The Water Cycle

National curriculum objectives (year 4):

- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

Science in the news today

Ladakh, at the northern tip of India, beyond the Himalayas, is one of many places in the world that is suffering a problem with the water cycle. In the past they have lasted the Spring and Summer using melting winter snows and glaciers. However in recent years, by the time it gets to Spring, there is very little water, causing issues for farmers rearing goats and growing wheat and barley.

So what is causing this problem? Climate change. A rise of around one degree Celsius in winter temperatures during the past forty years has damaged Ladakh's water cycle forcing local people to think of innovative solutions, such as these ice stupas. Designed to be cone shaped to reduce the area exposed to the sun, the stupas stay frozen in the shade mountain peaks, and then melt slowly through the Spring and Summer, providing vital water to the surrounding areas.

Here is a picture of a stupa

One of Northern India’s ice stupas, that serves as a water tower, storing winter meltwater for spring.

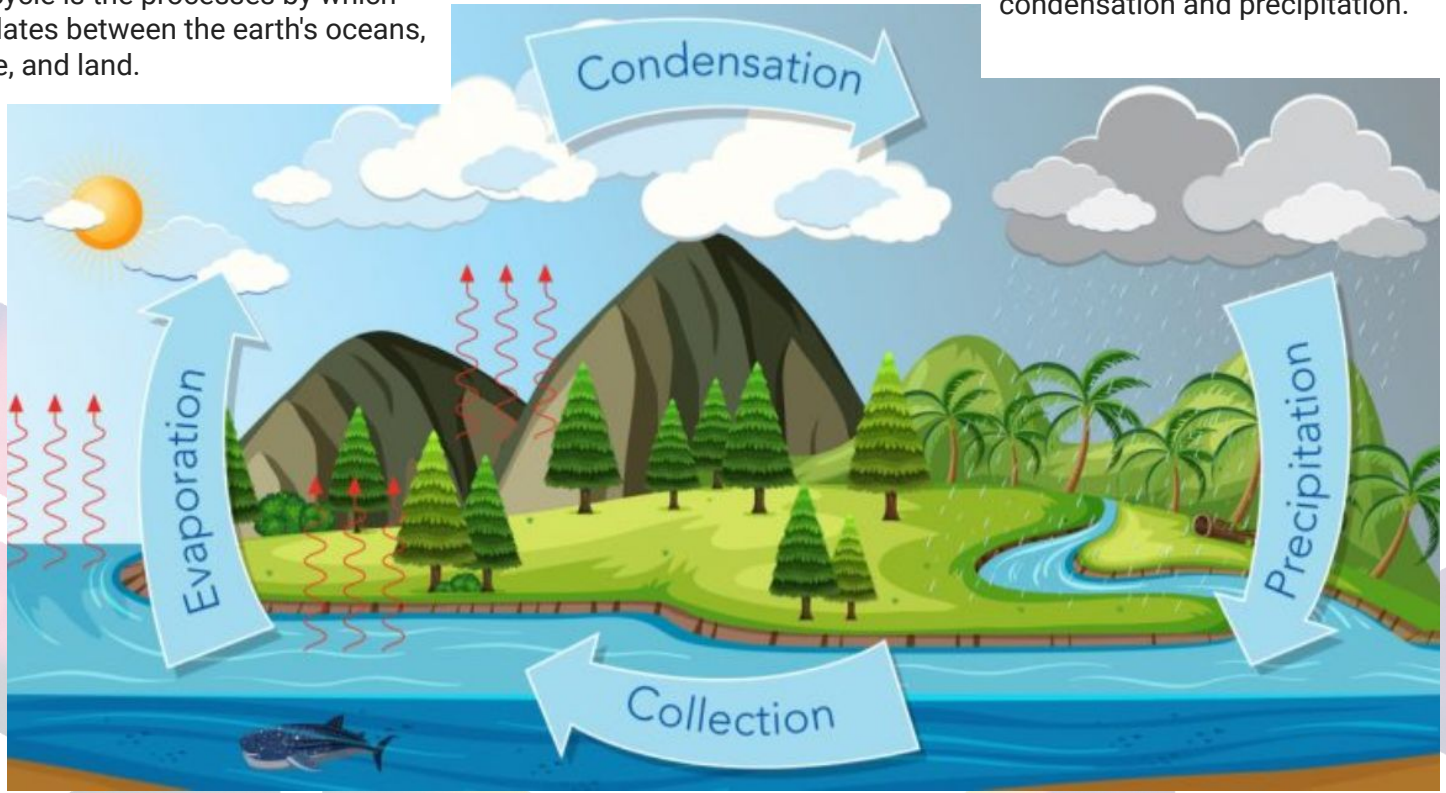
Water!

