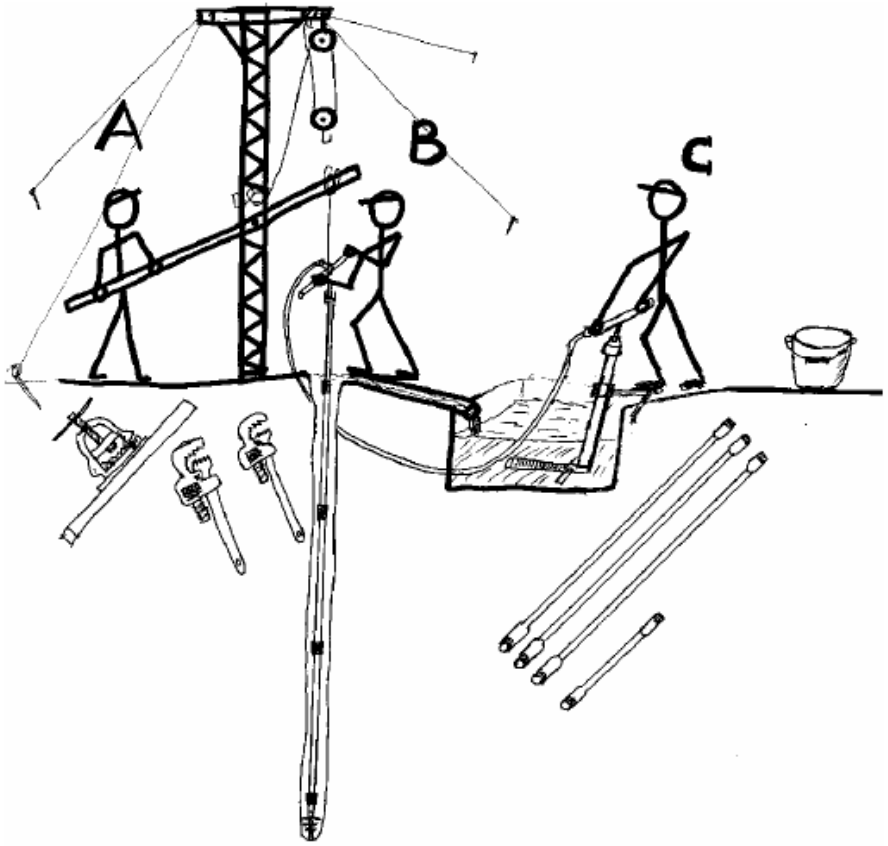
• EMAS manual drilling (up to 100m)

- Mainly for household uses
  (also apply to micro irrigation systems)
- Material of the equipment:
  - Tower + pulley system
  - Drilling pipes
  - Mud pump
  - Tools: clamping jaws,…
- Data:
  - Costs: equipment: aprox 300€
    drilling 6 €/ meter
  - Operation:

EMAS manually -drilled wells age (years)	No. of surveyed wells w/ response	No. of wells providing water throughout entire year	No. of wells providing water for less than 12 months per year [and reported months]	Location of wells providing water for less than 12 months/year
0-3	12	11	1 [1-3 months]	Pampa Chillaya
4-10	42	41	1 [6-9 months]	Somopai
11-15	12	12	0	
16-20	5	5	0	
over 20	1	1	0	
unknown age	3	3	0	
TOTAL	75	73	2	

97% supply water all the year



EMAS standard drilling method : washing

Drill bit

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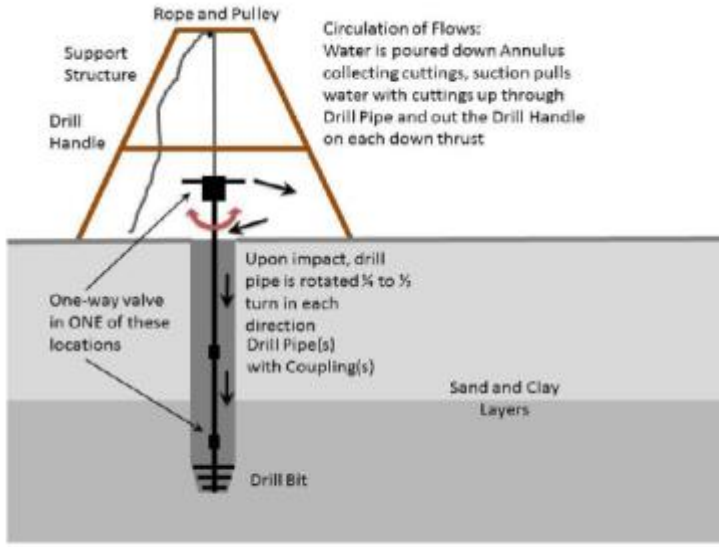
• EMAS manual drilling …Types

- Types:
  - Washing or Standard method (https://vimeo.com/8356556)
  - Suction method https://vimeo.com/8365486
  - Sludging (sand and water table not deep) https://vimeo.com/8357733

- System improvement with small engine: (https://vimeo.com/122246266)



