

Geography Chapter 3 notes!! ☹☹

Chapter 3: Water and its spatial distribution

What are the **physical states of water**?

- Water exists in the solid, liquid and gaseous states
 - The **solid** state of water:
 - **Ice** is water in its solid state.
 - Under cold conditions, water freezes into ice
 - Ice can be seen in: snow, glaciers and hail (all naturally occurring)
 - The **liquid** state of water
 - Water in its liquid state flows freely
 - Liquid water has no set shape but has a set volume
 - Water can be seen in its liquid form when it rains, and in rivers and reservoirs
 - The **gaseous** state of water
 - Steam is made of water vapour, water in its gaseous state
 - Water turns into vapour through evaporation
 - Since evaporation occurs at any time and temperature, water vapour is **always** in the air around us.

Water on earth is most commonly found in **water stores**.

What are **water stores**?

- Places where water can be contained in
- Categorised as:
 - Freshwater stores
 - Saltwater stores
 - Glaciers
 - Rivers
 - Lakes
 - Groundwater
 - Soil
- These places **all** contain freshwater, meaning they **all** contain water with low amounts of salt that can be used more readily
- **Oceans** are saltwater stores, which means that they contain too much salt to be used more directly
- Water stores are **not evenly distributed** on the Earth's surface
 - Water **can** still move from one store to another in movements known as **flows**.

- For example, glaciers could melt and flow into rivers, which may eventually flow back into the ocean.

What are **oceans**?

- Oceans are **large masses of water** that are **connected** to one another.
- There are 5 oceans in the world
 - The largest ocean is the **Pacific Ocean** which is surrounded by countries in **Asia, Australia and the Americas**
 - The second largest ocean is the **Atlantic Ocean**, which **separates countries in Americas from Europe and Asia**
 - The third largest ocean is the **Indian Ocean**, which is surrounded by countries in **Asia, Africa and Australia**.
- **Polar Bears** swim in the **Arctic Ocean**
- **Penguins** swim in the **Southern Ocean**

What are **glaciers**?

- Glaciers are large masses of ice that rest on land or float in the sea
- Found in places that snow throughout the year so that enough snow can accumulate and harden into ice
- Glaciers move very slowly because they are very heavy

What are **lakes**?

- Lakes are large water bodies surrounded by land
- Lakes may receive water from rain, snow or rivers

What are **rivers**?

- Rivers are natural wide flows of freshwater across the land that store water temporarily before water flows into another water body.
- Flow from places of higher elevation as gravity pulls water downwards
- A river source marks where a river begins
- A river mouth marks the place where a river flows into another water body.
- For example, Kallang River starts from Lower Peirce Reservoir and flows into to sea through Marina Channel. Therefore, Lower Peirce Reservoir is the river source while Marina Channel is the river mouth

What is **soil**?

- Soil refers to the topmost layer of Earth's surface where plants grow
- Has different names and contains different materials
- When it rains, water passes through the soil through very small openings know as **pores**,
- Water that is stored in the soil is known as **soil moisture**

What is groundwater?

- Groundwater is found **below** the surface of the Earth.
- Water enters the ground through the pores in the soil due to gravity
- Groundwater forms when part of this water makes its way to the rocks beneath, filling up the pores and cracks of these rocks
- Countries like China and India use groundwater to grow crops while countries like Indonesia and Thailand use groundwater for household for household activities

What is the hydrological cycle?

- The hydrological cycle is a sequence of processes that occur to ensure that water is naturally replenished on the earth. The hydrological cycle of a catchment goes something like this:
 - 1. Precipitation: Water falls as rain or snow if the air is cold enough.
 - 2. Groundwater: Water that seeps into the ground may be absorbed by plants or stored as groundwater.
 - 3. Surface runoff: Water flows from the highlands and over the ground surface into streams and rivers
 - 4. Evaporation: The Sun's heat causes water to evaporate. Water changes into water vapour.
 - 5. Transpiration: Plants give out water vapour through their leaves.
 - 6. Condensation: Warm moist air cools as it rises. Water vapour changes into water droplets. Small droplets combine to form bigger droplets. Large amounts of water droplets gather to form clouds.

What is a water budget?

- A water budget equation describes the flow of water in and out of a catchment area.
- Tells us how much water is available in an area
- Processes that **increase** the amount of water in a catchment are known as **inputs**
- Processes that **decrease** the amount of water in a catchment are known as **outputs**
- When the input is **more** than the output, more water is received than lost and the water is likely to have more than enough water available, a **water surplus**
- When the output is **more** than the input, more water is lost than received and the catchment is likely to have less water available than enough, a **water deficit**

- Similarly, for a catchment to consistently have enough water, its inputs and outputs need to be balanced.
- Rain add water to a catchment so precipitation is an input
- Surface runoff, evaporation and transpiration decrease the amount of water in a catchment, so these processes are outputs.
- These processes can be represented in a water budget equation:
 - $\text{Net} = \text{Input (precipitation)} - \text{Output (Surface runoff, evaporation, transpiration)}$
 - Water surplus occurs when input is more than output
 - Water deficit occurs when input is less than output.
- Since the amounts of input and outputs change throughout the year, the amount of water stored within a catchment changes as well, this is known as net change.
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