



Water Innovation Network for
Sustainable Small Systems

A National Center for Innovative Small Drinking Water Systems

A4: Natural Filtration for Water Supply

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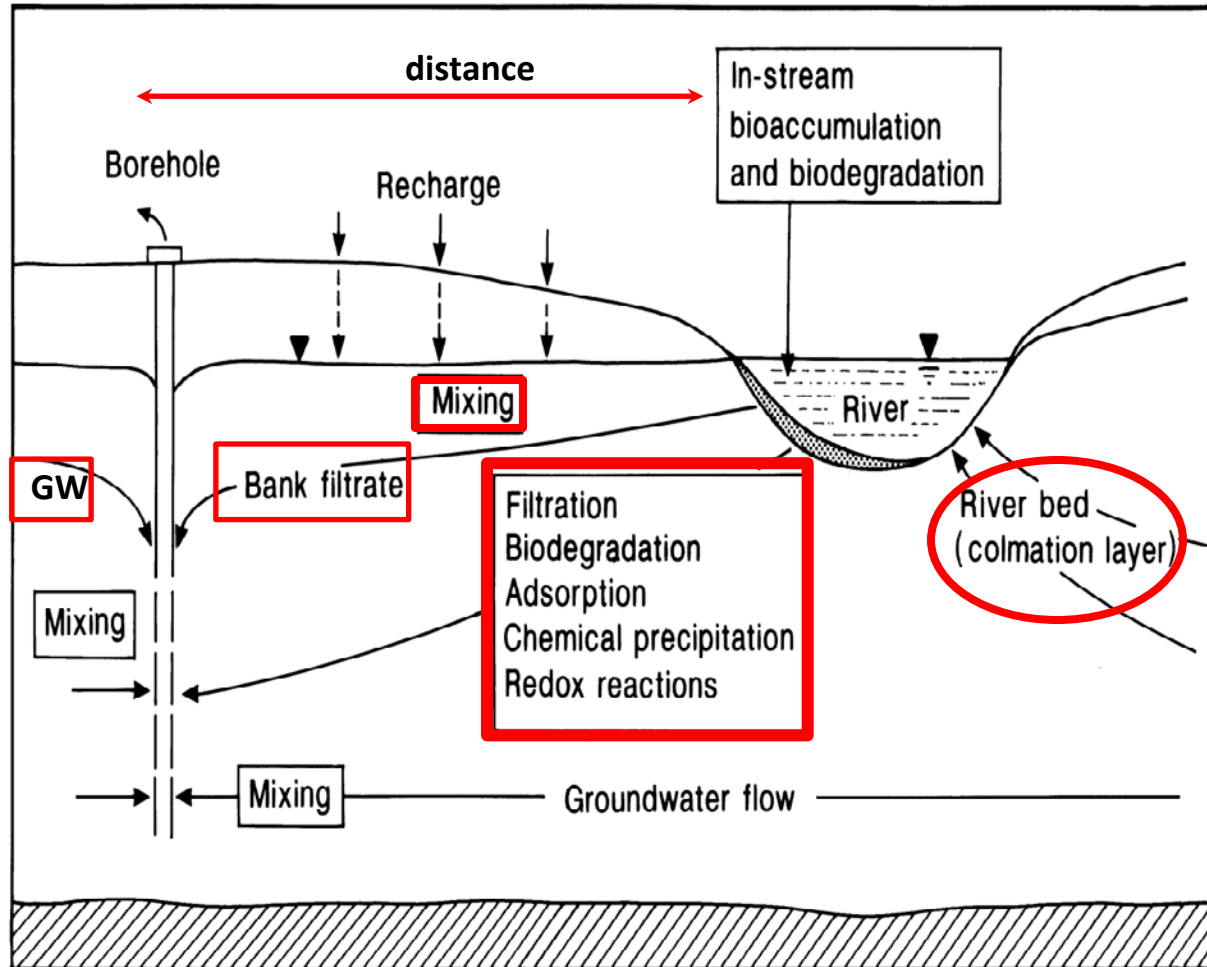
Introduction

- *Brief Description:* Examine use of the soil and aquifer material on riverbanks and beneath the riverbed as filtration materials to remove turbidity, indicator organisms and pathogens, as well as chemical constituents present in surface water.
- *Anticipated target utility characteristics:*
Near surface water with appropriate aquifer where riverbank filtration will simplify treatment, replace use of other contaminated aquifers, and/or allow for reduced DBP formation potential.
- *Continuum of technology development:*



River Bank Filtration (RBF): Basic Concepts

Bank filtration: infiltration of a river into a ground water system induced by water abstraction adjacent to banks



Source: Hiscock & Grischek (2002)



RBF: Basic Concepts

ADVANTAGES

- Low capital investments
- Low operating costs
- Ability to remove:
 - Suspended particles,
 - Biodegradable compounds,
 - Bacteria and viruses
- Ability to buffer possible fluctuations in the quality of the water produced

LIMITATIONS

- Riverbed clogging
- Increase in:
 - Hardness,
 - Ammonium,
 - Dissolved iron and manganese
- Possible formation of malodorous sulfur compounds



OBJECTIVES

1. Examine the improvements in water quality at selected RBF systems in small systems by comparing the quality of river waters and filtrate and examining the response of the systems to hydrologic forcing such as spring runoff or low flows in rivers.
2. Examine if small systems that use natural filtration have reduced DBP formation potential in their water system compared to systems that directly use surface water.



Project design

Removal studies of constituents of surface water (TASK 1) and occurrence of disinfection byproducts in drinking water (TASK 2)

- Sampling of water
 - Fairbury – Little Blue River
 - Auburn – Little Nemaha River
- Field measurement of water quality parameters
 - DO, pH, turbidity, specific conductance
- Laboratory testing of water samples
 - Nitrate, nitrite
 - TOC, UV
 - Stable isotope
 - Selected DBPs (i.e., THM)
 - Indicator bacteria (total coliform, *E. coli*..)



Channel view near USGS gaging station: Little Blue River near Fairbury, NE

(http://waterdata.usgs.gov/nwis/uv?site_no=06884000)

SAMPLING
1 sample/month
1 sample/week in March
& April



Downstream view near USGS gaging station: Little Nemaha River at Auburn, NE

(http://waterdata.usgs.gov/ne/nwis/uv?site_no=06811500)



Outputs and Outreach

Completed:

none

Scheduled:

none

Anticipated:

White paper for WINSSS Website by summer 2017

Conference paper for summer 2017

Manuscript for submission to a technical Journal, Fall 2017.

WINSSS or US EPA Small Systems Webinar – late 2017

