

Environmental Management

Key Terms:

Water and its Management

Sanitisation

The conditions necessary for health, such as providing clean drinking water and the safe disposal of sewage.

Transpiration

The movement of water up plants and its subsequent loss as water vapour from their leaves.

The Water Cycle

(<https://www.activityvillage.co.uk/the-water-cycle>)



Surface Run-off

The process by which water runs over the ground into rivers.

Evaporation

The process in which liquid water turns into vapour, the opposite of condensation.

Interception

The process by which precipitation is stopped from reaching the ground surface by the presence of trees and other plants.

Condensation

The process in which water vapour turns into liquid water, the opposite of evaporation.

Infiltration

The process by which water seeps into the ground.

Precipitation

The process in which liquid water (as rain) or ice particles (as snow or hail) fall to Earth due to gravity.

Groundwater Flow

The process by which infiltrated water flows through rocks.

<p style="text-align: center; border: 2px solid cyan; padding: 10px;">Through Flow</p>	<p>The process by which infiltrated water flows through the soil.</p>	<p style="text-align: center; border: 2px solid magenta; padding: 10px;">Water Resource: Sources</p>	<ul style="list-style-type: none"> - Surface water - Groundwater - Aquifer - Desalinated sea water
<p style="text-align: center; border: 2px solid magenta; padding: 10px;">Water Resource: Demand</p>	<p>Domestic: drinking, cooking, washing, sanitation, watering gardens, (& leaks) Level needed depends on how developed the country is. Industrial: manufacturing, cooling (in electricity production) Agricultural: irrigation, animals, hydroponics</p>	<p style="text-align: center; border: 2px solid gray; padding: 10px;">Potable</p>	<p style="text-align: right;">Safe to drink.</p> <p>Requires:</p> <ul style="list-style-type: none"> - sanitation systems (so dirty water doesn't get mixed with clean water) - water-treatment processes (cleans water) <p>Stages of treatment to make water potable:</p> <ul style="list-style-type: none"> • Raw water (non potable) • Adding coagulant - causes particles to clump • Sedimentation - clumped particles sink to bottom • Filtration - through sand, removes particles • Disinfection - chlorine kills bacteria • Storage (potable) and distribution
<p style="text-align: center; border: 2px solid purple; padding: 10px;">Surface Water</p>	<p>Water in lakes, rivers and swamps.</p>	<p style="text-align: center; border: 2px solid gray; padding: 10px;">Desalination</p>	<p>The removal of salt from water.</p>
<p style="text-align: center; border: 2px solid purple; padding: 10px;">Groundwater</p>	<p>Water in the soil, and in rocks under the surface of the ground.</p>	<p style="text-align: center; border: 2px solid purple; padding: 10px;">Reservoir</p>	<p>An artificial lake where water can be stored.</p>
<p style="text-align: center; border: 2px solid purple; padding: 10px;">Aquifer</p>	<p>Water stored in pore rocks under the ground</p>	<p style="text-align: center; border: 2px solid purple; padding: 10px;">Service Reservoir</p>	<p>A reservoir in which potable water (that has been treated) is stored, e.g. water towers and underground cisterns</p>