Suction method

Method to drill on sand using temporary casing

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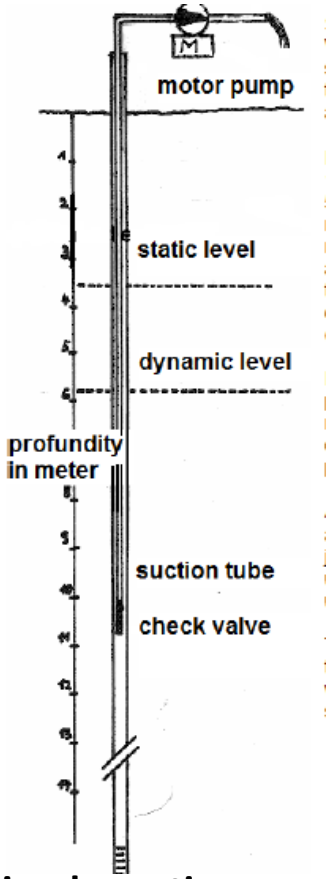
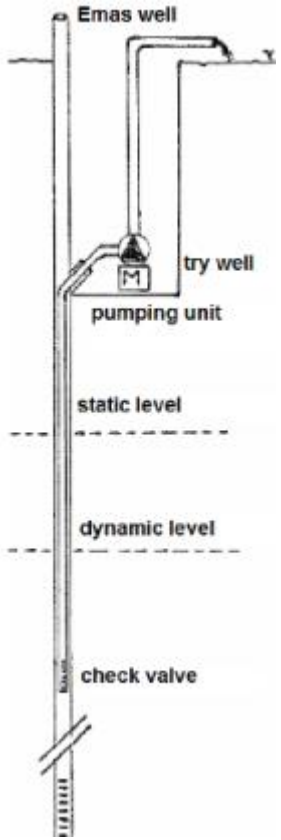
• EMAS manual drilling …pumping the water…

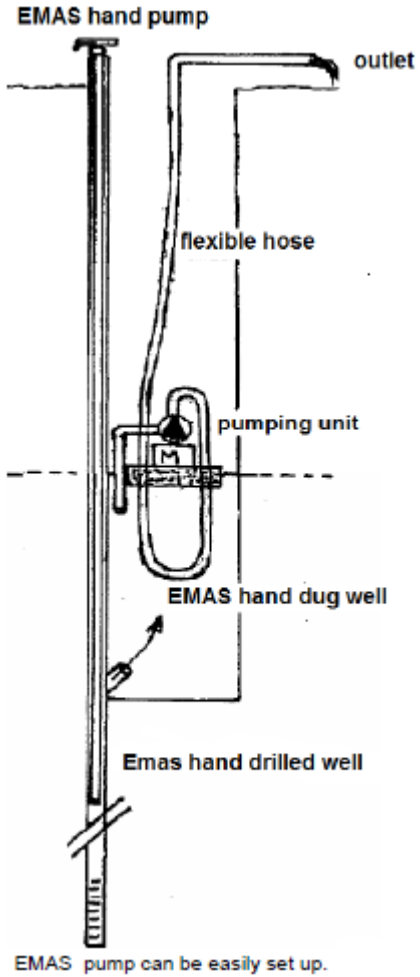
- EMAS pump
- Motorized pump, compressor,…



Simple suction
± 8 m deep

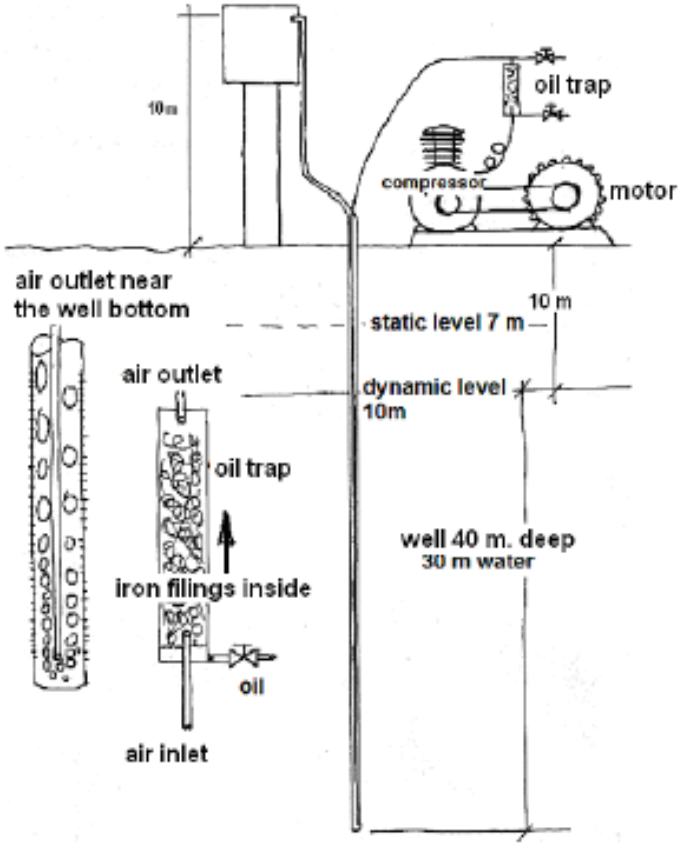


Deeper static level. Pump brought down in a dry well



EMAS pump can be easily set up.

