

Clean Water by Riverbank Filtration

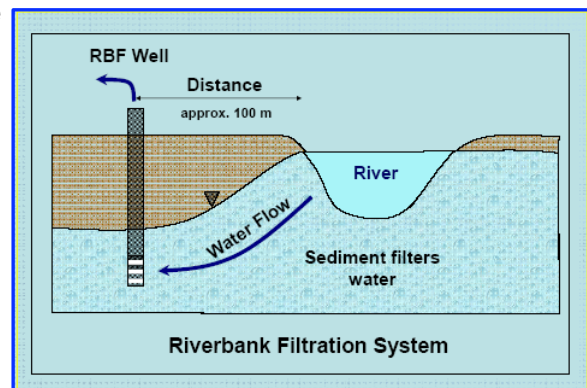
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Riverbank filtration (RBF) is a low-cost water treatment technology with a history of use dating back to ancient Egypt. RBF involves extracted water from one or more wells located near rivers (Figure 1) and using the physical, chemical, and biological processes of the riverbank to purify the river water and to provide a buffer against rapid changes in river stage or water quality. The principal benefits of RBF are (1) predictable removal efficiency for bacteria, parasites, and viruses, (2) efficient removal of particles and turbidity, (3) biodegradation of trihalomethane (THM) precursors and micro-pollutants, (4) smoothing of variations in temperature and concentration of pollutants and (5) compensation for peak and shock loads.



The RBF technology has been successfully implemented in dry to wet climates and at scales ranging from small community treatment systems to supplying drinking water to

large industrial cities in Europe and the US. Ideally, RBF systems are installed in the inner bend of a river meander where hydraulic conductivity of the riverbank deposits are $>10\text{m/d}$. The distance of a RBF well to the river should be at least 100 m to ensure a travel time from the river to the well of at least 20 days. Although simple in concept, the performance of a RBF system is strongly dependent on local conditions, i.e. sedimentation, filtration, sorption, ion-exchange capacity of the local riverbed materials and the red/ox reactions and (bio) degradation conditions prevalent along the flowpath from the river to the well. Sites not well suited for RBF are along rivers with high concentrations of clay (turbidity > 100) or with high levels of organic particulate matter and algae, including high levels of biodegradable substances ($\text{BOD} > \text{O}_2$ river), especially in combination with $\text{pH} > 7$ and low red/ox conditions.

It is recommended to consult with a hydro geologist to determine the suitability of a prospective RBF site. Once a suitable site has been identified and land ownership issues have been addressed, setting up a RBF system requires at minimum the drilling of a 6 to 8 inch shallow well (about 20 m, depending on local hydrogeology) and installation of an adequately sized pump. Pumps can either be run off the electrical grid, if available, or powered by generators or possibly by (expensive) solar energy systems. Depending on the distance to the consumer, pipelines and/or storage tanks, including water taps or household connections, have to be constructed. Outfitting storage tanks with disinfection capabilities ensures a safe water supply. Also, water meters are required to recover capital and operation costs from individual consumers. Total cost varies from country to country, but a small, self-sustaining community RBF system can be installed for around \$15,000. This estimate includes operator wages and business costs.

For more information about RBF projects in India and assistance with implementation, contact the Joint Center for Water Quality and Aquifer Remediation in Coastal Areas, Dr. Boving ([✉ boving@uri.edu](mailto:boving@uri.edu)) or TERI - Western Regional Centre, Vasudha Housing Colony in Alto Santa Cruz, Goa-403 004, INDIA ([✉ +91 832-245-9338](tel:+918322459338), [✉ bchoudri@teri.res.in](mailto:bchoudri@teri.res.in)).