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Pure. Simple. Solid.

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Member of
German Water
Partnership

SuMeWa|SYSTEM

Solar Driven electro-chlorination for safe water disinfection and arsenic removal from contaminated source waters in developing regions
Experiences from AquaNES and Solarex Project

IFAT 2018 Munich Hochschulforum
Philipp Otter, HTW Dresden, AUTARCON GmbH, Kassel

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Foto: by Georg Schaumberger

Water supply situtation in rural developing areas

- Water distribution in unsecured containers
- Local storage in warm climate regions

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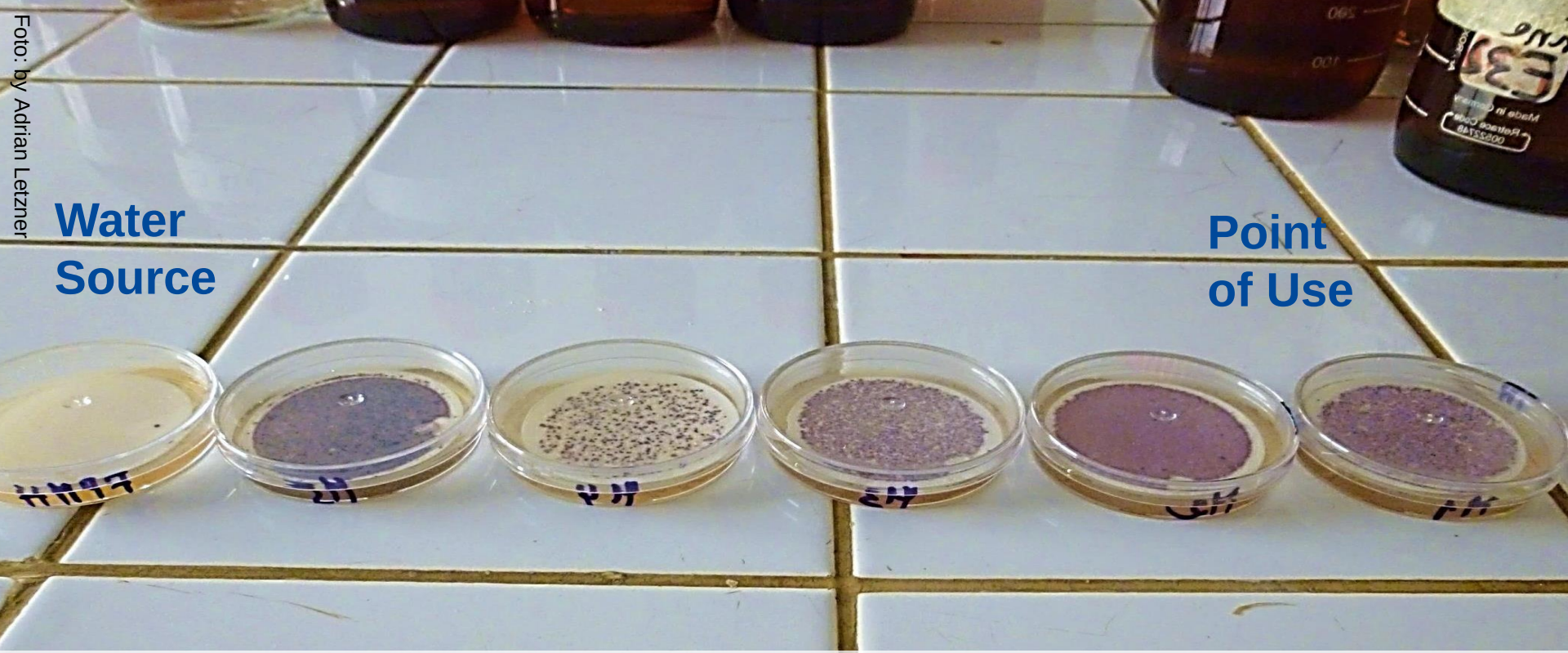

Foto: by Adrian Letzner

Water distribution in unsecured containers

- Recontamination after source / treatment
- UV, membranes, boiling, etc. are not sufficient !

