**Activity: Water sensitive urban design in action (Years 5 and 6)**

Why worry about stormwater?

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| Victorian Curriculum F–10[[1]](#footnote-1) links:  **Levels 5 and 6**  **Geography**  **Geographical Knowledge**  **Factors that shape places and influence interconnections**  Environmental and human influences on the location and characteristics of places and the management of spaces within them  **Science**  **Science Understanding**  **Science as a Human Endeavour**  Scientific understandings, discoveries and inventions are used to inform personal and community decisions and to solve problems that directly affect people’s lives  **Chemical sciences**  Solids, liquids and gases behave in different ways and have observable properties that help to classify them  **Design and Technologies**  **Technologies and Society**  Investigate how people in design and technologies occupations address competing considerations, including sustainability, in the design of solutions for current and future use  **Materials and technologies specialisations**  Investigate characteristics and properties of a range of materials, systems, components, tools and equipment and evaluate the impact of their use |

Students investigate their local area and identify how water from rains flows along roadside gutters and drains. Discuss issues associated with stormwater and the effect on waterway water quality. Investigate, design and build a model of a redesigned roadside gutter and drain to address water quality issues.

### Duration

Two sessions

### Equipment

For each group:

Large plastic soft drink bottle with the bottom cut off

Materials to put in the bottle such as soil, sand, mulch and different sized pebbles

Container in which the inverted drink bottle sits while it is draining water

Stopwatch or stopwatch app

A container of water containing grass clippings and dirt

Watering can

### Preparation

Collect images of the built and natural features including parks or bushland, or strips of roadside vegetation in the local area. Ensure that safety guidelines are followed.

### Activity steps

1. Display the images of local built and natural features. Students identify changes in the way water flows in the urban environment by contrasting the way water would have flowed when the environment was in its natural state. Compare the built and natural environment in the local area or show some photographs of remaining natural spaces such as park or bushland, or strips of roadside vegetation. (Optional: students can bring a photograph which depicts a natural space and another that depicts a built up area.)
2. Visualise with the students what the local area may have been like 150 years ago (Optional: use historical photographs or paintings for reference if they are available.)
3. View artwork of early Melbourne to discuss the natural environment. You can find the following digital curriculum resources in Scootle <<https://www.scootle.edu.au>>. Teachers can register for free using your school email address.

* R8216 'Golden summer, Eaglemont', 1889
* R6807 'Melbourne in 1838'.

Many of the natural areas have been replaced by hard surfaces such as roads, buildings, footpaths, car parks. Raise the following questions. Discuss student responses and guide the discussion as required.

* 1. What happens to water flow from heavy rains in a natural area?

Generally water in the natural environment seeps into the ground while some flows across the surface and flows towards waterways. Vegetation and rocks slow the speed of water run-off. Wetlands often provide a natural filter to water flowing across the surface and also slow the pace of the water, therefore avoiding erosion.

* 1. What is the effect of replacing natural spaces with the built environment?

There are many more hard surfaces where water does not seep through (permeate).

* 1. What is the purpose of roadside gutters and drains?

In the urban environment water that flows over hard surfaces such as roads, footpaths, driveways and car parks is channelled through a series of roadside gutters and drains which lead to our waterways and finally flow out into the ocean. This stormwater network of gutters and drains is to help avoid or at least reduce flooding.

* 1. What are some issues with stormwater flowing into our waterways?

One issue is the speed and volume of water that flows into the waterways. After heavy rains, fast-flowing water entering the waterway can cause erosion. Another issue is the pollutants and particles (suspended solids) that are carried into the waterway via stormwater, which affect water quality.

1. Students identify a section of their local roadside guttering and drain that they will redesign. Students take a photograph or draw the site. Show examples of existing water sensitive urban design (WSUD) using bio-retention where stormwater treatment is integrated into the landscape (refer to Resources).
2. Prior to starting their design, students investigate the effect of particular natural materials on water flow and how these may be incorporated into their design. Natural materials include soil, sand, mulch and different-sized pebbles.
3. Working in groups, students investigate the flow of water through a plastic soft drink bottle with the bottom cut off. Sit the inverted bottle in a container so that the water is captured:
4. Time the flow before and after adding stones to a container.
5. Observe the passing of dirty water containing grass clippings and other particles. Do the stones trap some of the particles?
6. Discuss how vegetation slows the flow of water and soaks up water in soils. Use a pot-plant or section of the school garden to observe the effects of water flows.
7. Students use the results of their investigations to devise a plan and draw their design. In their design they address how to:

* slow the water flowing into the drain
* reduce the amount of water flowing into the drain
* filter out some of the pollutants and particles
* ensure their design does not increase the chance of flooding.

1. Students use a range of natural and recycled materials to create their design. They share their designs and explain how it addresses the stormwater issues and how it is an improvement on the existing design. They evaluate their design and discuss any changes they would make as a result of feedback and discussion.

### Resources

For information about water sensitive urban design and its applications, go to:

Evaluating Options for Water Sensitive Urban Design – A National Guide, Australian Government Department of Sustainability, Environment, Water, Population and Communities, <<https://www.environment.gov.au/system/files/resources/1873905a-f5b7-4e3c-8f45-0259a32a94b1/files/wsud-guidelines.pdf>>

Healthy Waterways Waterwatch, <[www.waterwatchmelbourne.org.au/](http://www.waterwatchmelbourne.org.au/)>

Bioretention basins, Gold Coast Planning Scheme Policies, <[www.goldcoast.qld.gov.au/gcplanningscheme\_policies/policy\_11.html#guidelines](http://www.goldcoast.qld.gov.au/gcplanningscheme_policies/policy_11.html#guidelines)>

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