

# Science and Technology Fairs 2011

## Teacher Information Pack



*Everything is connected*

## Introduction

Since 1996 Environment Canterbury have awarded prizes to Canterbury schools whose students have exhibited outstanding projects on environmental themes in the school science fairs.

\$500 goes to four schools – two in South Canterbury and two in Mid/ North Canterbury every year.

## Environment Canterbury school awards

**Categories:** Junior (yrs 7/8)  
Senior (yrs 9-13)

<b>Prizes</b>	<b>1st</b>	\$500 to the school, \$400 to the student
	<b>2nd</b>	\$150 to the student
	<b>3rd</b>	\$80 to the student

Senior winners also have the offer of a weeks work experience at Environment Canterbury.

**Entries** are judged through the school **Science and Technology Fairs** in Christchurch and Timaru. All projects with an environmental theme entered in the fairs will be judged for this award.

If you are entering your students in the Science and Technology Fair you do not need to specify that you are entering in the Environment Canterbury School Awards category. Our judges will automatically judge all entries with an environmental theme.

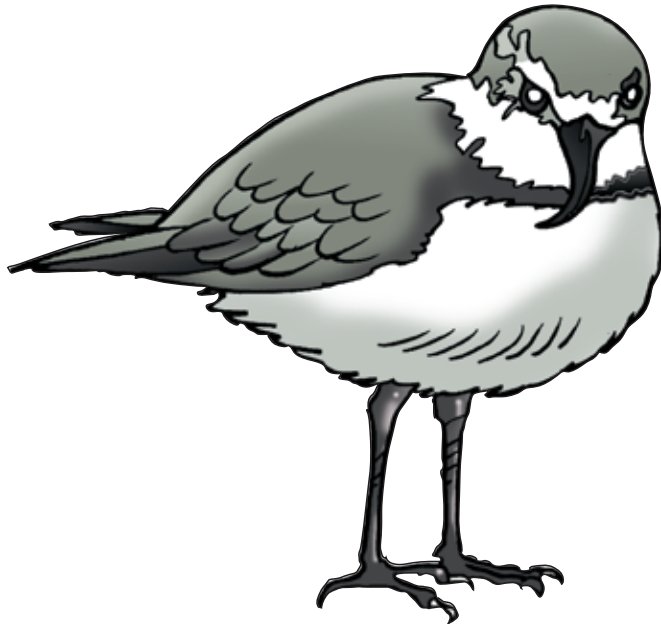
If you do not normally enter your students in the Science and Technology Fair you will need to contact the organisers of your region's fair for information.

### **North and Central Canterbury**

Lincoln University Canterbury-Westland Science and Technology Fair:  
<http://www.canterburysciencefair.co.nz/welcome/index>

### **Sanford Science and Technology Fair, Timaru**

Contact: yet to be formalised as of February 2011.



## Wrybill Trophy

- the best of the best!

If a student from your school wins the Environment Canterbury Award for their category, they will be invited to present their exhibit to council and be in the running to win the prestigious Wrybill Trophy.

If they are successful, they will be presented the trophy which will be displayed at their school for the year.

## Offer to teachers

An Environment Canterbury educator can visit your class to discuss science fair projects and resource management issues.

This visit will include a lesson based around the inquiry approach and action required to organise a science fair project.

Whether or not your students choose to enter in the science fair, the visit will be a beneficial learning experience.

To arrange a class visit from an Environment Canterbury educator, please contact:

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# What does sustainable resource management mean?

## **For these purposes Sustainable Resource Management is:**

Managing the way we use and look after our natural and physical resources (such as air, land, coastal features, sources of energy, water - rivers, lakes, estuaries, lagoons and groundwater) to ensure they are sustained in good stead, for future generations.

Therefore this award is for students who can see ways that we could improve the state of our resources or sustain the present quality.

## **Choosing a topic**

The judges are interested in the sustainable resource management of Canterbury.

Decide on a local or regional issue which affects an aspect of Canterbury's environment.

Following is a list of environmental issues concerning Canterbury.

Some students may have personal environmental concerns affecting their family's home or neighbourhood. Projects where students have a personal involvement or interest are often well investigated and are welcomed.

## **What the judges are looking for**

The judges are particularly interested in inventive *solutions* to problems.

There is more merit in a project that is not just about a topic but makes new observations and invents creative ways to deal with environmental issues.

Use the following checklist to help your students with their projects.

- Topic is relevant to a local area or the Canterbury Region
  - Investigates an issue which impacts on the environment
  - Investigates ways to improve or maintain natural or physical resources.
  - Possible solutions to the problem/ issue have been tested
- or**
- Makes new observations about an aspect of your local or regional environment.



## Soils and land use

- The quality of land can be degraded because of land use activities.
- Burning or over-grazing can cause loss of nutrients and organic matter, increased pests and increased bare ground (allowing erosion). Fine cultivation of soils also allows wind erosion.
- Some land use activities can result in soil contamination and affect the environment.
- Some land use activities can affect water quantity and quality in catchments.