Well drilled + excavated
Floating pump



Air compressor + motor
η good for small Ø

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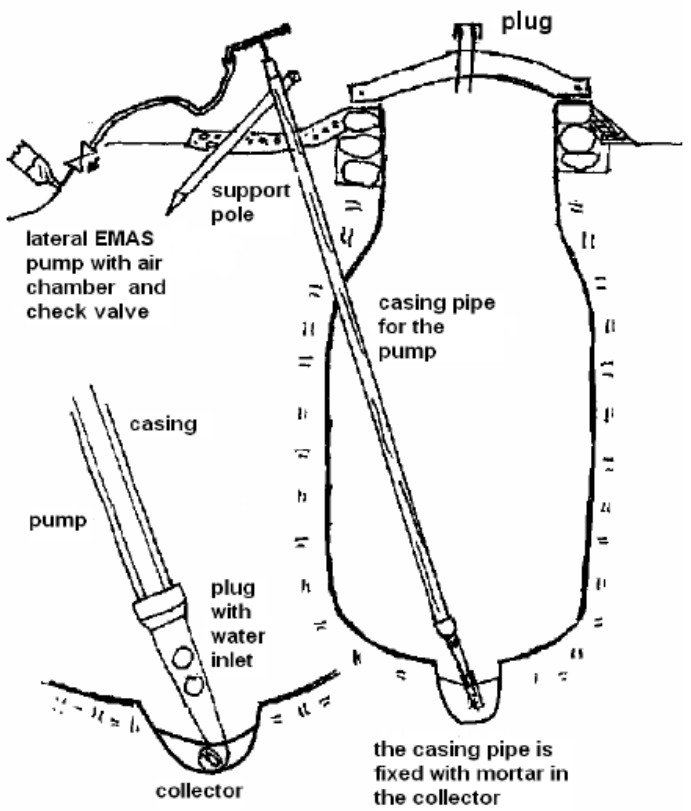
• EMAS Rainwater harvesting System(RWHS)

- As a primary or secondary (complementary) source of water
- Elements:
  - Catchment area (normally the roof)
  - Gutter/drainage system
  - Filter
  - Storage tank (elevated, underground, semi-embeded)



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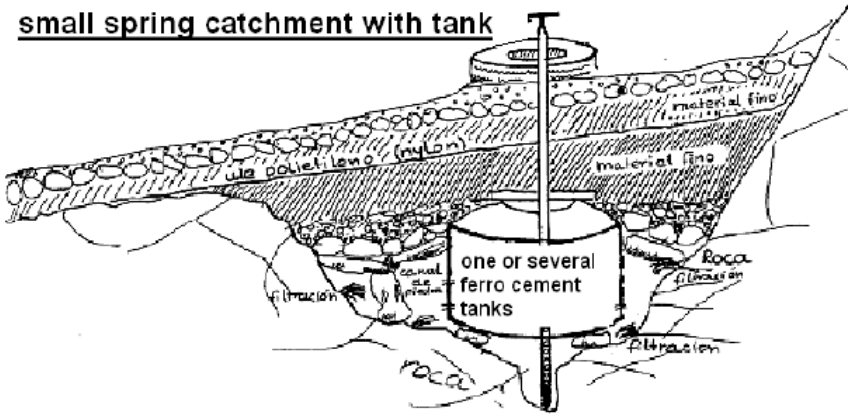
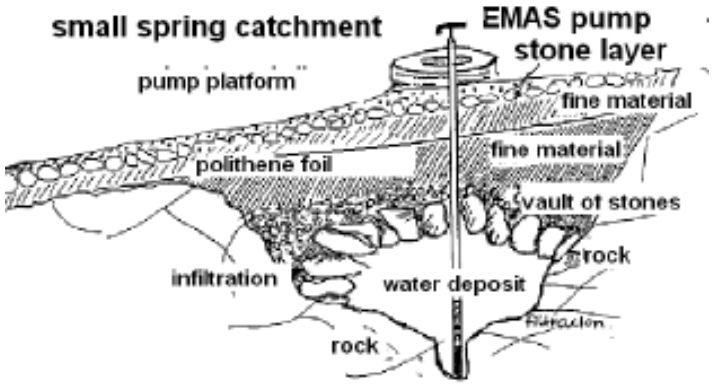
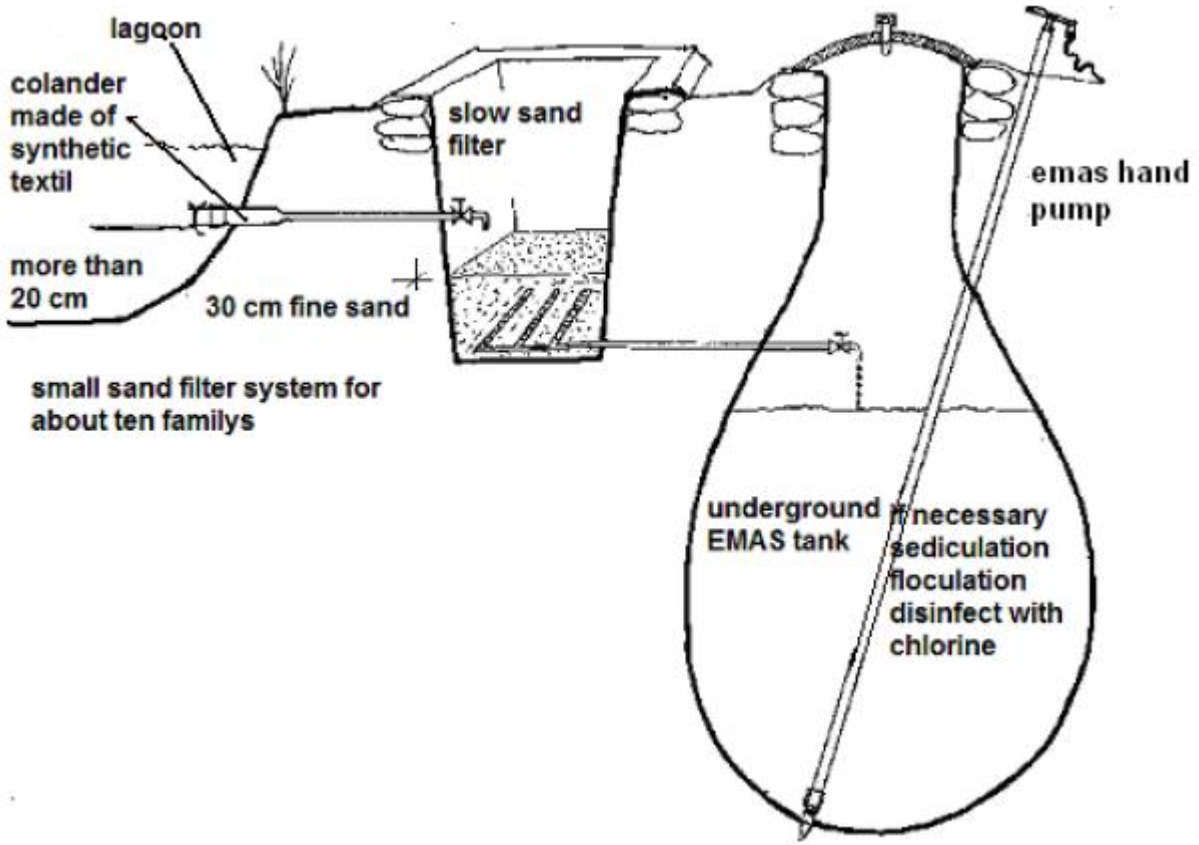
• Neither roof, neither well…

