



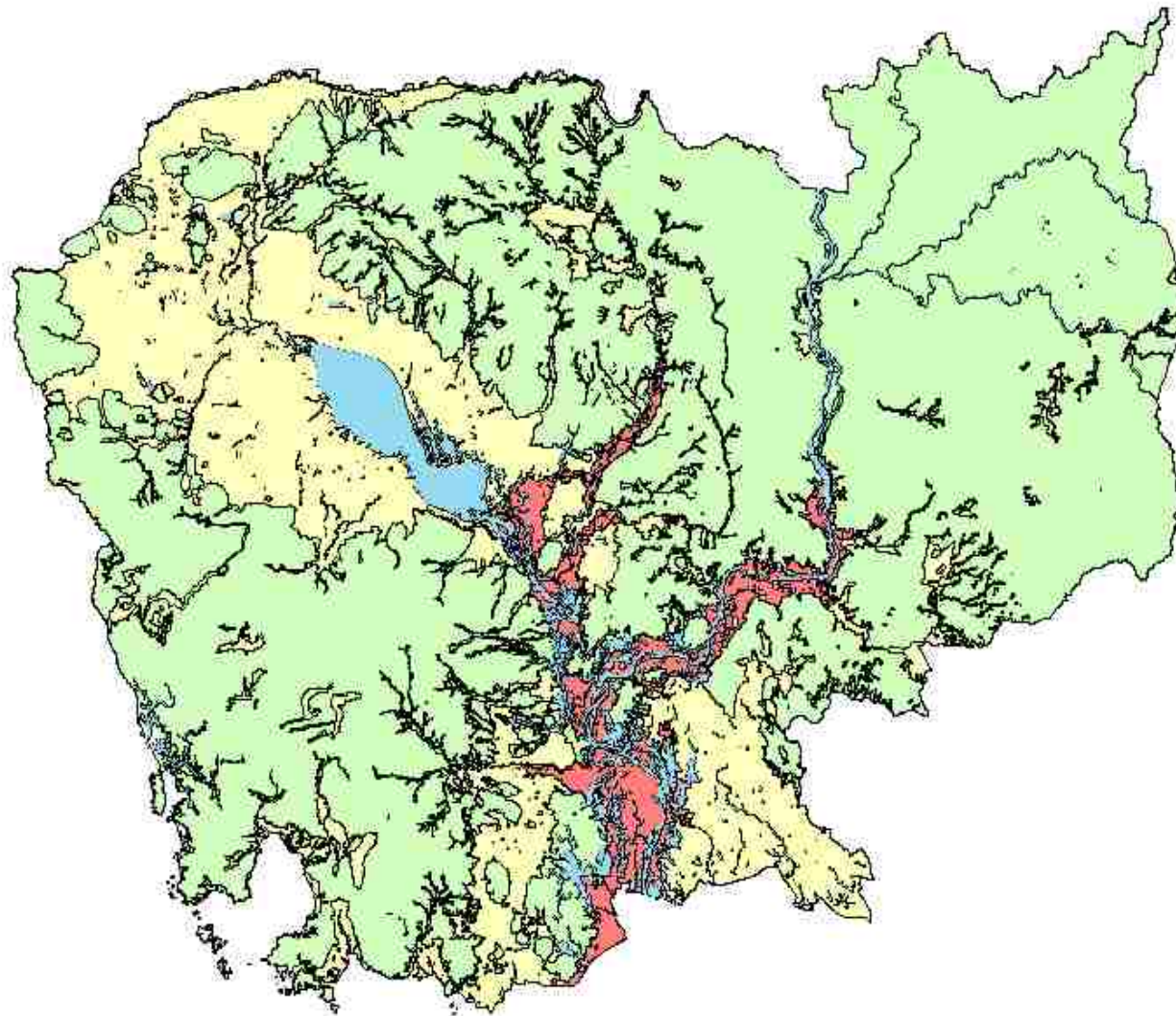
ARSENIC SITUATION AND MITIGATION IN CAMBODIA

