



ROYAL INSTITUTE
OF TECHNOLOGY



Using local knowledge for meeting global challenges

examples from Bangladesh and Ethiopia





ROYAL INSTITUTE OF TECHNOLOGY

Knowledge for meeting global challenges for Water Development

Examples of Bangladesh and Ethiopia



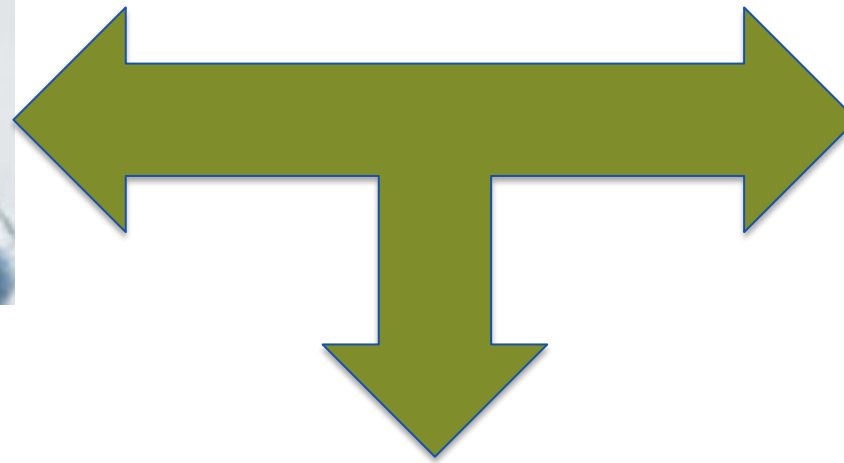
Drinking water

- * Safe groundwater
- * Natural coagulant
- * Nanotechnology



Wastewater

- * Biofilters
- * Hydroponic systems

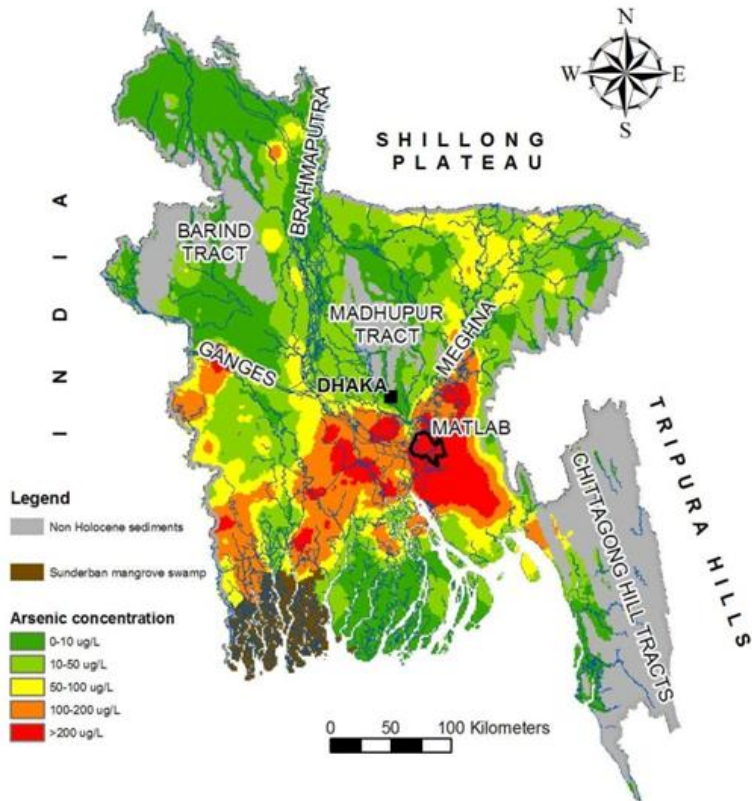


Knowledge to develop Sustainable Practices

I. SASMIT



- Drinking water supply in Bangladesh mostly (> 90%) depends on groundwater
- Most widely accepted option is manually operated suction mode hand tubewell
- More than 90% of 10 million tubewells are privately owned and installed by the local tubewell drillers
- SASMIT is a community based and cost efficient strategy for targeting safe groundwater for installation of safe drinking water tubewells
- Optimized on the basis of local knowledge and technique