- Impounding from river, lake,..
- Impounding from spring







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- **Financing:**
  - More than 60000 water supply systems withouth subsidy, paid directly by the users….

- **Conclusions**
  - High rate of functionality for EMAS Water Supply Systems
  - Low maintenance and low cost on its maintenance when required, which normally can be done by the owner or by the local technicians
  - **Important impact on increasing access to water supply**
  - **Local technician running small manual drilling businesses**
  - **Capacity to pay by the users**
  - Big market potential, ….

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- **EMAS in many regions….**

…..Latin America , Asia and Africa,…..:

Sierra Leone

https://vimeo.com/111885900

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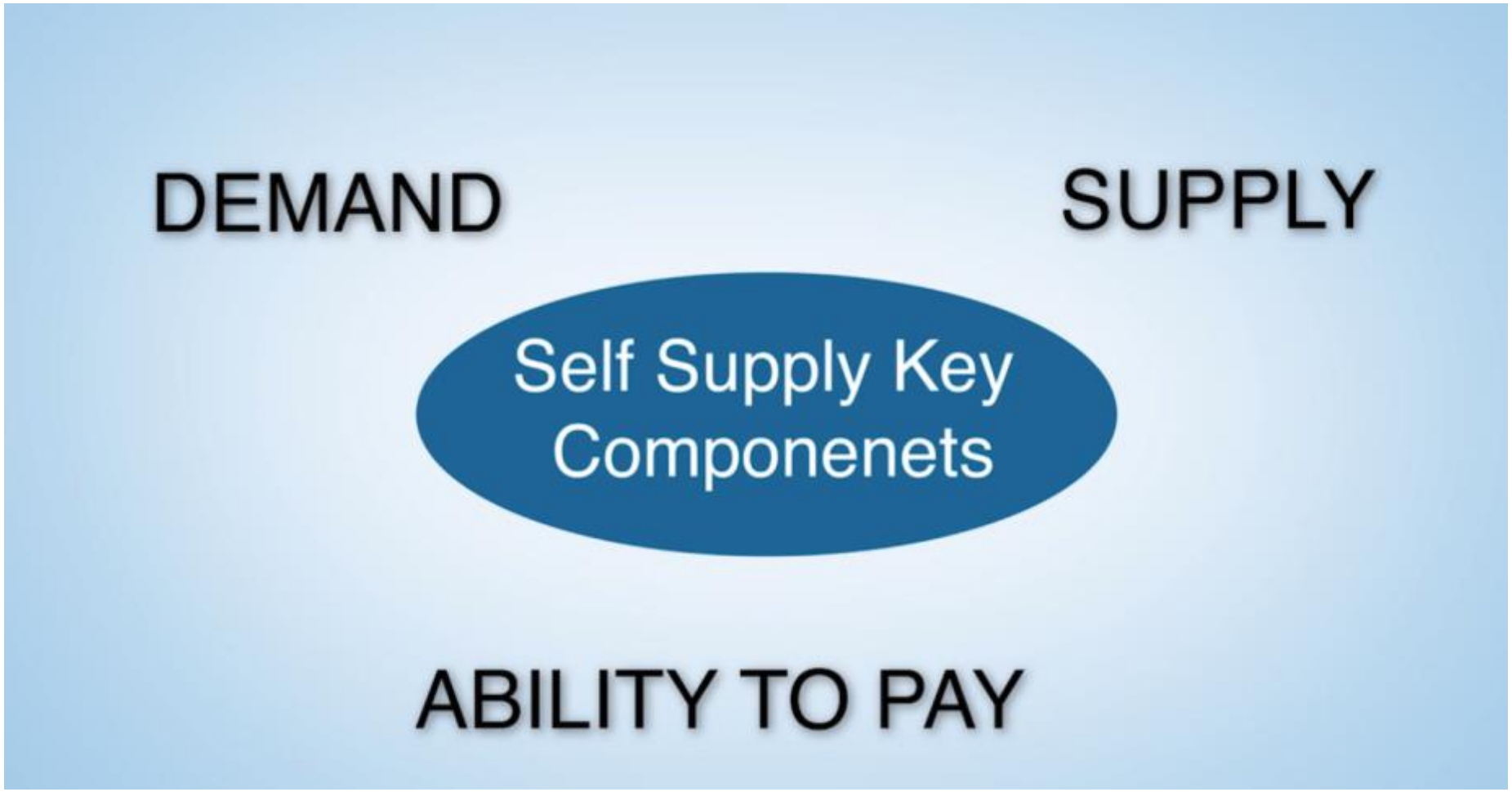
- **EMAS in Sierra Leone**



