

Your Health, The Degradation of the Water Supply, and Seneca Lake

The Connections Between Surrounding Industries, Our Drinking Water, and Our Health

Abstract

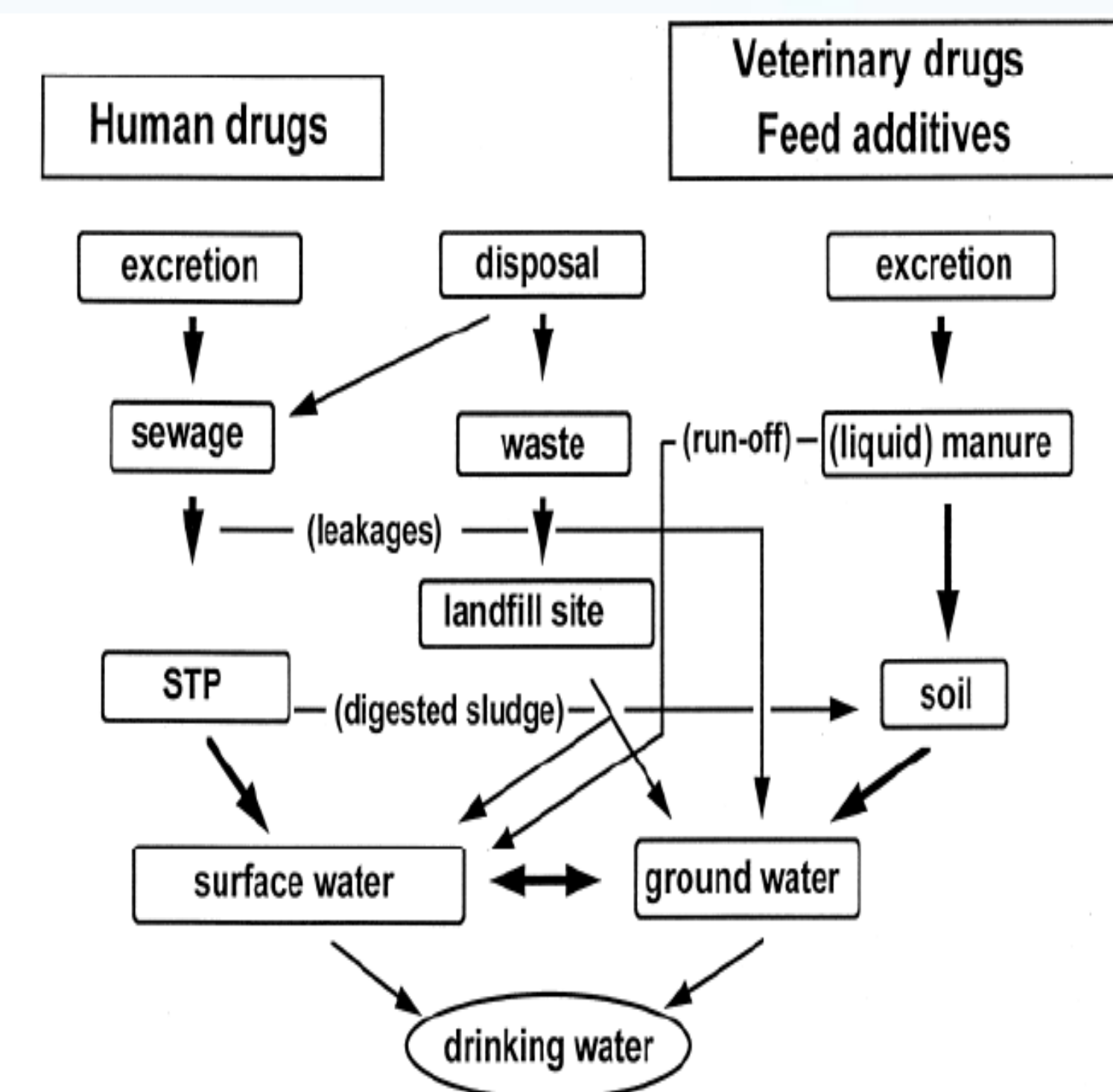
Seneca Lake's productivity has increased significantly over the past year. Two sources that contribute to the increase in productivity are fertilizer and CAFO (concentrated animal feeding operations) runoff. These not only add to the productivity, but are the two major sources of the pollutants that are degrading the drinking water within the Seneca Lake Watershed. While some of the pollutants are minor and will not have much effect on humans, some of the pollutants can have serious medical side effects. Toxins such as arsenic, cadmium, and mercury are found in chemical fertilizers while pharmaceuticals like antibiotics and hormones are found in CAFO runoff. All of these, if not handled properly, end up in the water system and in our bodies. I focus on different toxins, how they get into our water system, what affects they have on humans, and best management practices to avoid contamination of our beautiful water source.