There is a lot of water on Earth. It is in the sea, lakes, rivers, ponds, puddles, clouds, rain, water vapour, streams, hailstones, ice caps, glaciers, snowy mountain tops and also in our glasses when we have a drink of water!

What is the water cycle?

The water cycle is the processes by which water circulates between the earth's oceans, atmosphere, and land.

There are three main processes: evaporation, condensation and precipitation.



What is evaporation?

Evaporation is the process of turning from liquid into vapour. When looking at the water cycle, this is when the sun heats up water, for example in rivers, lakes or the ocean and turns it into vapour. The water vapour leaves the river, lake or ocean and goes into the air. Evaporation happens more quickly in higher temperatures.

What is condensation?

Condensation is the opposite of evaporation. Condensation is the process by which water vapour in the air is changed into liquid again. Condensation is crucial to the water cycle because it is responsible for the formation of clouds. Clouds are usually formed when air rises and the water vapour within it cools.

It's not easy to see in the clouds so here's an example of condensation forming on the inside of a teapot instead. As the water vapour hits the cooler glass of the teapot, it changes into liquid again and forms droplets.

What is precipitation?

Precipitation is water that falls from clouds in the form of rain, freezing rain, sleet, snow, or hail. Most precipitation falls as rain. And what comes after precipitation? Evaporation! This is the water cycle.

Evaporate that puddle!

What do you need?

- Water
- A plastic cup or container
- A piece of chalk
- A timer or clock
- A sunny day (definitely not a rainy day!)

Instructions:

1. First, get a plastic cup and fill it with water.
2. Next, go outside into the sun and find a clear bit of tarmac, paving or pavement (always go with an adult if you are going out to the pavement).
3. Then, crouching low, pour the water onto the ground to form a puddle.
4. After that, draw around the puddle with your chalk.
5. Turn your timer on now and set an alarm to observe your puddle at regular intervals e.g. every 20 minutes. Each time you visit the puddle, draw a new outline of the puddle.
6. Finally, turn your timer off when your puddle has evaporated. How long did it take? Can you explain where the water went to friend or family member?
   Top tip - repeat this experiment with the same amount of water but spread out over a larger area (you could use your feet or a broom to spread the water out). Will this evaporate quicker or slower? Why?m.

Make a mini water cycle

What do you need?

- A large bowl
- A smaller container, cup or mug (you could use a jar or pot too)
- A piece of cling film
- Water
- Large elastic band or string
- Small weight (you could use a small piece of fruit household item)
- A sunny day!

Instructions:

1. First, place the smaller container in the middle of the large bowl.
2. Next, pour water in the bottom of the large bowl (not in the smaller container)
   Top tip - if you are allowed to draw on the bowl, draw a line to show where the water level is
1. Then, cover the large bowl with cling film and secure in place with an elastic band or string
2. After that, place the small weight on top of the cling film, over where the smaller container is.
3. Finally, take your mini water cycle outside, leave in a sunny location and set an alarm to come back and observe regularly. What happens?

SPOILER ALERT!

The water in the large bowl (you could pretend this is the sea, a river or a puddle) will evaporate and create condensation on the cling film (you could pretend this is the clouds). The condensation will flow down to the centre of the cling film because you put a weight there. Then it will begin to drip down (as precipitation) into the smaller container (you could pretend this is the land, mountains or sea again). These are some of the processes in the water cycle!