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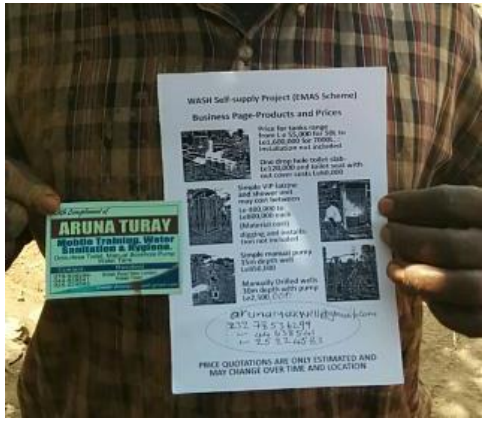
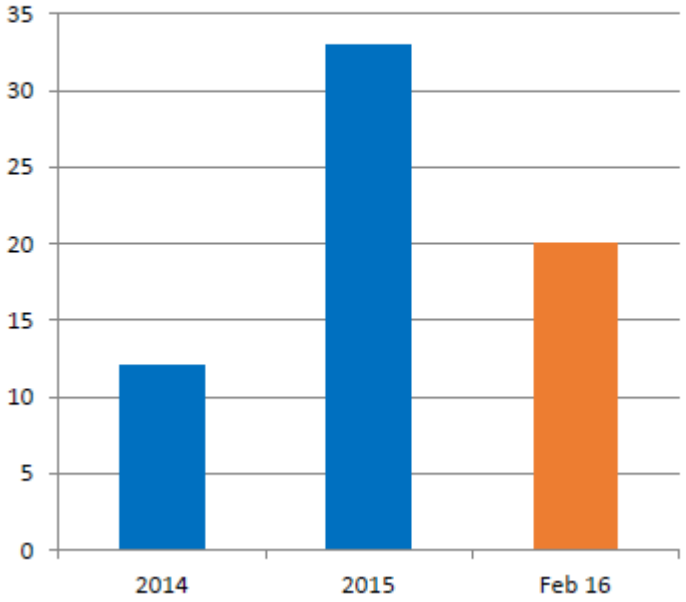
• EMAS inSierra Leone

- School and research center for water and sanitation
- Technicias that start their own businesses

