SNAPSHOT: Concepts and connections

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THE ROLE OF WATER

Water is a link to every topic in Geography Stages 4–6 Water:

- is essential to life on Earth
- connects people, places and environments through the water cycle and water based activities activities such as trade, tourism and the production and consumption of goods and services
- is an agent in the geomorphic processes that shape landscapes and landforms
- influences the liveability of places
- contributes to human-well being and quality of life
- is a climatic factor that determines the distribution and productivity of Earth's biomes, and their capacity to produce food .
- is affected by climate change and human modifications to landscapes, biomes and environments.
- is a natural resource impacted by population growth and human activities
- causes political conflict and population movements
- influences types and patterns of economic activities such as agriculture and tourism.
- has cultural, spiritual, economic, environmental and aesthetic values to people

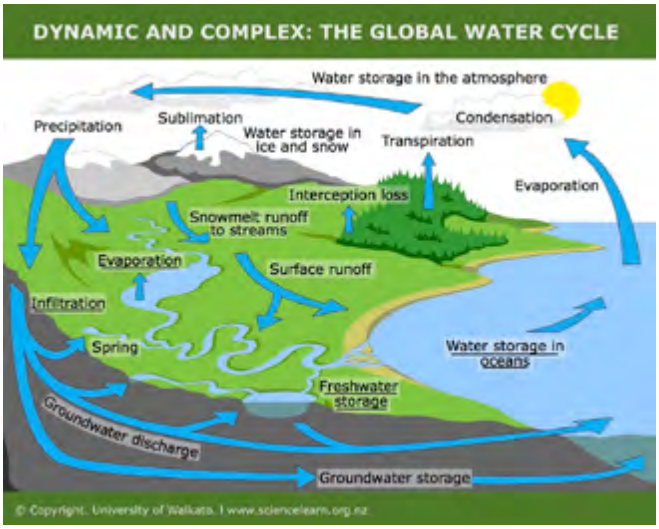
The hydrological (water) cycle

A catchment is an area where water is collected by the natural landscape. Water moves through a catchment via the processes of the water (hydrological) cycle. As it moves water connects people, places and environments. For example, in a catchment, water that falls as rain on higher land will travel through different environments such as forests, rivers and wetlands and be used by people for a range of activities such as agriculture and drinking water as it travels above and below the surface towards the ocean.

'The water cycle is one of the largest physical processes on earth, with the earth's water used over and over again'

Water NSW

SOURCE A: The Water Cycle



Source: https://en.wikipedia.org/wiki/Water_cycle#/media/File:Diagram_of_the_Water_Cycle.jpg

Water Cycle processes

The key processes changing the state and location of water are:

- evaporation
- condensation
- precipitation
- infiltration
- runoff

Understanding hydrological processes is essential to effective and sustainable management of places, environments and human activities.

Global water cycle

At a global scale the amount of water stays basically the same year after year and there is a balance between evaporation and precipitation. Evaporation and precipitation occur all over the earth, continuously and at the same time.

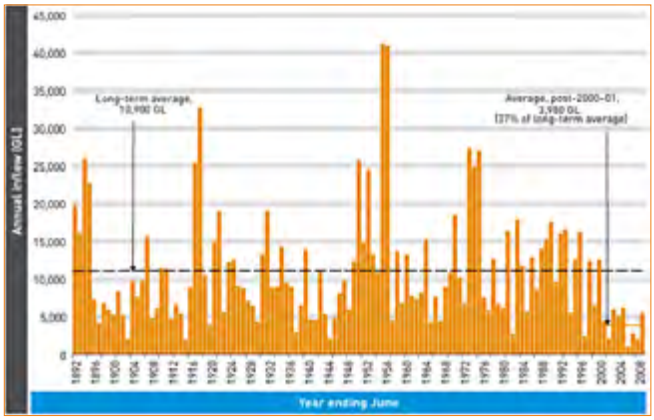
Water cycle in a catchment

The amount of water in a catchment (also known as a watershed or drainage basin) changes over time. Water is gained or lost via wind and clouds as water vapour and water droplets. People live in catchments and rely on the available water resources which could include rivers, wetlands and groundwater. Sometimes water needs to be transferred from other catchments by pipelines to satisfy demand. Natural environments in a catchment also rely on its water resources

SOURCE B: Features of a catchment

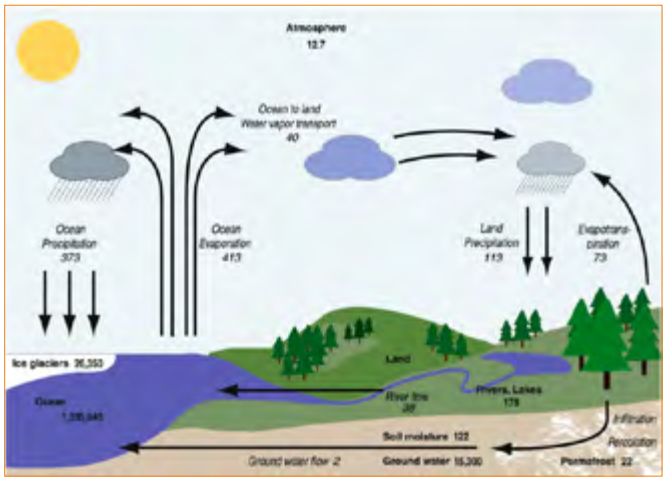
Rainfall variability refers to natural changes in annual precipitation. Australia has very high rainfall variability. Large variations can result in droughts and floods.