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Foto: by Hajo Olfs

Residual disinfectant requirements

Parameter	WHO	Vietnam	Thailand	Malaysia	India	Jordan
Residual Chlorine	≥ 0.5	min. 0.3 - 0.5	min. 0.5 max. 2.5	≥ 1.0	0.2…1.0	≤ 0.2 .. 1.0

Challenges of disinfection in rural areas

- Availability
- Transport
- Correct dosing

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Challenges of disinfection in rural areas

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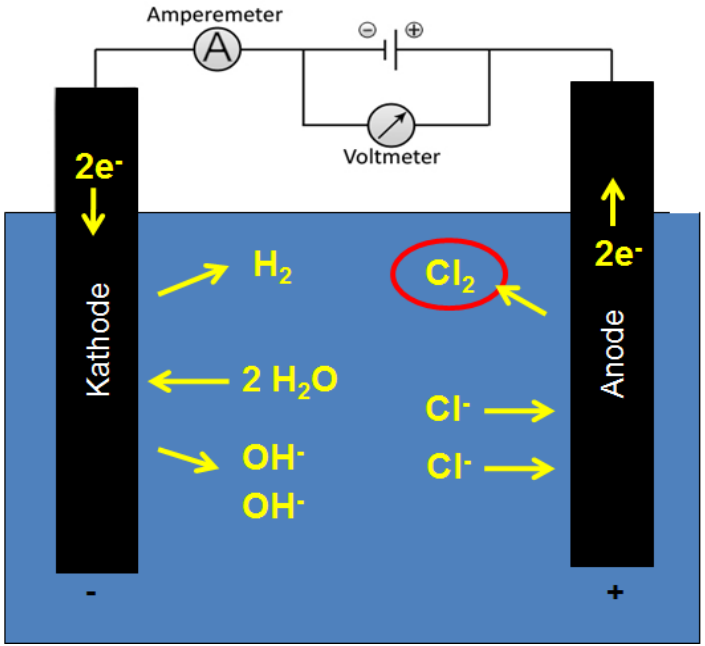

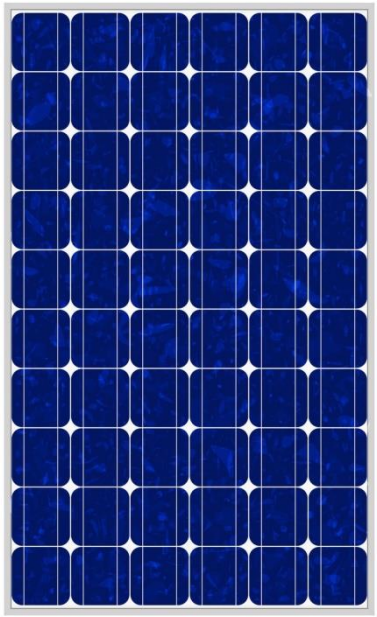

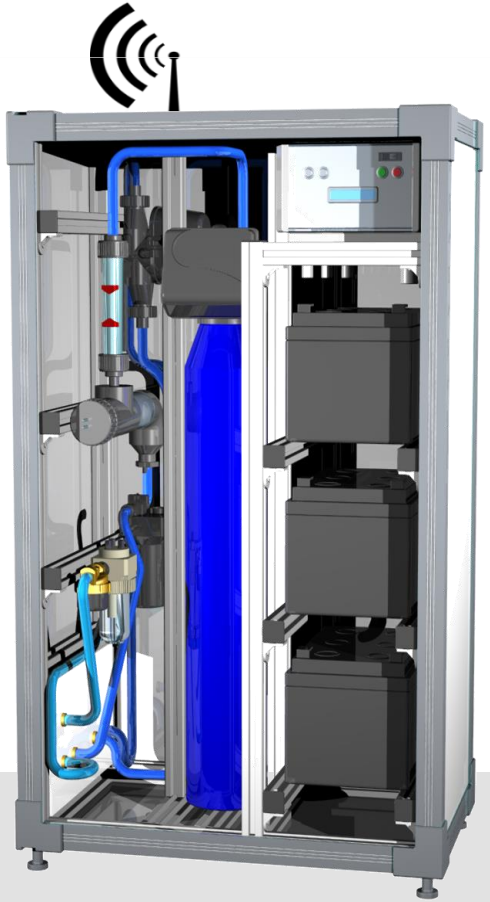

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- Chemical free water treatment
- $Cl_2 + 2\ H_2O \leftrightarrow HOCl + H_3O^+ + Cl^-$

