

# AIR, FOOD AND WATER-BORNE HUMAN INFECTIONS



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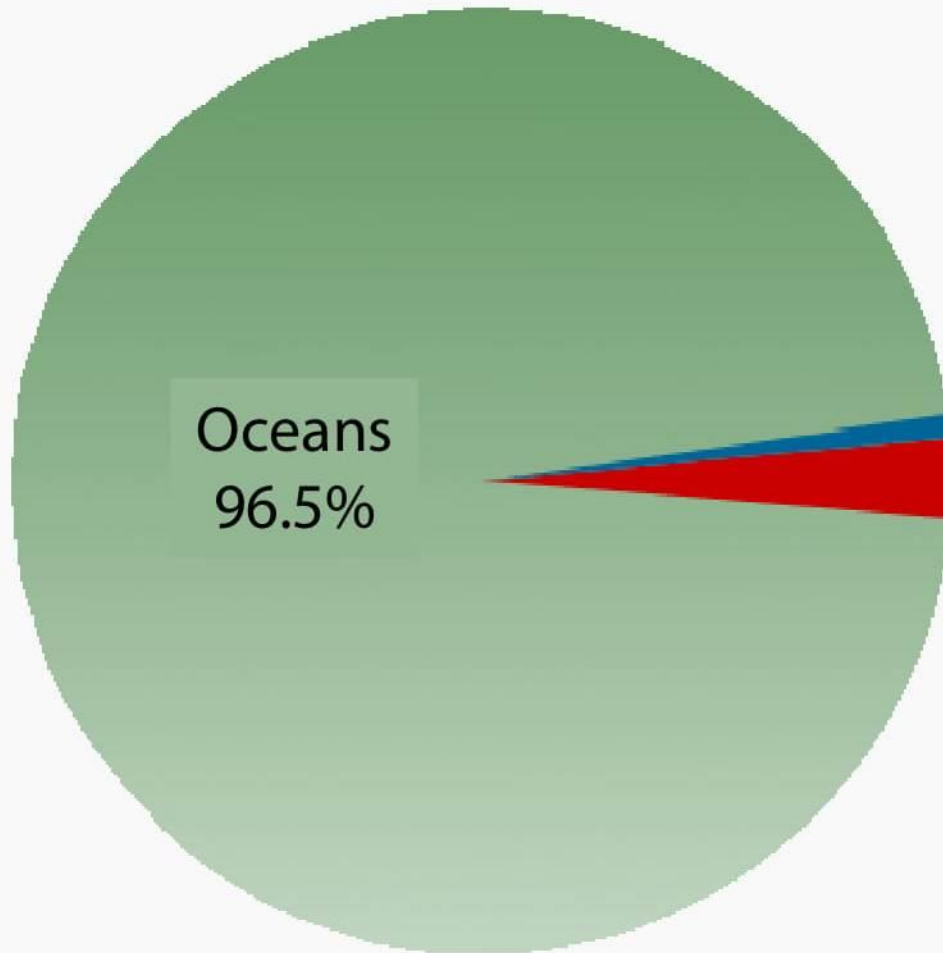
