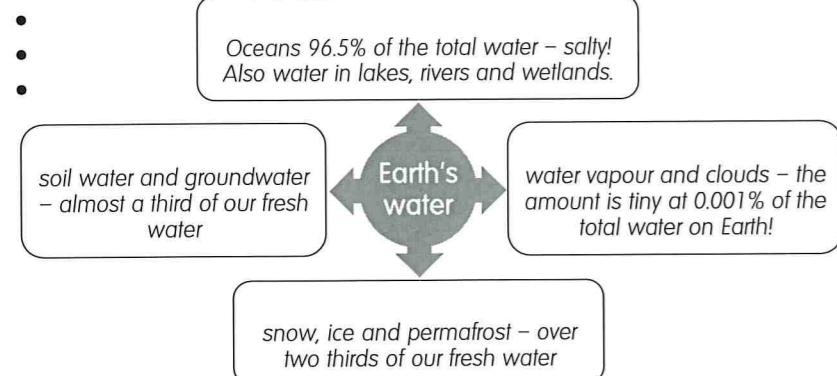


WHERE'S OUR WATER?

Water exists as:

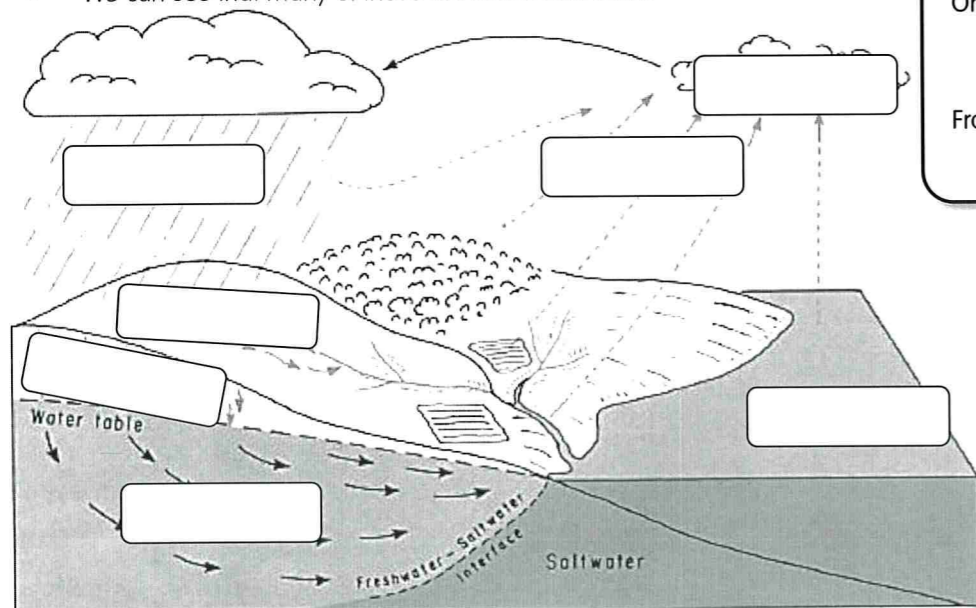


Water can go from liquid to gas (evaporation), gas to liquid (condensation), ice to gas (or gas to ice) – sublimation, freeze to ice and back into liquid water.

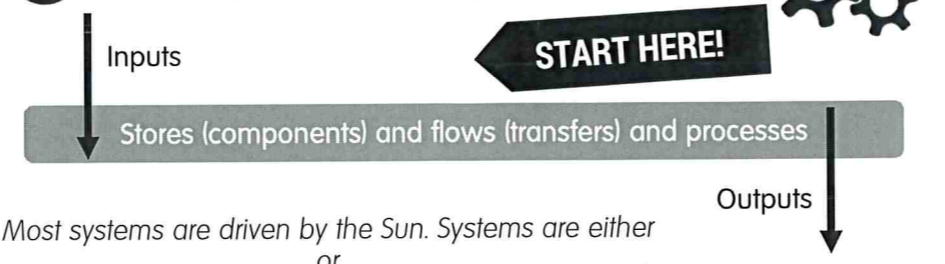
ARE WE CHANGING THINGS?

THE WATER CYCLE AT THE HILLSLOPE LEVEL

- Evaporation:** The Sun provides energy – to water from the oceans, from the land surface, and from vegetation.
- Condensation:** The water vapour rises and to form clouds and, therefore, precipitation.
- Precipitation:** The precipitation falls on the land – some is by trees (some will drip off to the ground or run down the trunks as and some will evaporate). Some will into the soil and eventually into rock to form the groundwater below (flowing underground). Some will flow through rivers and eventually flow into stores, such as lakes, and eventually the ocean.
- Transpiration:** Trees and vegetation – water flows through the plants from the soil into the air.
- We can see that many of these are stores and flows!