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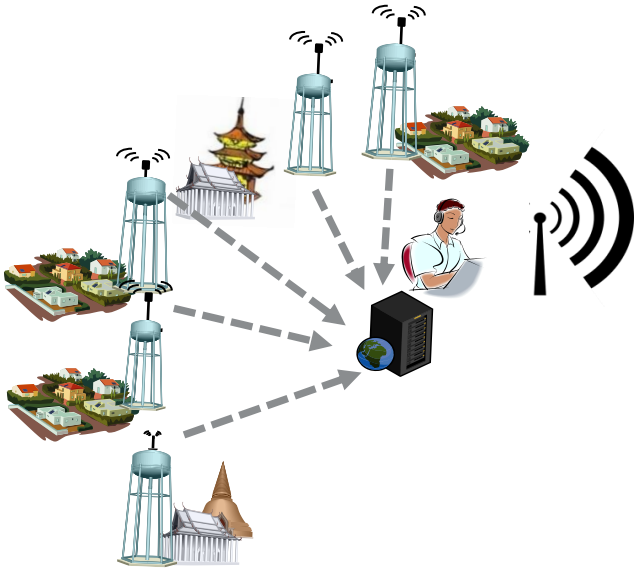

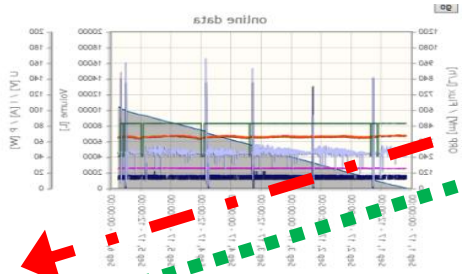

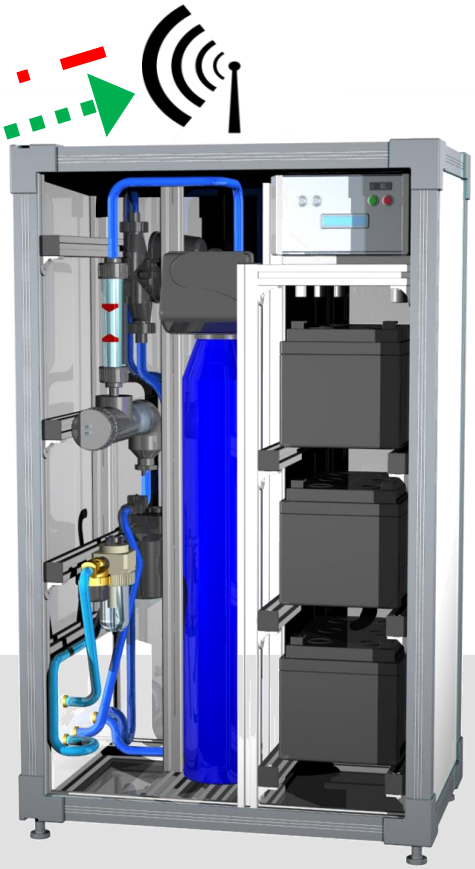

Online Data Monitoring

- System Performance
- Quality and quantity of water treated
- Very cost efficient