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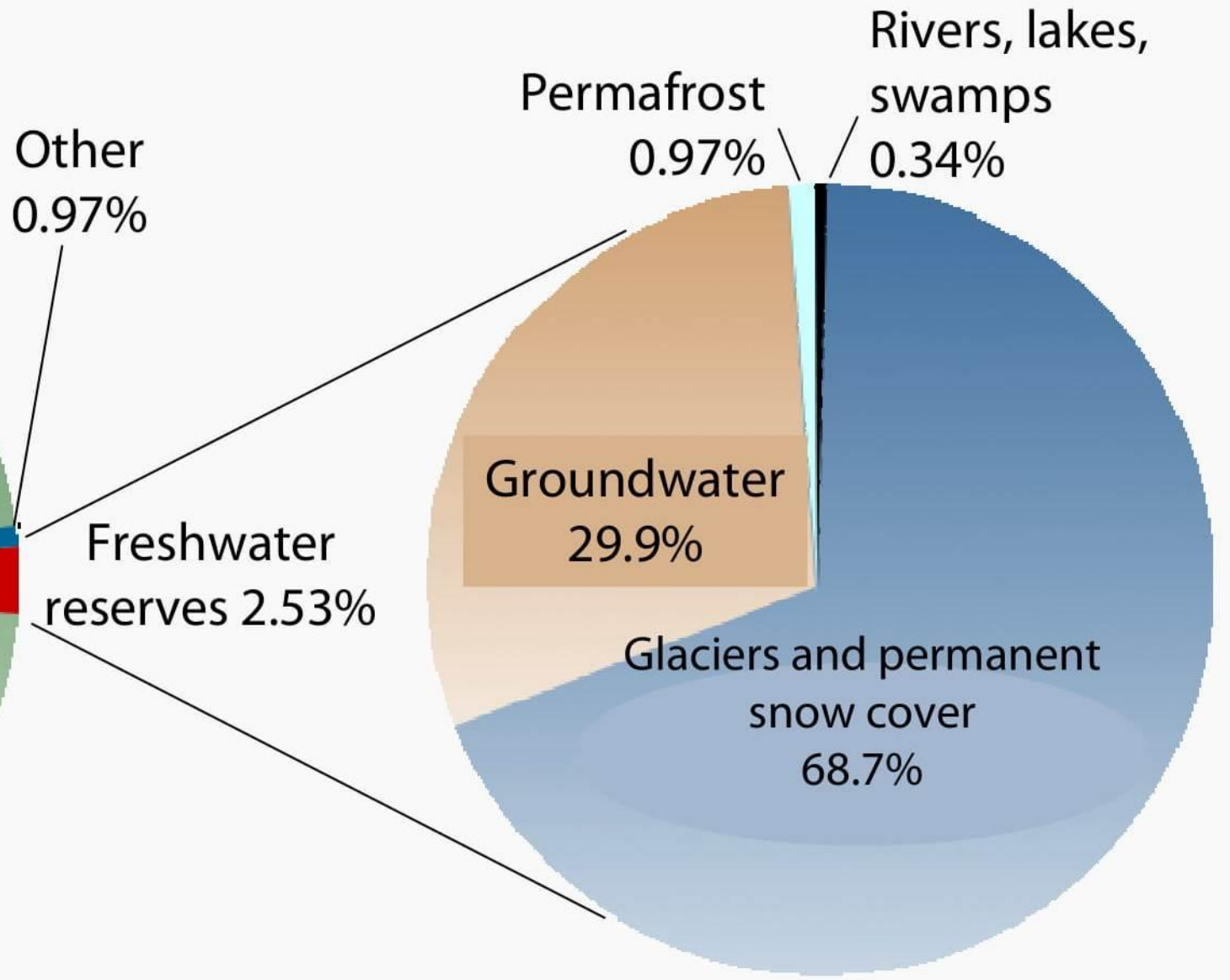
# WATER-BORNE DISEASES



