Year 7
Lesson 4
Groundwater

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Learning Objectives

Students will be able to:

- Understand what groundwater is and where it is derived from.
- Understand key terminology associated with groundwater processes, including aquifer; water table, infiltration and porosity
- Understand issues associated with the management and use of groundwater supplies

Learning outcomes

Outcomes Subject	Strand & Content Descriptors
Science	Science Understanding • Some of Earth's resources are renewable, but others are non-renewable (ACSSU116) • Water is an important resource that cycles through the environment (ACSSU222) Science as a Human Endeavour • Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management (ACSHE121) • Science knowledge can develop through collaboration and connecting ideas across the disciplines of science (ACSHE223) • People use understanding and skills from across the disciplines of science in their occupations (ACSHE224)
Geography	Geographical Knowledge and Understanding • Water is a resource that links places together as it moves through the water cycle • Water is a difficult resource to manage because it moves through the environment, is an essential but shared resource, has competing uses and is highly variable over space and time • Aboriginal Peoples and Torres Strait Islander Peoples have contributed to the knowledge about water resource management within Australia • There are several strategies for increasing water supply and reducing water use, such as dams, desalination, charging higher prices, aquifer recharge and storage, recycling, changing the uses of water, and trade in virtual water Geographical Skills and Inquiry • Develop geographical texts using appropriate geographical vocabulary, concepts and geographical conventions to communicate effectively in one or more of the following forms: written, oral, visual and graphic

Important Questions

- Should groundwater supplies be managed in the same way as other resources?
- Is groundwater free?
- How is groundwater utilised in our region?

Lesson Plan

This lesson provides an understanding of the formation of groundwater supplies and considers their management and use in comparison with other water resources.

Introduce the term 'groundwater' and ask students to contribute definitions or explanations for the term. The use of graphics or images showing windmills; bores, wells or other relevant images can assist. Some students may use groundwater at home or have used it in other parts of Queensland – for agricultural purposes for example.

Pose the questions: Where does the water in groundwater come from? Are groundwater supplies associated with the natural water cycle?

As appropriate reinforce key aspects associated with the water cycle: groundwater supplies are part of Earth's supply of water which is constantly recycled through processes of evaporation, condensation and precipitation. During rainfall events some rain will flow over the surface of the Earth and eventually return to rivers and oceans – this is referred to as runoff. However some soaks into the soil and eventually travels below the soil surface to be stored in aquifers as groundwater – this process is called infiltration.

In small groups students are provided with three clear plastic or glass containers (straight sided soft drink bottles with the tops cut off are suitable) and instructed to fill one container with sand; one with gravel; and one with a clay (or soil mixture containing clay).

Students are first asked to record comparative observations of the samples, particularly in relation to the particle size of each sample and the space between the particles (the space between particles is referred to as porosity) and predict which sample will allow water to flow more freely through the container. These observations and predictions are recorded.

Students carefully pour water into each container and record observations. Did they observe a relationship between the space between particles (porosity) and the speed of the water?

Introduce the term permeability which describes the speed at which water moves through soil. If they continue to pour water into the sample what happens?

Like surface water supplies, groundwater can be polluted – use food colouring, jelly crystals or drink powder to represent pollution, place it on the surface of the samples, pour water over it, observe and record.

What happened to the ‘pollution’; did the ‘pollution’ move through all samples in the same way and at the same speed?

Observations and predictions are recorded and accompanied with diagrams and appropriate terminology to produce a report on groundwater processes.

Follow up activities associated with groundwater management are included in Additional Activities below.

Resource Requirements

- Samples of sand, gravel and clay based soil; containers
- Poster: Our Urban Watercycle

Additional Activities

Groundwater in the neighbourhood: Investigate groundwater resources in your region; identify what they are used for and how they are managed (e.g. are there restrictions on how you can use the water or how much you can use?)

The Great Artesian Basin: The GAB is a groundwater resource that stretched from Cape York in Northern Queensland to Dubbo in New South Wales. Research the GAB and identify; how was the basin formed: How has the water and associated environments been used and viewed by both Indigenous and European Australians? How is the GAB managed to ensure long term sustainability?