SASMIT – strengths and opportunities

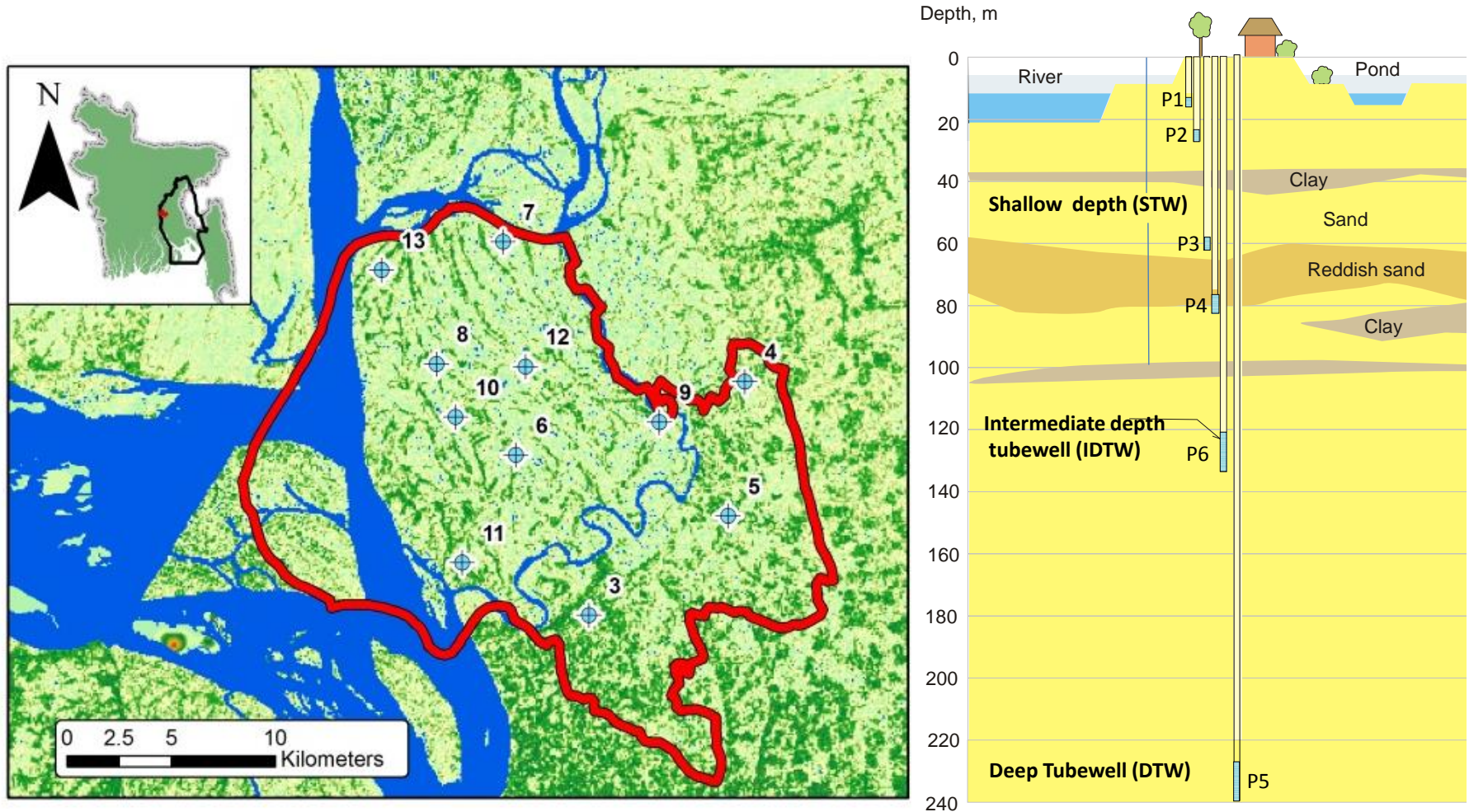
- Uses **local knowledge** and technique
- **Accepted** and adopted by community
- **Cost efficient**
- SASMIT strategy can be used within RWS programmes or/and through private sector to **scale-up** safe water access
- Easily **replicable** elsewhere in Bangladesh through simple correlation efforts/surveys
- Specially useful in arsenic **hard hit areas**
- **Low arsenic and low manganese** option

