BILINGUAL PUBLISHING CO.
Pioneer of Global Academics Since 1984

Hydro Science & Marine Engineering
https://ojs.bilpublishing.com/index.php/hsme

EDITORIAL

Water Quality and Pollution Control: Changes in Water Quality with River Bank Filtration (RBF)

Fathy A. Abdalla*

Geology Department, Faculty of Science, South Valley University, Qena, Egypt

ARTICLE INFO

Article history
Received: 29 April 2022
Accepted: 05 May 2022
Published Online: 17 May 2022

Pollution of the water bodies poses a great threat to humans life and the aquatic ecosystem. Worldwide surface water bodies (rivers and canals) are exposed to pollution because of discharging untreated liquid wastes. Anthropogenic activities, including domestic activities, especially sewage disposal practices, industrial, and agricultural activities, may deteriorate both water quantity and quality representing a potential threat to the communities. Pollutants effect may vary depending on their types and source. Therefore, various pollutants could be detected in surface waters, the fate of these contaminants is mainly determined to large extent by adsorption mechanisms and biological transformations during their underground flow path which known by riverbank filtration (RBF) [1].

In order to explore trends in hydrogeological sciences and engineering in the field of water pollution control and management, this natural process (RBF) holds promise as a relatively simple and low-cost technology to remove particulates and micro-organisms from surface water and make subsequent disinfection treatment easier. Thus, research in our issues of *Hydro Science and Marine Engineering* journal supports such new innovative methods for water pollution control management and technology from the well-known academicians and scientists from any country. In addition, climate change and its associated global warming are also likely to affect the availability of water in the future, therefore we supports all the distinguished scholars worldwide to write on that topic and

*Corresponding Author:
Fathy A. Abdalla,
Geology Department, Faculty of Science, South Valley University, Qena, Egypt;
Email: fathy.abdallah@sci.svu.edu.eg

DOI: https://doi.org/10.30564/hsme.v4i1.4673

also in other fields such as marine biotechnology, irrigation and drainage, ocean engineering, hydraulics, surface and groundwater hydrology, sediment transport, climate change, coastal protection, lake/shore environment and water socio-economics.

Even today, >1 billion people do not have access to safe and pure drinking water, RBF is well-known in many countries around the world. Pictures found in Egyptian temples wall dating back to 15th century BC, showed that, the Egyptian used bank filtration to improve Nile water quality (the Nile water turned into bloody colour due to algal bloom) by digging around the Nile to drink [2]. In Germany, it has been used for more than one hundred and thirty years along the Rhine and Elbe Rivers [3]. In the USA experiments on water filtration were carried out during the late 1880s [2]. Chlorination is the most widely used disinfectant of drinking water supplies in Egypt due to its effectiveness against a wide spectrum of disease-causing organisms and relatively low cost. The World Health Organization has established a guideline value of 5 mg/L for chlorine in drinking water. In this method, production wells are placed deep within riverbank sediments, where they collect river water that filters through the alluvial sediments, which means almost pure bank filtrate was extracted. Economically, the RBF technique showed a lower Net Present Value and a shorter Payback Period compared to other treatment techniques.

The problem of disinfection by-products

The traditional disinfectant methods (especially chlorine method) have been used widely to eliminate the risks of waterborne diseases such as typhoid fever, cholera and malaria. In chlorination method if there is too much chlorine present, it can react with the organic matters to produce Trihalomethanes (THMs) as chlorine disinfection by-products DBPs which has carcinogenic effect [4]. DBPs are chemicals that result from the reaction of chlorine with organic substances in raw water. Trihalomethanes (THMs) refer to one class of disinfection by-products which may be found in nearly every chlorinated public water supply. The highest levels are found in surface water supplies that have higher levels of naturally occurring organic contaminants (DOC) and higher bromide concentrations. Therefore, source water with high DOC and bromide concentrations requires special and additional treatment steps. Due to the aforementioned problems, direct extraction of surface water as drinking water should be replaced by artificial or natural subsoil passage of river water due to its efficiency in eliminating micro-organisms, turbidity, temperature deviations and other pollutants from the infiltrating surface water. The effectiveness of RBF or the quality of bank-filtered water is also affected greatly by aquifer sediment properties, (e.g., grain size and distribution), the riverbed sediment, the infiltration velocity, the distance of the well from the river, and the residence time in the aquifer, which varies greatly among sites.

The most common questions should be addressed from the RBF processes are the:

· Effectiveness of bank filtration as purification process and its removal efficiencies for the most problematic substances such as turbidity, pathogens, algae and trace metal.

· Movement of organic contaminants in bank filtrated water.

· Riverbed clogging with time and during long-term usage

· Characterization of the elimination processes along the flow paths from the river to the production wells such as filtering, precipitation, degradation and redox processes,

· Factors controlling the travel time of river water with pollutants from the river to the wells, the most important parameters are: distance from the bank; well depth; discharge rate, and the river conditions near the site. Optimisation of well location from the Nile and abstraction rate are required.

· Rriver water quality and aquifer sediment properties, (e.g., grain size and distribution), the riverbed sediment, the infiltration velocity.

· Areas of high vulnerability or to generate risk maps for contamination and finally.

· Best and suitable location for RBF sites along the surface water bodies and what are the system's limitations.

We invite all the distinguished scholars worldwide to write and publish original articles, case studies and comprehensive reviews on such hot topics of marine biotechnology, ocean engineering, irrigation and drainage, hydraulics, climate changes and water quality and pollution control. The Journal focuses on innovations of research methods and is committed to providing theoretical and practical experience on all aspects of marine and water research for all those who are involved in these fields within the scope of the papers in the journal of *Hydro Science and Marine Engineering*.

Conflict of Interest

There is no conflict of interest.

References

[1] Abdalla, F., Shamrukh, M., 2011. Riverbank Filtration as an Alternative Treatment Technology: Abu Tieg Case Study, Egypt. In C. Ray and M. Shamrukh

(eds.), Riverbank Filtration for Water Security in Desert Countries. https://springerlink3.metapress.com/content/1874-6519/. NATO Science for Peace and Security Series C: Environmental Security. pp. 255-268.

[2] Deininger, R., Lee, J., Ancheta, A., et al., 2002. Public Health Aspects of Riverbank Filtration. In C. Ray (eds.). https://www.researchgate.net/publication/267269953_Riverbank_Filtration_Understanding_Contaminant_Biogeochemistry_and_Pathogen_Removal. Riverbank Filtration: Understanding Contaminant Biogeochemistry and Pathogen Removal. pp. 153-176.

DOI: https://doi.org/10.1007/978-94-010-0479-4_8

[3] Schmidt, C.K., Lange, F.T., Sacher, F., et al., 2003. Assessing the fate of organic micropollutants during riverbank filtration utilizing field studies and laboratory test systems. Geophysical Research Abstracts. 5, 08595.

[4] IARC (International Agency for Research on Cancer), 1991. Monographs on the evaluation of carcinogenic risks to humans. Chlorinated drinking water, Chlorination by-products; Some other halogenated compounds; Cobalt and cobalt compounds. IARC, Lyon, France. (52), 544.