सत्यमेव जयते
Embassy of India

Report

Prepared by

Prosun Bhattacharya, Professor, KTH Royal Institute of Technology

In consultation with

Vijai Kumar, Counsellor, Embassy of India, Stockholm – Sweden
&
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Organised by
Embassy of India, Stockholm, Sweden
Sweden-India Business Council
KTH Royal Institute of Technology

January, 2017

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Introduction

Roundtable on Water: Water Management that Makes Business Sense was organized on 24th January, 2017 by Embassy of India in Sweden, Sweden-India Business Council and the KTH Royal Institute of Technology together with the experts in the area of water management, private sector collaboration and partnership to understand how effective and focused programmes with the private sector can catalyse innovation practices. Each of the speakers bring a vast experience of programmes with India, that have been game-changers for private sector engagement with development initiatives. The Roundtable will also discuss the legal parameters required to make successful initiatives sustainable. Welcome to a dynamic discussion.

The Programme

Location: ”7A Centralen”, Vasagatan 7, 111 20 Stockholm

10:15–10:30 Welcome address – by H.E. Monica Kapil Mohta, Ambassador of the Republic of India to Sweden and Latvia

10:30-11:10 Panel Speakers

10:20	Prosun Bhattacharya, PhD, KTH Royal Institute of Technology *Ensuring Safe Drinking Water - from Source to Consumers in a management, innovation and business context*
10:40	Cecilia Chatterjee-Martinson, WaterAid *The Business case for Water, Sanitation and Hygiene (WASH) in India*
11:00	Katarina Veem, Director, Swedish Water House, SIWI *Sweden Textile Water Initiative*
11:20	Jenny Grönwall, PhD, Programme Manager, SIWI *Water management & regulation of the Indian textile industry*
11:40	David Nilsson *Repositioning research for global water innovations*

followed by a Panel discussion and Networking Lunch

The event was moderated by

Robin Sukhia SIBC and Prosun Bhattacharya, PhD, Professor, KTH Royal Institute of Technology

sibc.se/roundtable-water-management-india-jan-24th/

Opening Remarks by the Ambassador

Ambassador Monika Kapil Mohta, in her opening remarks, highlighted India's needs for clean water, affordable and adaptable technology for development of related infrastructure; India as a huge market for water related foreign companies; and various programmes launched by the Government of India, including Swachh Bharat, Namami Gange to clean Ganga River and AMRUT to ensure, among others, that every household has access to a tap with assured supply of water and a sewerage connection. With India's needs for development in water sector and Sweden's right cutting-edge technology, she called India and Sweden as natural partners.

There were five presentations by – (i) Prof. Prosun Bhattacharya, KTH Royal Institute of Technology, on 'Safe drinking water – from source to consumers in a management, innovation and business context'; (ii) Ms. Cecilia Chatterjee-Martison, WaterAid Sweden, on 'The global situation – from WaterAid'; (iii) Ms. Katrina Veem, Director, Swedish Water House, Stockholm International Water Institute (SIWI), on 'Sweden Textile Water Initiative' and highlighted best practices adopted by Swedish companies around the globe, including India, to ensure clean water and environment to its employees; (iv) Dr. Jenny Grönwall, Programme Manager, SIWI, on 'Water Management and Regulation of Indian Textile Industry'; and (v) Prof. David Nilsson, KTH Royal Institute of Technology, on 'Repositioning Research for global water innovations'. The presentations were followed by a panel discussion.

Summary of the Plenary Presentations

Safe Drinking Water- from Source to Consumers in a management, innovation and business context

Prosun Bhattacharya, PhD, KTH Royal Institute of Technology (prosun@kth.se)

Access to safe drinking-water is a basic human right and a component of effective policy for health protection. Water, sanitation and hygiene are the three major important pivotal points for health and overall development. Recognizing this importance the Government of India in recent decades have launched a number of missions and initiatives for improving access to safe drinking water and sanitation. Inspite of a phenomenal deployment of efforts and resources through public and private sectors in India, several challenges are evident in rural and urban drinking water and sanitation. The growth in population, urbanization, as well as industrial activities have resulted in a sharp decline of the availability of surface water sources and presently the demand for drinking water supplies is mostly covered from groundwater resources. However, there are critical challenges due to the presence of geogenic contaminants such as arsenic, fluoride, manganese and others like uranium among others which are mobilized in different groundwater sources. Drinking water quality is also impacted due to microbial contamination and a number of other anthropogenic contaminants, the so called emerging contaminants (ECs) – pesticide, pharmaceutical and antibiotic residues and several other chemicals in surface and groundwater systems.

Drinking water management encompasses an integrated process involves the source water, quality, the treatment systems and its efficiency, the distribution and storage system as well as the consumer

system. Water Safety Plan designed by the WHO in 2005 as an instrument to ensure the safety of a drinking-water supply most effectively and consistently through the use of a *comprehensive risk assessment* and *risk management approach* that encompasses all steps in water supply from catchment to consumer. There is a growing need for technology innovation for drinking water programs which involve on those ideas and frames the business case for water technology innovation; identifies "market opportunities" specifically for solving the drinking water challenges through developing tools for assessment and monitoring of water quality, and robust set of actions for technology innovation for clean and safe water. *Business sense* is an important concept for the current safe drinking water paradigm that has a critical role to play by integrating the knowledge base, expertise and experience in developing, implementing and scaling-up focused solutions through partnerships.

The Business case for Water, Sanitation and Hygiene (WASH) in India

Cecilia Chatterjee-Martinson, WaterAid, Sweden (Cecilia.chatterjee-martinsen@wateraid.se)

More than 40 percent of the Indian population defecates in the open and more than 75 million Indians don't have access to safe drinking water. This is a sanitary and health crisis that has huge impact on people's lives, but also on business. Companies all over the world are starting to realise what effect the lack of water and sanitation for their employees and the wider affected communities has in terms of e.g. absenteeism, productivity and social licence to operate. WaterAid will present the WASH crisis from a business perspective; the latest relevant developments, initiatives and opportunities; as well as examples of how Scania, IKEA and H&M are working on this in India.

WaterAid India has a goal to "Make WASH poverty a history in the country". To achieve this, we engage in the areas with the greatest concentration of excluded and marginalised communities and empower and include them in local decision making, help revive and strengthen the local governance institutions and influence those responsible for delivering the basic WASH services.
Influencing long-lasting change is integral to everything we do. We use our experience, our work with partner organisations and our learning through research and analysis to influence policy at local, state, and national to global levels. We support the central government programmes like Swachh Bharat Mission and National Rural Drinking Water Programme and try to ensure that they enshrine principles of quality, equity, inclusion and sustainability, the foundation of all WaterAid's programmes.
We monitor the effectiveness of WASH service delivery, advocate for the essential role of safe water, improved hygiene and sanitation in human development particularly in health, nutrition, and education. WaterAid India facilitates and fosters an enabling environment for collaboration, convergence, learning and growth.

In India currently, we directly intervene in 43 districts, and 14 towns/cities across 11 states. In the year 2015-16 we reached 7,03,925 people with water, 11,23,180 people with sanitation and 18,87,253 people with hygiene.

Sweden Textile Water Initiative

Katarina Veem, Director, Swedish Water House, SIWI

Sweden Textile Water Initiative (STWI) was launched in 2010 through the initiatives of 35 major Swedish textile and leather brands. The idea behind the initiative was to create a trustable platform for

knowledge exchange that would lead to better understanding of the industry's water challenges and to finding the right mechanisms to address them.