Knowledge base

Assessment of groundwater conditions



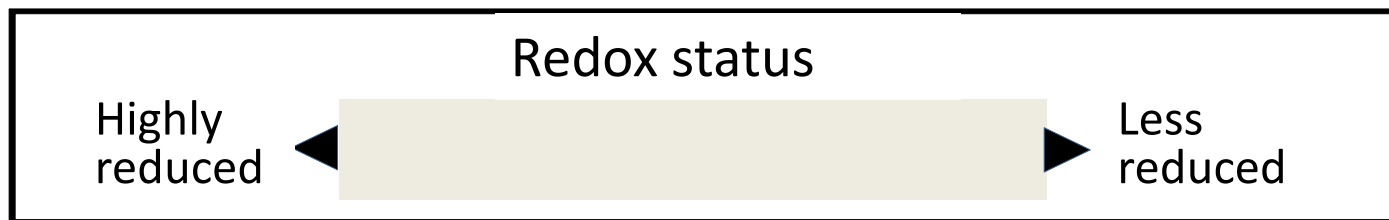
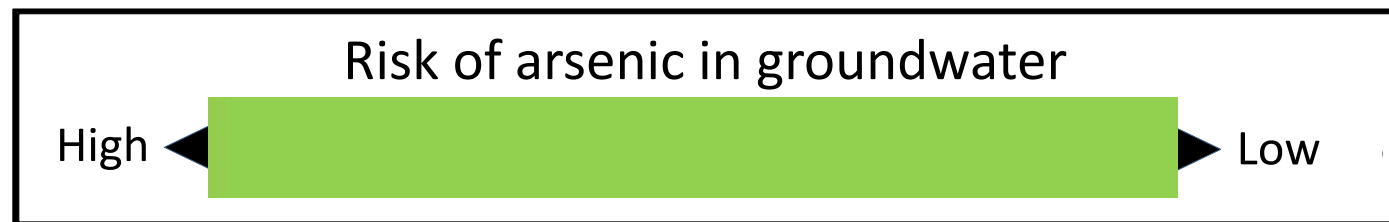
Knowledge base Used for identifying the safe aquifers



SASMIT Innovations

I. Sediment Color Tool (SCT)

Identified safe aquifers – based on characteristic sediment color



I. Sediment Color Tool

Science of the Total Environment 493 (2014) 615–625



Transfer of knowledge to development of tool

Sediment color tool for targeting arsenic-safe aquifers for the installation of shallow drinking water tubewells



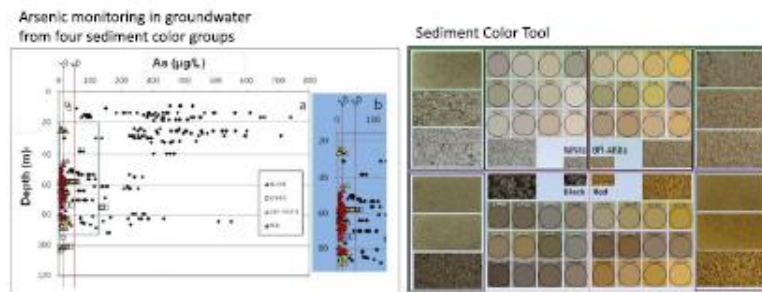
Mohammed Hossain^{a,b,*}, Prosun Bhattacharya^{a,*}, Shaun K. Frape^c, Gunnar Jacks^a, M. Mainul Islam^b, M. Moklesur Rahman^d, Mattias von Brömssen^{a,e}, M. Aziz Hasan^d, Kazi Matin Ahmed^d

^a KTH-International Groundwater Arsenic Research Group, Department of Sustainable Development, Environmental Science and Engineering, KTH Royal Institute of Technology, Teknikringen 74, SE-100 44 Stockholm, Sweden
^b NGO-Forum for Public Health, 4-6(Block-E, Lalmatia, Dhaka 1207, Bangladesh
^c Department of Earth and Environmental Sciences, University of Waterloo, Waterloo, ON N2L 3G1, Canada
^d Department of Geology, University of Dhaka, Dhaka 1000, Bangladesh
^e Soil and Water Environment, Ramölv Sweden AB, SE-104 62 Stockholm, Sweden

HIGHLIGHTS

- More than 90% tubewells in Bangladesh are installed privately by the community.
- Local drillers are the main driving force in tubewell installations.
- Long term monitoring validated arsenic in water with respect to sediment color.
- A sediment color tool is developed based on local driller's color perception.
- This tool would play a significant role to scale-up safe water access.