SOURCE C: Yearly rainfall variability in NSW



Source: https://www.mdba.gov.au/sites/default/files/archived/annualreports/2009-10/chapter3-2.html

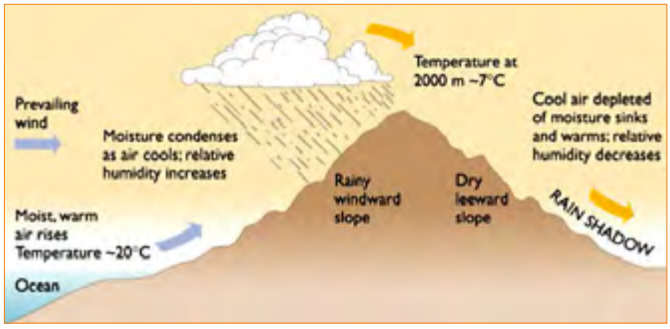
SOURCE D: The Global Water Cycle



Factors influencing how the water cycle works in a catchment particularly precipitation include:

- altitude and topography
- latitude and distance from the sea
- ocean currents and circulations
- air pressure and wind direction

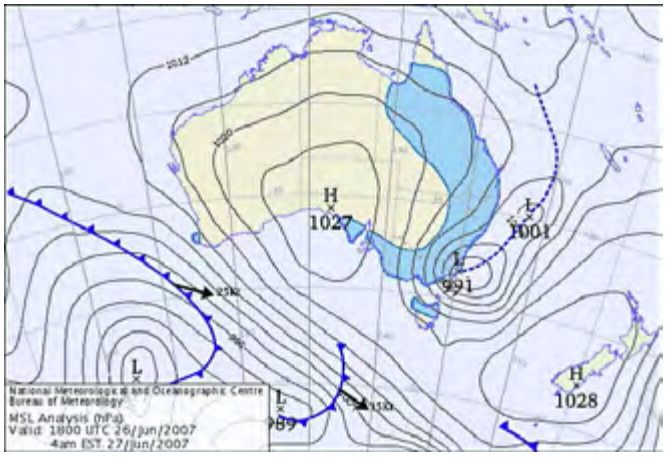
SOURCE E: Altitude, topography and rain



Source: https://studylib.net/catalog/Science

Orographic rainfall forms as air rises over mountains and a rainshadow tends to develop as air descends the other side.

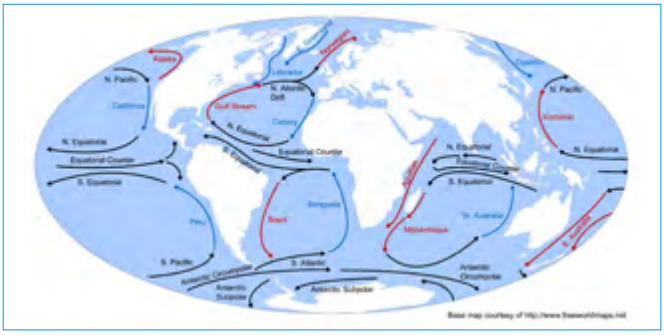
SOURCE F: Low air pressure and rain



Source: http://www.bom.gov.au/nsw/sevwx/facts/events/june-07-ecl/

Low pressure is associated with unstable (rising) air and creates the chance of precipitation occurring. As air rises it cools and water vapour condenses. This can result in result in precipitation. Each year, East Coast Lows bring heavy rain to the NSW coast. High pressure is associated with stable (sinking) air. When air sinks it becomes warmer and is less likely to form clouds and bring precipitation.

