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SAPH PANI - ENHANCEMENT OF NATURAL WATER SYSTEMS AND TREATMENT METHODS FOR SAFE AND SUSTAINABLE WATER SUPPLY IN INDIA
CIS-SPI BRIEF 1

Study area

Objective / Theme of the supporting activity

The project aims to enhance water resources and water supply particularly in water stressed urban and peri-urban areas in different parts of the Indian subcontinent. The studied natural water treatment systems are:

- river bank filtration (RBF),
- managed aquifer recharge (MAR) and
- constructed wetlands

The objective is to strengthen the scientific understanding of the performance-determining processes occurring in the root, soil and aquifer zones. The removal and fate of important water quality parameters such as pathogenic microorganisms and fecal indicators, organic chemicals, nutrients and metals are considered. The hydrologic characteristics (infiltration and storage capacity) and the ecosystem functions are also investigated since they influence the local or regional water resources management strategies. The scope of the project and the different work packages are shown in the figure below.

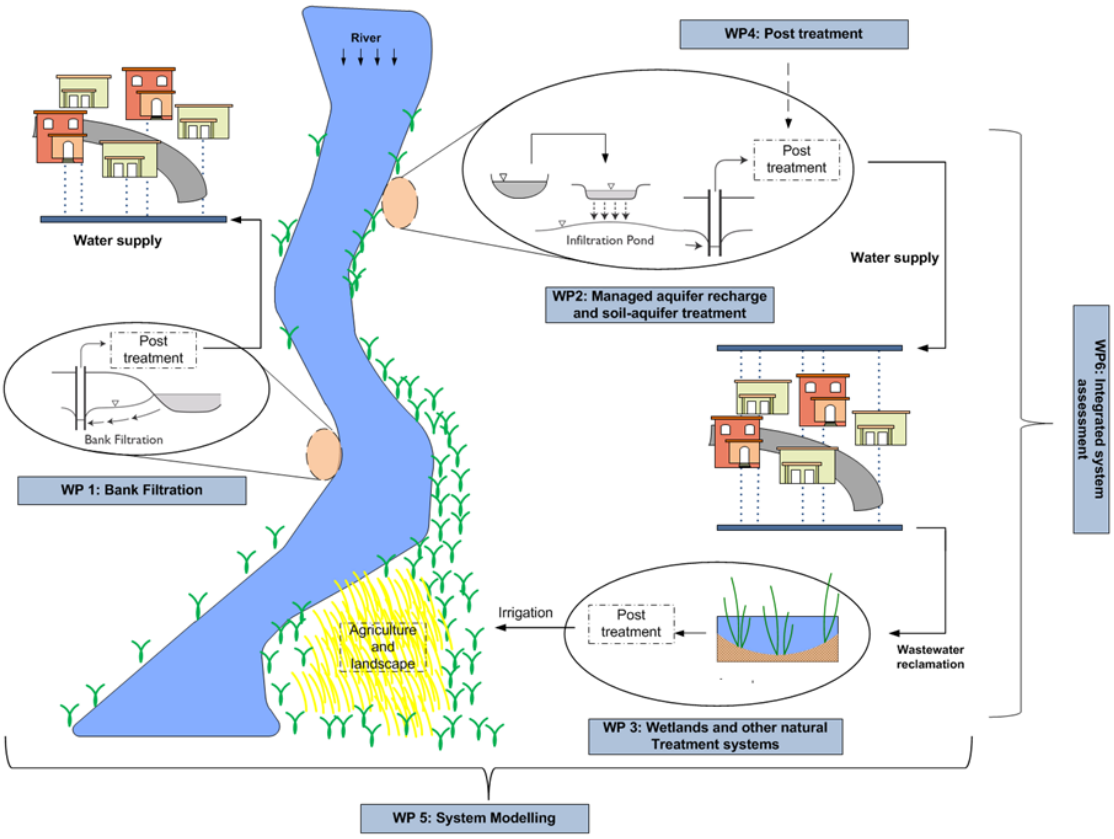

Figure 1: Scope and work packages of the Saph Pani project

Contribution European water policy implementation:

Water Framework Directive (2000/60/EC),
Groundwater Directive (2006/118/EC),
Drinking Water Directive (98/83/EC),
EUWI Water for life and Blueprint

Policy focus:

Compliance with existing drinking water standards (DWD, WHO Guidelines for Drinking Water Quality)

- The Drinking Water Directive has the objective to *"protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean*". Saph Pani investigates relevant parameters at the selected sites and gives suggestions for effective post treatment for safe drinking water production.