GRAPHICAL ABSTRACT

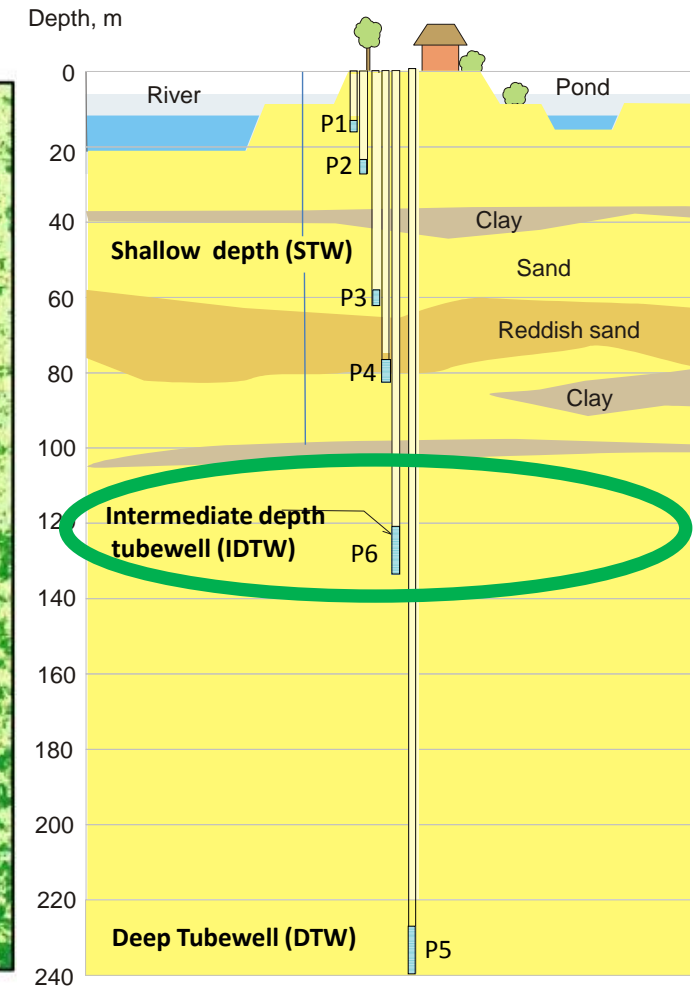
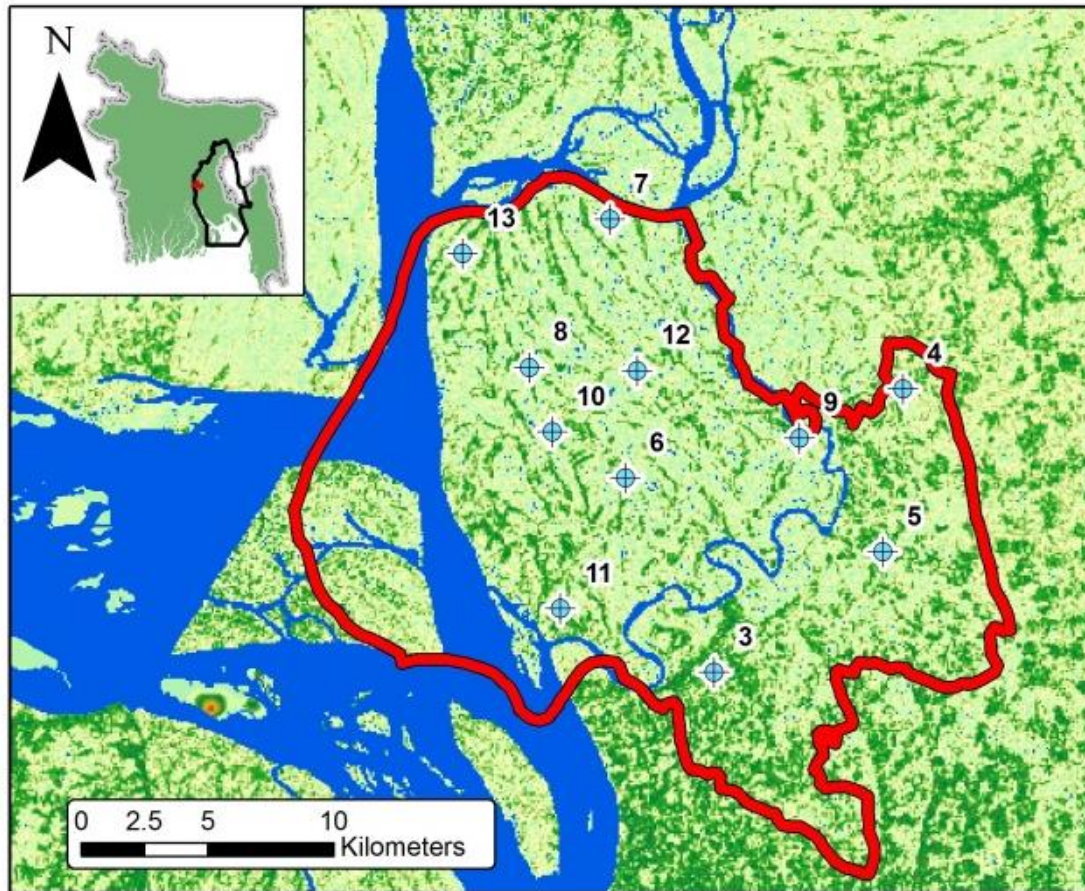