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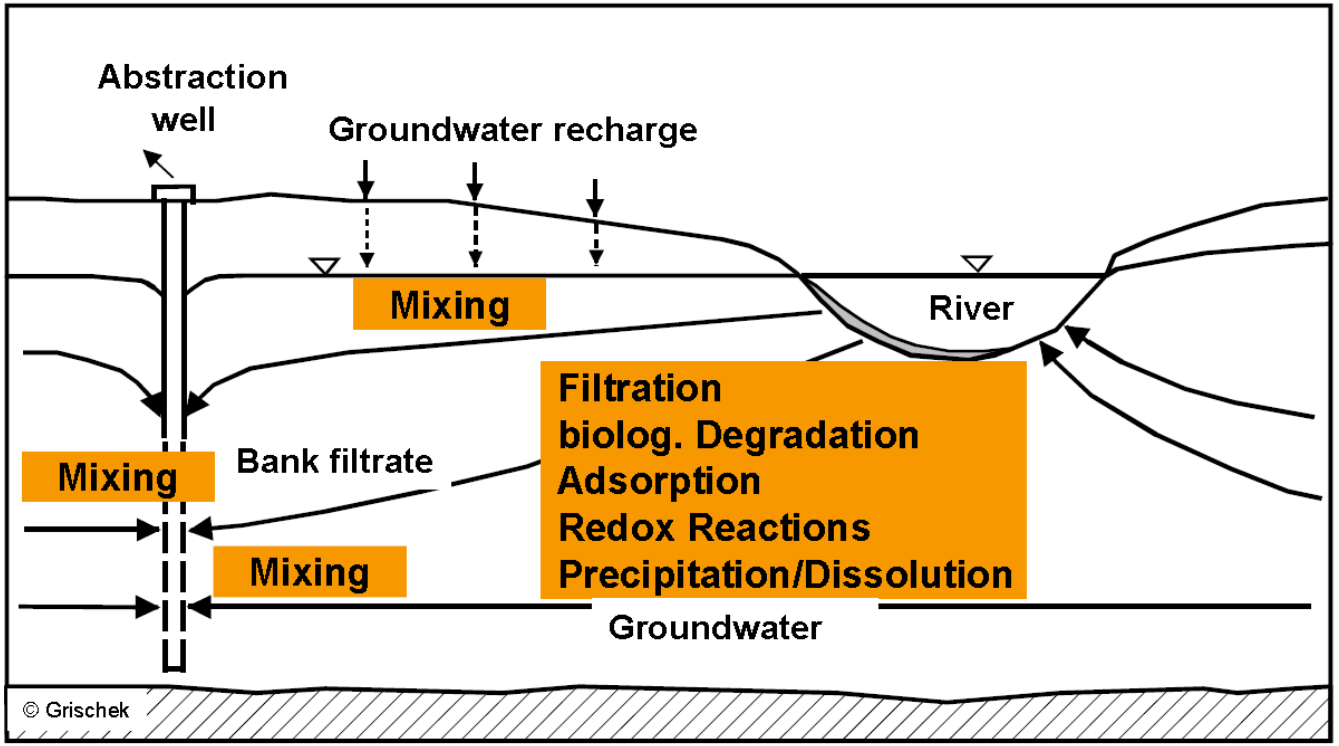

Riverbank Filtration (RBF)

- Natural pre-treatment
- Perfectly suited for SuMeWa|SYSTEM

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Riverbank Filtration (RBF) System
Haridwar India

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Riverbank Filtration

- Large Diameter Bottom Entry Well

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AquaNES Pilot Station in Haridwar

- Drinking water Disinfection of Riverban filtrate
- 10.000 L/h Safe Drinking Water Supply for

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Students Wanted!!

- Interships abroad
- Supervision of Bachelor/Master Thesis

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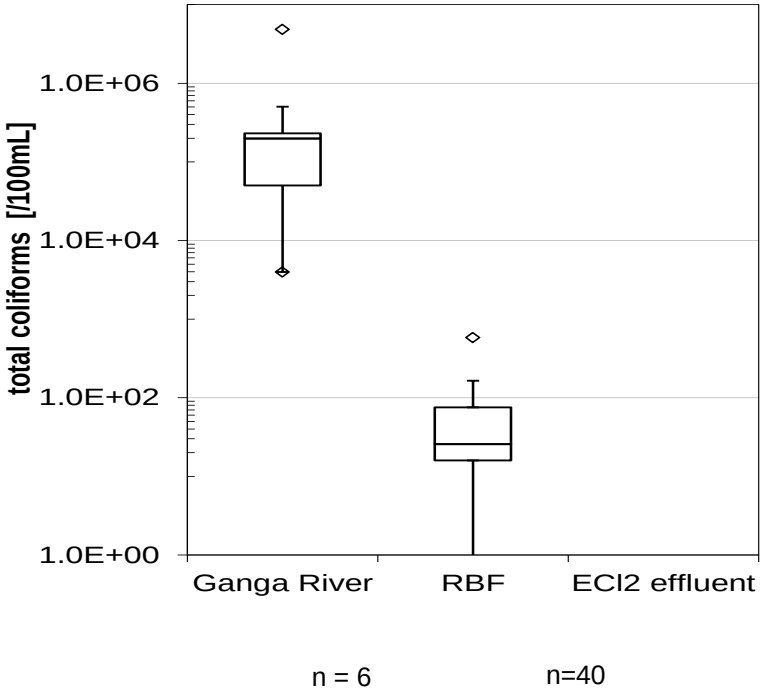

