

# **Rainwater Gardens**

Year 5 Lesson Plan

#### Stamp Collecting Month Overview

Stamp Collecting Month (SCM) provides an exciting way for middle and upper primary school students and teachers to engage with interesting learning areas through stamps. This year's SCM stamp issue, In the Garden, focuses on themes highlighted by primary school teachers as appealing to students and providing learning opportunities that are linked to both the curriculum and real life. SCM 2019 encourages learning about sustainable living, kitchen gardening, biodiversity, plant and animal behaviours, and minimising our environmental impact.

#### Lesson Overview

This lesson will explore soil infiltration in the context of creating a rainwater garden in the school grounds. Students will explore what it means to be *water wise* and how to be more sustainable in their use of water at school and home. They will use their knowledge of the water cycle to have informed discussions on water pollution and how it affects the land and wildlife, as well as linking this to their knowledge of sustainability in their local area. Students will explore different types of soil via an activity and small group experiment, then use this knowledge to design and build a rainwater garden in the most suitable location in their school grounds. Students will use creative and collaborative skills to construct the rainwater garden and monitor its use over a period of time to evaluate how it supports local wildlife and whether it has made an impact on the school's environmental footprint. Students will also explore how this method could be used to support communities in dry, arid areas.

#### Learning intentions

Students will understand:

- What it means to be water wise
- How to be more water wise in a range of contexts
- How to describe the water cycle
- The importance of preserving water as a resource
- The filtration properties of a range of soil types
- How to conduct an experiment to measure filtration
- What a rainwater garden is and how it is used
- How to design and construct a rainwater garden

#### Resources

- Teacher interactive whiteboard (IWB) resources
- Large space such as school hall or playground
- Enough empty 2 litre drink bottles for each pair (or group of 3) in the class
- Enough coffee filters for each pair (or group of 3) in the class
- Top soil, sand, compost (for experiment and construction of rainwater garden)
- Garden spades, watering cans, gardening gloves
- Gravel and large rocks
- Range of native plants and grasses to plant in the rainwater garden





#### Assessment

There are a number of informal assessment opportunities throughout this lesson including:

- Class discussion
- Student questioning
- Work samples
- Observation
- Student reflection
- A summative assessment of the finished resource

## Curriculum links

ACHASSK113 The environmental and human influences on the location and characteristics of a place and the management of spaces within them (ACHASSK113 - Scootle)

#### Geography

ACHASSK088 The importance of environments, including natural vegetation, to animals and people (ACHASSK088 - Scootle)

**ACHASSK090** The use and management of natural resources and waste, and the different views on how to do this sustainably (<u>ACHASSK090 - Scootle</u>)

#### **Economics and Business**

ACHASSK120 Types of resources (natural, human, capital) and the ways societies use them to satisfy the needs and wants of present and future generations (ACHASSK120 - Scootle)

#### Introduction

#### Activity 1

- Using the IWB, display the resource, What does it mean to be water wise? (hyperlink) Invite a discussion about this question and collect students' responses.
- 2. Explore the question, 'Why should we be water wise?'

### Differentiation

As with all of our lesson plans, we encourage teachers to differentiate the activities by making any necessary modifications in order to cater for diverse student learning needs.

**Note:** the suggested duration of the activities found within this module may require adjustment to cater for the needs of your students.

#### **General capabilities**

- 📄 Literacy
- 🔚 Numeracy
- 💿 Critical and Creative Thinking
- 😩 🛛 Personal and Social Capability
- 🗧 Ethical Understanding

#### Cross curriculum priorities

- 샂 Sustainability
- Aboriginal and Torres Strait Islander Histories and Cultures

#### Interesting fact

Australia is the driest inhabited **/ /** continent on earth. It has the lowest **/ /** percentage of rainfall as run-off, the **/ /** lowest amount of run-off, the least amount of water in rivers, the smallest area of permanent wetlands and the most variable rainfall and streamflow in the world.

- 3. Establish an understanding with the class that it is important for us to conserve water due to the Australian landscape being mostly dry, arid and desert land. Producing water is costly and has a significant impact on our environment. We must all make an effort not to waste water as it is a precious resource, after all without water there is no life!
- 4. Using the resource titled, Ways to be water wise (hyperlink), encourage students to generate ideas on how they can be more water wise inside and outside. Encourage them to think about the different places they visit. How will being water wise look at home versus at school?





#### Activity 2

- 1. Display the Water Cycle (hyperlink) resource and discuss each stage of the water cycle.
- 2. Pose the following questions:
  - Where does the water come from?
  - Where does it go?

- Who or what does it affect?
- How does it collect pollutants?
- 3. Establish an understanding that rainwater collects pollutants which can affect plants and animals. Challenge students to discuss in groups the following question; How do we remove pollutants from water so we can use it safely?
- 4. Invite each group to share their ideas with the class.

#### Activity 1

- 1. Explain to the students that they are going to investigate soil infiltration. Introduce the concept that soil can have different textures depending on what it is made up of and this can affect how much water can pass through it. This is important to know because it will help them to understand how water can be used effectively in the school garden.
- 2. For this activity you will need a large space, for example a school hall or playground. Designate an area for the soil molecules (aka students) to be in. You or another adult represent the water trying to get through the soil. As a group, you will demonstrate how easy it is for the water to infiltrate each soil sample.
- 3. Establish the students' comprehension that water moves differently in different types of soil.