Munsell color shades and codes (corresponding to field sediment color)				
ARSENIC RISK	High	10YR 4/2	2.5Y 4/2	5Y 4/2
		B-1	B-2	B-3
		কালো (Black) / অত্যধিক আর্সেনিক (High Arsenic) / অনিরাপদ (Unsafe)		
	Medium	10YR 8/1	2.5Y 7/2	5Y 7/2
		W-1	W-2	W-3
		সাদা (White) / মধ্যম আর্সেনিক (Medium Arsenic) / অনিরাপদ (Unsafe)		
	Low	10YR 7/4	2.5Y 7/4	5Y 6/4
		OW-1	OW-2	OW-3
		বাদামী (Off-white) / স্বল্প আর্সেনিক (Low Arsenic) / নিরাপদ (Safe)		
		10YR 5/4	2.5Y 6/4	10YR 6/6
		R-1	R-2	R-3
		লাল (Red) / অত্যন্ত কম আর্সেনিক (Very low Arsenic) / নিরাপদ (Safe)		

আর্সেনিক নিরাপদ অগভীর নলকূপ (১০০ মিটার পর্যন্ত) স্থাপনের জন্য বালির রঙ নির্দেশিকা				
ARSENIC RISK	High	B-1	B-2	B-3
		কালো (Black) / অত্যধিক আর্সেনিক (High Arsenic) / অনিরাপদ (Unsafe)		
		W-1	W-2	W-3
	Medium	সাদা (White) / মধ্যম আর্সেনিক (Moderate Arsenic) / অনিরাপদ (Unsafe)		
		OW-1	OW-2	OW-3
		বাদামী (Off-white) / স্বল্প আর্সেনিক (Low Arsenic) / নিরাপদ (Safe)		
	Low	R-1	R-2	R-3
		লাল (Red) / অত্যন্ত কম আর্সেনিক (Very low Arsenic) / নিরাপদ (Safe)		

