

SECONDARY SCHOOL STORMWATER NCEA RESOURCES

JUNIOR SECONDARY PROGRAMME

LEVEL 4-5 'CRIME SCENE INVESTIGATION'

STORMWATER

'Crime scene'

In your local catchment there will be crime scene evidence that students can investigate to detect causes and also possible actions for improvement. Students can explore their own impact on waterways and also possible behaviour changes that could help.



Teacher notes

How can you use this resource? The next few pages offer some alternatives for how to use stormwater as a context for learning science.

The Post Primary Teachers' Association (PPTA) curriculum resource bank provides an inquiry unit that teachers can use about streams or adopt a crime scene investigation where students begin to explore the connection between human activity on land and the relationship with waterways and the sea using scientific data as evidence. The PPTA has a teacher-derived resource 'Stream Study for Education for Sustainability.'



Teachers can use the suggestions on the next page and work to their strength or interest to allow students to investigate specific topics or organise a home and expert jigsaw activity where students choose different areas of research in a home group and work with other experts to share results with all the class across the four science strands.

Achievement objectives

Science

- **Nature of science** – understanding, investigation, communicating in science and participating and contributing.
- **Planet earth and beyond** – investigate the composition, structure, and the features of the geosphere, hydrosphere and atmosphere and interacting systems.
- **Living world** – investigate the interdependence of living things (including humans) in an ecosystem.
- **Material world** – chemical and physical properties of different groups of substances. Chemistry and society.
- **Physical world** – identify and describe.

Education for Sustainability

- **In:** Investigate and collect scientific data in the local catchment.
- **About:** Research the effect humans have on the science of our streams and harbours.
- **For:** Carry out action to improve the quality of the water in our catchments.

Social science

- Understand how people interact with natural environments and that this interaction has consequences.
- Understand how, as a result of scarcity, consumers, producers and governments make choices that affect New Zealand society.

Baseline data: Describing the 'crime scene'

What are the crimes in our harbours and how does it link to your local catchment?

Auckland Harbours – Manukau and Waitematā.



Describe your local catchment.



What is the geology of my catchment?



What is stormwater and how does it affect our harbours?



Investigations: 'Crimes' on our harbours

Teachers could investigate the ideas around each box on the next page, or could coordinate students to investigate the science around one idea and then present to the rest of the class. There is plenty of opportunity for hands-on investigations in each.

The diagram over the page provides options for investigations on the 'crimes' on our streams and harbours!

Students could design an inquiry around one of these topics using 5W's and an H. (What? Where? When? Why? How?) to investigate properties and changes of matter, chemistry and society that each causes to our waterways. Teachers could support student's understanding with investigations in the classroom. E.g. dissection of a fish gill, effect of fertiliser on algae growth, simulation of urban run-off, acids and bases and solubility.

From deeper investigation students could then make connections about the impacts on biodiversity, habitat, breeding grounds, mahinga kai and kai moana.



'Crimes' on our streams and harbours

Students could conduct an inquiry into one of the contexts listed and how they are a crime on the harbour. They could design and model a demonstration to show effect.

Stormwater

- affected by urban growth and impermeable surfaces
- impacts stream ecosystems
- impacts turbidity, temperature and pH
- impacts flow rates.

Sedimentation

- affected by land use
- affected by heavy metals
- affected by erosion
- impacts on mangroves
- impacts gills of fish and macroinvertebrates.



Nutrient pollution

- from phosphates
- from nitrates
- causes oxygen depletion
- causes eutrophication
- impacts ecosystems.

Pollution and pathogens

- from farming run-off and sewage overflows
- from litter and debris
- impacts species and habitats.

Which suspect is guilty?

Who did it?

Thinking through the science of water quality problems – students can use the diagram below to look at causes and effects of stream degradation from the evidence they discover on site. This diagram can support them to think of ways to stop pollution at the source, e.g. plastic as a pollutant can be reduced or prevented from getting into waterways by collecting and recycling, as it will end in the sea.

Source: Parliamentary Commissioner for the Environment: Water Quality in New Zealand – Understanding the Science. March 2012, Figure 9.1, page 73.

Interventions – what can be done about it?



How to solve the crime

Through their research, students could come up with action plans to improve the stream and reduce pollution. Possible actions could be integrated into other learning areas for raising awareness about the future of our streams and harbours. Examples are speeches, persuasive writing, graphic design, videos, music, art or drama. Below are resources to support students to take action.

Student resources



gw.govt.nz/take-action-for-water



boprc.govt.nz/residents/teachers/teacher-resources/waiora-healthy-water/



waikatoregion.govt.nz/Services/Regional-services/For-schools/Resources-for-teachers/



ecan.govt.nz/advice/your-school/lesson-resources/Pages/water.aspx