Better understanding of the impacts of MAR and natural treatment systems in support of WFD and GWD objectives.

- Artificial recharge of aquifer is among the supplementary measures (Annex VI) that may be adopted as part of the programme of measures required under Article 11(4) of the Water Framework Directive to improve the quality and quantitative status of groundwater bodies.
- The Groundwater Directive (2006/118/EC) is to specify measures in order to prevent and control groundwater pollution. Whilst in general, the input of pollutants into groundwater bodies shall be prevented or limited, Article 6(3) of the Groundwater Directive foresees exemption in cases where those are *"(d) the result of artificial recharge or augmentation of bodies of groundwater authorised in accordance with Article 11(3)(f) of Directive 2000/60/EC*". Saph Pani contributes to a better understanding of the impact of substances input and whether this actually leads to pollution as well as how the purifying effect and the attenuation capacity in the unsaturated zone contribute to preventing and limiting detrimental effects.

Design proposed actions of the "Blueprint to safeguard Europe's Water Resources"

The recent assessment of the implementation and achievements of policies and measures in place lead to the identification of gaps to be filled to deliver the environmental objectives more efficiently. The Blueprint presented a number of proposals for actions. Among them the establishment of an EU-level instrument to encourage water re-use, including a regulation setting common standards. In this context the potential of extensive treatment methods to achieve desired qualities or risk levels is an important aspect.

Supporting the EU Water Initiative (EUWI) "Water for Life" objectives is also relevant:

- 1 billion people have no access to safe drinking water and over 2 billion lack basic sanitation. The Water for Life Initiative has its goal to halve these numbers by 2015.
- The EUWI is committed to "*ensuring a supply of sufficient, good quality drinking*

water, adequate sanitation and hygiene to every human being, especially the poorest and with a clear focus on the needs of women and children" as well as to implement "*cross-sectoral coordination to ensure equitable, sustainable and appropriate distribution of water between users of different kinds*".

- The recently issued "Blueprint" underlines that EU Water Policy will continue to support the achievement of the MDG to assure access to safe drinking water and basic sanitation services, as reaffirmed in the Rio+20 Declaration in 2012.

The activities in Saph Pani clearly work towards this ambition on the Indian subcontinent.

Contribution Indian water policy implementation:

National Water Policy

Model Bill for Conservation, Protection and Regulation of Groundwater

- The National Water Policy (NWP) recommends promotion of artificial groundwater recharge (article 3.2) for improving both the quality and availability of groundwater resource (article 7.2). The NWP recommends intensifying R & D efforts regarding the recycling and re-use of treated wastewater.
- The Model Bill for Conservation, Protection and Regulation of Groundwater (2011) of India also suggests promotion and protection of good conservation, augmentation (recharge) and management practices for the long-term sustainability of the resource.

Key policy milestones requiring technical / scientific support:

- Placing managed aquifer recharge appropriately in the context of water management options
- Promoting basic water treatment in emerging and developing countries using natural processes such as river bank filtration and aquifer recharger
- Mitigating saltwater intrusion in coastal aquifers by infiltration of harvested stormwater
- Fostering water reclamation and reuse using extensive and affordable treatment technologies
- Groundwater quality monitoring
- Guidelines for safe implementation of MAR in India need to be established
- Lack of accessible data and little published data describing the characteristics of the recharge structures of India.
- Guidelines for the quality of recharge water
- Support the development of sustainable water management and water governance in developing and emerging countries

Key outputs in support of policy milestones

Despite a vast experience with countless recharge structures over centuries the impact of MAR in India is poorly known. Most results from the existing studies are not available in the public domain. Saph Pani can contribute to an improved knowledge of the characteristics of different structures on the study sites and their performance. Saph Pani will provide a good understanding based on modelling of the study site experiences in

Maheshwaram, Chennai and Hyderabad.