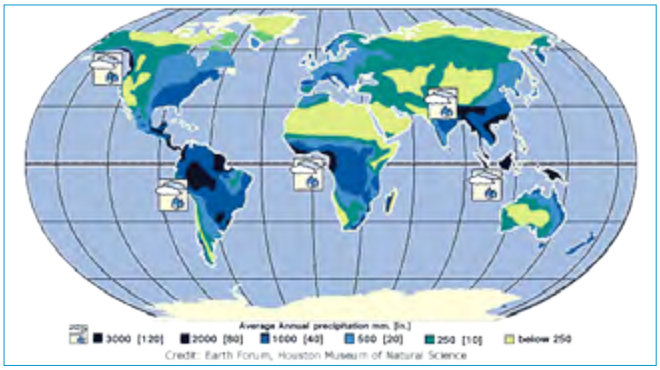
SOURCE G: Warm and cold ocean currents



Source: http://www.ecn.ac.uk/what-we-do/education/tutorialsweather-climate/climate/factors-affecting-climate

Ocean currents act like a conveyor belt, transporting warm water and precipitation from the equator toward the poles and cold water from the poles back to the tropics. Cold currents result in less rainfall due to less evaporation compared to warm currents.

SOURCE H: Latitude and distance from the sea



Source: https://www.usgs.gov/media/images/generalizedworld- precipitation-map

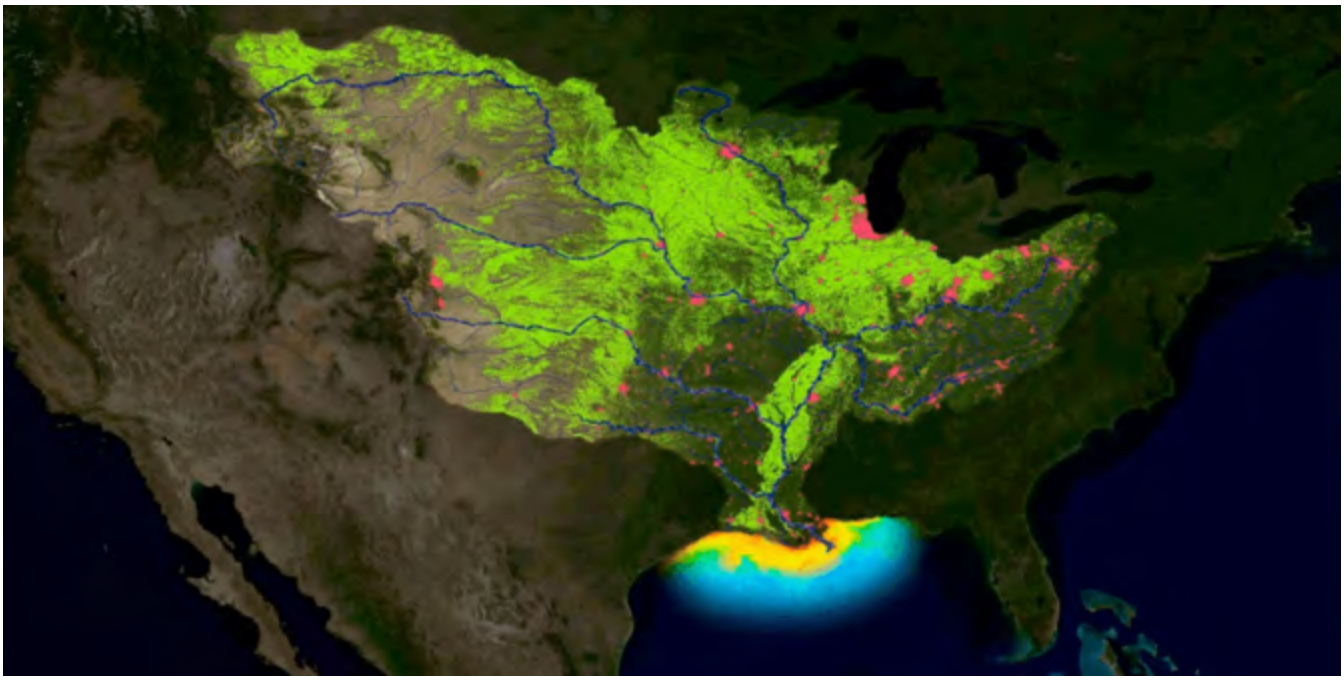
The wettest places on Earth are in the **low latitudes** (between the tropics) where hot, moist air brings heavy rainfall and along coastlines where moist winds carry moisture onto the coast. Other influences such as altitude and ocean currents impact on these patterns.

Catchment connections

Water connects people and places within a catchment and needs careful management. Activities in the upper catchment such as dam building, urban settlements and agriculture, will impact on users downstream. When water the quantity and quality are reduced there are consequences for people and environments.

Water connects environments within and outside of a catchment such as wetland, rivers and marine environments like coral reefs. Some species live in both land (terrestrial) and marine environments, moving from fresh to salt water during their life cycle. Corals rely on clear water. Activities in a catchment affect water availability and quality important for the health and survival of environments. Dead zones form in marine environments such as the Gulf of Mexico as a result of polluted freshwater discharged from catchments.

SOURCE I: Catchment connections



The Mississippi River catchment and the Gulf of Mexico Dead Zone Source: https://news.umich.edu/very-large-dead-zone-forecast-for-gulf-of-mexico/