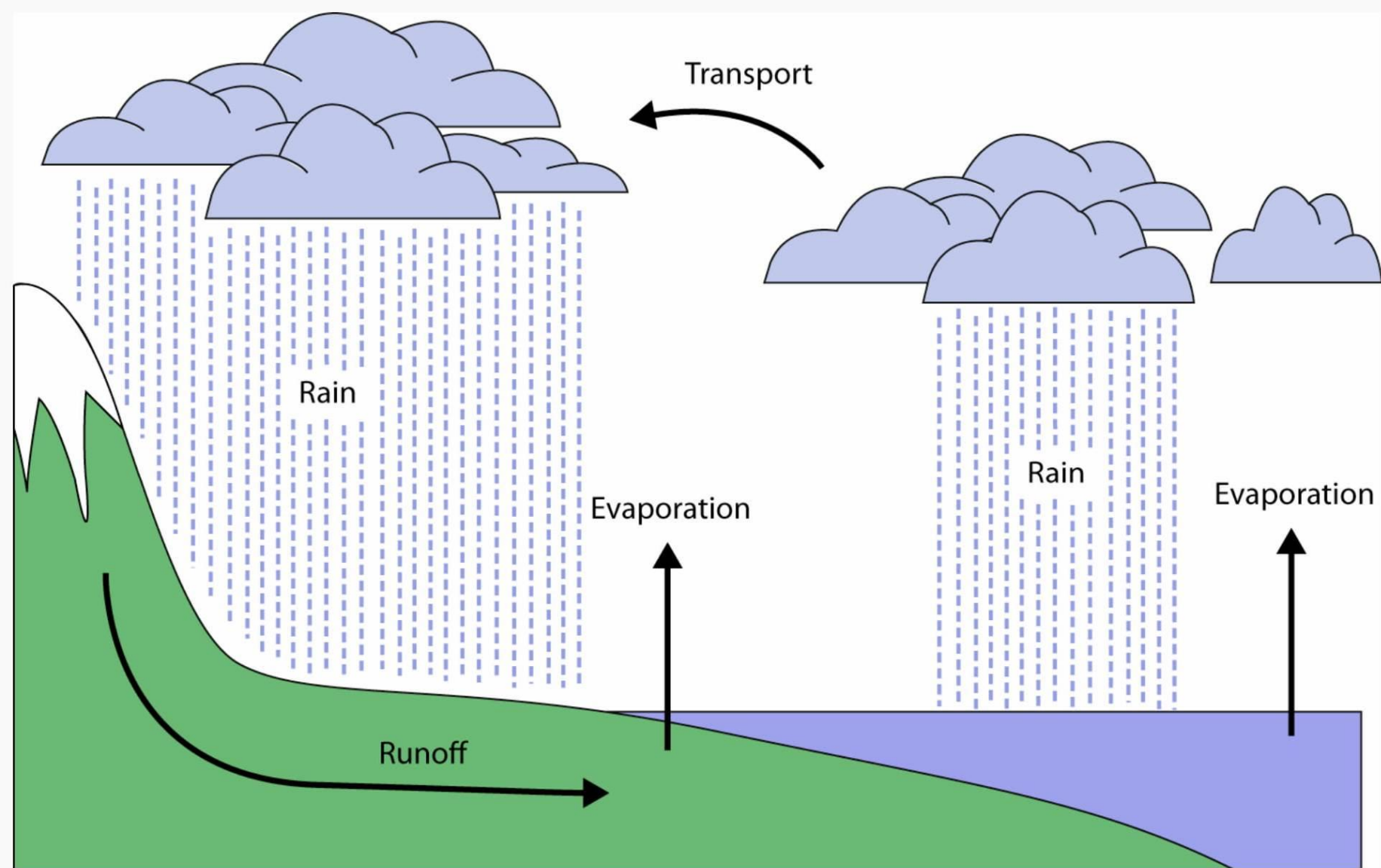
# Total water resources



# Freshwater resources



# HYDROLOGIC CYCLE



# FRESH WATER SOURCES

- Groundwater
  - Available at point of need at little cost
  - Until recently was not polluted
- Surface water
  - Usually requires extensive purification
- Protected runoff
- Ocean and brackish waters
  - Costly to desalinate