Dr. Davin Uy

Director of Research and Development





Institute of Technology of Cambodia. BP 86, Blvd. Pochentong
Phnom Penh, Cambodia. Tel: 855 12 213982, Fax: 855 23 880369

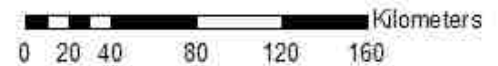
Arsenic Risk Map



Legend

Arsenic Risk

-  At Risk
-  Low Risk
-  Very Low Risk
-  Water



Frederics D., 2004

TUBE WELL TESTED

Total of tube-well tested in Cambodia: 47,950

Tube-well at risk area (As > 50 ppb): 9,047 (29%) of 31,320

Affected Provinces:

- Kandal 35%,
- Prey Veng 19%,
- Kampong Chhang 6%
- Kampong Cham 33%,
- Kratie 15%,
- Kampong Thom 3%

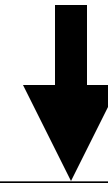
DRINKING WATER IN AT-RISK AREAS

Source of drinking water	Dry season %	Rainy season %
Rain water	1.53	19.56
Stream / Canal	6.59	5.28
Pond	3.04	1.33
River	42.04	33.21
Lake	0.97	1.64
Tube well	22.23	17.58
Combine Well	0.31	0.31
Unlined open well	1.42	1.33
Lined open well (no cover)	12.68	12.21
Lined open well (with cover)	1.03	0.83
Pipe system	6.83	6.21
Others	1.33	0.52

