Year 7 science
Is water renewable?

Australian Curriculum links: Year 7 Science
Some of Earth's resources are renewable, including water that cycles through the environment, but others are non-renewable (ACSSU116)
People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity (ACSHE121)
Sustainability cross-curriculum priority

In this lesson, students appreciate how long our finite supply of water has been on Earth and evaluate whether or not this resource is renewable.

Preparation

For the 'how old is water on Earth' activity choose any historical touch-down points that may be of interest to your class and calculate the clapping time (see Lesson steps 3-7).

Lesson steps

Where did water on Earth come from?

1. Water is so much a part of our everyday lives that we tend to take it very much for granted. Ask students to consider where Earth's water came from and how long it has been here. They share their initial ideas with the class.

2. Explain that there are a number of theories about how Earth got its water. For instance, the water might have arrived from space when icy comets collided with the young Earth. Alternatively, it could have been made by chemical reactions deep inside the Earth.

   Optional: How Earth got its water is a good example of the dynamic nature of science knowledge. Students research current and emerging answers to this question. Online articles from New Scientist are a good place to start.

How old is water on Earth?

3. Despite the controversy about how water got to Earth, scientists (geologists) are in general agreement about how long it has been here – at least 4.5 billion years. Comprehending 'deep time' can be a challenge. One way to understand how long different periods of time take to pass is to use hand claps. We can represent the passing of each year by one clap of the hands every second[2].

   Geologists are scientists who gather evidence about the different types of rocks and landforms to work out how places have changed over time.

4. Ask a student to volunteer his or her age. The class claps it out. Clap out the ages of two or three students.

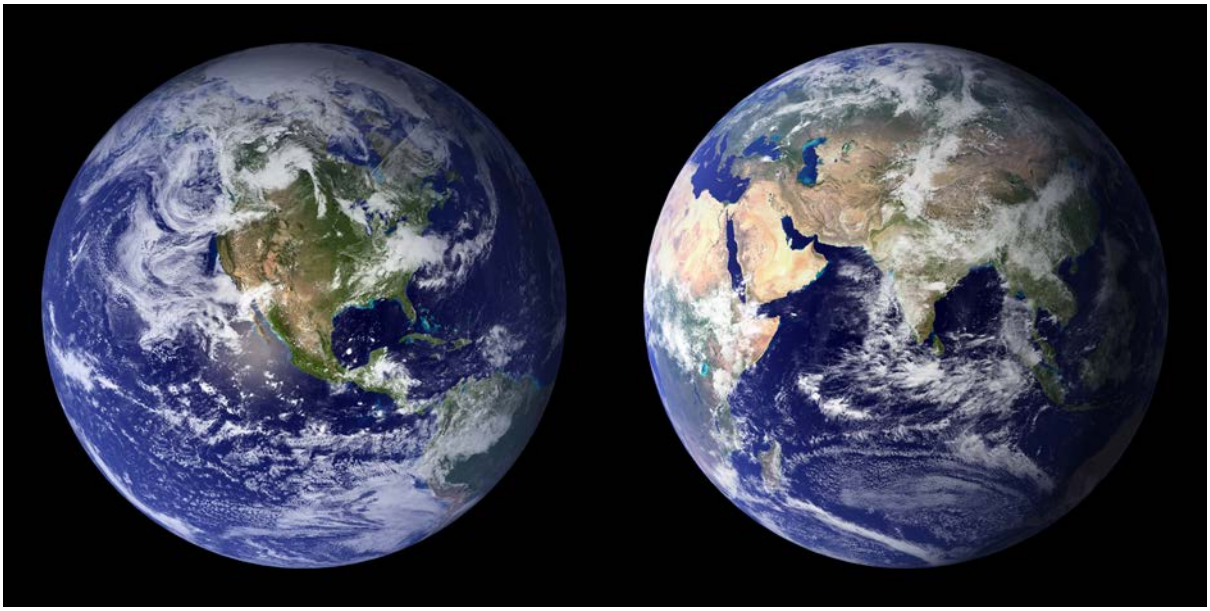
[2] This activity was adapted from: Clary R. & Wandersee J. (2009). How old? Tested and trouble-free ways to convey geologic time. Science Scope, National Science Teachers' Association.

5. Europeans landed in Australia 240 years ago. How long will it take to clap out 240 years that Europeans have been settled in Australia? How long is 240 seconds? If there are 60 seconds in a minute, how many minutes in 240 seconds? [4 minutes].

6. Aboriginal people have been in Australia for at least 60,000 years. If there are 60 seconds in a minute, how many minutes are there in 60,000? [1000 minutes] If there are 60 minutes in an hour, how many hours would it take to clap out 60,000 years? [about 17 hours].

7. Geologists think that the Earth was formed about 4.5 billion years ago and that water accumulated on Earth since then. If 4.5 billion years is 4,500,000,000 years, how many hours would you have to clap out this time period? [about 143 years – assuming 365 days in a year]

8. Complete the activity with a creative thinking exercise. Explain that once water condensed on Earth around 4.5 billion years ago, virtually no water has been added to our planet. Think about the water that is in your body. What water cycle pathways might that water have taken during the 4.5 billion years it has been on Earth?



Renewable or non-renewable?

9. If the Earth has a finite volume of water, is it a renewable or non-renewable resource? In groups, students use print and electronic references to devise their own definition for renewable and non-renewable resources. They use their definition to decide if water is a renewable or non-renewable resource and justify their position in a whole-class discussion.

   A class discussion about whether water is a renewable resource provides an opportunity to highlight the idea that there can be many ‘right’ answers to a question depending on the way the term is defined and the particular focus of interest. For instance, if a renewable resource is defined as a resource that is renewed or replenished by natural processes, then water on Earth could be regarded as a renewable resource. If the focus of the discussion, however, is on local drinking water supplies, it could be argued that

water is a non-renewable resource as it is possible to deplete these resources. Note the following definition of a renewable resource from the Earth and Environmental Sciences senior secondary content descriptions:

> Renewable resources are those that are typically replenished at time scales of years to decades and include harvestable resources (for example, water, biota and some energy resources) and services (for example, ecosystem services) (ACSES076)**Error! Bookmark not defined.**

The discussion can also address the sustainability cross-curriculum priority ideas by highlighting the importance of conserving water supplies and maintaining the health of local waterways.