WHAT ARE SYSTEMS?



Most systems are driven by the Sun. Systems are either _____ or _____.

Open systems have _____ of energy and material. Closed systems only transfer _____ in and out.

The water cycle is a closed system overall, but small-scale _____ are open systems.

There are four linked open systems – the atmosphere, the hydrosphere (water), the lithosphere (rock) and the biosphere (living world).

If the inputs and outputs are balanced, the system is in a state of _____.

Processes called _____ change the equilibrium – positive feedback pushes the system _____ from the previous equilibrium and negative feedback restores the system _____ towards the previous equilibrium.

The WATER CYCLE

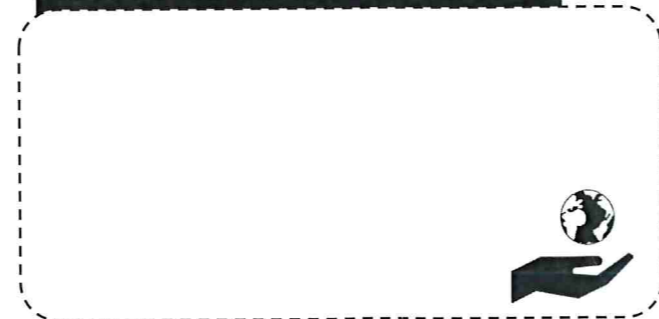
WHY DOES IT RAIN?

Condensation:

Orographic:

Frontal:

SYNOPTIC GEOGRAPHY



THE WATER BALANCE (BUDGET)

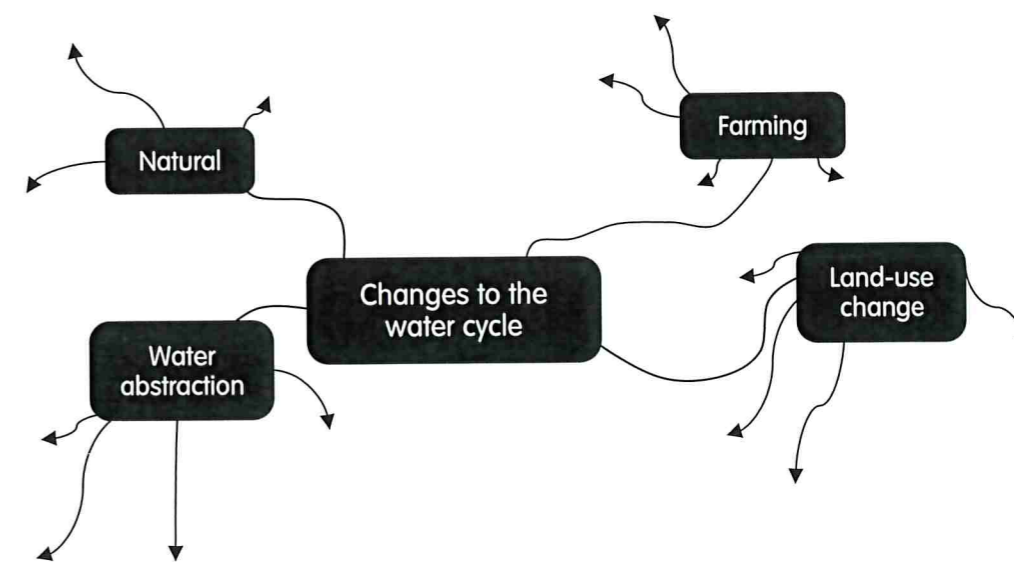
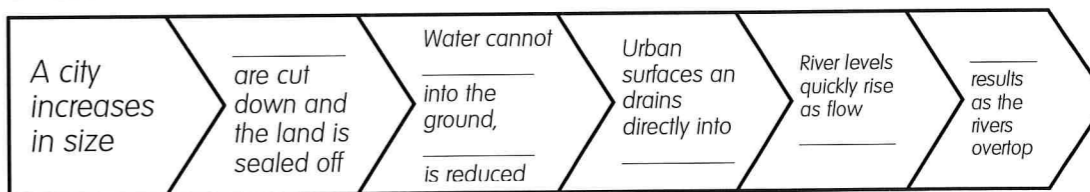
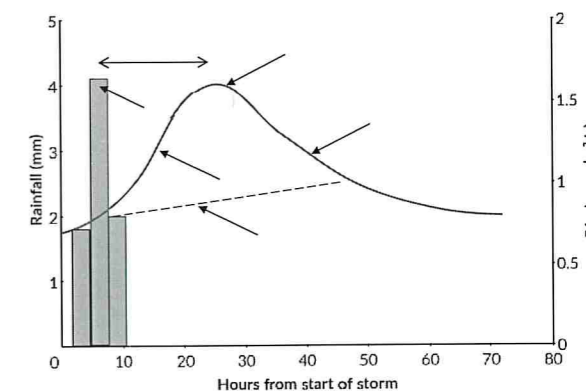
- We can calculate the water balance of both catchments and the soil. We use the equation:
Precipitation = _____ + _____ ± _____
- The soil moisture budget

