Lesson Plan

We are all connected

Students will use Google Earth to investigate interesting facts about rivers near and far. They will get hands-on learning about pollution of our rivers and ways to prevent it happening. As a class, use Google Earth to work out where the continents of Africa and Europe are compared to home, extending students with design of a travel brochure about one of the many countries in these continents.

Subject area:

Humanities and Social Sciences

Year level:

Year 4

Learning objectives:

- Gain an understanding of how the Earth sustains all life.
- Learn about the continents of Africa and Europe, and the location of their major countries in relation to Australia. They will also explore climate, natural vegetation, landforms, and native animals found in these continents.
- Understand the major bodies of water surrounding their school, the major rivers in Western Australia and in one country of Africa and one country in Europe.
- Analyse the impact of human activity on surrounding bodies of water.

Curriculum links

Geography	ACHASSK087
Geography	ACHASSK088

Cross curriculum priorities - Sustainability

OI.2	All life forms, including human life, are connected through ecosystems on which they depend for their wellbeing and survival.
OI.7	Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments.
OI.9	Sustainable futures result from actions designed to preserve and/or restore the quality and uniqueness of environments.

General capabilities

Literacy

Information and communication technology (ICT) capability

Critical and creative thinking

Personal and social capability

Activity 1

Rivers near and far

Using the Google Earth app, students will identify water bodies in the vicinity of their homes and school and discuss activities they do near these bodies of water. Their knowledge of West Australian rivers will be enriched by independent research and completion of an activity sheet.

Time required:

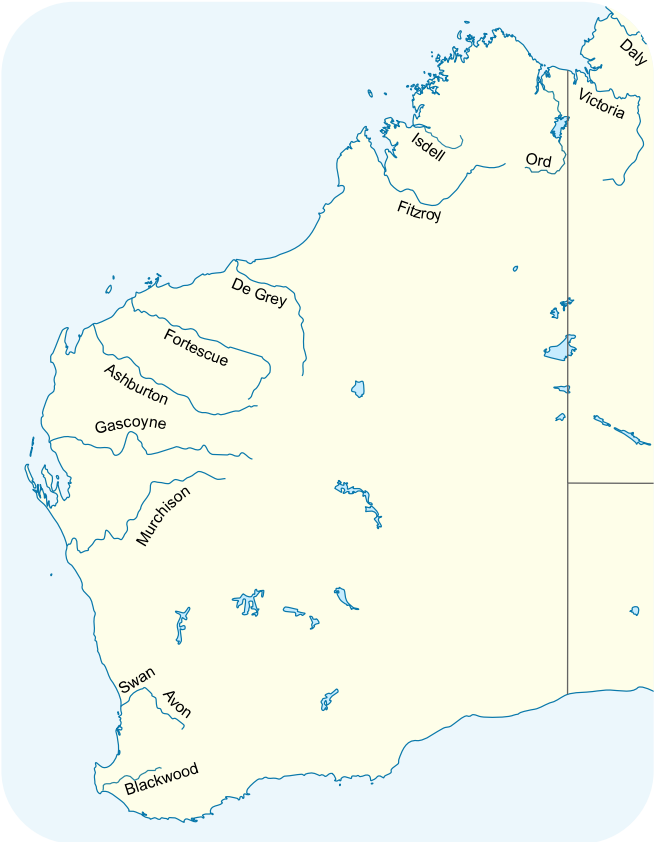
1 hour

Resources required:

- iPad or computer per student
- Activity page 1: Western Australian rivers

Preparation:

1. Google Earth
2. Print Activity page 1: Western Australian rivers for each group of students.



Steps:

1. Project Google Earth onto a smart TV or interactive whiteboard and explore the features of Earth, specifically how we are all connected by water.
2. Explain to the students they are going to locate where they are in the world.
3. Type in the school address in the search bar and show students their current location.
4. Scroll out slightly and identify the bodies of water near the school.
5. Talk to the students about how important water is and the activities they do in and around water. To start conversation, ask them what activities they like doing on the weekends near these bodies of water?
6. In the search bar, type in Western Australian rivers. Divide students into small groups and allocate 3 rivers to each group. Students must find five quick facts about each river to share with the class. Distribute Activity page 1: Western Australian rivers to each group to record their information and answer the questions.
7. Talk to the students about some of the main towns along the rivers, the presence and purpose of the river/s, and where the mouth of the river is. Discuss how water from these rivers is used today (agriculture, recreation, nature, town supply, ports).

