



Introduction

The use of groundwater for public water supply and irrigation has many benefits for water suppliers as well as for consumers. Over the last decades availability and consumption of this valuable resource has increased worldwide along with technical progress, but it has often been ignored that any abstraction of groundwater is an intervention in the balance of the natural water cycle.

Managed aquifer recharge (MAR) present the double interest :

1. to be a possible technical answer to over-exploitation of groundwater reservoirs and can contribute to water resource preservation and possibly reuse
2. to provide a natural cleaning step to pre-treat surface water for drinking water supply, and therefore could contribute to reduce the need for highly sophisticated treatment methods which are cost intensive in installation and also in maintenance.

In many parts of the world, such as low income countries, MAR offers the possibility to profit from the storage and purification capacity of natural soil/rock and to guarantee a sustainable management of groundwater.

River bank filtration is an ancient and widely used method that currently provides water to a large number of population in EU (45% of Hungarian water supply, 16% of German water supply, 5% of The Netherland water supply). River bank filtration relies on natural conditions to operate efficiently and allow to produce a quality of water which, in some cases, doesn't required further treatment before distribution (such as in Berlin). There are now many evidences that global environmental conditions are progressively changing and may impact existing water supply scheme by bank filtration. The extensive study of bank filtration systems in different environmental settings (such as in India with higher temperature, different surface water quality, systems subject to monsoons and flooding ...) will allow apprehending the limitation that current bank filtration systems may face, and highlight the possible need for adaptive strategies.

The aim of this report is to document work performed within the first 6 months since the start of WP 5.2 of TECHNEAU integrated project and to give an overview of the results and future planning. This includes detailed regional investigations, field studies and laboratory work performed in collaboration between the KompetenzZentrum Wasser Berlin gGmbH (KWB), the Indian Institute of Technology in Delhi (IIT) and the Freie Universität Berlin (FUB).

Preliminary studies at potential sites in different parts of the world were performed prior to the TECHNEAU Project with the aim to investigate their suitability for RBF and thus to allow for deeper investigation within TECHNEAU. These preliminary studies were carried out in the cities Kaliningrad (Russia), Recife (Brazil) and New Dehli (India), and were funded by Veolia Water.

In Recife (Brazil), the investigation performed by the FUB showed that both hydrogeological data and model results indicate that the area is not suitable for the production of drinking water by RBF in sufficient amounts due an unfavorable hydrogeological conditions (too low transmissivity of the target aquifer because of

the low content of sand in the samples and the scarce distribution of sandy sediments). At this point further investigations were stopped since no alternative field site area was found.

In Kalingrad, water quality data that was gained in the preliminary study from the field site and will be compared with the data gained from investigations in Delhi and Berlin.

In Delhi, India, the appropriate conditions, as well as the establishment of a valuable collaboration with the IIT, has lead to the implementation of three different field sites (in three different conditions). The activity performed within the techneau framework and included (i) the integration of existing information and literature on local climate, geology and water supply system, (ii) the detailed investigation about the local hydrogeology and ground and surface water quality and (iii) the development of a GIS (Geo Information System).

Result

In agreement with local authorities, three different field sites were selected in the territory of Delhi, representing distinctly different environmental conditions within the district. According to local conditions, a net of 17 groundwater observation points (piezometers) has been designed and installed on each of the field sites. A description of local geology, including stratigraphical charts has been elaborated, based on the evaluation of information obtained during the drilling and from analysis of sediment samples. A strategy for monitoring of water level and water sampling analysis has been developed, and monthly field campaigns have been carried out. Water samples have been analyzed, considering a broad variety of parameters including major chemical contents, trace substances and pathogens. Hydraulic tests have been conducted to obtain aquifer properties in order to estimate travel velocities during underground passage.

More information

Authors: Gunnar Lorenzen, Christoph Sprenger (FUB),
Janek Greskowiak (KWB)

Contact person: Gunnar Lorenzen, PhD
E-mail: lorenzen@zedat.fu-berlin.de
Phone: +49 (0)30 838 706 29
Address: Freie Universität Berlin,
Malteserstr. 74-100, 12 249 Berlin