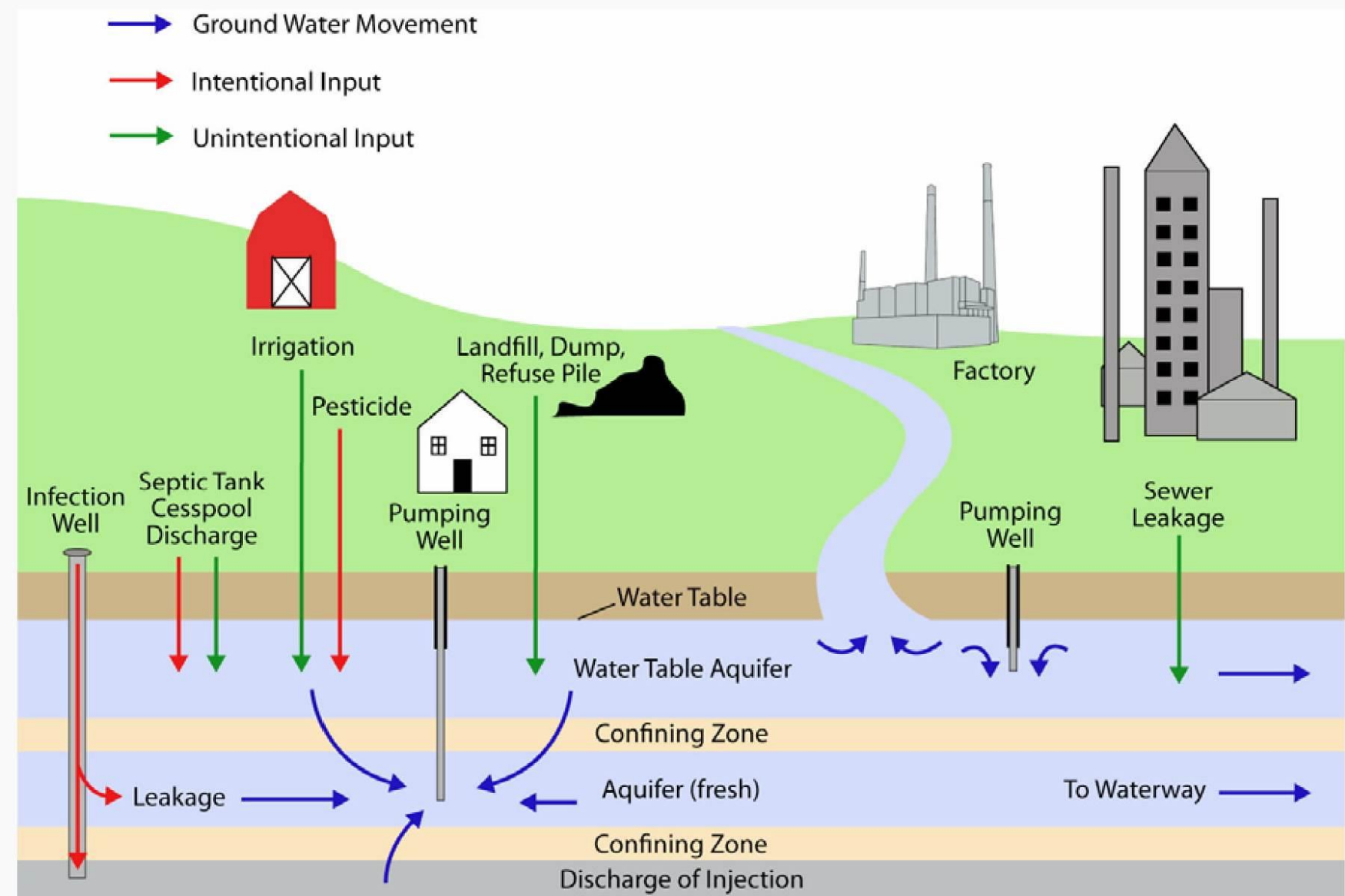
# FRESH WATER FACTS

- Body composition
  - Body, 65% water; blood, 83%; bones, 25%
  - Water loss: 1% thirst; 5% hallucinations; 15% death
- Basic requirements for safe water
  - Drinking: 2–3 liters/day
  - Minimum acceptable standard for living (WHO)
    - ▶ 20–50 liters/capita/day for cooking and basic hygiene