A journey down our river

After brainstorming the definition of a catchment area, students will role-play a story to understand how pollutants enter a river system, the effect of pollutants on water quality and their individual responsibilities in protecting the integrity of local water bodies. Completion of worksheets will embed this newfound knowledge.

Time required:

1 hour

Resources required:

- Activity page 2: Story of a catchment
- 5 buckets
- Several ice cream containers (one per group)
- Smaller containers (e.g. small yoghurt pots)
- Food colouring or paint (in several different colours)
- Optional: plastic, grass and soil to use as pollutants
- Activity page 3: Pollutants in our rivers

Preparation:

1. Ensure 'pollutants' are divided into 5 groups.
2. Place fresh water in the 5 large buckets.
3. Separate smaller containers and ice cream containers into the 5 groups.
4. Print enough copies of Activity page 3: Pollutants in our rivers for each student.

Steps:

1. Define a 'catchment area' for students. This is the area from which rainfall flows into a river, lake or reservoir. Every area of land on the planet is part of a catchment. As water moves over the land, it finds its way into streams and down into the soil, eventually flowing into the river. Some water remains underground and this slowly recharges the river even when there is no rainfall. Ask students to imagine the water falling from a showerhead, which represents rainfall. As water passes over your body, it picks up soap, grease and dirt. By the time the water reaches the drain, its quality is not the same as when it 'rained' or left the showerhead. The same applies to a river flowing through a catchment. It picks up all sorts of things along the way including pollutants. So just like when we have a shower, pollutants act the same way, they mix with the water moving across the catchment and are deposited in the lowest point. This can lead to the deterioration of water quality.
2. As a class brainstorm who may use water from a river as it travels down to a catchment and record the answers on the board (e.g. homes, schools, farmers, industry, fishermen, people who use boats).
3. Explain to students they will role-play a story to further explain what a catchment is and how it can become polluted.
    a. Divide the class into 4 groups and label them as a water user (home, leisure, farmers and industry).
    b. Take the students outside and give each group a bucket of water and a few ice cream containers.
    c. Keep one bucket full of clean water which represents the river or dam.
    d. Each group needs to form a chain (to represent the water as it travels along the river). The first person in each chain holds the fresh bucket of water and the last person in the chain holds the ice cream container.
    e. Transfer the water from the bucket into each group's ice-cream container using the small pots. If water drops during the transfer, explain that this represents water being wasted or not conserved and protected along the system. Highlight how this affects the entire system.
    f. Tell the story of a catchment. As you tell the story, each group takes turns to 'pollute' their water with a few drops of paint, food colouring, plastic, grass, leaves or soil to represent the pollution.
    g. At the end of the story, ask students to transfer their polluted water back into the end bucket to represent the river at the end of its journey. The others watch the effects then take their turn.
4. Individually or in groups, get students to complete the Pollutants in our rivers activity page. Students will need to choose five pollutants from the images provided in the activity page or from the Story of a catchment.

Where are we?

Using Google Earth, students will gain an understanding of the location of Australia, Western Australia, Perth and their home town (if not Perth) in relation to the rest of the world. Designing a travel brochure for a European and an African country will expand their knowledge of their chosen countries.

Time required:

1 hour

Resources required:

- iPad or computer per student
- Activity page 4: World map outline.

