2013/WP 1/1

Bank filtration for drinking water production in India benefits & motivation

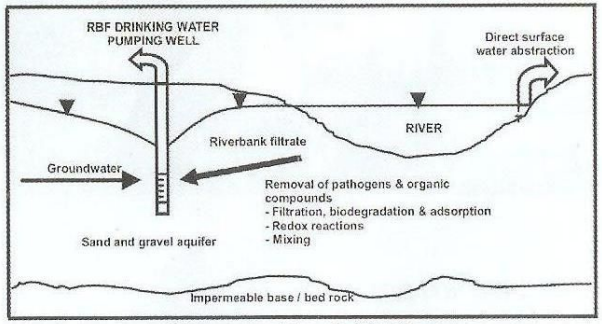
Did you know ...

- *that nature can significantly treat our drinking water?*
- *that one of these techniques is called bank filtration?*
- *where and how is bank filtration being used?*
- *what is the motivation to investigate bank filtration in India?*

Curious...? Then take a look inside to learn more!

What is bank filtration?

Riverbank filtration (RBF) or simply bank filtration (BF, a unified term for river and lake bank / bed filtration) is a process by which surface water from rivers, channels and lakes is induced by pumping from nearby production wells to flow through the natural aquifer soil, undergoing many positive changes in water quality before finally mixing with local groundwater from the land side and being abstracted for direct use or further treatment.



Process of bank filtration

Why is bank filtration useful?

Along the underground passage from the surface water to the abstraction well, natural attenuation results in an improvement of various physical, chemical, and biological water quality parameters. Compared with direct surface water abstraction for drinking water (DW) production, bank filtration has the following advantages:

- Removal of suspended particles, turbidity and pathogens (bacteria, viruses and parasites);
- Removal of biodegradable organic compounds (e.g. dissolved organic carbon, trace organics, pesticides, hydrocarbons and algae toxins);
- Equilibration of temperature and concentration changes of dissolved constituents in the bank filtrate;
- Attenuation of adsorbable compounds.

Where is bank filtration possible?

The efficiency of BF depends mainly on the quality of surface water (SW), soil material, flow path length, and flow time. Consequently, some of the typical conditions required for BF are :

- good hydraulic connection between the surface water and the unconsolidated aquifer
- aquifer (alluvium) thickness > 5 m
- suitable quality of groundwater
- erosive river bed conditions

Why is bank filtration especially appropriate for India?

Most of the drinking water (DW) in towns and cities in India is sourced from groundwater (GW) or directly abstracted SW. This implies that,

- GW abstraction is becoming unsustainable,
- Conventional treatment of directly abstracted SW does not effectively remove turbidity and pathogens, especially during monsoons,
- Due to the large volumes of partially and untreated sewage discharged into SW in India, the most significant advantage of BF is the removal of microbial pathogens from drinking water derived from SW.

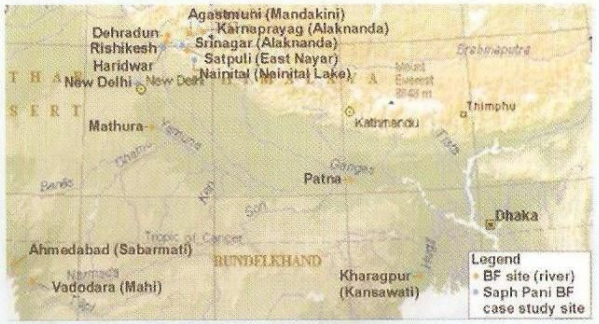
Specific aspects of bank filtration in particular context to India

Considering that significant potential for BF exists and that it is already used at some sites in India, the aims of work package 1 of the Saph Pani project are to :

- analyse the performance of existing BF sites in urban areas in India in particular context to the removal of organic pollutants and microbial pathogens;
- evaluate the risk of floods to BF sites and improve their flood-protection measures;
- develop remediation concepts for BF in aquifers contaminated with inorganic nitrogen species, and to
- determine economic aspects of BF schemes.

Which are the case-study sites for bank filtration in Saph Pani?

The BF sites of Haridwar (Ganga River), Srinagar (Alaknanda River), Nainital (Nainital Lake) and Delhi (Yamuna River) have been selected as case study sites for the project.



BF sites in India (red dots) &Saph Pani BF sites (blue dots)

The hydrogeology, quality of SW and GW, the production of DW and proportion and quality of bank filtrate abstracted is different at each site. The removal of pathogens by BF compared to directly abstracted SW is the main advantage. While Srinagar is a newly developed site (since 2010) and is affected by floods, Haridwar experiences complex boundary conditions and is occasionally affected by floods. The SW quality in Nainital and Delhi is considerably affected by high concentrations of pathogens from treated sewage. BF supplements SW and GW abstraction in Srinagar and Delhi and serves as an alternative to SW in Haridwar and Nainital.

Cover photo: BF well in Haridwar (L. Rossoff, HTWD, 2011)

SEVENTH FRAMEWORK PROGRAMME

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About the Project

SAPHPANI

The FP7 project "*Saph Pani* - Enhancement of natural water systems and treatment methods for safe and sustainable water supply in India" addresses the improvement of natural water treatment systems such as river bank filtration (RBF), managed aquifer recharge (MAR) and wetlands, building on a combination of local and international expertise. The project aims at enhancing water resources and water supply particularly in water stressed urban and peri-urban areas in different parts of the sub-continent. The project focuses on a set of case study areas in India covering various regional, climatic, and hydrogeological conditions as well as different treatment technologies.

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