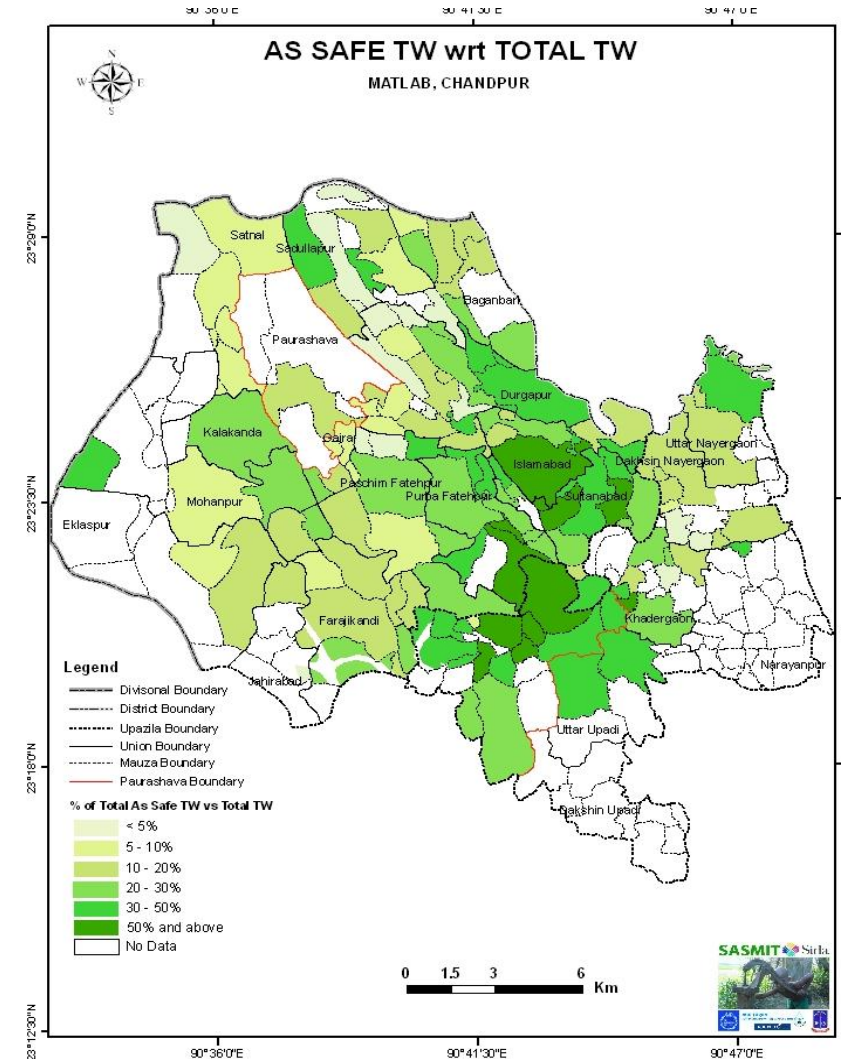
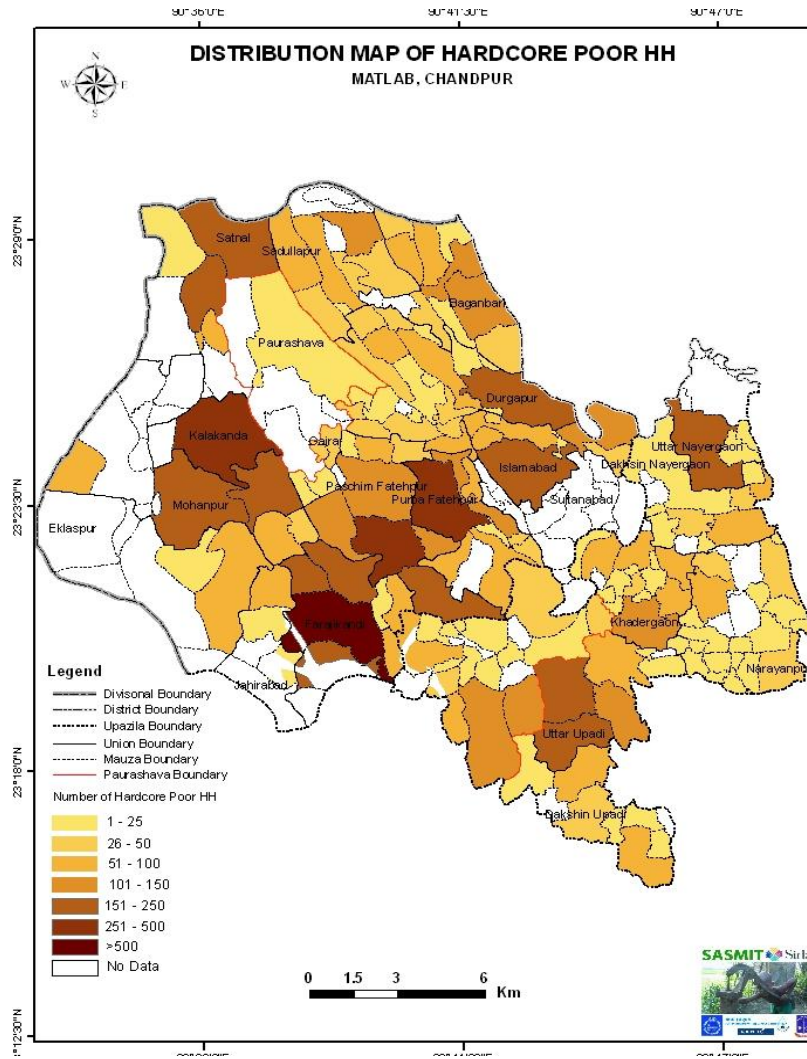
SASMIT Sicta **Sediment Color Tool** for installation of arsenic-safe shallow tubewells
 Designed and developed by © Sustainable Arsenic Mitigation (SASMIT) 2014
 Sida Contribution No.:73000854