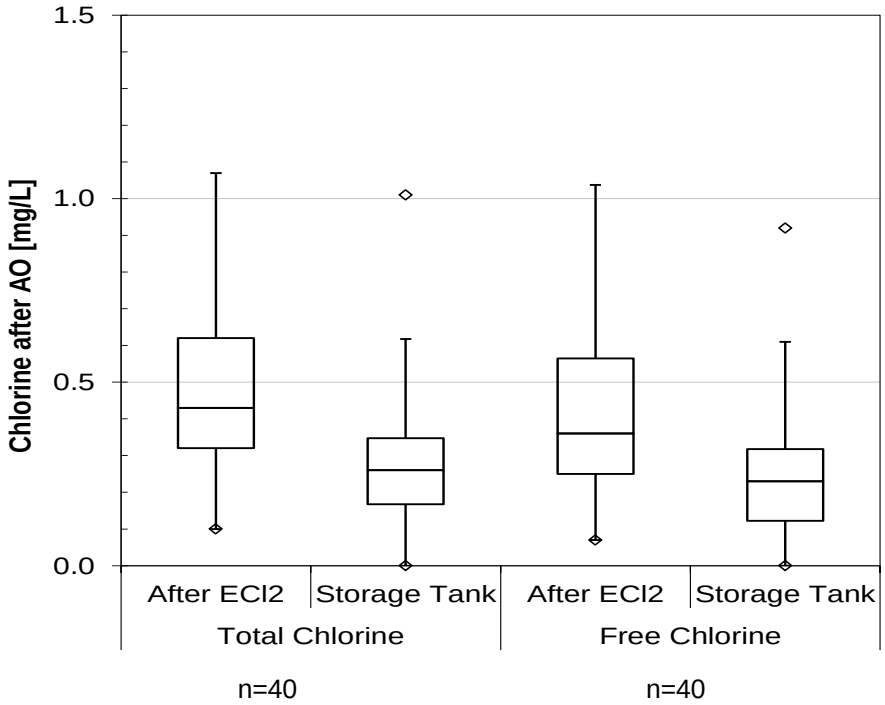

SuMeWa|SYSTEM

- No addition of chemicals, no exchange of media
- 99 % iron and manganese removal, > 90 % arsenic removal

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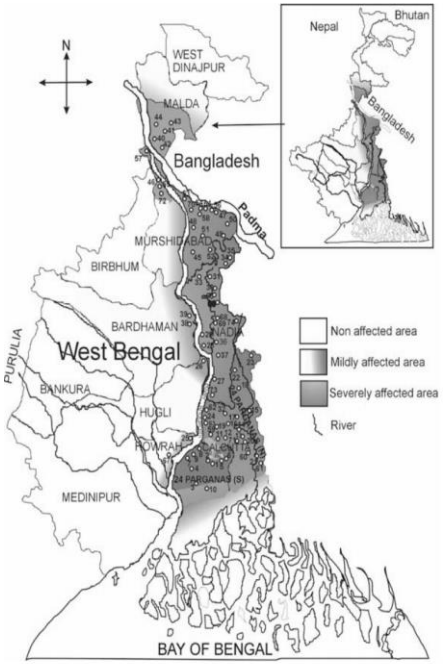

From Chakraborti *et al.* (2002)

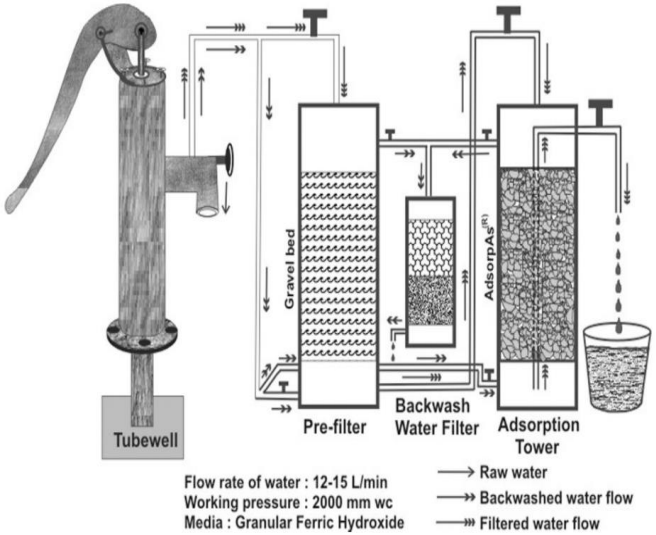

Fig. 1. Schematic diagram of a typical arsenic removal plant widely used in West Bengal, India.