<p style="text-align: center;">Well</p>	<p style="text-align: center;">A hole bored or dug into rock to reach the water stored there.</p>	<p style="text-align: center;">Water Resource: Scarcity</p>	<p>Physical water scarcity: A situation in which there is simply not enough water for human needs. Economic water scarcity: A situation in which there is enough water available but the money does not exist to extract and/or treat enough of it for human needs.</p>
<p style="text-align: center;">Artesian Aquifer</p>	<p style="text-align: center;">An aquifer in which the water is under pressure.</p>	<p style="text-align: center;">Dams: Pros & Cons</p>	<p>Pros:</p> <ul style="list-style-type: none"> • electricity generation - Hydroelectric power (HEP) • flood control • tourism and leisure • provision of water: domestic/agriculture/industry • creation of habitat for wetland species <p>Cons:</p> <ul style="list-style-type: none"> • relocation of people • floods land • disrupts life cycles of fish/other aquatic organisms • alters water supply/soil enrichment downstream
<p style="text-align: center;">Desalinisation</p>	<p style="text-align: center;">Removing salt from seawater.</p> <p>Method 1: distillation Method 2: reverse osmosis</p>	<p style="text-align: center;">Dams: Considerations</p>	<ul style="list-style-type: none"> • Narrow dams are cheaper - need narrow river valley • HEP dams need to be high up - greater water pressure, so more potential energy • In developed areas, reservoirs can be polluted.
<p style="text-align: center;">Distillation</p>	<p style="text-align: center;">The purification of a liquid by boiling a solution so that the liquid evaporates and can be collected when it condenses at a lower temperature</p> <p>Pros: can get pure water, might be better for environment than transporting water from elsewhere</p> <p>Cons: inefficient, leftover brine needs to be disposed of (can be form of pollution), energy needed to do it</p>	<p style="text-align: center;">Water-related Diseases</p>	<p>Water-borne diseases (bacteria - human faeces):</p> <ul style="list-style-type: none"> • Cholera • Typhoid <p>Need good sanitation, sewage removal and treatment, water treatment, good hygiene</p> <p>Water-related disease (mosquitos passing *plasmodium* (a parasite) on to people and back)</p> <ul style="list-style-type: none"> • Malaria <p>Remove stagnant water, drain wetlands, introduce fish to water bodies, oil on surface of water, stay inside when dark, cover up, use repellent, mosquito nets with insecticide, and insecticides in properties</p>
<p style="text-align: center;">Reverse Osmosis</p>	<p style="text-align: center;">The purification of water by pumping it at high pressure through a fine membrane.</p> <p>Pros: more efficient than distillation, so uses less energy than distillation</p> <p>Cons: leftover brine needs to be disposed of (can be form of pollution), energy needed to do it</p>	<p style="text-align: center;">Vector</p>	<p style="text-align: center;">An organism that carries a disease-producing organism, such as the mosquito, which carries the malaria parasite.</p>

<p style="text-align: center;">Sewage</p>	<p>Waste matter that is carried away in sewers or drains from domestic (or industrial) establishments.</p>	<p style="text-align: center;">Water Resource: Industrial pollution</p>	<ul style="list-style-type: none"> • Toxic compounds, e.g. heavy metals and some pesticides, going straight into the water system • Acid rain - making water in lakes and rivers more acidic, run-off causes leaching of heavy metals from soil into water - fossil fuel pollutants SO₂ & NO_x dissolve in water clouds, and fall with the rain <p>Clean air acts have been passed to encourage industry to reduce its emissions through e.g. changing to low-sulfur fossil fuels, etc.</p>
<p style="text-align: center;">Pathogen</p>	<p>An organism, including bacteria and viruses, that can cause disease.</p>	<p style="text-align: center;">Leaching</p>	<p>The movement of a soluble chemical or mineral away from soil, usually caused by the action of rainwater</p>
<p style="text-align: center;">Effluent</p>	<p>A discharge of liquid waste</p>	<p style="text-align: center;">Algae</p>	<p>Plant-like, photosynthetic organisms that lack true stems, roots and leaves</p>
<p style="text-align: center;">Human Waste Facilities</p>	<ul style="list-style-type: none"> • Flush toilet - by hand or through a cistern, connecting to a sewer system or a septic tank • Pit latrine - platform over a pit • Composting toilet - like a pit latrine, but vegetable waste, straw, grass, sawdust and ash are added to produce compost • Open defecation - either through lack of facilities or cultural behaviour. Can lead to spread of disease. 	<p style="text-align: center;">Algae bloom</p>	<p>The rapid growth of algae in water, caused particularly by a surge in nutrients.</p>
<p style="text-align: center;">Chlorination</p>	<p>Adding chlorine-based substances to water to kill any disease-causing pathogens (bacteria, viruses and other microorganisms that cause disease.</p>	<p style="text-align: center;">Organic</p>	<p>Derived from living organisms</p>

Eutrophication

A sequence of events starting with enrichment of water by mineral nutrients or organic matter that leads to a reduction in oxygen levels in the water and the death of fish and other animals.

1. Nutrients enter water
2. Stimulate algae growth and an algal bloom
3. Algae die
4. Bacteria decompose dead algae, increasing the organic matter
5. Oxygen used up and level is lower
6. Fish and many other aquatic animals, including insect larvae, die.

