Water cycle world

A discussion activity on the natural water transformations on Earth

Water into the atmosphere

Ask pupils to make a list of all the different ways they can think of that water can get into the atmosphere (to form water vapour gas). You may wish to give them some 'starters' such as: from a boiling kettle of water; from drying washing; from breathing; from a lake.

Laundry on the ghats ,Varanasi , India

Water from the atmosphere

Then ask the pupils to list all the ways they can think of that water can come out of the atmosphere. Possible starters include: condensation on a window; frost; condensation onto water droplets, which then fall as rain.

Snowball sized hail in Finland, 10th July 2006.

Water on the move

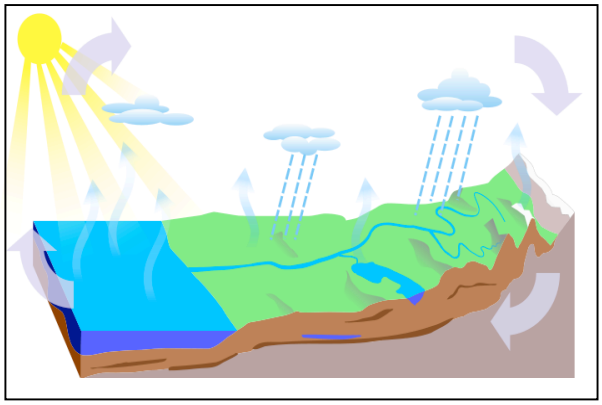
Then ask for a list of all the ways that water can be transported. Starters – evaporating water vapour rising into the air; falling rain; percolating into soil; moving glaciers.

Rain falling on the streets of Calcutta, India.

Water cycling

Finally, ask the pupils to use their lists to label an enlarged copy of a water cycle diagram like the one below, with the different ways that:

- water can get into the atmosphere;
- water can come out of the atmosphere;
- water can be transported.



The back up

Title: Water cycle world.

Subtitle: A discussion activity on the natural water transformations on Earth.

Topic: Pupils apply their understanding of the water cycle to the 'real world'

Age range of pupils: 7 – 12 years

Time needed to complete activity: this depends upon the quality of the discussion involved.

Pupil learning outcomes: Pupils can:

- recount a range of ways in which water enters and leaves the atmosphere;
- recount many of the different ways in which water is moved on Earth.

Context:
The answers and discussions depend on the ability and knowledge of those involved. Full listings might include the following, but many of these are more appropriate for older pupils. You could challenge them with a number of transformations to list, eg. more than 20 are given below.

Water into the atmosphere – possibilities include:
- from boiling water in any circumstances;
- from evaporation of any uncovered water surface at home;
- from evaporation from any damp object at home;
- from evaporation from any natural water surface, including gutters, streams, rivers, puddles, ponds, lakes and the sea;
- from evaporation from any natural damp surface, such as soil or any wet surface after rain, snow, fog, etc;
- from trees and other plants by transpiration;
- from biological processes of animals, such as breathing and perspiration;
- directly from solid ice (sublimation).

Water from the atmosphere:
- condensation on any cold surface, such as windows or a cold can of drink (try breathing onto cold glass);
- natural condensation on the ground as dew or, if below freezing, frost;
- condensation in the air to form water droplets in clouds, mist and fog;
- condensation in the air below freezing point to form ice crystals in clouds;
- the further condensation on water droplets/ice crystals until they are large enough to fall as rain, snow, sleet, or hail;
- mist and fog dampening surfaces.

Water on the move - in a myriad of ways including:
- water vapour rising as above, being moved by wind and then falling, as above;
- falling as rain, snow, sleet or hail;
- liquid water flowing downhill (gutters, streams, rivers);
- liquid water moving in the sea (waves, tides, ocean currents);
- liquid water flowing through rocks/soils (percolation into soil and the rocks beneath, groundwater flow, water flowing from the ground in springs);
- ice flowing downhill (glaciers, ice sheets);
- icebergs carried by ocean currents;
- water rising through plants in transpiration;
- water being moved in the bodies of animals (breathing, perspiration, in digestion);
- people carrying water (water bottles, water bags in arid areas)
- water being carried in mobile water tanks.

These can be summarised on a water cycle diagram as water:

… into the atmosphere	… from the atmosphere
• from boiling water • evaporation of water at home from water surfaces and damp surfaces • evaporation from natural water surfaces and damp surfaces • transpiration from plants • biological processes of animals • from solid ice	• condensation on the ground • condensation on cold surfaces • condensation in the air as water droplets • condensation in the air below freezing as ice crystals • further condensation on growing droplets or ice crystals • condensation from mist or fog

… on the move
• water vapour being moved in the air (rising, falling or sideways) • falling through the air • flowing liquid water • moving sea water • movement through soils and rocks • ice flowing downhill • icebergs moving • water rising through plants • water moving in the bodies of animals • people carrying water

Following up the activity:
Ask the pupils to discuss and describe how the processes they have listed could be demonstrated in the classroom.

Underlying principles:
- Water becomes invisible water vapour gas in a number of ways, including: evaporation, from boiling water, through transpiration in plants and respiration and perspiration in animals and by sublimation from solid ice.
- Water vapour condenses to liquid water or ice, if below freezing point, in a range of different circumstances.
- Water moves in a myriad of ways, some of which are listed above.

Thinking skill development:
When pupils appreciate the pattern of water movement under the headings above (through construction) – they find it easier to suggest different routes. Disagreements in discussion may provoke cognitive conflict.

Resource list:
None

Useful links:
see the other Earthlearningidea 'watery' activities at:
http://www.earthlearningidea.com/home/Teaching_strategies.html

Put "water cycle song" into a search engine like Google™ to find several songs at different learning levels. By just inserting "water cycle", you will find a range of other water-related activities.

Source: Devised by Chris King of the Earth Science Education Unit.

The progression of thinking skills shown by the Earthlearningidea Water Cycle activities

Earthlearningidea	Strategies and skills developed
Changing state – transforming water: practical activities to change the state of water; solid, liquid, gas	Demonstrations of the change of state of water in a tactile way, enabling language skill development
Mini-world water cycle: a water cycle demonstration model in a box	Demonstration of key water cycle processes in a simple model, allowing bridging to the more abstract water cycle and the development of higher level thinking skills through discussion
Water cycle world: a discussion activity on the natural water transformations on Earth	Extended discussion about the different elements of the water cycle and the many different products of the cycle
'Tagging' water molecules – to explore the water cycle: a thought experiment to investigate the water cycle	A 'thought experiment' to encourage creativity and imagination in pupils in the context of the water cycle
Cycling water and heat in the lab – and the globe: demonstrating the water cycle, latent heat and global energy transfer	A lab demonstration of the water cycle, extended to promote higher level thinking skills and an understanding of the abstract process of latent heat transfer