Arsenic water contamination – Largest Mass Poisening

- Study in West Bengal evaluated 570 ARP
- 475 not useful, 145 not in working conditions

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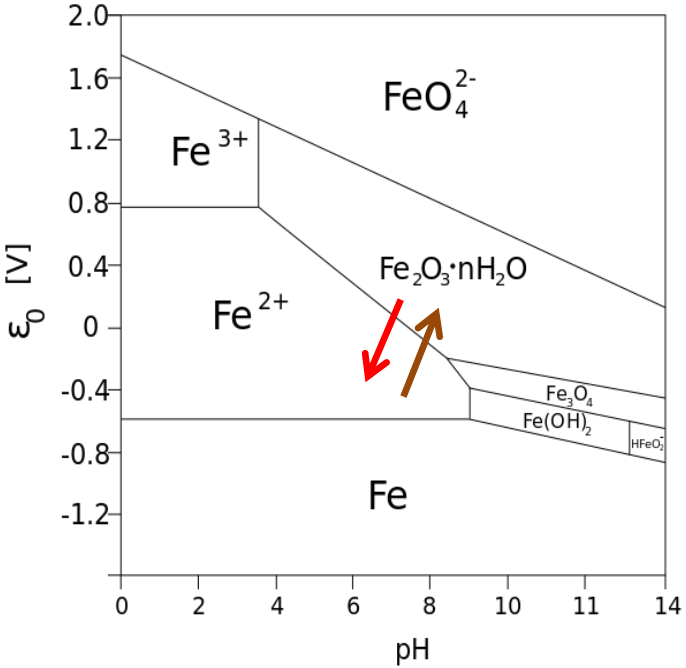

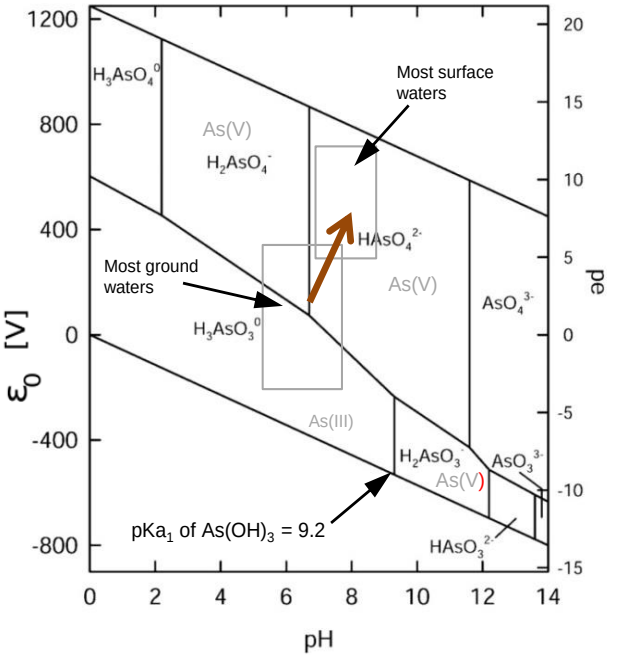

SolArEx - Approach:

In-situ iron sludge production and arsenic oxidation for enhanced co-precipitation