II. Intermediate Deep Tubewells (IDTW)



Knowledge base

Socio-economic status and safe-water access





ROYAL INSTITUTE
OF TECHNOLOGY

Transforming knowledge

Setting priorities and optimizing sites





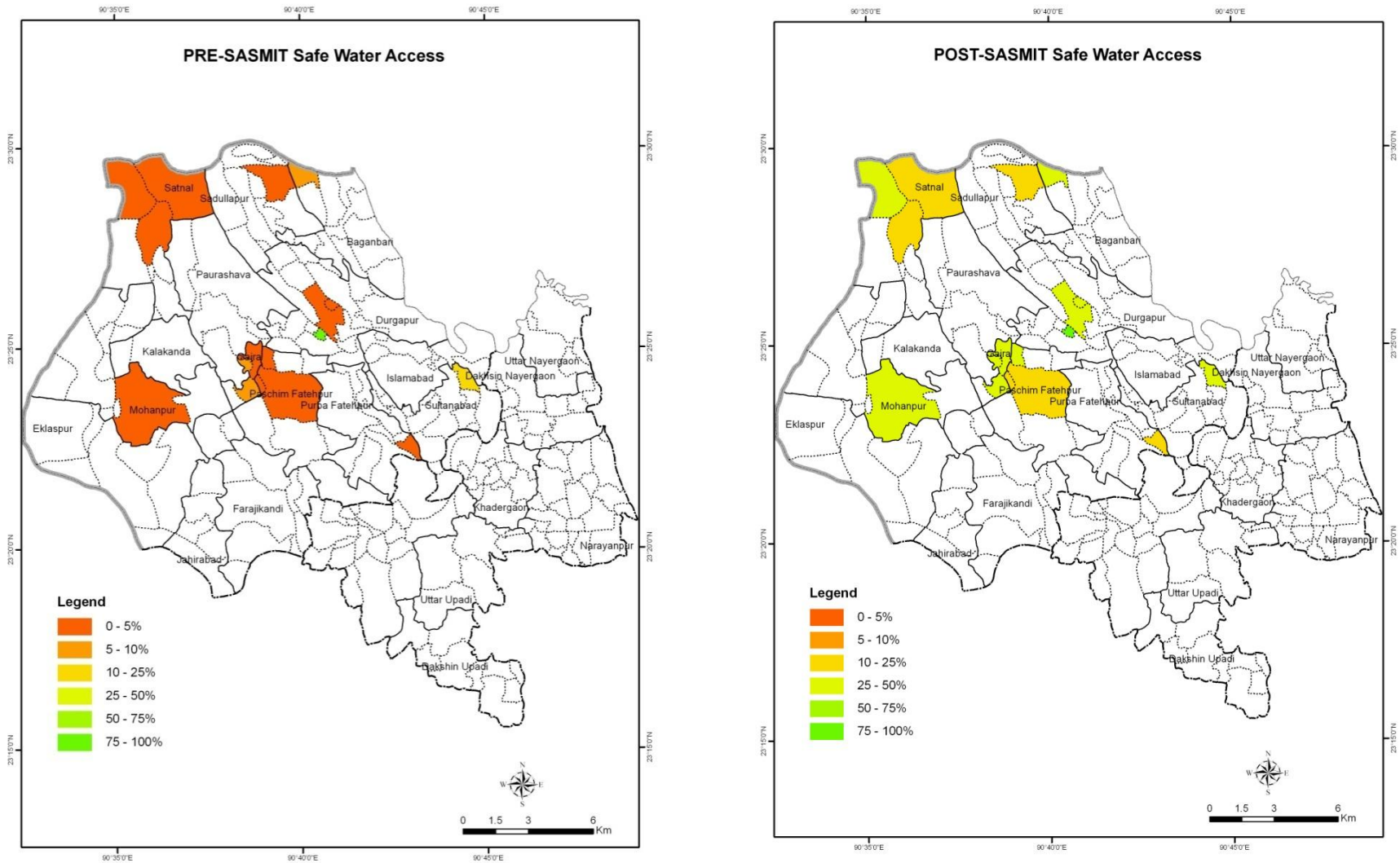
ROYAL INSTITUTE
OF TECHNOLOGY

Transforming knowledge

Capacity building of the local drillers and developing entrepreneurship



Scaling up safe water access

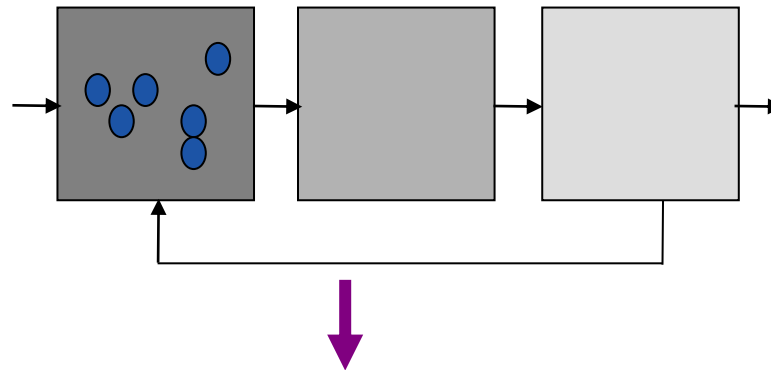


II. BIO-EARN

Efficient wastewater treatment process



**Process design
(adaptable to
the local
systems)**



**Wastewater
treatment**