Knowledge about Arsenic of Cambodian

No knowledge on Arsenic
as poison = 88 %

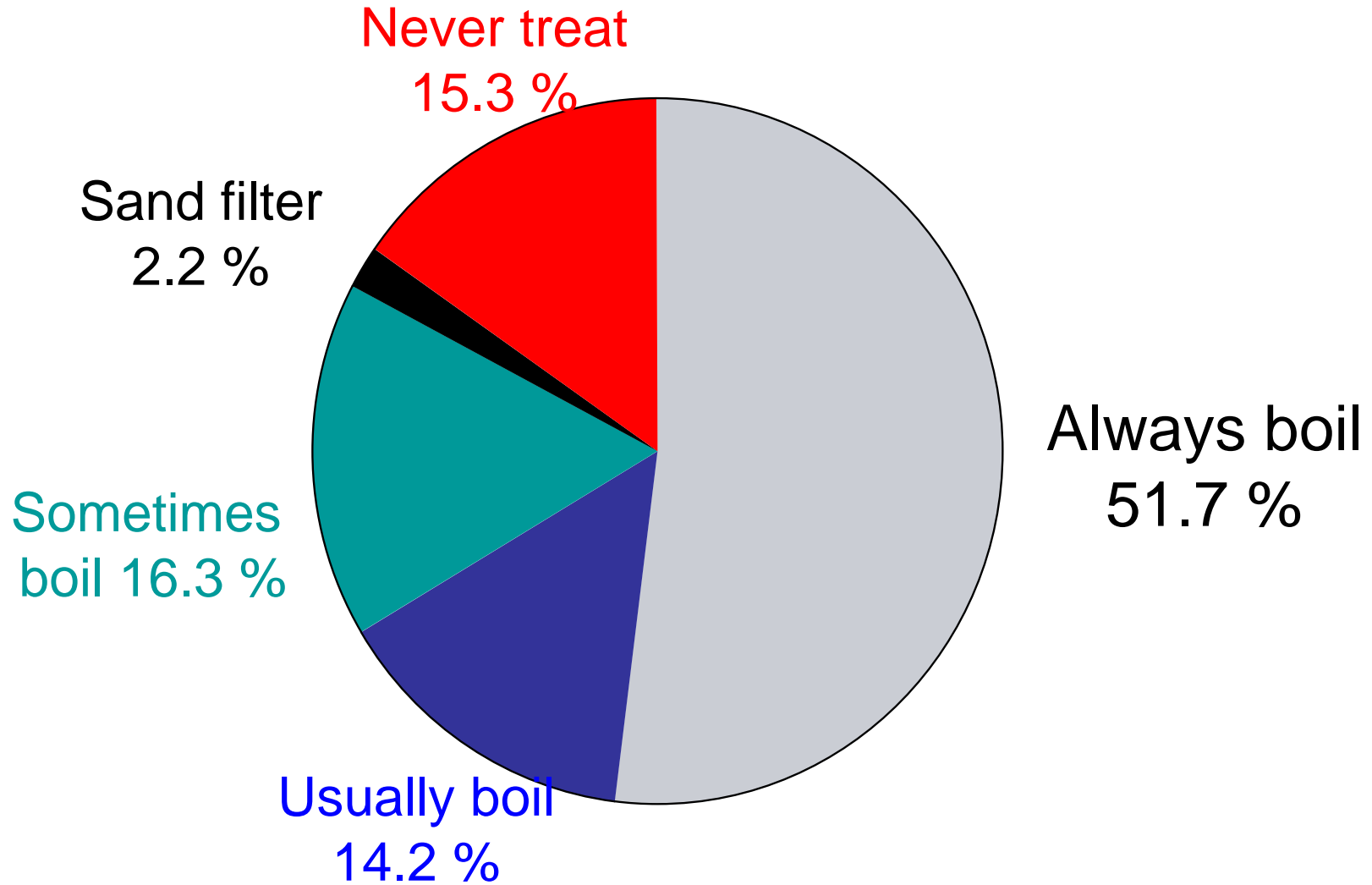
Knowledge: Arsenic
is poison = 12 %



Their answers

Knowledge	Percentage
Arsenic can be removed by boiling	56.6
Arsenic can be removed by filtering	61.3
Arsenic caused diseases	60.0
Problem caused by arsenic go away	58.6
People spread arsenic diseases	67.8
People die from drinking arsenic water	49.2
Arsenic water can use for gardening	58.5
Arsenic water can use for animal	55.1
Arsenic water can use for washing	64.8
Arsenic water can use for bathing	62.4

Frequency of treating water for drinking in Rural Area



CASES OF ARSENICOSIS IN CAMBODIA

High Arsenic location in
Kandale province: Testing
people in Prekroesey

- High Arsenic in tube-well
- Arsenicosis appears after
drinking the water about
5 - 10 years.

290 cases have
symptom of
suspected
arsenicosis

Confirmation
of arsenicosis
by WHO/MOH

Arsenicosis in rural area



Cases of arsenicosis in Cambodia



Children



CANCER



Arsenic mitigation for drinking water in Cambodia now

- Encourage the use of alternative water (surface, rain and dug well) by Min. of Rural Development and UNICEF
- Initiate the ETV process under the support of WSP
- Piped water systems provided under private and/or public partnerships applied only in capital
- Experimentation of household and village scales of arsenic removal systems.

General characteristics of water in Cambodia

- ❑ Surface water : **Mn, F**, turbidity, **pathogens**
- ❑ Groundwater: **Mn, F**, turbidity, **Arsenic** and possibly pathogens