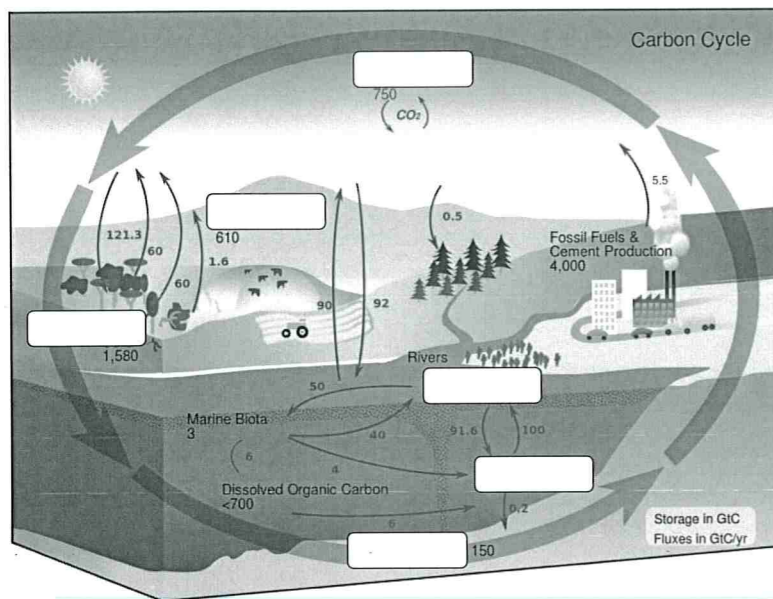
- River flow

THE FLOOD HYDROGRAPH

A representation of river flow – how the river flow changes after precipitation.

- Natural factors:
- Human factors:





PROCESSES WITHIN THE CARBON CYCLE

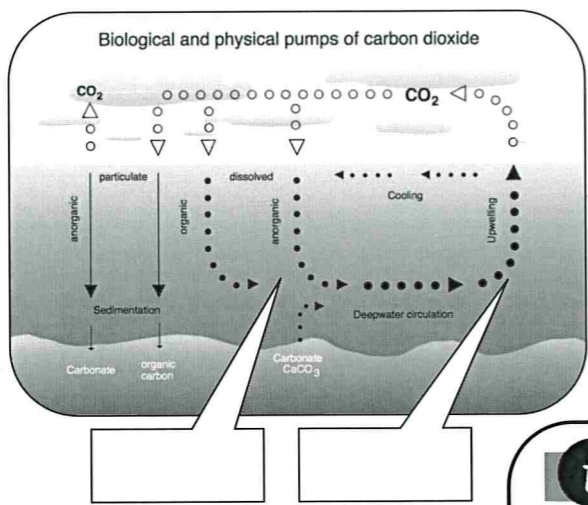
- Photosynthesis
- Respiration
- Decomposition
- Combustion
- Weathering

CHANGES TO THE CARBON CYCLE

- Humans are releasing huge amounts of CO₂ through
- Farming releases CH₄ through
- Humans are also increasing the number of wildfires – both deliberately and accidentally
- Deforestation releases
- As population grows and countries develop

THE FAST AND SLOW CARBON CYCLES

- Carbon can either be organic (from living things), or _____ – from rock.
- The carbon cycle is a continuous _____.
- There are essentially two carbon cycles – the _____ carbon cycle (months to years) and the _____ carbon cycle (hundreds of years to millennial).
- The fast carbon cycles transfer CO₂ between the oceans and _____ (oceanic inorganic carbon pump), and living things quickly store and release carbon.
- The slow carbon cycle includes the formation of _____, including burial and compaction of ocean sediments, and the release of CO₂ from the mantle to the atmosphere by volcanic activity.
- _____ are very good at altering the carbon cycle.