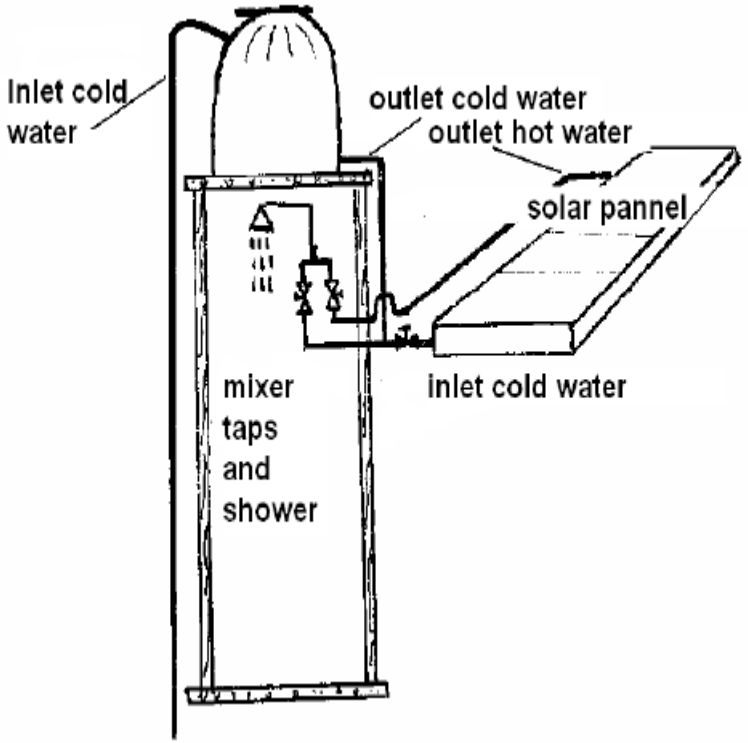


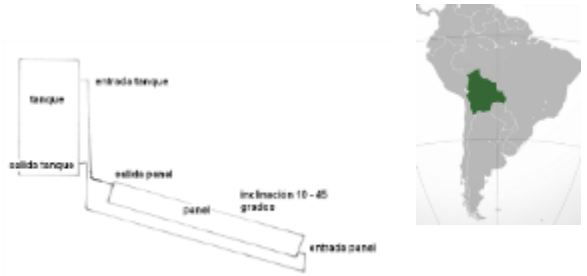
Numbers of wells drilled
on 2014, 2015 and up to Feb on 2016



- **A bit more…improving the quality of life…**

…hot water (with/without storage tank)





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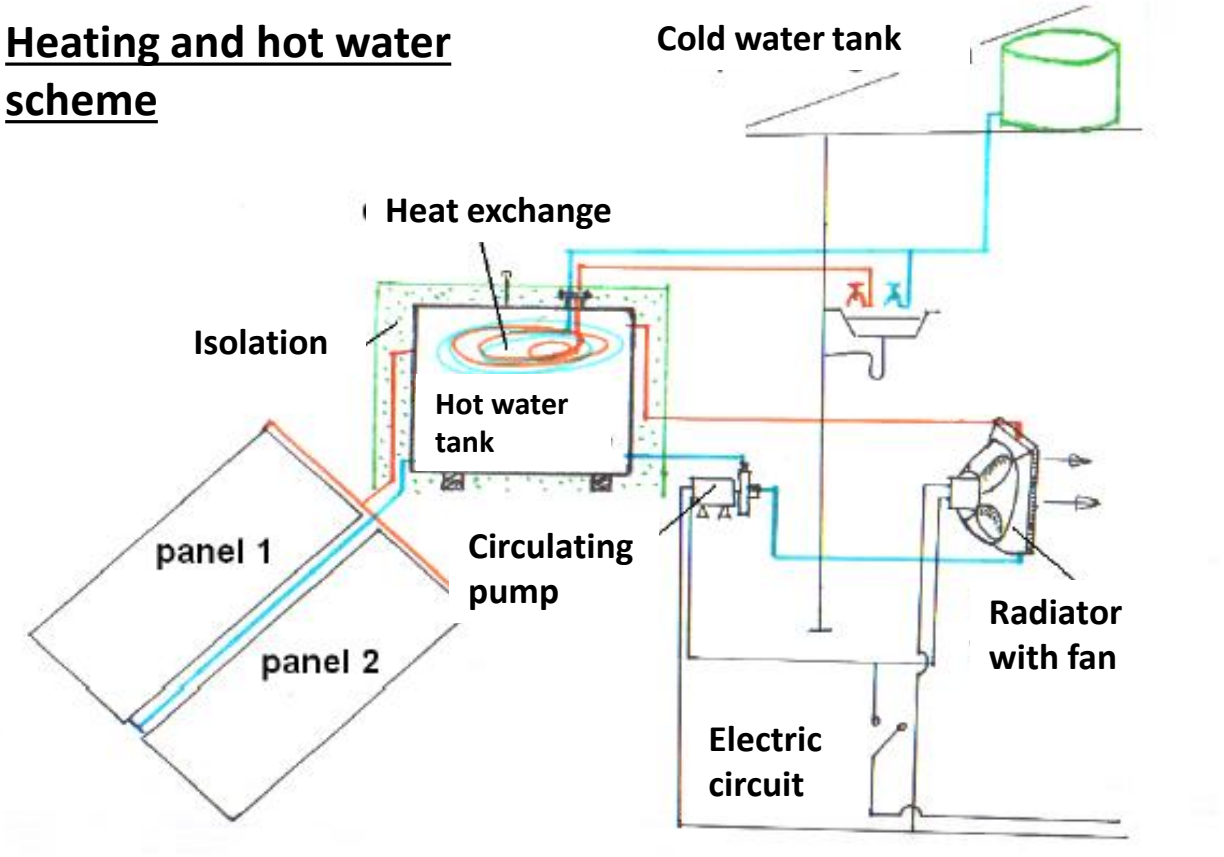
- **A bit more…improving the quality of life…**