The initial two-year phase of the STWI was financed through the support from the Swedish government channeled through SIWI's Swedish Water House. Through long internal consultations among member companies and SIWI, and external consultations with other Swedish experts on industrial water use, the first phase resulted in the creation of joint guidelines for sustainable water and waste water management in supply chains. Members of the network have together with the support of the Swedish Development Cooperation Agency (Sida) and with the Stockholm International Water Institute (SIWI) as implementing partner, started in 2015 the implementation of the guidelines. The Project is implemented at the main production sites of the Swedish brands which correlates with the global production patterns for textiles. The five countries selected for the implementation stage are: China, India, Bangladesh, Turkey and Ethiopia.

Water management & regulation of the Indian textile industry

Jenny Grönwall, PhD, Programme Manager, SIWI (jenny.gronwall@siwi.org)

We all use textiles in our daily lives and the global demand is steadily increasing. The growth results in income generation and job opportunities for many actors along the value chain – not least in India. But the wastewater generation is a serious and growing problem, affecting ecosystems, human health, and freshwater availability for other sectors. A case in point is Tirupur, where the textile manufacturing has had far-reaching positive and negative impacts for decades. "Zero liquid discharge" has been promoted as a technical solution to safeguard the river system, but comes with its own set of problems. Yet, it became the backbone of a recent legal reform process. This presentation will touch on Tirupur's experience and the new requirements for discharge of effluents from the textile industry.

Repositioning research for global water innovations

David Nilsson PhD, KTH Royal Institute of Technology (david.nilsson@abe.kth.se)

KTH has a long tradition in sustainable water engineering and management. However, in order to stay as a leading knowledge actor upfront, as well as to face up to the challenges of tomorrow, new approaches are needed. Across seven schools at KTH, advanced and highly specialized research is already being carried out on the many different aspects of water and its interaction with society, but typically in isolation from each other. To fully exploit the possibilities for interaction and cross breeding of ideas and to realize the immense innovation potential, a new and truly transdisciplinary form for knowledge production is needed. Today, businesses and public authorities find it difficult to access people and knowledge in KTH and the society at large remains largely unaware of what KTH does. Stronger collaboration within KTH and with partners is needed, as well as a bolder approach to knowledge production and innovation around water and its relationship with man and nature.

Water Center@kth is established as a university-wide centre with a focus on fostering globally competitive research and innovation environment that generates applicable and viable solutions to some of the challenges of sustainable and equitable use of water faced by humankind in the 21st century. The center will benefit researchers across schools, facilitate collaboration with industry and public agencies, improve visibility of KTH and help improving the quality and attractiveness of our higher education in water. The Centre is hosted by the ABE-school but six other schools (BIO, ITM, ICT, SCS, SCI, and CHE) are the participants in the centre, and contributed in its preparation. A number of external partners, notably KTH strategic partners IVL and SEI, and the Stockholm Water Company, (Stockholm Vatten) will be part of the centre. The Stockholm Water Innovation Center (SWIC, Hammarby Sjöstadsverk) is the test treatment plant jointly owned by KTH and IVL, will form an important cornerstone of the centre. The new centre will thus be an open and inclusive platform for research and innovation on sustainable water management.

Synthesis of the Roundtable and Recommendations

Overview

Water is at the core of sustainable development and included in the Agenda 2030 as a dedicated goal (SDG 6) to ensure availability and sustainable management of water and sanitation for all. As a component of effective policy for health protection, drinking water, sanitation and hygiene are the three major important pivotal points for health and overall development. In order to address the importance of this issue the Government of India has launched a number of missions and initiatives for improving access to safe drinking water and sanitation. In spite of a phenomenal deployment of efforts and resources through public and private sectors in India, several challenges are evident in rural and urban drinking water and sanitation. The first presentation by Professor Prosun Bhattacharya from KTH Royal Institute of Technology highlighted aspects on Safe Drinking Water and its path from the source to consumers and the various facets of the requirements for management, innovation and business context. The purpose of this roundtable was to create a road map for the Swedish entrepreneurs involved in water sector and to bring in clean water technologies with partnership with the Sweden-India Business Council.

The growth in population, urbanization, as well as industrial activities have resulted in a sharp decline of the availability of surface water sources and presently the demand for drinking water supplies is mostly covered from groundwater resources. However, the challenges for safe drinking water are critical due to the presence of geogenic contaminants such as arsenic, fluoride, manganese and uranium which are mobilized in different groundwater sources. Drinking water quality is also impacted due to microbial contamination as well as a number of other anthropogenic contaminants, the so called emerging contaminants (ECs) – pesticide, pharmaceutical and antibiotic residues and several other chemicals in surface and groundwater systems.

The SDG 6 and Key Business opportunities

The SDG 6 encompass 6 specific targets (Figure 1)::

Target 6.1: “achieve universal and equitable access to safe and affordable drinking water for all”

Target 6.2: "access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations"

Target 6.3: "improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and increasing recycling and safe reuse….".

Target 6.4: "substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suff-ering from water scarcity"

Target 6.5: "implement integrated water resources management at all levels, including through transboundary cooperation

Target 6.6:"By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes"

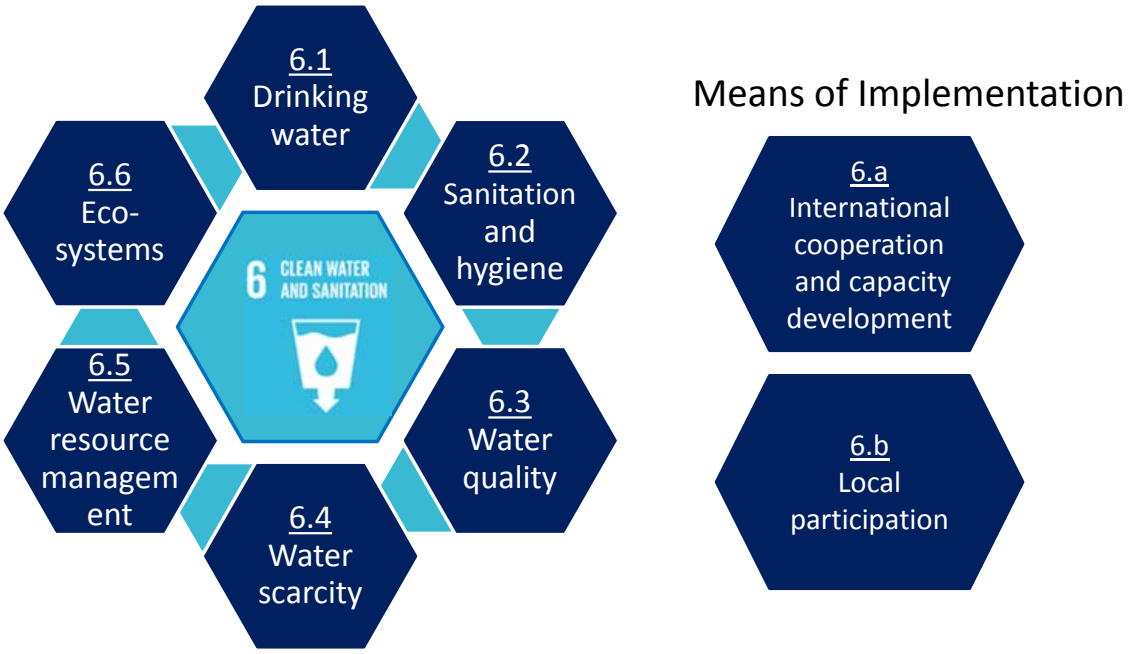


Figure 1: The Sustainable Development Goal SDG-6 and the targets.