# GLOBAL WATER ISSUES

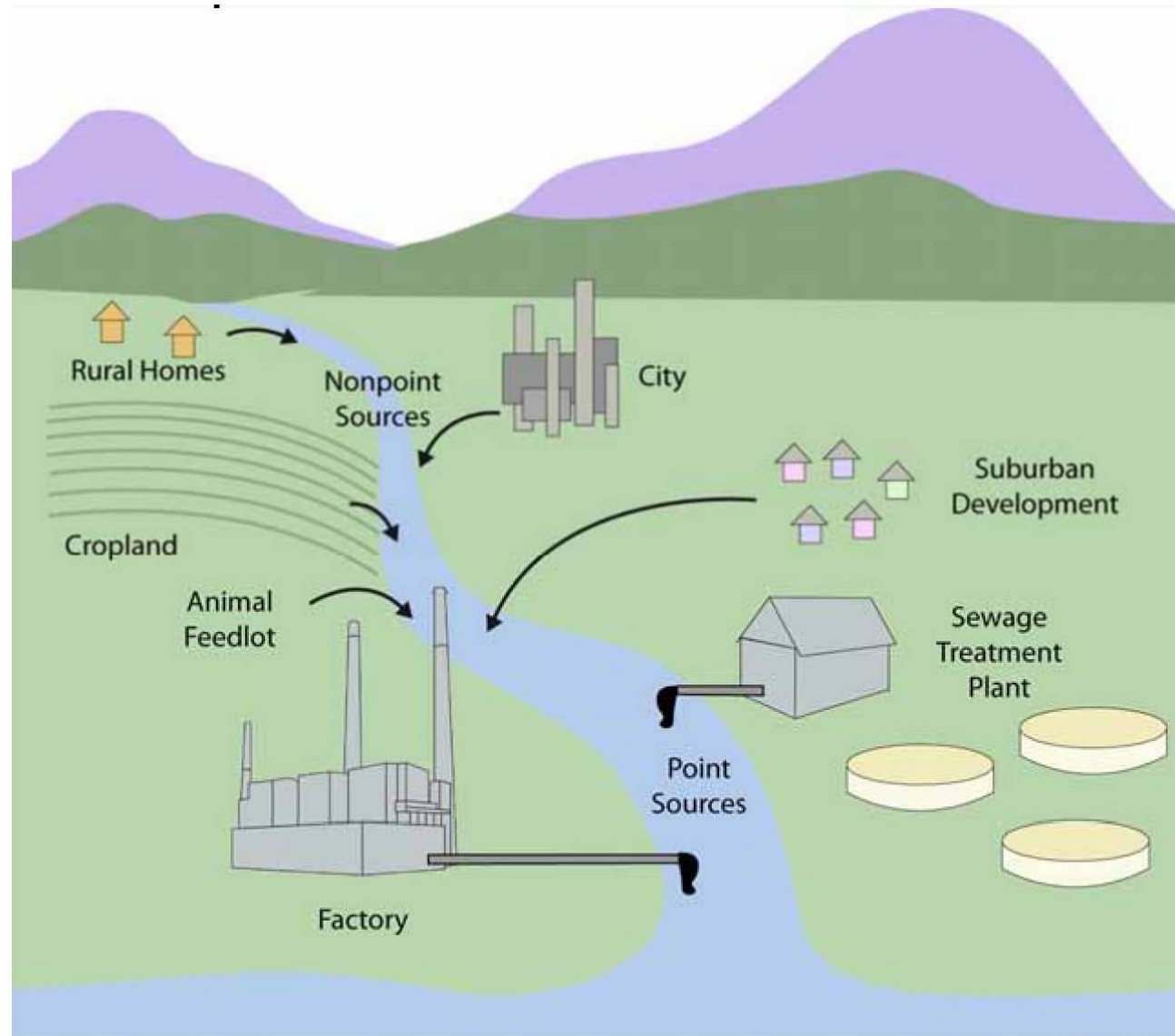
- Vulnerability of surface water to:
  - Drought (not replenished); i.e., lakes, reservoirs
  - Diversion of rivers for agricultural and urban use
- Declining groundwater levels
  - Failure to replenish
  - Compaction of aquifers
  - Saltwater intrusion
- Surface water pollution from nonpoint sources
- Groundwater pollution
- Increasing competition for water supplies
  - World's available freshwater is not distributed evenly