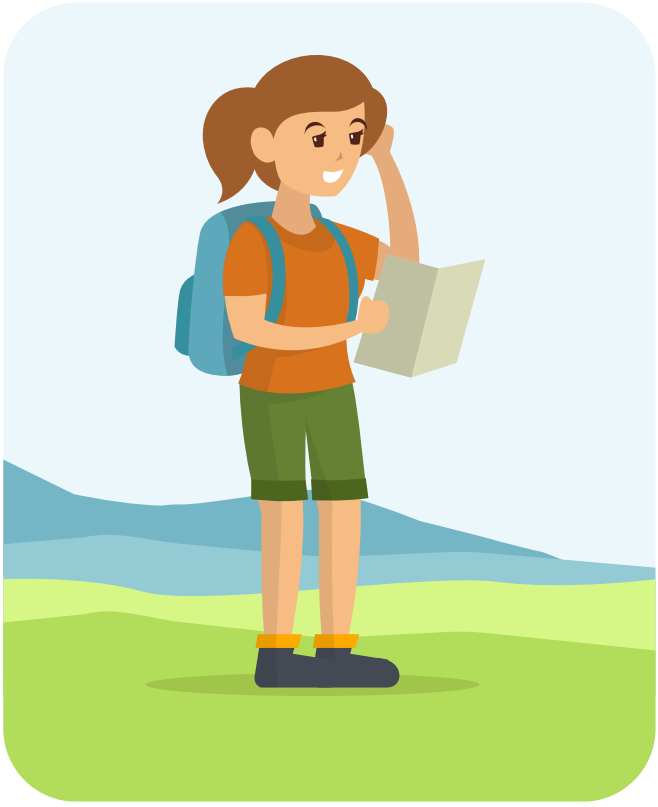
Preparation:

Ensure students have access to:

1. Google Earth app
2. Canva app
3. Optional: A3 card for each student

Steps:

1. Using iPads, ask students to open Google Earth.
2. Hand students a World map outline. As a class, locate the following places:
    a. Australia.
    b. Western Australia.
    c. Perth.
    d. The town or city where you live if it is not Perth.
3. Continue to scroll out to identify where the continents of Africa and Europe are.
4. With 54 countries in Africa and 44 countries in Europe, spend some time scrolling in on each continent, specifically looking at the rivers and waterways and where they enter the ocean or sea.
5. Split students into pairs. Allocate one country from Europe and one country from Africa to each pair.
6. Together, students make a travel brochure for each country using either A3 card or create an online brochure using the Canva app. The brochures should include:
    a. Facts about the country.
    b. Major rivers (list 3).
    c. Information about two native animals that live near to the rivers mentioned.
    d. Climate, including rainfall average.
    e. Optional: Water Corporation is the largest water utility in the world in terms of the area we cover. In fact, if you took all of our pipes, and connected them end to end your connected pipe would circumnavigate the Earth at the Equator! Compare the surface area of YOUR research country with the size of WA (2.646 million km^2). Include this comparison in your travel brochure.



Western Australian rivers

1. As you search for rivers using Google Earth, write the name of the river you find in the table below. Complete the table by finding out more information about the river.

River name	Aboriginal name	Length	Towns/cities along the river	Are there dams along the river?	Where is the river mouth?

2. How do farms use water every day? List three ways.

_____

_____

_____

3. There are lots of fun water activities and sports for people to do in a small town. Can you think of three water activities?

_____

_____

_____

4. Water is valuable to people across the state and it is Water Corporation that makes sure it is available for everyone. Draw a picture of your favourite activity involving water.

Story of a catchment

A 'catchment area' is the area from which rainfall flows into a river, lake or reservoir. Every area of land on the planet is part of a catchment. As water moves over the land, it finds its way into streams and down into the soil, eventually flowing into the river. Some water remains underground and this slowly recharges the river even when there is no rainfall.

Before reading this story as a class, students should be in four groups, with each group labelled a different water user, including home, leisure, farmers or industry. As they listen to this story, students will role-play the story to understand what a catchment is and how it can become polluted.

It is recommended this activity takes place outside as students will transfer water using their buckets and ice-cream containers.

This is the story of a river flowing through a catchment. Our story begins one day up in the hills and the mountains where it starts to rain. The water runs off the mountains and starts its long journey inland down through the valleys flowing into a river. Can anyone name a river here in WA? OK, we will call our river X. Our river starts in the hills where there are some small towns. These towns all take their drinking water from the river as well as put their treated and untreated wastewater back into the same river. This contributes to the overall nutrient load of the catchment, **the homes group add 1 spoon full of pollution to your container**.

We are now in a very beautiful part of the catchment, where there is a lovely lake. There are lots of tourists and people with boats. There are bars and cafes and shops on the shore and lovely picnic areas. Some people are water skiing, another group are fishing and others are having a picnic on the shore.