The framework of SDG6 offers unique business opportunities through the means of implementation through:

i) International cooperation and capacity-building support in water- and sanitation-related activities and programs and
ii) strengthen the participation of local communities/stakeholders in improving water and sanitation management"

These are specifically oriented towards opportunities to develop partnerships and private-public sector participation to assess the risks for increased environmental liabilities and inappropriate mitigation plans and emerging health issues from contaminated water supplies and food.

In the water management context the business opportunities need to develop:

- National household/habitation based water point mapping
- Water quality monitoring on a water shed /catchment basis
- Water harvesting,
- Desalination
- Increased water efficiency,
- Wastewater treatment,
- Recovery, reuse and upcycling technologies and establishing a circular economy.

Means of Implementation and related business opportunities

The implementation of SDG 6, necessitates to explore and employ different aspects of the means of implementation (MoI), such as financing, trade, technology, capacity building, policy and institutional coherence, data and monitoring, and multi-stakeholder partnerships. Although Government of India has developed a track for monitoring and implementation of the SDG 6, it needs to scaled up with adequate support required through developing the business opportunities from the international community. This will be essential to fully realize the human right to safe drinking water and sanitation, and there are research based evidence that achieving SDG 6 will bring significant economic benefits that exceed the investments by a factor of 3 to 6 times.

Finance

Financial estimates through government-public-private and innovation forums for financing the actions.

Technology innovation

Using smart tools for water quality monitoring and reporting, decision-making, adaptable technologies

Capacity-building

Investments that support the use, adaptation, and transfer of new technologies, in addition to public awareness and the dissemination of best practices

Data, monitoring, and accountability framework

Coordinated, fit-for-purpose monitoring systems that serve multiple actors, scales, and applications.

Partnerships

Recognize existing *functional* alliances, national and Global Partnership for Sustainable Development and utilizing this as a resources with the public-private partnerships.

Drinking Water Safety Management

The Implementation of Drinking Water Safety Plan and interface with Smart City initiatives

Drinking water management includes an integrated process involves the source water, quality, the treatment systems and its efficiency, the distribution and storage system as well as the consumer system. Through the use of a comprehensive *risk assessment* and *risk management* approach that

encompasses all steps in water supply from catchment to consumer. Potential losses in development opportunities as a result of delayed or incomplete assessment of proposals from the lack of water information could have significant effects on local and regional economies.

Drinking water management- The Water Safety Plans (WSP)

Water Safety Plans (WSPs) with *three key components*, are guided by *health-based targets* (WHO DW guidelines, 2011) and overseen through drinking-water supply surveillance. This is based on a pathway of water from the source to the consumers through the series of interventions to ensure the drinking water safety –following the model presented below (Figure 2).

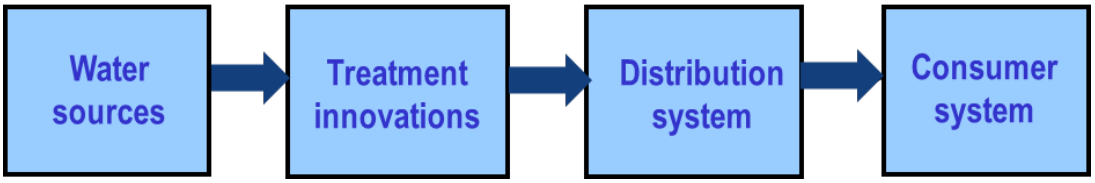


Figure 2: Water from the source to the consumers through the series of interventions to ensure the drinking water safety.

Each of the compartmentalized drinking water safety intervention hubs present significant business opportunities for system assessment:

- *To determine whether the drinking-water supply chain (up to the point of consumption) as a whole can deliver water of a quality that meets health-based targets.*
- Identifying control measures in a drinking-water system
- *To control the identified risks and ensure compliance with health-based targets.*

Targeted Actions for Developing Business

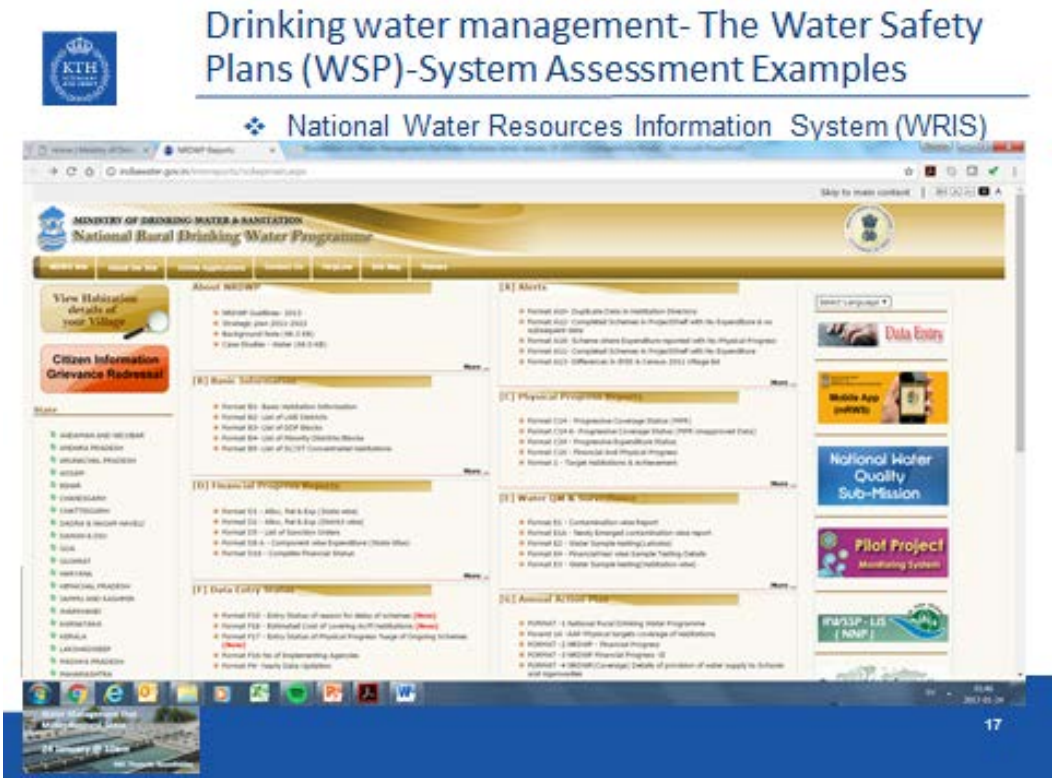
A number of short term interventions are outlined to implement the Drinking Water Safety Plan:

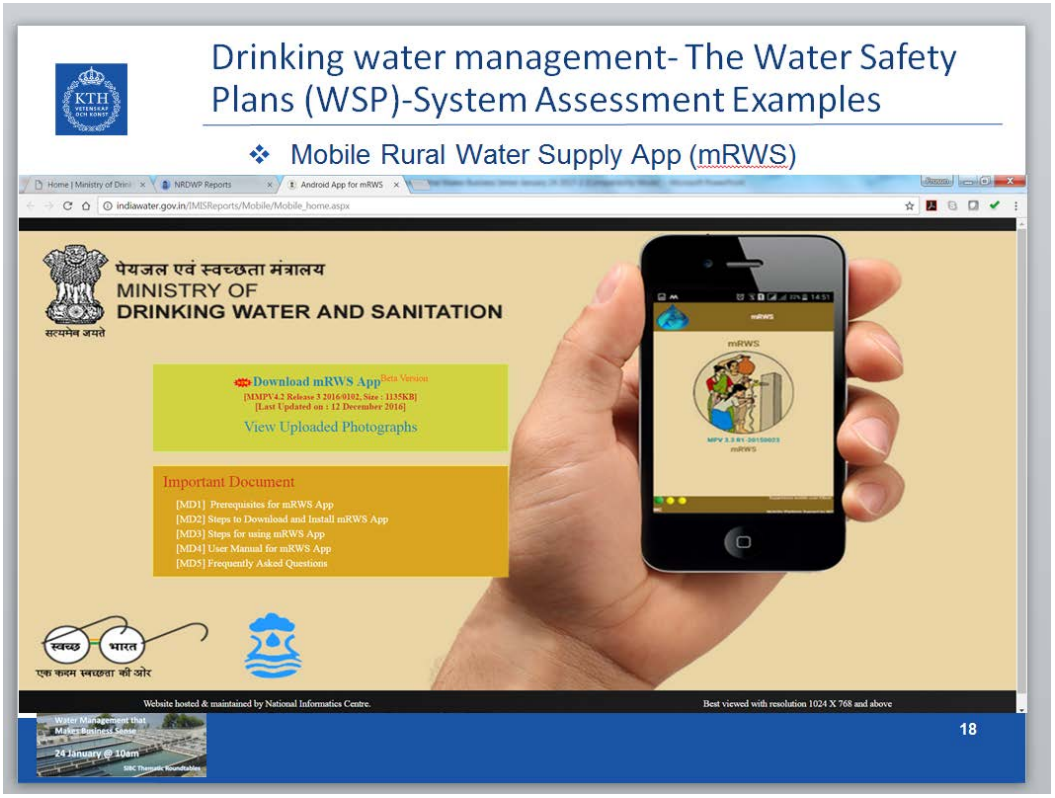
Source Water Characterization

A number of actions are being implemented by MoWR, such as "Aquifer Mapping" in a systematic following a river basin approach is one of the important reference for involvement of the Swedish expertise.

Strengthening the System Assessment Tools and implementation of Water Safety Plan - Some examples

- National Drinking Water Source Information System (NDWSIS) supplemented by a Water Point mapping (WPM)





- Integrated Drinking Water Quality Monitoring Plan – Implementing technology innovation for automated monitoring of Drinking Water Points for Public Water supplies
- Detection and monitoring of arsenic and fluoride in the drinking water points (in affected areas)

Summary of the DWSP - Business opportunities for result-oriented outcomes

Drinking water management encompasses an integrated process involves the source water, quality, the treatment systems and its efficiency, the distribution and storage system as well as the consumer system. Water Safety Plan designed by the WHO in 2005 as an instrument to ensure the safety of a drinking-water supply most effectively and consistently through the use of a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumer. There is a growing need for technology innovation for drinking water programs which involve on those ideas and frames the business case for water technology innovation; identifies "market opportunities" specifically for solving the drinking water challenges through developing tools for assessment and monitoring of water quality, and robust set of actions for technology innovation for clean and safe water. Business sense is an important concept for the current safe drinking water paradigm that has a critical role to play by integrating the knowledge base, expertise and experience in developing, implementing and scaling-up focused solutions through partnerships.

Targeted Business Opportunities within the implementation of DWSP following the National Drinking Water Framework Act (2016, draft) would address the National Priorities and help to accelerate the progress toward the access to safe drinking water. The salient outcomes:

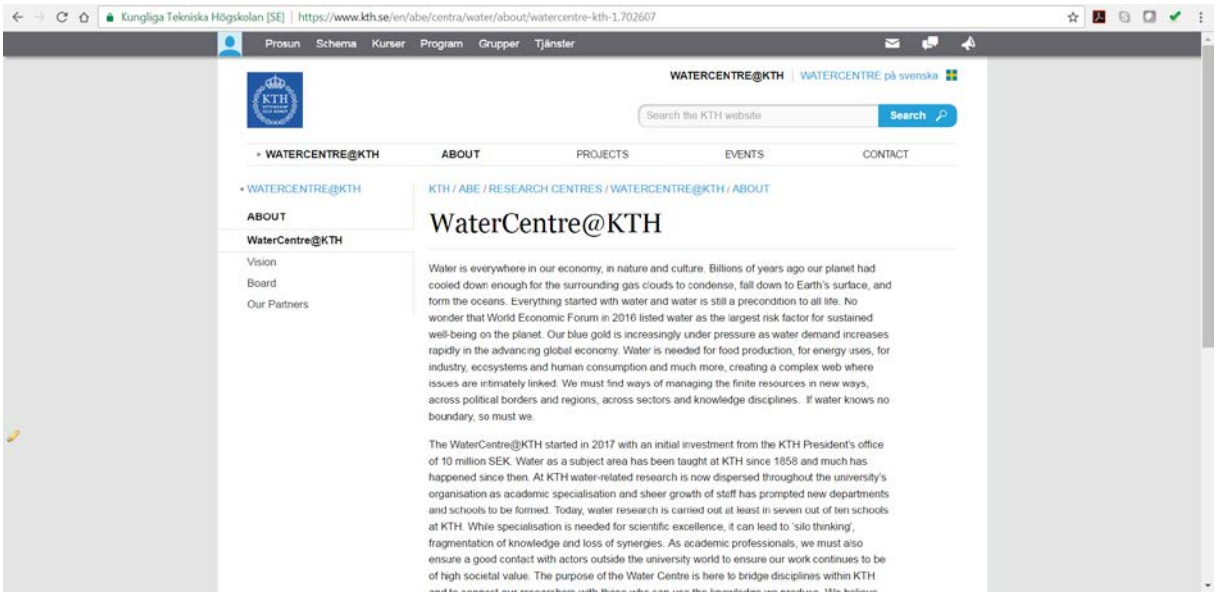
- Development of an understanding of the system and its capacity to supply water that meets health-based targets;
- Identification of potential sources of contamination and control measures;
- Validation of control measures deployed to control hazards;
- Implementation of a system for monitoring the control measures within the water system;
- Timely corrective actions to ensure that safe water is consistently supplied; and
- Undertaking verification of drinking-water quality to ensure that the WSP is being implemented correctly and is achieving the performance required to meet health-based DW standards.
- Effective regulatory system based on understanding of the resources that allows sustainable development.

Selected Academic and Business Cluster for Water Management in Sweden

KTH Royal Institute of Technology (Research and Innovation Technology-hub)