…heating system and hot water supply

Heating and hot water scheme



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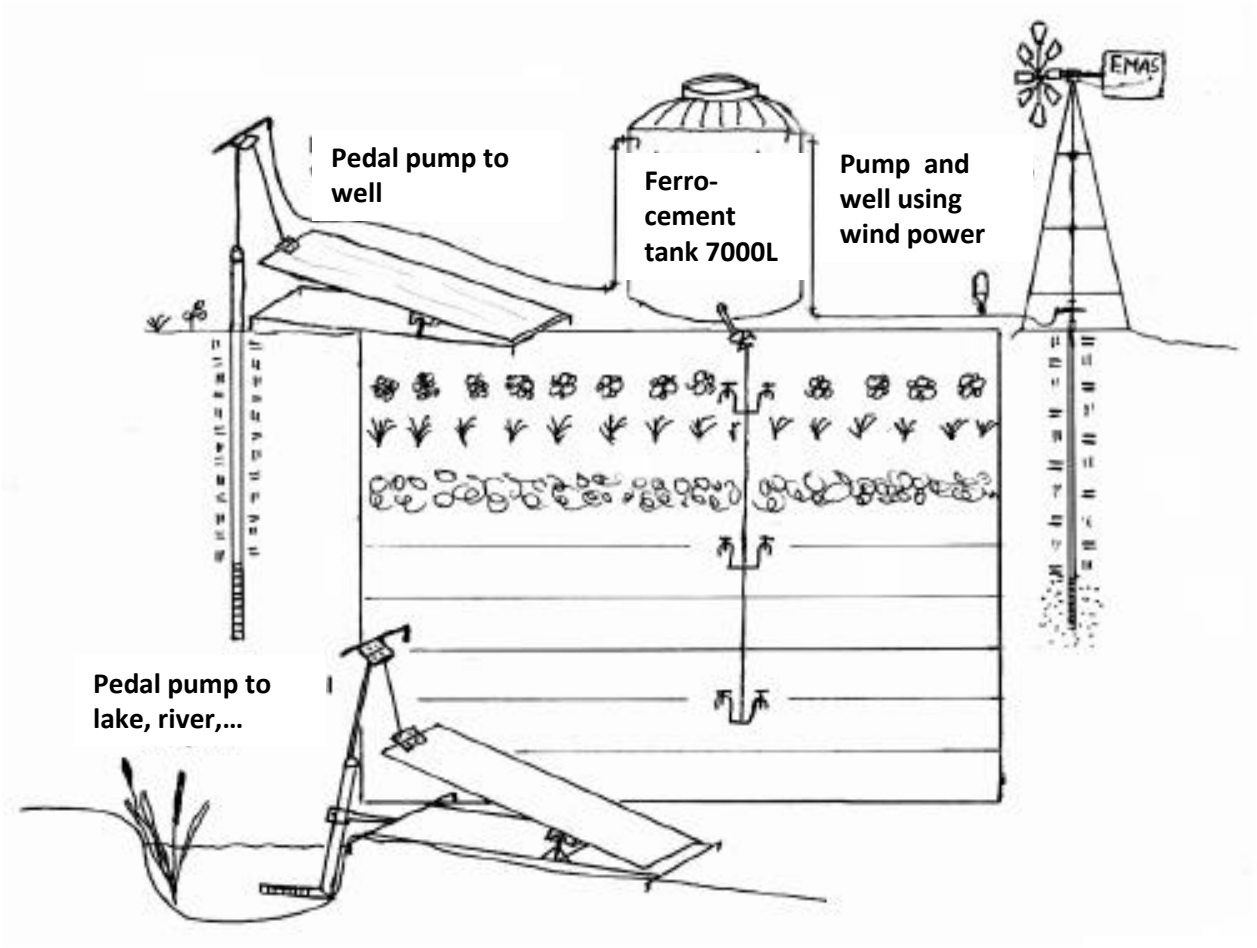
- **A bit more…improving the quality of life…**

…micro irrigation



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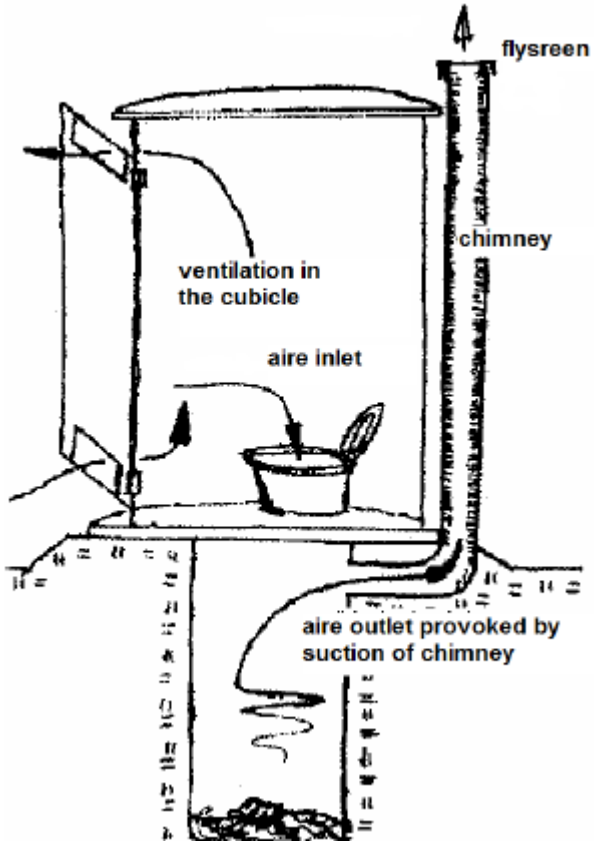
• A bit more…improving the quality of life…