# SOURCES OF GROUND WATER CONTAMINATION





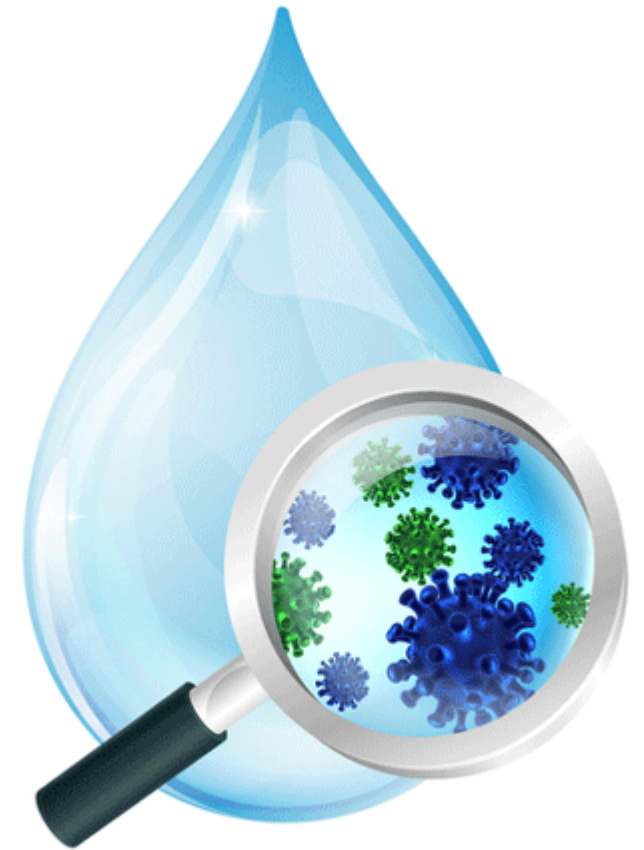
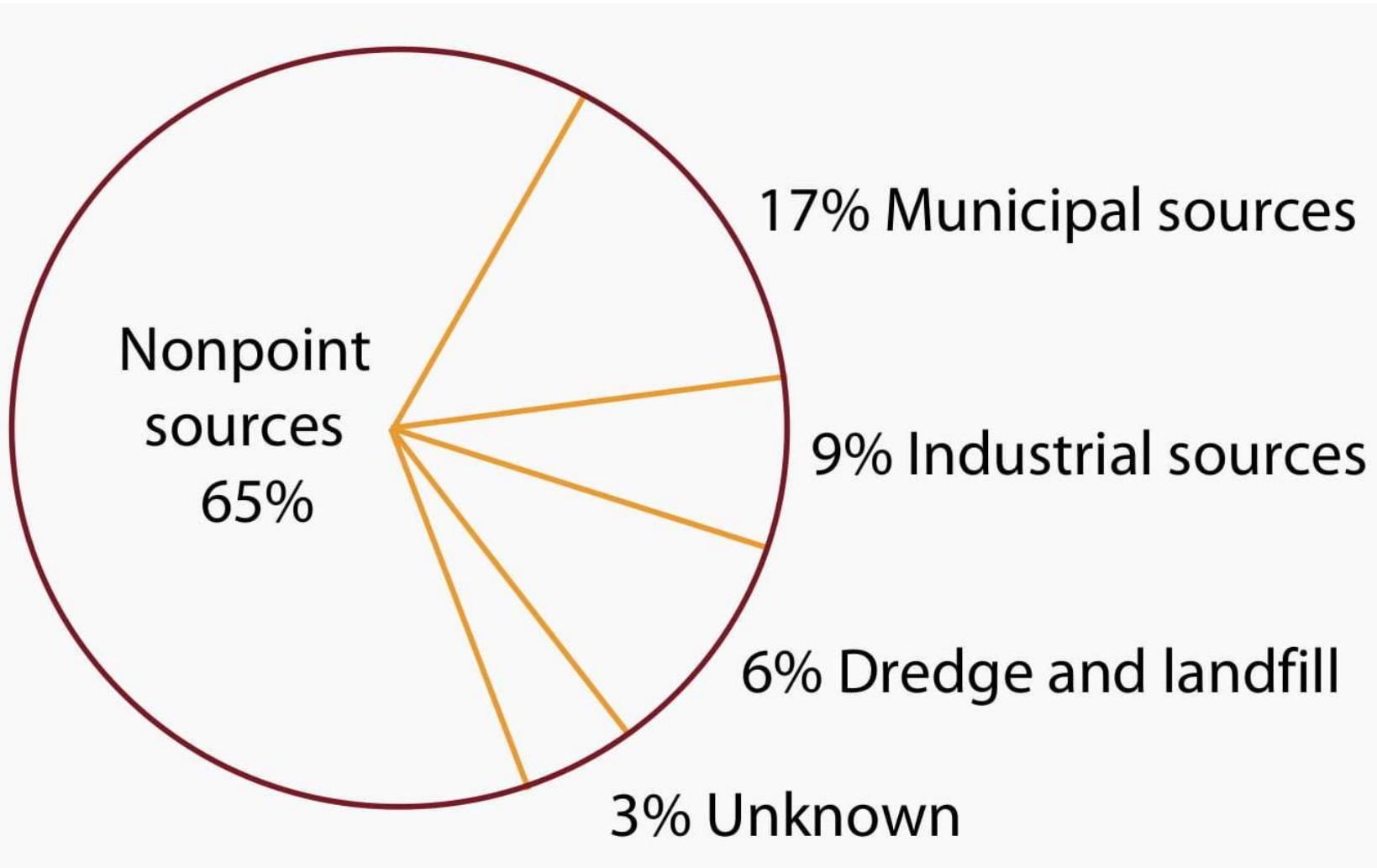
# SURFACE WATER CONTAMINATION



# CLASSES OF WATER CONTAMINANTS

Oxygen-demanding wastes	Plant and animal material
Infectious agents	Bacteria, viruses, protozoans
Plant nutrients	Fertilizers: nitrates, phosphates
Organic chemicals	Pesticides, detergents
Inorganic chemicals	Acids from coal mine drainage, inorganic chemicals from steel plants
Sediment from land erosion	Clay silt on stream beds
Radioactive substances	Waste products from mining and processing
Heat from industry	Cooling water used in steam generation of electricity

# MAJOR SOURCES OF RIVER AND STREAM WATER CONTAMINATION



# UNTREATED WATER CONTAMINANTS

Class	Groundwater	Surface water
Bulky materials	None	Branches, leaves, algal mats, soil particles
Colloidal materials	Microorganisms, trace organic and inorganic material	Clay, silt, organic materials, pathogenic organisms, algae, other microorganisms