$$2\ Fe^{2+} + O_2 + 6\ H_2O \rightarrow FeO(OH)\downarrow + 8\ H^+$$

$$2\ Fe^{2+} + HOCl + 3\ H_2O \rightarrow FeO(OH)\downarrow + Cl^- + 5\ H^+$$

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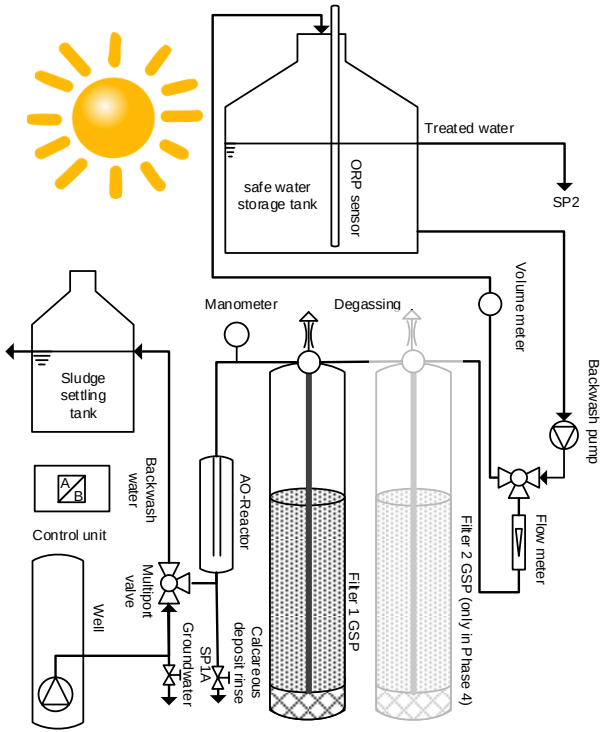

SolArEx Pilot System in West Bengal

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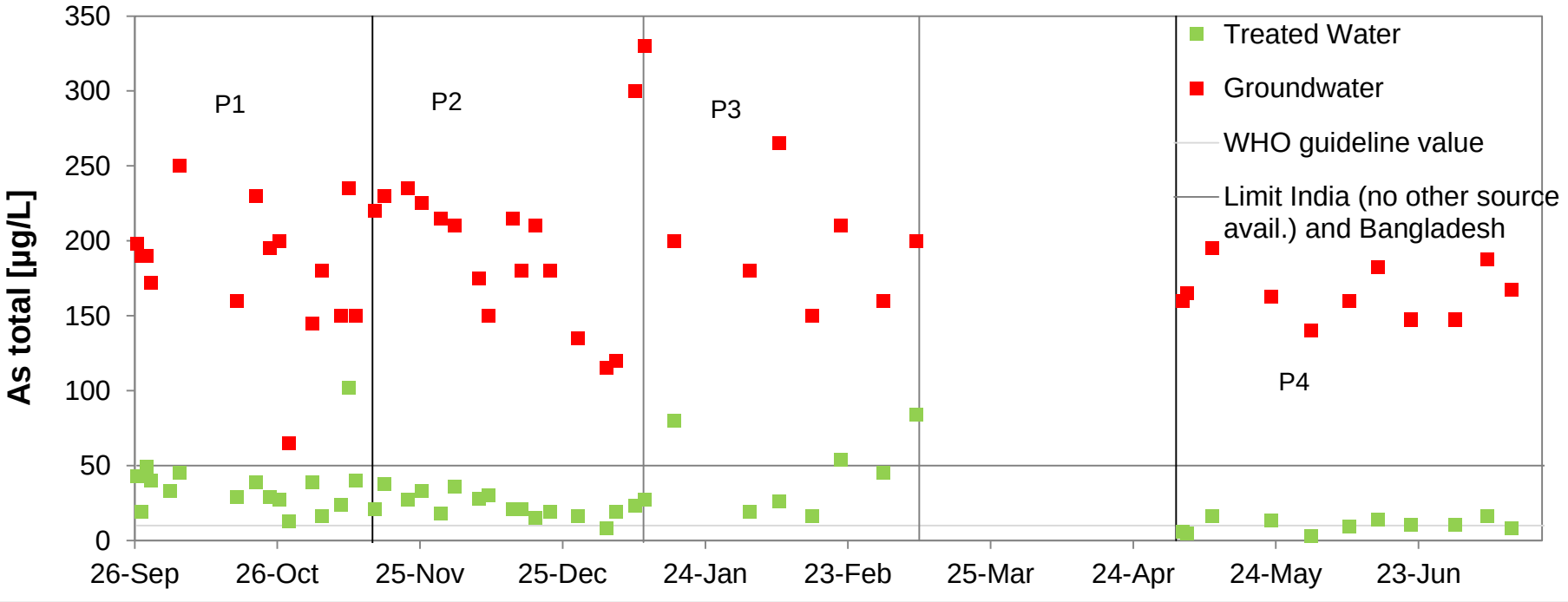