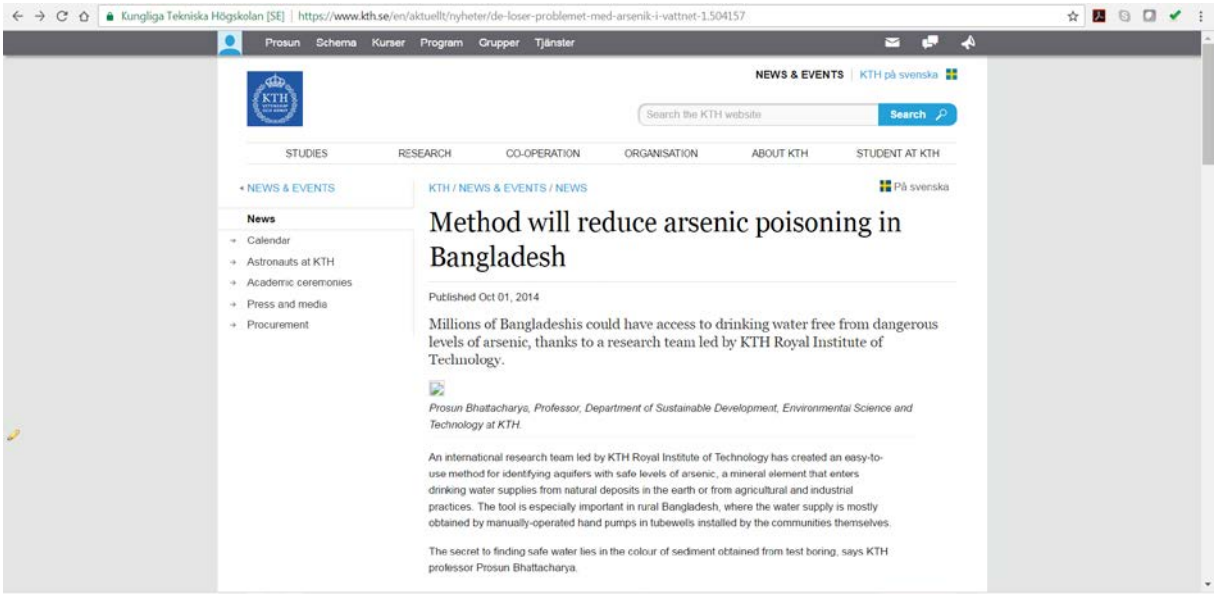
https://www.kth.se/en/abe/centra/water/about/watercentre-kth-1.702607

https://www.seed.abe.kth.se/om/avd/lwr/2.12735/kth-researchers-sign-mou-on-arsenic-mitigation-centre-in-west-bengal-1.544360



Selective Water Innovation Projects- *KTH-International Groundwater Arsenic Research and Innovation Cluster*

Sustainable Arsenic Mitigation (SASMIT)



Collaboration with Government of West Bengal and UNICEF

ecure | https://www.seed.abe.kth.se/om/avd/lwr/2.12735/kth-researchers-sign-mou-on-arsenic-mitigation-centre-in-west-bengal-1.544360

Prosun Schema Kurser Program Grupper Tjänster

MARK- OCH VATTENTEKNIK | In English

Sök bland kurser, personer, platser m m... Sök

ABE UTBILDNING FORSKNING OM OSS KONTAKT

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KTH researchers sign MoU on Arsenic mitigation centre in West Bengal

Professor Prosun Bhattacharya with Mr. Subrata Mukherjee, Minister in Charge, Department of Panchayat and Rural Development and Public Health Engineering, Govt. of West Bengal, at the MoU signing ceremony in Kolkata.

Publicerad 2015-01-28

On 30 December 2014, the Department of Sustainable Development, Environmental Science and Engineering at the Royal Institute of Technology (KTH) in Stockholm signed a Memorandum of Understanding (MoU) with the Indian state government of West Bengal, that also involves two other partners, namely the prestigeous Indian Institute of Technology (IIT) Kharagpur, and the United Nations Children's Fund (Unicef). The MoU covers technical support in setting up an International Centre for Water Quality Research at Joka in the south-

er-visited-arsenic-mitigation-researchers-kth.html

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West Bengal Minister visited Arsenic Mitigation researchers at KTH

Mr. Subrata Mukherjee, Minister in Charge, Department of Panchayat and Rural Development and Public Health Engineering, Government of West Bengal, India, visited the Royal Institute of Technology (KTH) in Stockholm on Friday 22 August 2014.
The minister, who also works for UNICEF visited the KTH-International Groundwater Arsenic Research Group (GARG), Department of Sustainable Development Environmental Science and Engineering (SEED). The purpose of the visit to KTH was to pave the way for extensive collaborative research and implementation of the methods of Sustainable Arsenic Mitigation developed by KTH-International Groundwater Arsenic Group, and the Department of Public Health Engineering and the INternational Center for Drinking Water Quality at Kolkata. The formal Memorandum of Understanding will be formally announced through a Press Conference by the Minister-In Charge on 10th September, 2014.
The delegation also included Mr. Saurabh K Das, Principal Secretary, Departments of Panchayat & Rural Development and Public Health Engineering, Govt. of West Bengal, India; Mr. Animesh Bhattacharya, Director WSSO & Officiating Chief Engineer,Public Health Engineering Department, Govt. of West Bengal, India; and Mr. S. N. Dave, WASH Specialist, UNICEF, Kolkata, West Bengal, India.

Subrata Mukherjee in the middle. Prof. Prosun Bhattacharya (first from left) and Prof. Gunnar Jacks (third from right) were his hosts at KTH.

From Left to right (front row): Animesh Bhattacharya; Ms. Bimla R. Chander First Secretary (Commercial and Head of Chancery, The Embassy of India); Mr. Subrata Mukherjee (Minister in Charge, Departments of Panchayat and Rural Development and Public Health Engineering, Govt. of West Bengal); Professor Ramon Wyss (Vice-President, International Education, KTH); Professor Prosun Bhattacharya (Coordinator of the KTH-International Groundwater Arsenic Research Group, Department of Sustainable Development, Environmental Science and Engineering, KTH); Mr. Saurabh K. Das (Principal Secretary, Departments of Panchayat and Rural Development and Public Health Engineering, Govt. of West Bengal); Mr. S.N. Dave, WASH Specialist, UNICEF Kolkata; Ms. Aphonsa Loudordoss (Adviser, India, KTH International Office). Back row: Dr. Mattias von Brömssen (Ramböll Sweden AB); Mohammed Hossain (National Coordinator, Sida-SASMIT project, Sustainable Arsenic Mitigation); Professor emeritus Gunnar Jacks (Department of Sustainable Development, Environmental Science and Engineering, KTH); and Professor Rajeev Thottappilil (Director of International Affairs for India, KTH)

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Arsenic reduction for drinking water

Arsenic (As) is a hazard. Its concentrations in food and drinking water are regulated worldwide for safeguarding human health.

Arsenic researchers across the world increasingly believe that the risks of As are more widespread than previously recognised and concentrations lower than the EU standard of 10µg/l may still pose significant risk to the health and lives of consumers. Toxicology research emphasising the health effects of As concentrations below 10µg/l is currently ongoing in many parts of the world. These concentrations are those that many Europeans, Americans and Canadians live with every day.

Brabant Water, the public water supply company in the Brabant province of the Netherlands, has started optimising one of its groundwater treatment locations, Dorst, in collaboration with KTH-International Groundwater Arsenic Research Group (GARG) for enhanced As removal, targeting effluent As concentrations below 1µg/l.

The drinking water treatment plant (DWTP) of Dorst produces 10Mm³ of drinking water per year from deep groundwater. The treatment includes ten parallel treatment trains, each consisting of a raw water intake from a common reservoir (As ~12µg/l), a cascade aerator, a rapid sand filter and an effluent discharge to a common reservoir (As ~ 6µg/l) from where the water is subsequently distributed to communities in the southern part of the Netherlands. Brabant Water has studied the feasibility of a hybrid technique, advanced oxidation-coagulation-filtration (AOCF).

By laboratory jar testing, the most suitable coagulant for the raw water quality and the existing setup at DWTP Dorst was determined from three commonly used metal salts (ferrous sulphate, ferric chloride and alum). In accordance with what has been reported in literature, ferric chloride showed the highest As removal efficacy at the operational pH of Dorst (7.5-8). After selecting ferric chloride as the coagulant, its optimum combination dose with $KMnO_4$ oxidant was also determined through jar tests. Experiments led to various oxidant-coagulant dose combinations that could achieve a residual as concentration of lower than 1µg/l.