- Alternative water (surface, rain and dug well):
Biosand filter and CWP

Hagar and others

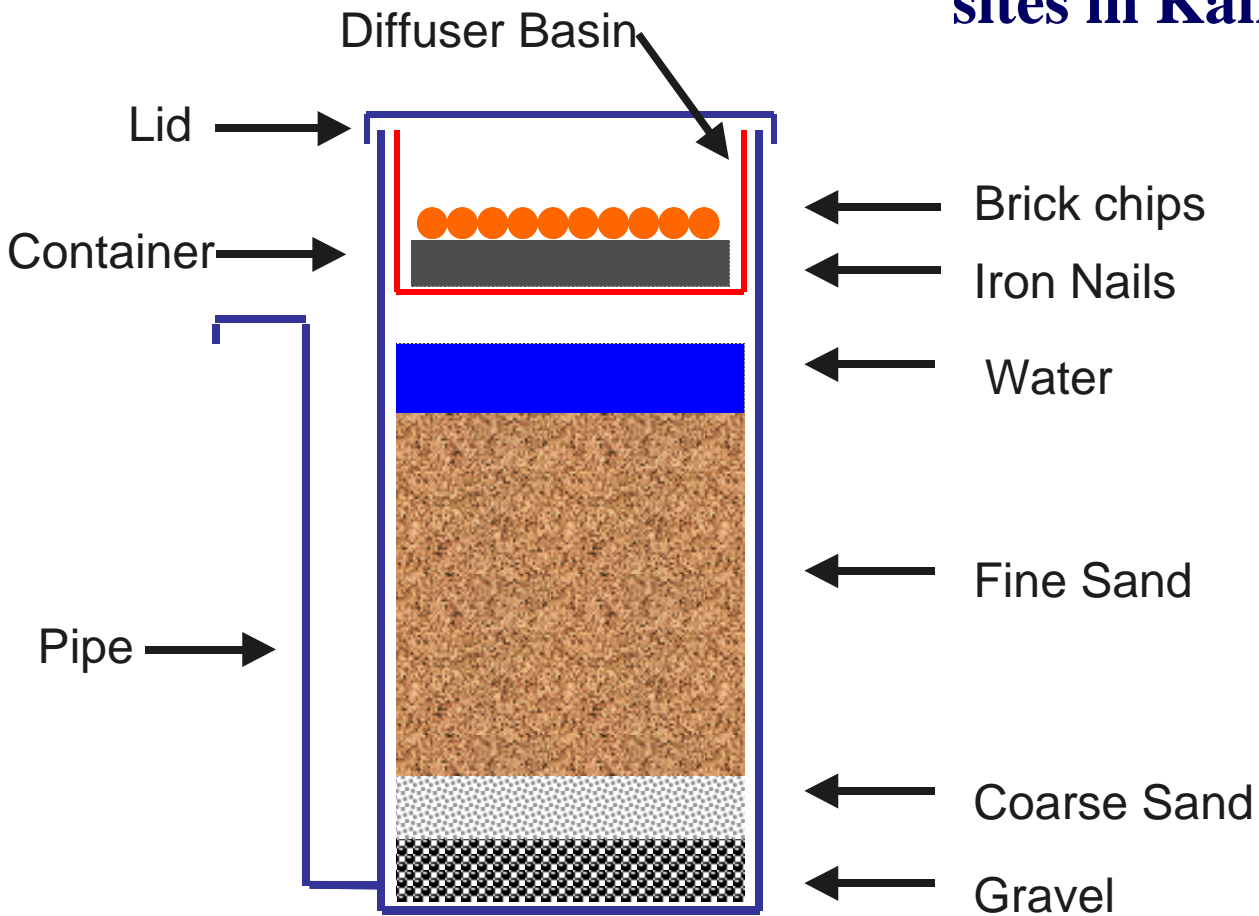


RDI, IDE and CRC



