The Water Cycle

Condensation

Precipitation

Infiltration

Evaporation

Wastewater

Wastewater Pollutants
Treatment of Pathogen Contaminated Drinking Water

1. Pathogen infested raw water is pumped through an intake

2. Removal of large particles, sand, and gravel through sedimentation

3. Form and remove floc through coagulation

4. Remove all remaining particulates and compounds through filtration

5. Kill remaining pathogens and microorganisms through chlorination

6. The disinfected water is pumped back into the system and distributed
The Nitrogen Cycle (N)
Both groundwater and surface water contribute to runoff.

$\text{NO}_3^-, K^+$

Pesticides & $\text{PO}_4^{3-}$

If humans consume infected water, it can cause blue baby syndrome in infants.

Eutrophication
- Algal Bloom
- Oxygen Depletion

Runoff can be caused by heavy rain or irrigation.
Water Quality

Without water quality, we would be drinking bacteria, parasites, viruses, and protozoa's.
ACID MINE DRAINAGE

OXYGEN + WATER + SULFIDE = SULFURIC ACID

INCREASED FISH MORTALITY
ACID RAIN

NO₂

SO₂

H₂SO₄

HNO₃

Trees killed by acid rain
1. Rain falls onto mountain
2. Water leaches into mine
3. Metals dissolve and acidify water
4. Heavy metals and acidic runoff kills aquatic life
Microplastics unaddressed by traditional wastewater treatment plants contribute to oceanic pollution.
Environmental Engineering

Water Filtration
All life on Earth requires water, especially us, and due to how many of us there are, there is quite a demand.

Water cycles through the ground, air, and living organisms. Along its way, it can gather up many harmful things to us, so we have to clean it before we use it.

We have engineered a treatment process for our reuse of water, removing things like solids and potentially harmful bacteria. But the products of cleaning our water must be disposed of and includes things harmful to other lifeforms.

These by-products cannot just be thrown somewhere else, that runs the risk of contaminating groundwater, ultimately harming the animals and plants that use that water.

We have to share the planet, so we should not let our own maintenance interfere with theirs!
Atmosphere – stores water

Condensation: phase change of water from vapor to liquid/solid

Evaporation: phase change from liquid to gas state, occurs on surface waters, land, rocks, trees, etc.

Water – stores water

Waterfall: (Water falls from atmosphere onto land/water sources)

Infiltration: water seeping through surface

Runoff: Flow from watershed to separate body of water

Transpiration: Water from plants is transferred to atmosphere as water vapor

Land – stores water