…toilets

- Hygienic, does not affect aquifers and almost odorless



Budget for an EMAS latrine

2 cement bags
1/4 m3 sand
4 corrugated tin plates Nº 28 - 28
2 laths or 15 mm x 15 mm profile pipes
hinges, knobs, latch key, rivet
One 1/4" I iron bar, 6m
1 Kg of wire
1 PVC 4" bend
1 revolving bend
paint
1 toilet seat
transport for purchase of material
use of tools and welding
2 daily wages, including setting up on site

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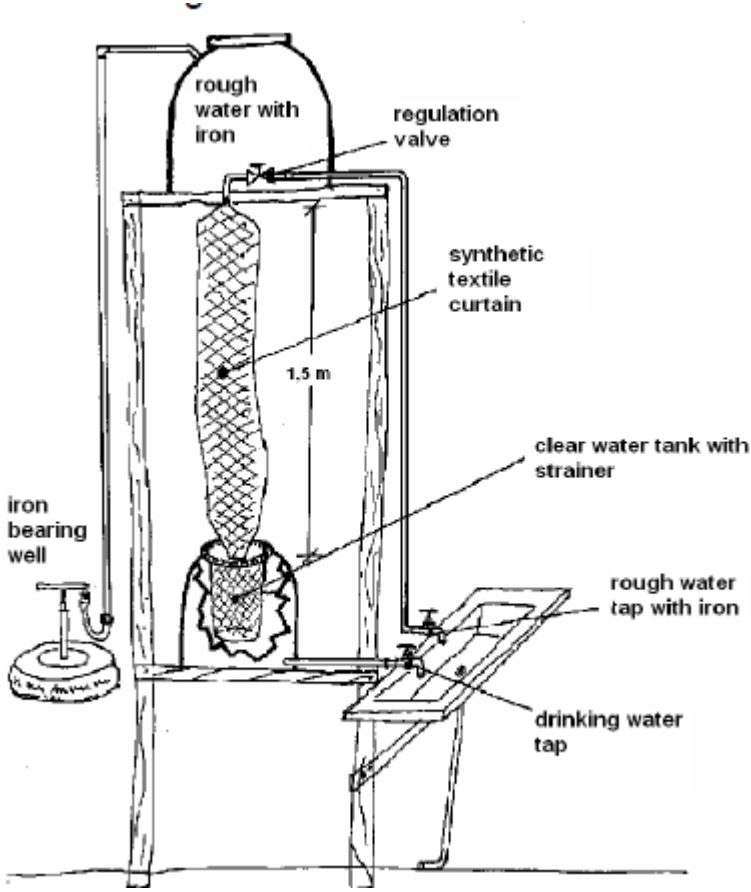
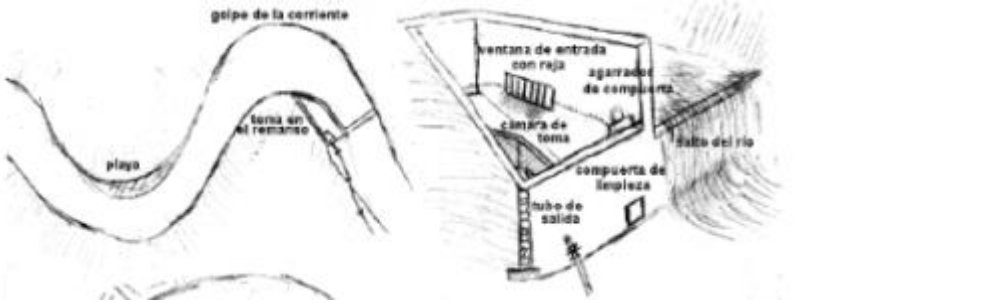
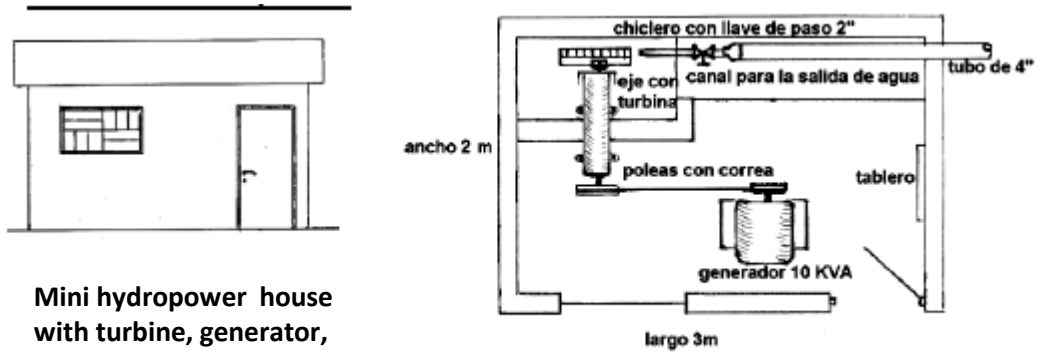
- **More…**
  - Low cost sinks
  - Iron water elimination
  - Hydraulic ram
  - House isolation
  - Household sewage treatment plant
  - Mini hydropower
  - ….







Mini hydropower house with turbine, generator, and voltage regulator

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