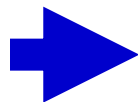
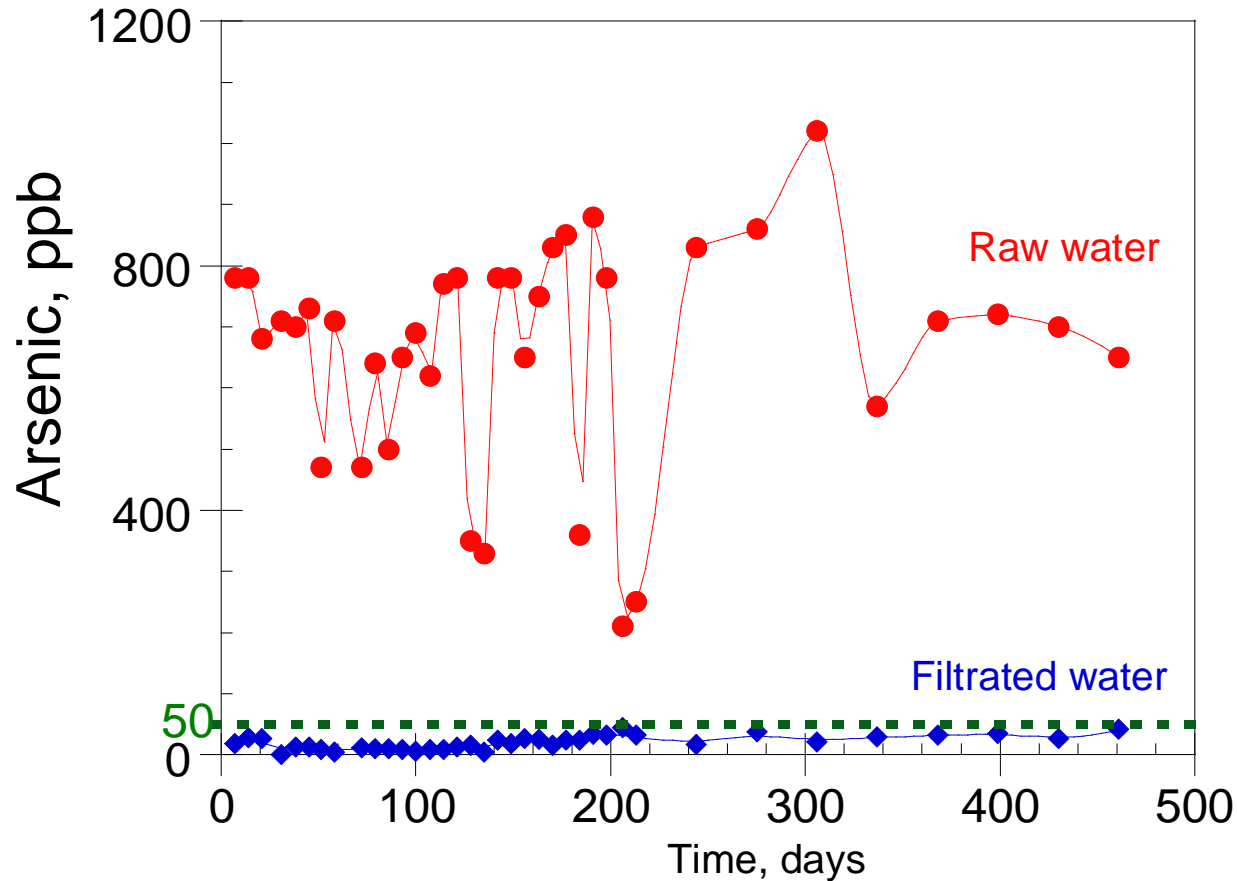
Experimentation of household and village scales of arsenic removal systems.

