

Science: Investigating our local waterway – for Year 9

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RESOURCE OVERVIEW

This resource presents three teaching ideas that support Australian Curriculum Year 9 Science in the context of investigating a local waterway.

1. Meet our local waterway

Investigates the components of a waterway and how the biotic and abiotic components interrelate.

2. A health check for our waterway

Uses various methods to assess the health of a local waterway.

3. Factors affecting waterways

Explores how biotic factors relate in an ecosystem and how different factors impact on waterways.

The first teaching idea introduces students to a waterway in their local area. They explore its importance along with the biotic and abiotic components of the waterway. The second teaching idea applies the learning from the first activity to assess the health of the local waterway using field techniques. While the third teaching idea investigates biotic factors in waterway ecosystems and factors that impact on ecosystems. These teaching ideas help Year 9 students learn about the biology of waterways experientially by exploring their local waterway.

Ideally these teaching ideas would be used sequentially. They can be used at the start of the unit to provide a 'real world' setting or later in the unit to demonstrate how science concepts can be applied in local ecosystems.

The teaching ideas offer students opportunities to:

- brainstorm, generate and discuss ideas
- research different cycles and present to the class
- create a mind map
- plan and perform a 'real world' assessment of the health of an ecosystem
- report on the health of a waterway

- construct a food web based on a local waterway
- research and present on a water issue
- analyse video clips.

These teaching ideas are relevant to the Year 9 Science Understanding content description for 'Biological sciences' relating to biotic and abiotic factors in ecosystems. They also address a number of sustainability cross-curriculum priorities and one also incorporates the cross-curriculum priority of Aboriginal and Torres Strait Islander histories and cultures.

Prior to the lesson, select two suitable monitoring sites on a local waterway about 100 metres apart. Visit the waterway and take photos or videos of the field study sites. Ensure that the excursion and field work complies with your school's excursion and health and safety procedures and invite additional parents/carers or school staff to assist with supervision.

AUSTRALIAN CURRICULUM YEAR 9 SCIENCE LINKS

Science Understanding

- Biological sciences

Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems (ACSSU176)

Aboriginal and Torres Strait Islander histories and cultures cross-curriculum priority

Sustainability cross-curriculum priority

TEACHING IDEAS

1. MEET OUR LOCAL WATERWAY

Students focus on how the biotic and abiotic components of an ecosystem impact on and interact with each other. They are introduced to a local waterway and identify biotic and abiotic components linked to that waterway. Students then prepare for field work by examining practical techniques used to investigate the health of a waterway. Finally, they plan their group investigations (ACSSU176).

Activities

- a. Our waterway and interactions in it
- b. A recipe for a healthy waterway

1a. Our waterway and interactions in it

Students are introduced to a waterway in their local area and identify biotic and abiotic factors of the ecosystem.

1. Display a series of photographs and/or videos of your local waterway. Discuss where the photographs or videos were taken. Show the location of the waterway using Google Earth. Explain that students will visit it to carry out field work.
2. Using the photographs and/or video, ask students to:
 - identify what they can see in the photographs
 - define the terms 'waterway' and 'catchment'
 - suggest any other things that might be in the waterway which are not in the photographs (e.g. things too small to see such as bacteria or microbes or things hidden from view). Compile a class list.
3. Watch the [How abiotic and biotic factors make an ecosystem](#) video [5:30] (see footnote 1). Ask students to compile a list of biotic and abiotic factors while they're watching.
4. Using Google Earth, ask students to identify the catchment area of the waterway and any land uses in the catchment which might impact on the waterway.

1 How abiotic and biotic factors make an ecosystem (video) <<https://www.youtube.com/watch?v=MdlwPtKg-VI>>

5. Working in groups or individually, students create a [mind map](#) (see footnote 2) showing the different types of organisms found in the waterway and the interactions between them. They can record the mind map on a large sheet of paper or use a program or app such as Mindomo. This mind map will be further developed in subsequent activities. (Mindomo is available online or as an app. Teachers can register to use this program for free.)

1b. A recipe for a healthy waterway

Students consider how the health of a waterway can be assessed.

1. Explain that the students will design an investigation to assess the health of a 100 metre stretch of the local waterway. Use slides 1 to 19 of the [Water quality](#) (see footnote 3) presentation to identify the factors that indicate an unhealthy waterway and the tests used to assess the health of the ecosystem. Students complete the first page of the student worksheet. Scroll down the page to the 'Water quality' resources.
2. Demonstrate how to collect samples and perform the water quality tests as per the instructions in [Freshwater water quality monitoring teacher information pack](#) (see footnote 4). Students complete the 'Testing water quality worksheets' on pages 7 and 8.
3. Watch the [Critters: Where they wriggle](#) video [8:19] (see footnote 5) which explains why waterways are important and how macroinvertebrates are used as indicators of waterway health.
4. Provide students with copies of the Adelaide Mount Lofty Ranges (AMLR) Natural Resources Management (NRM) Education [Advanced macroinvertebrate ID chart and the Results data sheet](#) (see footnote 6). (The resources can be found under the 'Macroinvertebrates' heading. You will have to scroll down.)
5. Working in their field study groups, students design an investigation to test the quality of a 100 metre stretch of their local waterway using the guide questions on page 2 of the [Water quality](#) student worksheet. Show students the equipment that will be available for use during the field trip and ensure they perform a relevant risk assessment (e.g. slipping hazards, wearing correct clothing, etc.)