Chemical Fertilizers

- **Arsenic**
 - occurs naturally in the environment within the earth's crust, water, and smoke from volcanoes
 - colorless, tasteless, and odorless (depending on its form) making it very hard to detect.
 - the attacking of the DNA causes a different reaction between people
 - 0.010 milligrams per liter ($\mu\text{g/L}$)
 - a study from 1999 revealed an increased amount of arsenic taken from the sediment core
- **Cadmium**
 - Created as a by-product of the zinc refining process
 - Found in: canned foods, drinking water, batteries, cigarette smoke, motor oil, exhaust, tires, plastics and some paints
 - headaches, fevers, nausea, salivation, vomiting, or abdominal cramping and diarrhea, while larger exposer or small exposer over a long period of time can cause prostate and kidney cancer, permanent kidney and liver damage, loss of sense of smell, and may cause anemia
- **Mercury**
 - bio accumulation
 - kidney damage, miscarriages, leads to mercury poisoning causes tremors, memory issues, gum and salivation problems, and hallucinations and psychosis
 - 1890's pollution



Kara A. Ruskin
William Smith '12
Kara.Ruskin@hws.edu



Note: STP is sewage treatment plant.

Figure ES1: Fate and transport of pharmaceuticals in the environment (Ternes, 1998)

CAFOs

- Reeder Creek as main source
- Increase in phosphates from animal excrement
- Pharmaceuticals fed to animals is excreted into water



Table 18. Average stream concentration and flux data 1999-2011 (Halfman, 2012).

Concentrations	Conductivity $\mu\text{S/cm}$	Discharge m^3/s	Nitrate mg/L, N	Total Phosphate $\mu\text{g/L, P}$	Phosphate (SRP) $\mu\text{g/L, P}$	Suspended Sediment mg/L, N
Seneca Lake	696	--	0.3	9.8	1.9	1.2
Castle	844	0.3	0.4	51.9	36.9	18.7
Wilson	629	0.4	1.0	40.8	32.7	5.7
Kashong	561	0.7	0.9	22.3	13.8	5.8
Keuka Outlet	359	3.2	0.7	21.7	15.4	8.7
Plum Pt.	580	0.1	0.9	13.0	8.5	2.3
Big Stream	400	0.6	0.5	34.9	48.6	3.9
Catharine	416	2.6	0.2	37.9	11.4	42.5
Reeder	589	0.2	0.7	160.4	109.5	2.5
Kendig	527	0.2	0.7	40.1	25.6	4.5