Achieved Arsenic removal rates

- Reduction during P4 from 165 ± 17 µg/L to 10 ± 4 µg/L (~ 94%)
- Increased current density improves arsenic removal
- Potential for improvement

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Foto: by Calvin Ndumwa

Pay-per-use through online prepaid water tapping

- Simple and fair distribution of water
- Long term operation of drinking water infrastructures
- Online monitoring of tapped water quantity

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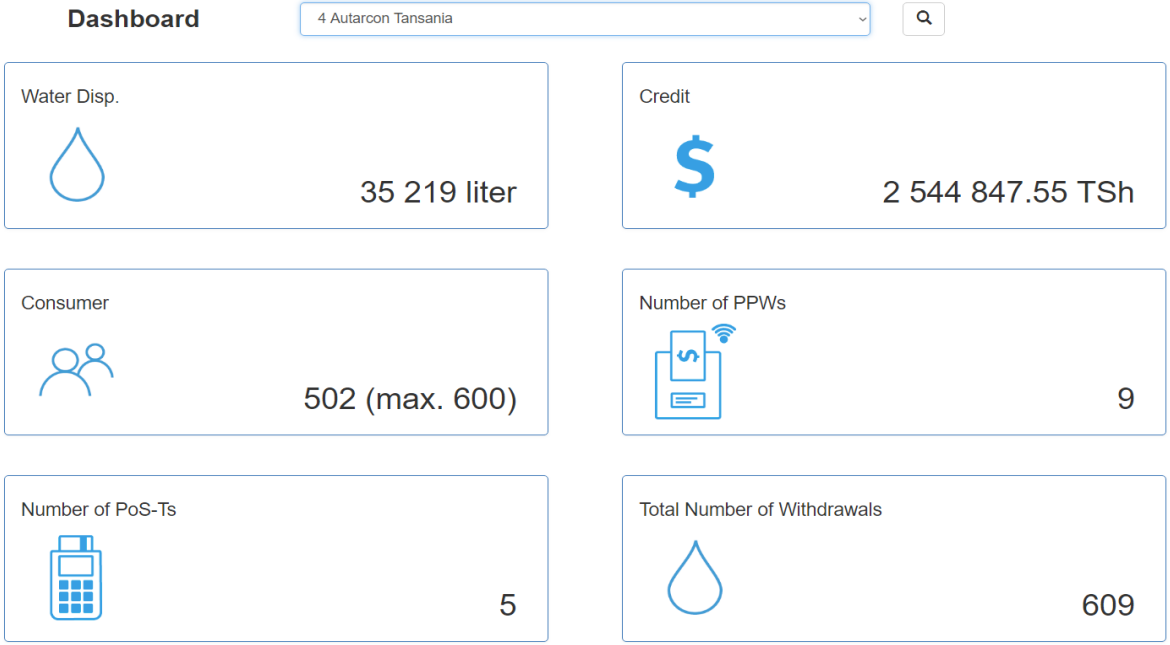

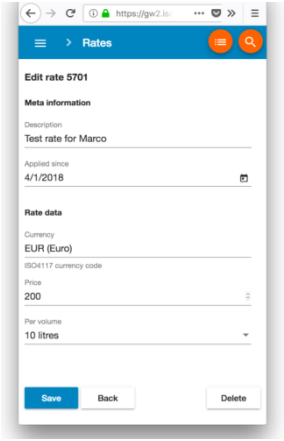

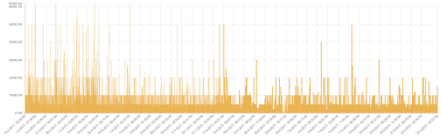

Pay-per-use through online prepaid water tapping

- Simple and safe management (web based or APP)
- Securing income through online money transfer
- Consumer oriented pricing

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Foto: byTina Jaskolski

What we are looking for!

- Project investors
- Project sites
- Reliable local partners

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Thank you very much!

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experience.science.future.: B4.138/238

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Bundesministerium
für Bildung
und Forschung

Member of
German Water
Partnership

AquaNES

Demonstrating Synergies in Combined Natural and Engineered Processes for Water Treatment Systems

The AquaNES project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 689450

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