Better understanding the impact on water quality

- Up to now little attention was paid to the quality of recharge water. However, a review of the situation in the Indian states (Saph Pani Deliverable D2.1 Chapter 3) shows a problem with groundwater quality. Almost all districts have areas with nitrate contamination. Also, excessive concentrations of other pollutants like arsenic, salt, fluoride and iron are widespread.
- Guidelines for a safe use of recharge water are needed. Quantity-quality data couples over time from Maheshwaram and Chennai will be obtained.
- Further, the effect of recharge on groundwater quality is rarely monitored and information is scarce. Within Saph Pani various recharge schemes will be monitored systematically to elucidate changes in water quality of both the recharged water and the groundwater. Analyses will be performed for chemical and microbiological parameters and published in *journals / public reports*.
- The understanding of the process of arsenic, fluoride, nitrate and heavy metal mobility in groundwater affected by MAR needs more understanding. Quality data for Maheshwaram and Chennai covering different seasons will be obtained.
- Until around 2004, the term riverbank filtration (RBF) was not commonly used in context to drinking water supply in India. Therefore little information about the water quality is available. Saph Pani is monitoring the water quality and attenuation capacity in six sites, to provide an overview of known BF schemes in urban areas of India.

Identification of appropriate technology and techniques

- For discovered quality problems in Maheshwaram and Chennai post treatment options will be proposed. The acceptance and the applicability of such a process in a rural area play an essential role for choosing a suitable post treatment.
- Techniques for coping with clogging and other technical problems as well as guidelines for maintenance and operation are needed. Saph Pani will make an evaluation of pre-treatment techniques and will give recommendations for operation and maintenance at case study sites.

Knowledge transfer

- Transferability of knowledge to the context of other countries will be considered. It is assumed that the insight into the natural attenuation capacity of extensive systems is very relevant also for the European, African and Latin-American context as well as for other parts of Asia.

Experiences gained – Recommendations to policy makers – Next steps

Adapted post treatment processes should be promoted and implemented for water quality improvement for the benefit of the local population. This aspect should be given equal prominence in guidelines or regulation.

Resource-efficient natural treatment technologies should be considered in the policy implementation of the GWD and WFD as well as in the development of regulations on water reuse.

Additional technical / scientific information

- Deliverable D2.1 Report on existing MAR practice and experience in India, especially in Chennai, Maheshwaram, Raipur
- Deliverable D1.1 Database of relevant pollutants in urban areas and their attenuation at RBF sites
- Deliverable D6.3 Report on integration of results and final recommendations (Policy and technical recommendations for mainstreaming and facilitating implementation of natural treatment systems – available at the end of the project)
- National Water Policy, Ministry of Water Resources, Government of India, New Delhi, April, 2012. 10p.
- Draft Model Bill for the conservation, protection and regulation of groundwater (2011)

Related projects / activities

Coroado www.coroado-project.eu

Outlook - Accessibility of results

Data is available at www.saphpani.eu/downloads.html

Title/Name of project: Saph Pani - Enhancement of natural water systems and treatment methods for safe and sustainable water supply in India

Starting/Ending date of project: October 2011 - October 2013

Participating countries/Institutes:

University of Applied Sciences and Arts Northwestern Switzerland (Coordinator)	FHNW	Switzerland
Uttarakhand Jal Sansthan	UJS	India
National Institute of Hydrology	NIH	India
IIT Roorkee	IITR	India
Veolia Water	VEOLIA	India
Anna University	ANNA	India
SPT Consultancy Services (SME)	SPT	India
Raipur Municipal Corporation	RMC	India
Akshay Jaldhara (SME)	AJD	India
CSIR - National Geophysical Research Institute	NGRI	India
IIT Bombay	IITB	India
DHI (India) Water & Environment Pvt Ltd	DHI	India
Competence Centre for Water Berlin	KWB	Germany
BRGM Service Eau	BRGM	France
Centre of environmental management and decision support	CEMDS	Austria
University of Applied Sciences HTW Dresden	HTWD	Germany
UNESCO IHE Delft	IHE	Netherlands

International Water Management Institute	IWMI	Sri Lanka
Commonwealth Scientific and Industrial Research Organisation, Australia Land and Water	CSIRO	Australia
Freie Universität Berlin	FUB	Germany

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Responsible Official: Michel Schouppe

EC Contribution: EUR 3 499 620

Type of R&D: Small/medium-scale focused research project for specific cooperation actions dedicated to international cooperation partner countries(SICA)

Programme: FP7 Environment

Web-Link: www.saphpani.eu