A pilot setup included two treatment trains, each consisting of a cascade and a rapid sand filter. One of the filters used metal oxide coated sand (MOCS), collected from the full scale filters of DWTP Dorst. In the other filter virgin sand (VS) of equal particle size was used. In the effluent of VS media residual an As concentration of lower than 1µg/l was obtained consistently for several weeks; however, the effluent from MOCS contained a slightly higher concentration of As (1-1.5µg/l). The application of AOCF did not disturb the pre-existing removal processes of CH_4, Fe, Mn and NH_4^+. However, a decrease in average filter run time from 96 to 24h was noticed for both the filters. In order to optimize the filter run time, dual media/double layer filtration with anthracite (1-1.6 mm) and finer sand (0.5-0.8 mm) was evaluated with the optimum chemical dosing combination. Average filter run time increased to more than 48h.

Currently Brabant Water is involved in the final phase of research project, i.e., dedicated filter trials at the DWTP Dorst, with one complete treatment train separated for the final trials. Effluent As concentration has dropped steadily below 1µg/l after dosing began. Average filter run time of 50+ hours at 130m³/h (5m/h) has been successfully achieved, which fulfills the operational criteria of Brabant Water.

Test column before addition of media

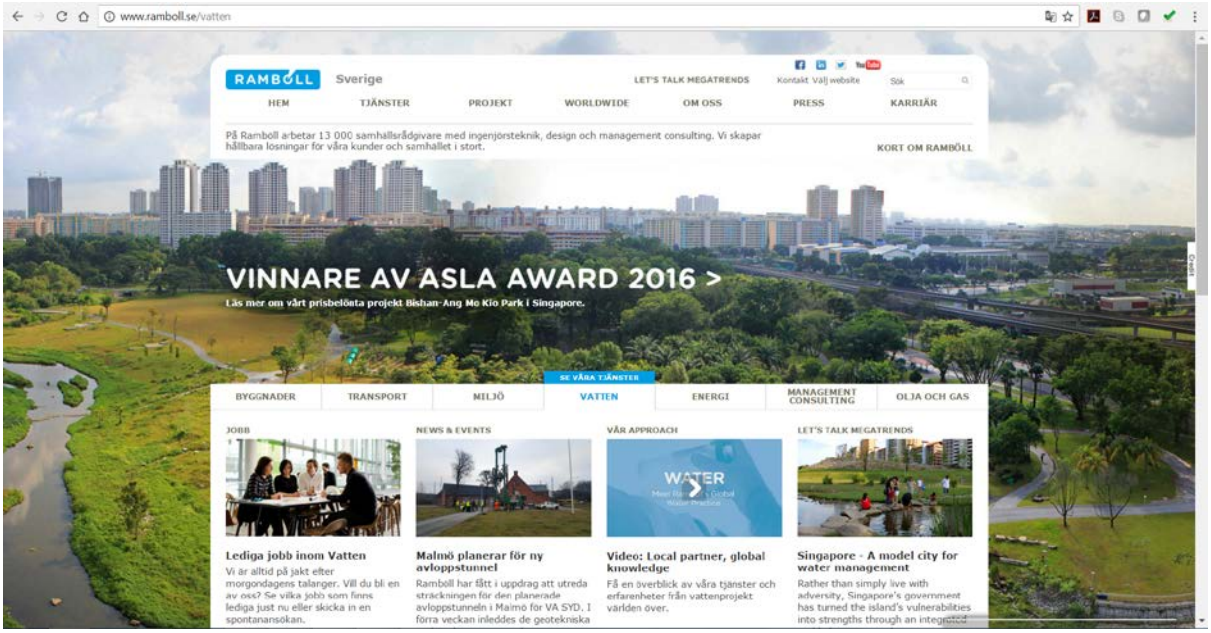
Based on experience at DWTP Dorst, AOCF appears to be an efficient, simple and affordable technology which can guarantee As concentrations below 1µg/l in drinking water supplies. Brabant Water has now approved the implementation of AOCF on the full scale and will be the first full-scale prototype in the Netherlands based on AOCF. ●

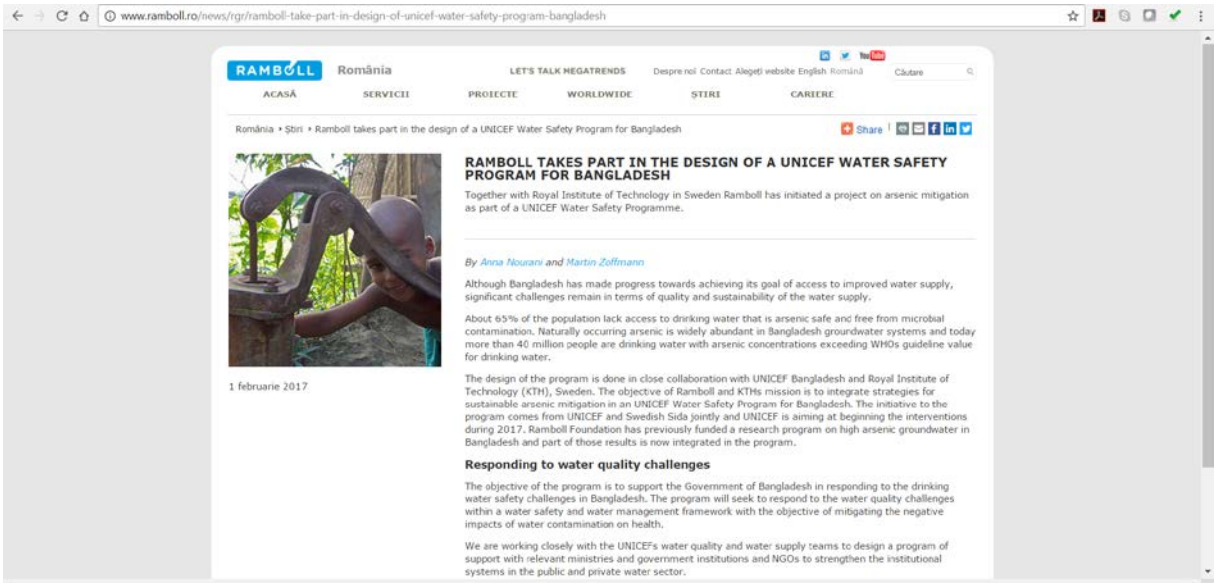
Adapted from an article by Arslan Ahmad, Tim van Dijk, Stephan van de Wetering, Martijn Groenendijk and Prosun Bhattacharya.