KAF: Installed 40 filters in 31 sites in Kandal and Prey Veng



➔ High efficiency for 1 – 1.5 year with efflux water As < 50 ppb

Performance of KANCHAN Arsenic Filter In Cambodia



High efficiency for 1 – 1.5 year with
efflux water As < 50 ppb

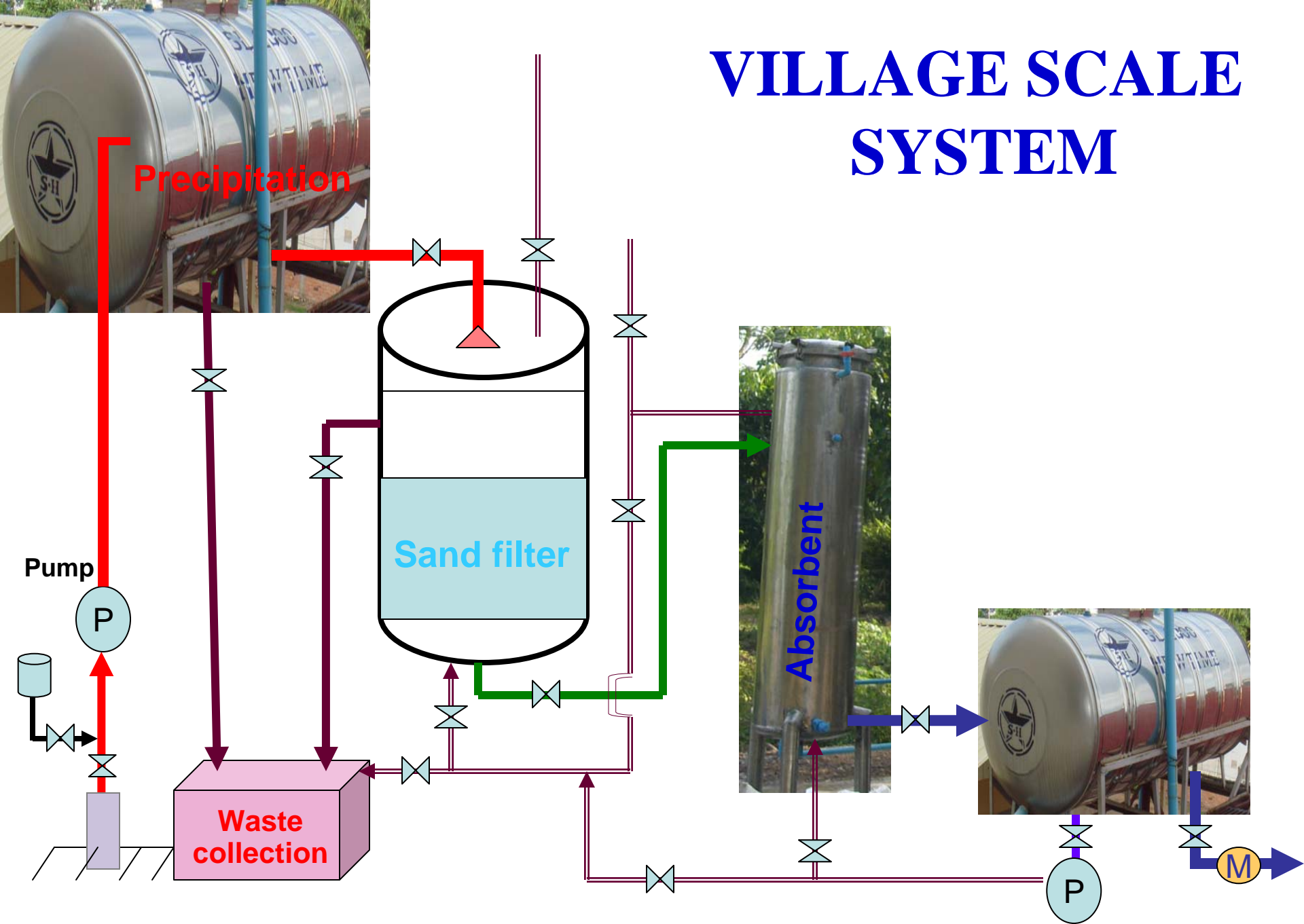
Characteristics of household systems

1. Idea of household is good for the isolated people
2. Testing performance is too expensive
3. Too much work for teaching all households to practice the same way
4. Too much work for waste collection
5. Investment for each family is US\$ 30 – 50
6. Quantity of water limited: 40 L/day
7. Too much work for sustaining the system

VILLAGE SCALE



VILLAGE SCALE SYSTEM



PERFORMANCE

Parameters	Raw water	After Sand filter	After Absorbent	Decrease or increase
pH	6.70	7.32	7.31	+ 0.4 - 0.6
Fe, ppm	5.15	0.02	< 0.01	- 99.90 %
As, ppb	670 - 720	39	0 - 2	- 99.70%
Turbidity, NTU	1 - 55	0.32	0.59	- 99%
Hardness, ppm	95		120	+ 26%
NO ₃ , ppm	0.09		0.25	+ 0.16 ppm
PO ₄ , ppm	3.20		0.09	- 97%
Mn, ppm	0.200		0.03	- 85%
F, ppm	9.40		0.88	- 91%
Flow rate, m ³ /h		0.96	0.96	
Smell	iron smell	good	good	
Back-wash		Every 10 days		
Time elapsed	3 months			

Characteristics of the system

1. System removes As, Fe, Mn, F, PO₄, turbidity and microorganisms. Water produced conforms WHO guideline.
2. Treat the groundwater with any Arsenic concentration
3. Cost of testing 1 every month for 50 – 500 families. System can be scaled up/down with investment US\$10 - 6/family and treated water < US\$ 0.20/m³.
5. Easy waste collection: every 6 – 12 months
6. Sustainable system
7. Easy operation and maintenance



THANK YOU VERY MUCH