Clay Soil

The students stand tightly together, shoulder to shoulder. The adult attempts to pass through them to the other side of the group. It is hard work!



Sand

Students stand slightly further apart with perhaps half a step separating them. The adult passes through the group to the other side, demonstrating that sand is easier to infiltrate.



**Top soil** Students widen the gap between themselves allowing the 'water' to pass through almost unhindered.





#### Activity 2

- 1. Explain to students that they are ready to conduct their own investigations to explore how water infiltrates different soils.
- 2. Split the class into groups of 2 or 3.
- 3. Give each group a 2 litre plastic water bottle and a coffee filter. They will need to carefully cut their bottle in two thirds and set up their equipment as shown:

**Teacher note:** If you do not have adequate supervision to allow the students to cut their bottles, ensure this preparation is done before the lesson.

- 4. Place the coffee filter over the neck of the upside down bottle section before putting in the soil.
- 5. Set up containers of different types of soil for students to draw from. These could be top soil, sand, compost, clay soil.
- 6. Set up a container of water dyed with blue food colouring, and a measuring cup and timer for each group
- 7. Encourage students to investigate how water moves through different mixes of soil. They can use the measuring cups to ensure an equal amount of water is used for each experiment, and the timer to time how long it takes the water to move to the bottom container.
- 8. Bring the class back together to share the results of the investigation.
  - What soil mix allowed the water to filter through it the fastest?
  - What happened to the colour of the water?
  - What does this mean for the treatment of polluted water?

## Activity 3

**Background Information**: Rainwater gardens make use of rainwater run-off from roofs, roads and rainwater tank overflow. They contribute to the health of surrounding waterways. Rainwater is directed straight into the garden bed with either a downpipe or by the natural slope of the land. A filtering system is used to remove pollutants. Rainwater gardens should be located in an area that has at least; half a day of sunlight, 3 metres from the school building, and be situated on a gentle slope to catch as much run-off as possible. The size of your garden should depend on the size of your school building and how much run-off is expected, but at least 90 centimetres by 1.2 metres. Planting native plants in your rainwater garden is a great way to encourage birds, butterflies and other pollinators to visit. If you are planning on having a standing water section for fish and frogs in your rainwater garden, you may want to think about planting species that discourage mosquitoes such as; basil, peppermint, lavender, citronella, and marigolds.

1. Explain to the class that they will be building the school's new rainwater garden. Show the class the resource *How to Build a Rainwater Garden* (hyperlink). You may wish to discuss the background information with them to introduce the concept.

Conduct a class walk around the school grounds to decide on the best place for the rainwater garden to be located. Discuss the pros and cons of the students' suggestions reminding them of the factors needed to successfully collect the water. Discuss each of the following steps.







#### Activity 3 (continued)

- 2. As a group, decide on a plan for your rainwater garden, thinking about the size and shape, the materials and equipment you will need and the layers of materials you will use. This may be a good opportunity to divide the labour between groups of students or create a roster of work over a period of several days.
- 3. Mark out the shape of your rainwater garden and dig to a depth of 15 25cm (more if you are planning to have standing water).
- 4. Lay a sheet of plastic lining in the bottom so it completely covers the base and slightly overlaps the sides, this will prevent water seeping into the joints in the timber.
- 5. Spread 20 millimetres of gravel or sand at the bottom of the area; this will capture some water allowing it to be used by the plants during dry periods.
- 6. Fill in the area with a mixture of 50% sand, 25% topsoil and 25% compost (if your topsoil has too much clay you may need to readjust these amounts) leaving a gap of around 10cm at the top.
- 7. Use the extra soil as a berm (a raised bank) around the lower edge of the rainwater garden to keep as much water in the soil as possible.
- 8. Line the upper edge of the rainwater garden with large stones to limit erosion during high rainfall.
- 9. Plant your rainwater garden with a range of native plants and grasses with long roots.
- 10. Top the soil with gravel, small pebbles or mulch to limit soil erosion.
- 11. Give the plants a thorough water and then let the rain do it's work!







#### Plenary

- 1. Monitor the growth of your rainwater garden. Weed it when necessary and keep it moist during dry weather.
- 2. Use it as an ongoing resource to irrigate various garden areas within the school.
- 3. Invite a discussion on how this method could be used to help people living in very dry areas. Discuss the concept of natural replenishment and how the seasons, geographic location of the school, and regular maintenance will impact the usefulness of their rainwater garden over time. Students work in pairs to generate and share ideas.

#### Further Reading

- Ag.tennessee.edu. (2019). Rain Gardens for Tennessee. [online] Available at: https://ag.tennessee.edu/ watersheds/Pages/Rain-Gardens-for-Tennessee.aspx [Accessed 12 Feb. 2019].
- Gardening Australia. (2019). A 'Rain Garden'. [online] Available at: https://www.abc.net.au/gardening/ factsheets/a-rain-garden/9428914 [Accessed 12 Feb. 2019].
- Gardeners Supply. (2019). How to Build a Rain Garden | Gardener's Supply. [online] Available at: https:// www.gardeners.com/how-to/rain-garden/5712.html [Accessed 12 Feb. 2019].
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- State of the Environment Advisory Council, Australia: State of the Environment 1996 Chapter 7 'Inland Waters', 7-4 'Introduction' <http://www.environment.gov.au/soe/1996/publications/report/index.html>