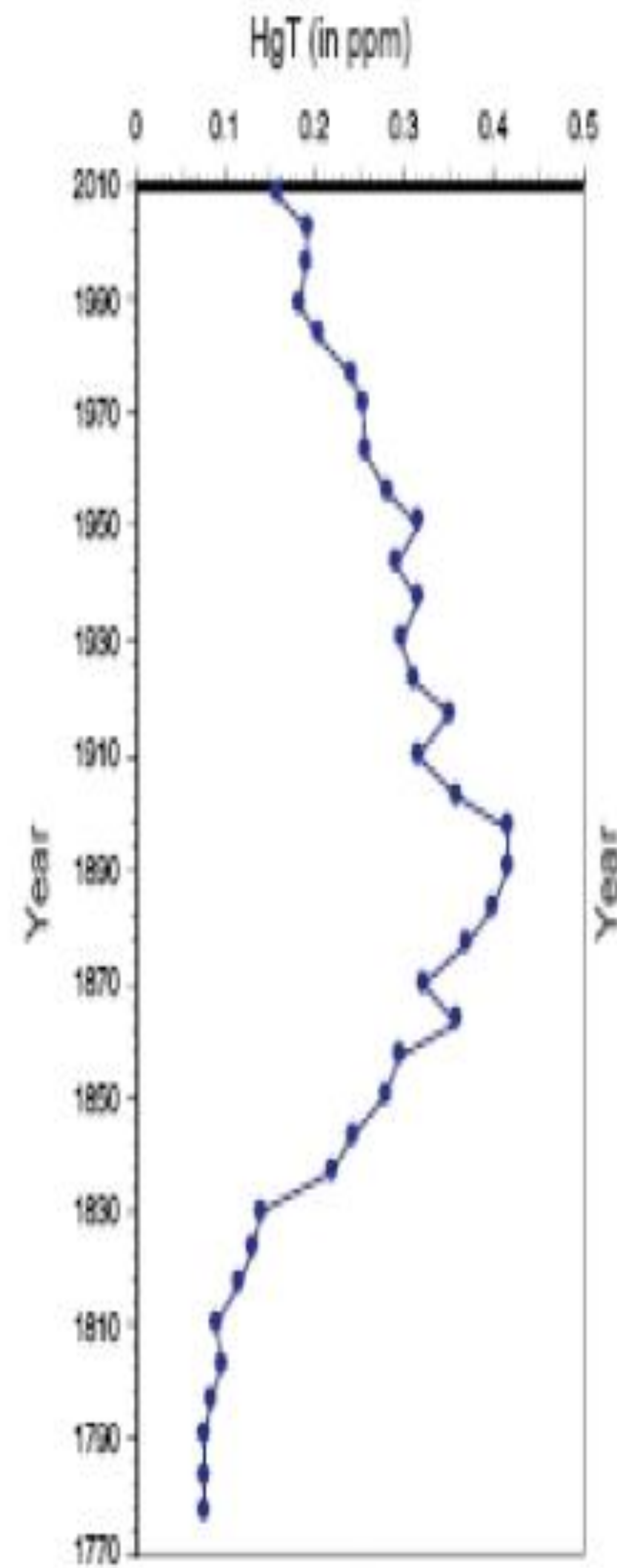
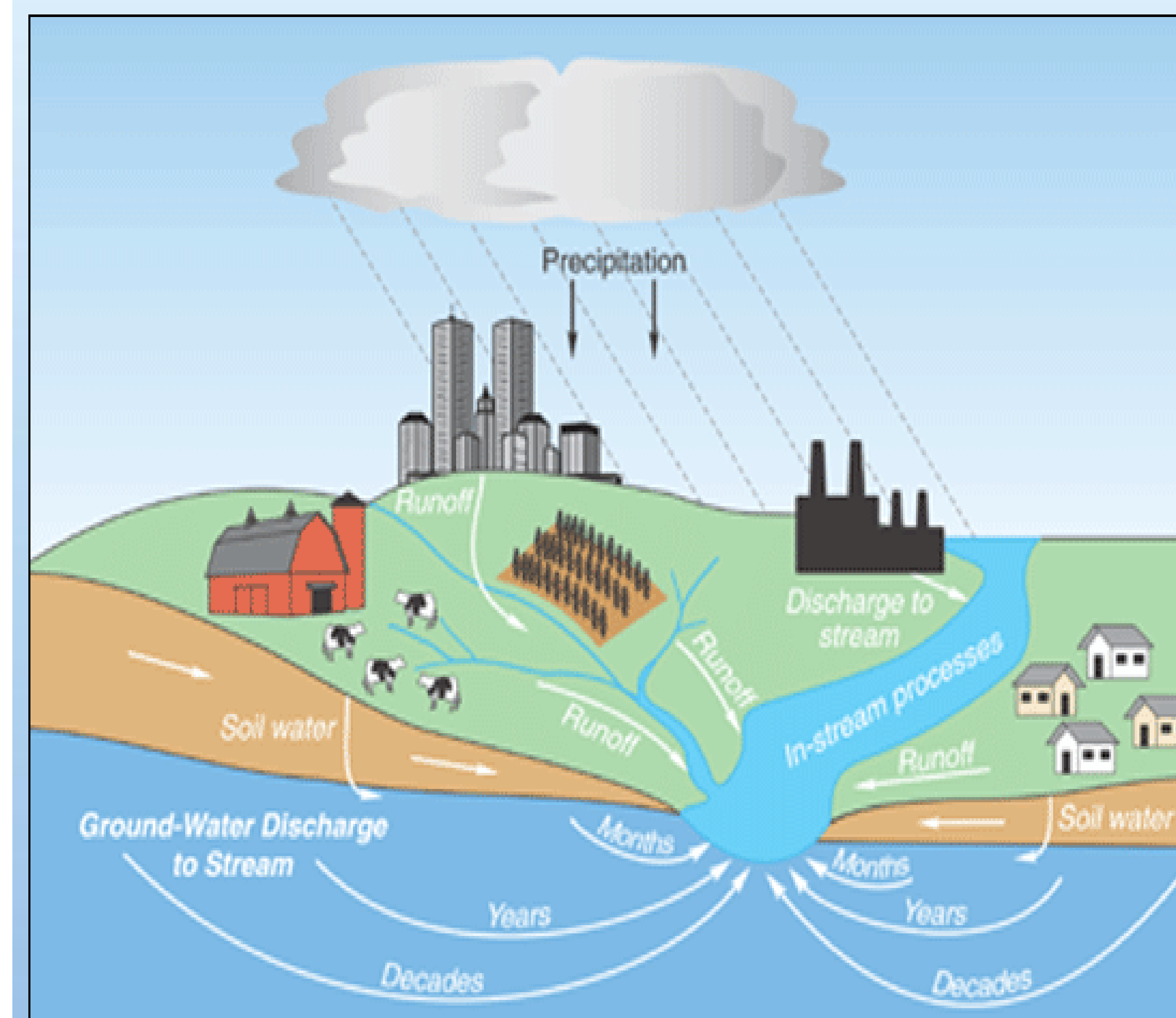


Fig. 6.



Best Management Practices

Chemical Fertilizers

- **Organic fertilizer vs. Chemical fertilizers**
 - healthier soil
 - Less Chemicals
 - Less cost
 - Decrease in top soil erosion and runoff
- **Crop Rotation**
 - help prevent single nutrient depletion
 - prevents erosion and excess runoff
 - better for soil.
- **Buffer Strips**
 - absorbs nutrients
 - plants prospers
 - prevents erosion and runoff

CAFO Waste / Pharmaceutical Pollution

- Educational Information at pharmacies
- Proper Removal of Animal Waste
- Keeping animals out or away from stream / water body areas that flow into the lake.