

# Water Abstraction through Bank Filtration to Improve the Drinking Water Supply in Upper Egypt

## Summary

Egypt's climate is predominantly arid and the Nile River is the major source of water for all purposes. Egypt's rapidly **growing population and developing economy** demand more and more water of adequate quality. The situation is worsened by rising temperatures due to **climate change**. Responding to Egypt's efforts to reform the water sector, GIZ is currently implementing the BMZ-financed Water and Wastewater Management Programme (WWMP) to improve Egypt's water supply and sanitation services. One task is the gradual consolidation of the newly established utilities for the water supply and wastewater management. One element of the programme is handling the drinking water supply in Upper Egypt within the general scope of **improving water services for the underprivileged population** in that area.

Investigations revealed that the use of **riverbank filtrates** could be an interesting option to secure water supplies for a number of cities and villages along the Nile, which presently use surface water for their domestic water supply. Surveys indicate significantly **higher water quality** of bank filtrates when compared to water abstracted directly from the river. The installation and operating **costs are considerably lower** than those of the widely-used 'compact units'. Supplying water at lower cost and of better quality to the people under the conditions of increasing temperatures and rising water demand can be regarded as a **climate change adaptation** measure.

## Challenge

Since time immemorial people living along the Nile River have been taking their water directly from the river, and even today you may find numerous pumping stations for drinking and irrigation water along the river at its shore (Fig. 1). The water required for irrigation is delivered untreated, whereas the water destined for drinking and domestic purposes is normally treated (Fig. 2).

The **increasing demand** for water by agriculture, people and industry, aggravated by climate change and the progressing water pollution (including of the Nile), demands changes in water extraction and processing.

## Setup

In the context of Egypt's water sector reform, the responsibility for providing water and sanitation services was transferred in the governorates to new utilities for water supply and wastewater management. These utilities have been consolidated step-by-step under the umbrella of the Holding Company for Water and Wastewater (HCWW), which was founded in 2004.

The Water and Wastewater Management Programme (WWMP), which was commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ), was launched in 2007. The lead executing agency is the Egyptian Ministry of Housing, Utilities and Urban Communities (MoHUUC). The objective of the programme is to improve the conditions for an efficient and sustainable water supply and wastewater management services in Egypt.



Fig. 1 (l): Floating pumping station at River Nile funded by Japan

Fig. 2 (r): Water quality analysis

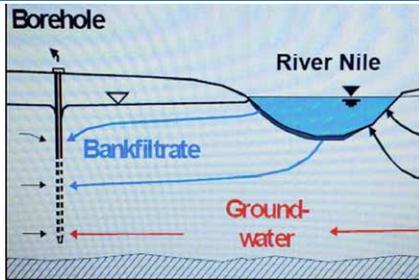


Fig. 3 (l): Training in leak detection

Fig. 4 (r): Schematic illustration of the bank filtration technology

## Opportunities

**Climate Change:** The Egyptian Government has already taken the first steps to counteract the impacts of climate change. Strategies have been drafted and a national committee for climate change has been set up. In 2010, the Government carried out a National Environment, Economy and Development Study (NEEDS) and submitted its second national communication to the United Nations Framework Convention on Climate Change (UNFCCC). Improved water services play a distinctive role in this framework.

**Institutional Issues:** The GIZ programme is supporting Egypt's efforts to reform the water sector in three areas:

- at the national and ministerial level;
- in the water and wastewater utilities of the governorates;
- in the informal urban settlements and underserved rural areas.

At the level of the HCWW, the programme continuously supports the enhancement of personnel and institutional capacities as part of its mandate (Fig. 3). Furthermore, good practices in technical and commercial measures are to be scaled up to other regional companies. The objective is to professionalise and increase efficiency in the management of the utilities as well as align the enterprises with economic criteria.

**Innovation:** Bank filtration has been used for many decades in Europe to provide drinking water to communities located near surface water bodies, typically rivers. In Egypt, the further development of bank filtration has the potential to provide drinking water to many villages and towns located along the upper Nile River and possibly along canals (Fig. 4 & 5). These are currently using surface water for their domestic water supply at high treatment cost.

Bank filtrates from a few sites monitored in recent years have shown a **significantly higher quality** when compared to water abstracted directly from surface water sources (Fig. 6 & 7). The **water treatment costs** are therefore much lower.

While bank filtration has historically been used at only a few locations in Egypt, concerted efforts are required to put in **practice the full potential of bank filtration** and understand and scientifically document the processes involved.



Fig. 5 (l): Bank filtration well at Deschna water treatment plant

Fig. 6 (r): Taking water samples from River Nile in Qena, Upper Egypt



*Fig. 7: Another pumping station along the Nile, which can be used for pumping bank filtrate*

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## Outlook

**Lessons learned:** Bank filtration systems are seen as having great potential for improving both the quantity and quality of water supplies to towns and cities built alongside perennial rivers and canals. The water treatment costs will be lower than for direct extraction. Bank filtration can be regarded as a climate change adaptation measure. However, there are a number of feasibility issues that must be considered regarding the sustainability of such systems (see below).

**Upscaling:** Hydrogeological conditions in several Egyptian cities seem to indicate that these cities would be suitable for the successful implementation of bank filtration systems.

**Transferability:** Bank filtration is a suitable technique for water extraction along permanent rivers and canals. Preconditions are: (1) suitable underground media (gravel, coarse sand) at the river bank; (2) permanent water supply from the river; (3) low clogging risk of pumps/filters; (4) no industrial wastewater influx (or other grave pollution sources) upstream and (5) laboratory facilities to monitor water quality and decide on the type of water treatment.

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