Each group will need to provide a short report containing information about their waterway (including photos), details of their investigation, conclusions about the health of the waterway, and a discussion of any issues, limitations or recommendations. Check and approve each group's waterway investigation plan.

2. A HEALTH CHECK FOR OUR WATERWAY

After assessing the ecological health of the waterway and collating other information they have learnt, students write a report that details the overall health of that waterway.

Activities

- a. Exploring our waterway
- b. The health of our waterway

2 Wikihow <<http://www.wikihow.com/Make-a-Mind-Map>>

3 Murray Darling Basin Authority (Lesson plans—Water quality) <<http://www.mdba.gov.au/education/teachers/lesson-plans>>

4 Natural Resources Adelaide and Mt Lofty Ranges (Freshwater water quality monitoring teacher information pack) <http://www.naturalresources.sa.gov.au/files/sharedassets/adelaide_and_mt_lofty_ranges/monitoring_and_evaluation/schools/amlr-me-schools-fresh-water-quality-teacher-resource-pack-gen.pdf>

5 Natural Resources Adelaide and Mt Lofty Ranges (Critters: Where they wriggle) <<http://www.teachertube.com/video/critters-where-they-wriggle-117005>>

6 Natural Resources Adelaide and Mt Lofty Ranges (School monitoring) <<http://www.naturalresources.sa.gov.au/adelaidemtlofyranges/about-us/our-regions-progress/monitoring-and-evaluation/schools#macroinvertebrates>>

2a. Exploring our waterway

In their groups, students conduct their waterway investigation and compile their results and observations. Each group should be supplied with the equipment they identified in their plan. Students perform their investigations as per their plans. Advise and assist as required, particularly in identifying organisms in the ecosystem.

2b. The health of our waterway

In their field work groups, students:

- collate their results and observations
- draw conclusions
- make an assessment about the health of the waterway
- compile a report that includes:
 - background information about their waterway
 - how they conducted their investigation
 - safety considerations
 - conclusions about the health of the waterway
 - issues, limitations and recommendations.

3. FACTORS AFFECTING WATERWAYS

Students explore the factors that impact on waterway ecosystems (ACSSU176).

Activities

- a. Biotic factors in our waterway
- b. Factors affecting our waterways

3a. Biotic factors in our waterway

Students explore the biotic factors in an ecosystem in more detail, looking at food chains and energy flows and the importance of biodiversity.

- a. Watch the music video, [Food chain](#) [2:45] (see footnote 7), and discuss how energy flows within a food chain. What are some of the different roles in an ecosystem? How does the flow of energy differ from the flow of nutrients? Where does all the energy come from?
- b. Students explore the idea of food chains and food webs by using the [Food chains: the wetlands](#) (see footnote 8) (TLF ID L11444) and the [Who's for dinner?](#) (see footnote 9) (TLF ID 25) learning objects on Scootle developed by Education Services Australia.
- c. Using the organisms identified during their field work, students research what each organism eats and what eats them and construct a food web for the ecosystem. If the students cannot identify enough organisms, provide some organisms typically found in wetlands such as those macroinvertebrates listed in the 'Freshwater macro-invertebrates' notes (pages 52-53 of the [Life in our waterways](#) resource (see footnote 10).
- d. Ask students to identify the primary, secondary and tertiary consumers and decomposers. Watch David Suzuki's [Why biodiversity matters](#) video [4:27] (see footnote 11) and discuss what biodiversity is and why it is important. Discuss

7 Science Music Videos (Food chains) <<https://www.youtube.com/watch?v=TE6wqG4nb3M>>

8 Scootle (Food chains: the wetlands) <<http://www.scootle.edu.au/ec/viewing/L11444/index.html>>

9 Scootle (Who's for dinner) <<http://www.scootle.edu.au/ec/viewing/L25/index.html>>

10 Waterwatch Victoria (Life in our waterways) <http://www.vic.waterwatch.org.au/file/inform/living_in_wetlands.pdf>

11 David Suzuki (Why biodiversity matters) <<https://www.youtube.com/watch?v=N5ssjM2Fjuc>>

what happens when something is removed from the food chain. Ask students to identify which organism from their waterway would cope the best with the loss of one food source and why.

Extension: The [What is biodiversity and why is it important](#) video [7:51] (see footnote 12) discusses the different values biodiversity holds for people. (This video was produced by CSIRO.)

Ask students to add new terms—including different roles and interactions between organisms—to their mind map (Activity 1a).

3b. Factors affecting our waterways

Students look at one approach to wetland management in the Northern Territory and then research an impact on ecosystems and present to the class.

a. Watch the [Aboriginal burning of Kakadu wetlands](#) video [7:36] (see footnote 13) and discuss the impact of fire on the wetland ecosystem.

b. Working in pairs or groups, students research how one of the issues from the list below impact on the biotic and abiotic factors of an ecosystem. They present the results visually (using a poster, story, infographic, comic strip, short video, song, role play or PowerPoint presentation etc.) with a brief explanation to the class.

- Destruction of habitat
- Bushfires
- Droughts and flooding
- Seasonal changes
- Threatened species
- Weeds
- Introduced species

12 CSIRO (What is biodiversity and why is it important?) <<https://www.youtube.com/watch?v=7tgNamiTRkk>>

13 CSIRO (Aboriginal burning of Kakadu wetlands) <https://www.youtube.com/watch?v=AXG_2JSW0FA>



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