Ramböll Sweden AB

Ramböll Water	Dr. Mattias von Brömssen

http://www.ramboll.se/vatten

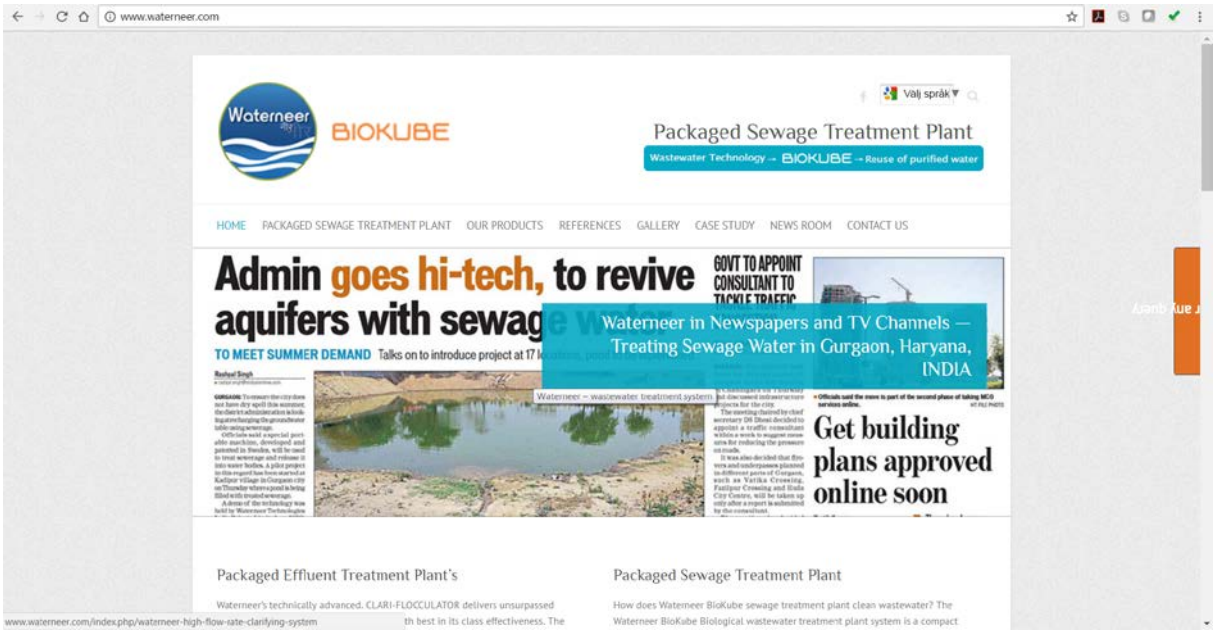


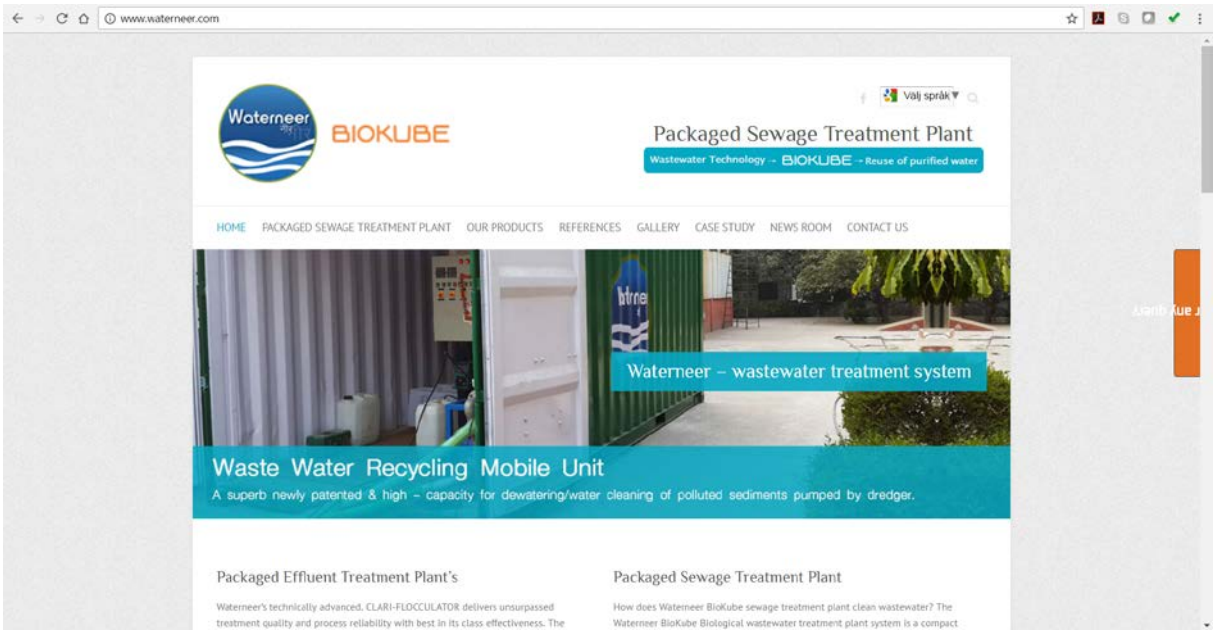


Waterneer AB

Waterneer AB	Mr. Torbjörn Wold

http://www.waterneer.com





Ecotech Sweden AB

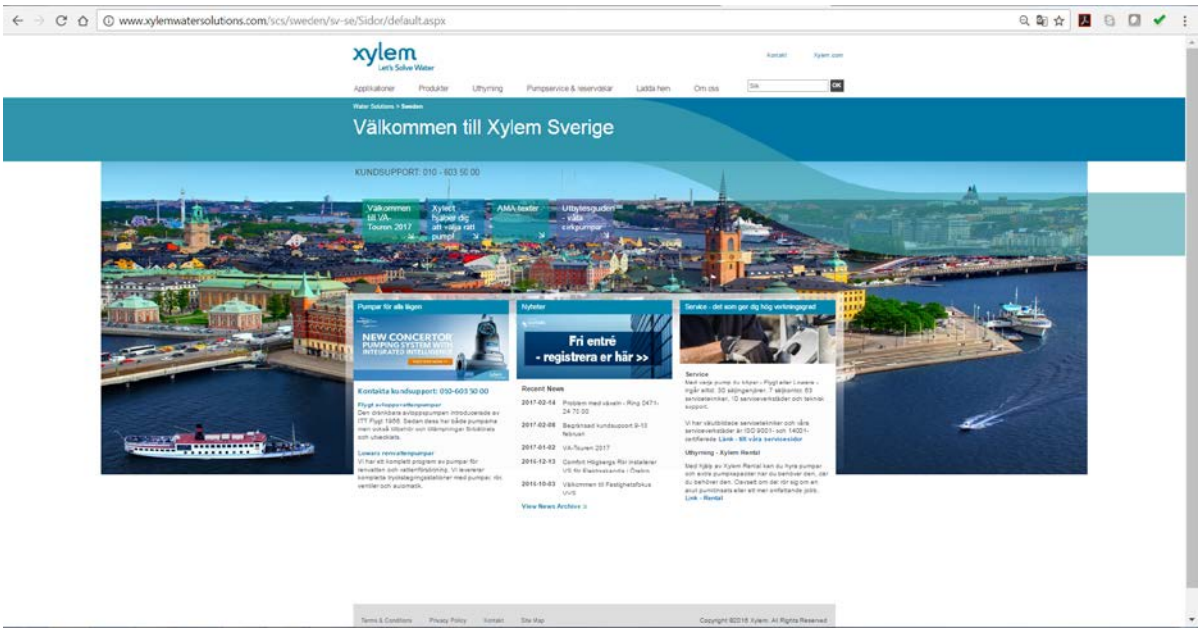
Skandinavisk Ecotech AB	Mr. Lars Ahlin
Skandinavisk Ecotech AB	Mr. Ansari Ismail