Some of the boats need a service and are leaking petrol and oil into the water. Someone is fishing on the river bank. Unfortunately, their line gets caught around a rock and is left in the water. **The leisure group add 1 spoon of pollution and some plastic to your water.**

Another group of people are enjoying a picnic at a park overlooking the river. Unfortunately, not everyone uses the rubbish bins that are provided and some people leave chip bags and chocolate wrappers on the ground which blow into the water. **The leisure group add 1 spoon of pollution and some plastic bags and paper to your water.** Further along the bank a man is walking his dog. He does not pick up his dog's waste so that falls into the river. **Leisure group add 1 spoon of pollution to your water.**

As the fast flowing river flows down into the valley, the water quality is good so a fish farm has been set up on the river. We can't actually see what the problem is but scientists have done tests that tell us that the waste coming from the fish farm is mainly nutrients and this contributes to the nutrient concentration in our river. **The farming group add 1 spoon of pollution to your water.**

We are now in the catchment near Perth. The towns here are a little bigger than in the upper reaches of the catchment and there are more houses and industry. When developing this area, the planners cleared the land of all vegetation and so the loose topsoil has been washed into the stormwater drains and into the river. **The industry group add 1 spoon of pollution to your water and add some soil and sand.**

The new roads collect brake fluid, petrol, rubber and other contaminants that are also washed into the stormwater drains and eventually into the river. **The home group add 1 spoon of pollution to your water.**

Most of the houses in the developed part of town have a garden. Someone has mowed their lawn and instead of sweeping up the lawn clippings on the driveway, they have hosed them into the gutter, down the stormwater drain and eventually the clippings end up in the river. **The home group add 1 spoon of pollution to your water and add some grass clippings.**

Activity page 2: Story of a catchment

The next house along has a lovely garden with lots of flowers and vegetables growing, but the householder has a problem with pests eating his lettuces so has used pesticides on his vegetable patch. Now it is raining and these get washed through the soil and into the river. **Home group add a spoon of pollution to your water.**

At another house someone is washing their car on their drive instead of on the grass. They have lots of soap and bubbles and they are using a hose pipe to wash it all off, which runs down the drain and into the river. **The home group add 1 spoon of pollution to your water.**

Going further down the catchment, we are now in the plains. Intensive dairy farming is a major land use. Land is irrigated to produce the pasture required for milk production, using water from channels. Poor irrigation practices means that excess water, animal waste and fertiliser flows off irrigation bays and into irrigation drains which eventually end up in the river. **Farming group add 1 spoon of pollution to your water.**

There is a man painting a new sign at the farm gates. He washes his brushes in running water and tips the excess paint down the drain. **Industry group add 1 spoon of pollution to your water.**

In the plains area there are many vineyards which produce lots of wine. The vineyard has a bad water table problem. The excess water that is used for irrigation soaks into the soil, which lifts the groundwater level close to the surface bringing salt with it. Vines do not like salty water around their roots. To lower the water table, groundwater pumps are used to drag water out of the ground and into the irrigation drains. This salty water ends up in the river. **Industry and farming groups add another spoon of pollution.**

The grapes from the vines are processed at a factory. The factory uses detergents to keep its equipment clean. This dirty water gets washed away in the yard where it disappears into a stormwater drain. Once again this water flows straight into the river. **The industry group add 1 spoon of pollution to your water.**

As the catchments' main creeks and rivers meander across the low-lying flood plain, land use turns into grazing land. Cattle use these creeks and rivers for drinking water and keeping cool in the heat. The hooves of the sheep and cattle are very hard and they break up the soil around the stream and cause soil erosion. The soil is washing into the stream which flows into the river. **The farming group add 1 spoon of pollution to your water and add some soil and sand.**

Now all form a chain using your yoghurt pots and transfer your water back into the river one group at a time. The rest of us will watch what happens to the clean water in the bucket.

Pollutants in our rivers

There are many pollutants that enter our waterways from homes, schools, farmers and industry. Choose five different pollutants from the images below, investigate how it may enter our waterway and ways to prevent it.


Oil leaks


Snail pellets


Paint and chemical leaks


Dog poo


Weed killer


Insect spray


Concentrated fertiliser


Car wash

Pollutant	How it gets into our river catchments	What can be done to prevent it polluting our waterways

Use the space below to design a sign reminding people to protect our waterways from pollutants.

World map outline