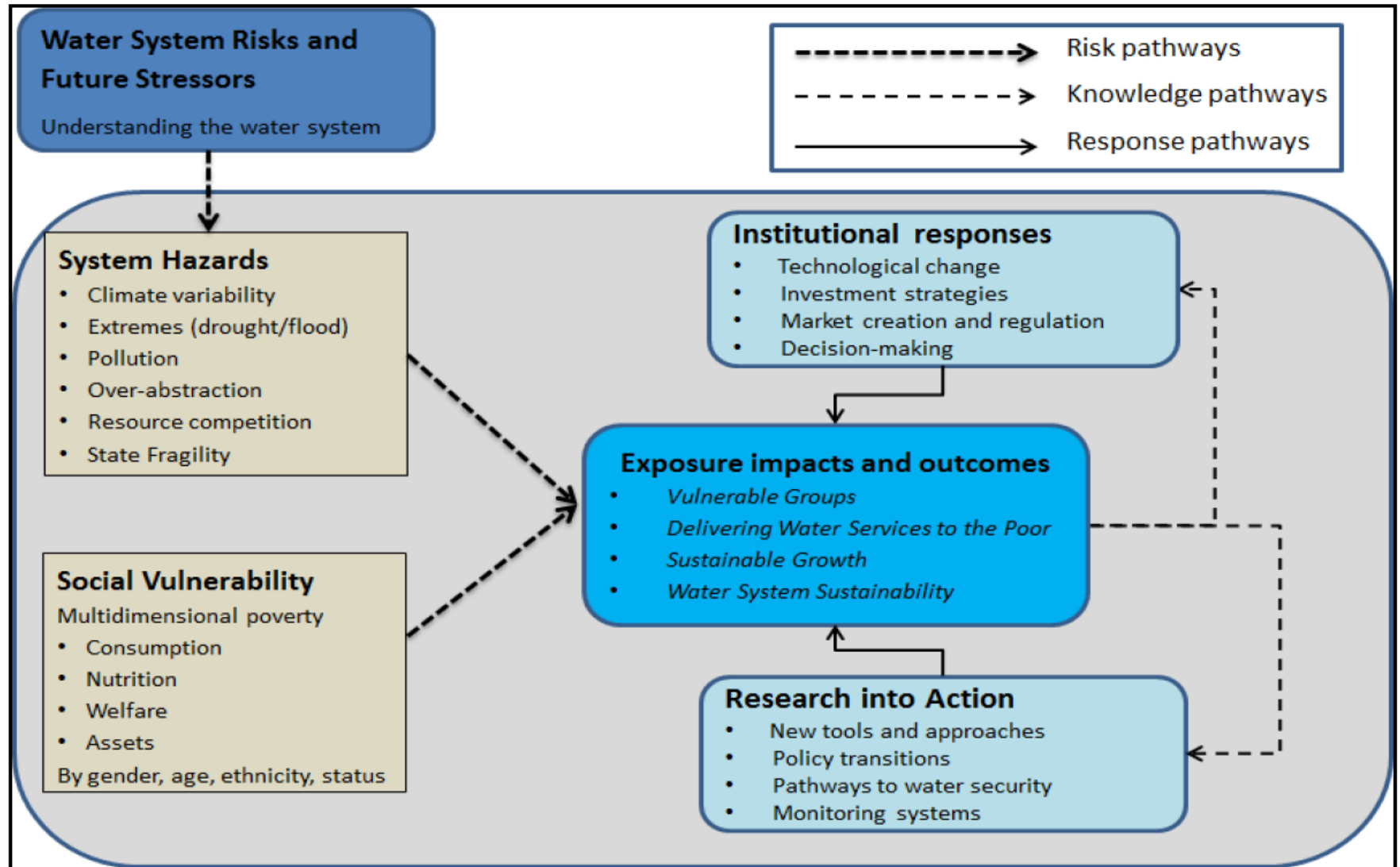
Knowledge transfer

BIO-EARN - Examples

- * Pilot treatment system - slaughter house wastewater
Uganda
- * Pilot treatment system - Tannery effluent
Ethiopia
- * Simple purification method
Tanzania - MFS, postdoc

Transforming knowledge for water development

(Adapted from REACH - Improving water security for poor, 2015)



FINALLY

It is high time to scale up implementation, at the same time ensuring:

Priority to poor people with limited access to safe drinking water

- Target safe groundwater sources
- Simple and efficient water treatment process



THANK YOU!