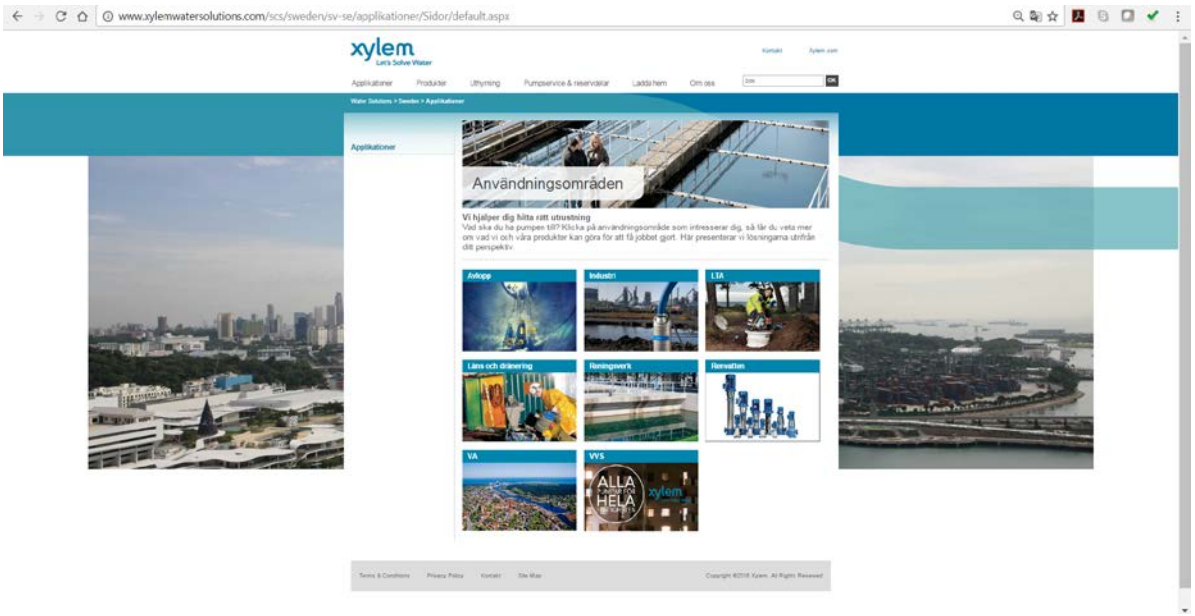
http://www.ecot.se/

Xylem, Sweden

Xylem	Mr. Mattias Bernstrom

http://www.xylemwatersolutions.com/scs/sweden/sv-se/Sidor/default.aspx





Solvatten AB

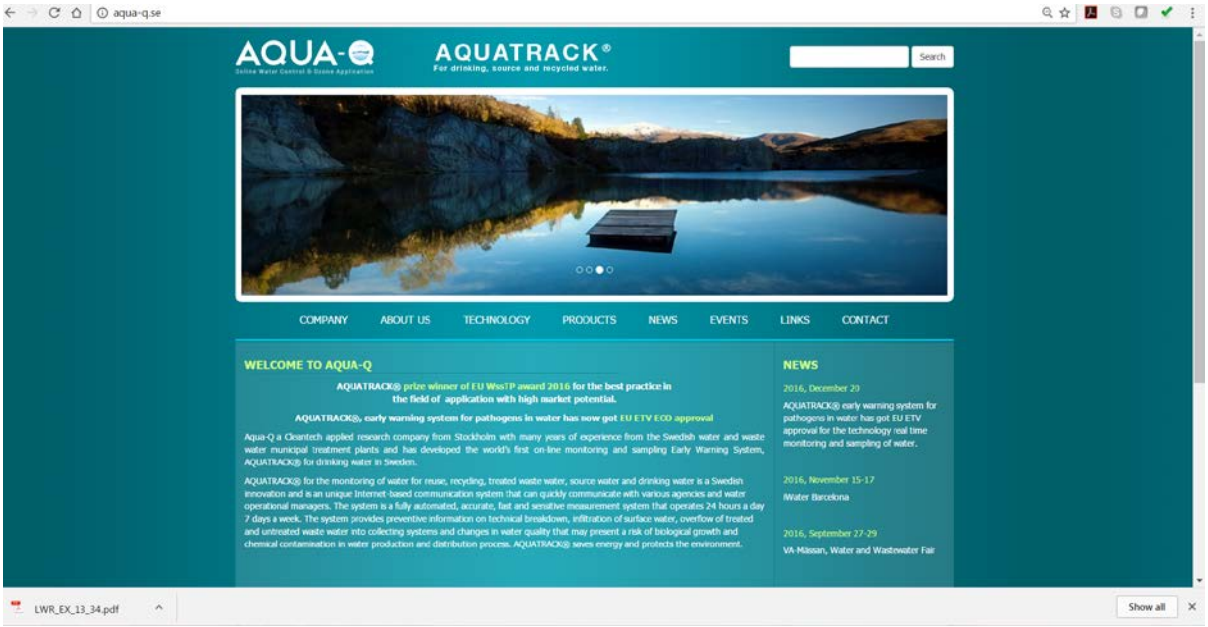
Solvatten	Mr. Oliwer Wadstrom
Solvatten	Ms. Charlotte Lindahl

http://www.soroptimistsweden.se/projekt/solvatten/

Aqua-Q-AB

30	Aqua-Q-AB	Ms. Ulla Chowdhury
31	Aqua-Q-AB	Mr. Sudhir Chowdhury

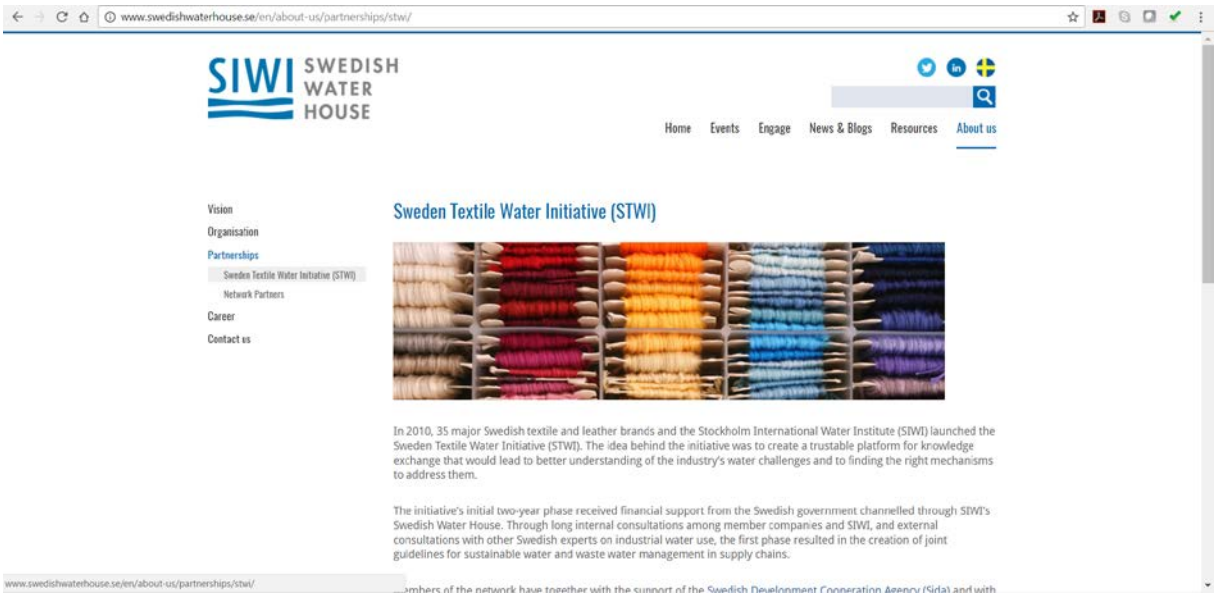
http://aqua-q.se/



Swedish International Water Institute (SIWI)

SIWI	Ms. Katarina Veem
SIWI	Dr. Jenny Grönwall

http://www.swedishwaterhouse.se/en/about-us/partnerships/stwi/



WaterAid, Sweden

WaterAid Sverige	Ms. Cecilia Chatterjee Martinsen
WaterAid Sverige	Mr. Christian Lannerberth

http://www.wateraid.org/se