SYNOPTIC GEOGRAPHY



The CARBON CYCLE

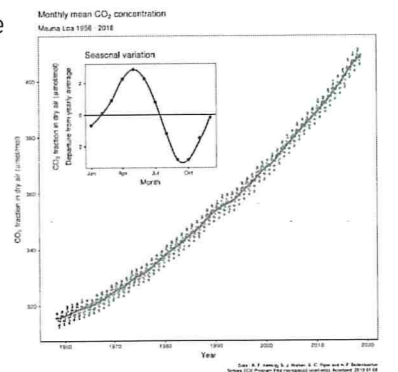
i THE CARBON BUDGET

The difference between inputs and outputs. Change from natural processes to human changes. Humans are changing the stores and fluxes – decreased stores of _____ carbon. _____ carbon.

Changing the budget can have _____ loops (+ve and -ve).

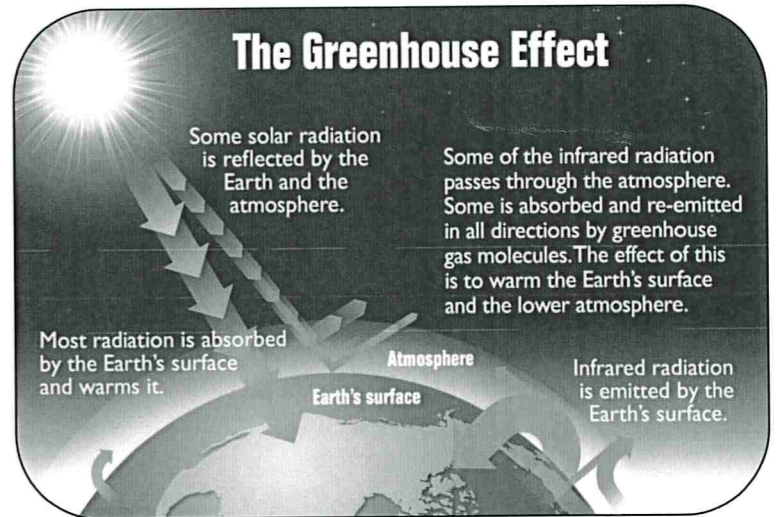
Land:
 More CO₂ = more plant growth -> decrease in _____ (-ve feedback)
 More CO₂ = melting of permafrost -> release of _____ (+ve feedback)
 Knock-on effects on weather and droughts, agriculture, and ecosystems.

Oceans:
 Thermal expansion and melting ice cause sea level to rise.
 _____ from dissolved CO₂ – coupled with increased temperatures – is disastrous for coral reefs. Reduced albedo from melting ice -> decreases albedo -> more warming (____ve feedback).



THE ENHANCED GREENHOUSE EFFECT

- Gases such as _____ are greenhouse gases.



i WHERE'S THE CARBON?

Hydrosphere –

Lithosphere –

Atmosphere –

Biosphere –

Cryosphere –

_____ of carbon are measured in gigatonnes.
 _____ absorb more than they emit, sources of carbon release the carbon faster than they absorb carbon.

The movement between the stores (_____) is measured in gigatonnes per year.

Atmospheric CO₂ is measured in ppm – parts per _____.

i WHAT ARE SYSTEMS?

Inputs

Stores (components) and flows (transfers) and processes

Outputs

Most systems are driven by the Sun. Systems are either _____ or _____.

Open systems have _____ of energy and material. Closed systems only transfer _____ in and out.

The water cycle is a closed system overall, but small-scale _____ are open systems.

There are four linked open systems – the atmosphere, the hydrosphere (water), the lithosphere (rock) and the biosphere (living world).

If the inputs and outputs are balanced, the system is in a state of _____.

Processes called _____ change the equilibrium – positive feedback pushes the system _____ from the previous equilibrium and negative feedback restores the system _____ towards the previous equilibrium.

START HERE!

i REDUCING OUR IMPACT

There are strong links between the water and carbon cycles, and both are vital for life on Earth. We're causing changes, and we need to limit the effects because of the positive feedback cycles that warming has.

For example, we can:

- ✓
- ✓
- ✓
- ✓



CASE STUDY FOR A TROPICAL RAINFOREST:

INTRODUCTION TO...

ENVIRONMENTAL CHANGE

WHO LIVES THERE?

RELATIONSHIPS BETWEEN THE ENVIRONMENT AND HUMAN ACTIVITY

Slash and burn - sustainable?

WHAT ARE THE SOLUTIONS?

Just how important?

Mind Map

Deforestation occurs.



CASE STUDY FOR A LOCAL RIVER CATCHMENT:

INTRODUCTION TO...

USES OF THE RIVER

FLOODING

Photos

USES OF THE CATCHMENT

Discharge Graph