## Landscape, ecology and heritage

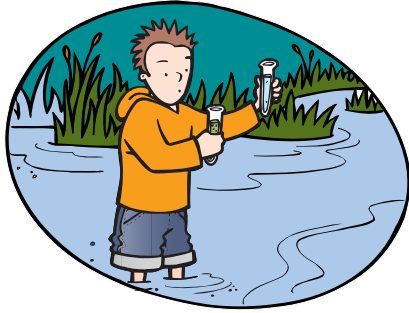
- The use and development of significant natural features (wetlands, lakes, rivers, and the coastal environment) can affect their distinctive characteristics.
- Indigenous vegetation and animal habitats can be affected as well as the historical and cultural values of areas.

## Water

- There are competing demands for the use of water in water bodies;
  - Those who want to take water for domestic or industry use
  - Those who want to discharge into water (industry)
  - Those who store water and generate electricity
  - Those who drain or divert water
  - Fishers and other recreational users
  - Those who value the water for its natural character and ecology
  - Tangata Whenua, who value the water for its cultural significance.
- Land uses can affect water flows and levels in water bodies affecting the values held for those water bodies.
- Land uses, and discharges of contaminants into water can affect water bodies and coastal waters. What can it affect?
  - Their ecological value
  - Their use by present and future generations
  - Their recreational, cultural, social, economic and health values to the Canterbury community.



## Beds of rivers and lakes



- Land uses can change the natural vegetation
- Damming or diversion of water and construction or mining machinery can cause destruction.
- Human induced erosion can cause movement of silt which can damage plants and animal life.
- Vehicles, watercraft, people and domestic animals, particularly grazing stock can disturb wildlife and habitats.
- Beds of rivers and Lakes can be affected by:
  - The spread of undesirable plants
  - The dumping of rubbish
  - Dust storms associated with low lake levels
  - Extraction of rock, gravel or sand
  - The presence of structures (such as bridges) and buildings
- The ability for rivers to carry floods can be affected by land use, accumulation of plants, tree planting, the erection of structures and deposits of sand and gravel.

## The coastal environment



- Rivers can discharge contaminants and sediment into coastal areas
- Agricultural run-off can directly affect coastal areas.
- Port operations, harbour dredging and mining of beach deposits can affect the natural character of coastal areas.
- Public access along coastal marine areas can effect ecological values (e.g. bird nesting), sites of cultural significance to Tangata Whenua, sand dune stability.
- Natural occurrences, such as coastal erosion, salt water inundation and climate change causing a rise in sea level, can affect human lives.



## Air

- Poor air quality affects health in urban areas of Canterbury, particularly in Christchurch and Timaru.
- Air is contaminated by discharges from smoke from domestic fires, motor vehicles, smoke and gas from industrial sites.

## Transport

- Providing regional transport infrastructure can affect the environment by way of air and noise pollution, contaminated discharges into water or onto land, change of natural character and effects on indigenous vegetation and animals.

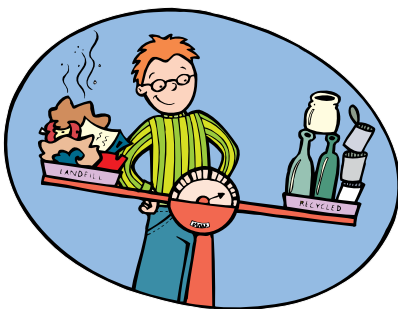


## Energy

- The region depends on non-sustainable energy sources (fossil fuels in particular) to meet present and future needs.
- The production and use of energy can cause air pollution, loss of land, effects on ancestral lands, sites and other taonga of value to Tangata Whenua, loss of recreational values, and changes in the landscape.

## Natural Hazards

- Natural Hazards, and the measures put in place to protect communities from hazards, can affect the environment, especially habitats, amenity values, heritage places and places of cultural value.



## Hazardous Substances and Waste Disposal

- Air, water, soil and cultural sites may be affected by the storage, use, disposal, or transportation of hazardous substances.
- Spills or leaks can occur when hazardous substances, such as chemicals, are transported or loaded and unloaded.
- There is an increasing amount of waste which needs to be disposed of.

## Past winning projects

### **Water-less washing machine**

A top-loading washing machines that reuses rinse water. This young scientist designed a method of collecting the rinse water for reuse by using a programmable computer chip. The aim was to show how cities like Christchurch could minimise water use in the home to avoid overtaxing our underground aquifers.

### **Microbial Fuel Cells**

A number of scientists are exploring how sewage could be reused to create biofuels. In this project the young scientist isolated a black bacterial substance from sewage samples to power a circuit and potentially create a clean, renewable source of power. The idea was developed through combining knowledge and skills from biology, physics and chemistry.

### **Walk this way in Timaru!**

This project investigated walking schools buses. Schools and parents were surveyed. From the results, a version of a walking school bus stop sign with information about pick up times was developed.

### **You've got the power!**

The focus of this project was on energy saving techniques that we could all take on board at home. 23 families were surveyed and the results highlighted some interesting trends. The results showed that most people would dispense with the extravagant and luxury categories. These might include heating in bathrooms and bedrooms or a swimming pool heater in summer.

### **Smogless Chimney**

A chimney attachment was designed that recycles smoky pollution particles through water thereby reducing the pollution to the air. Briquettes were made out of the waste product recycling it over and over again.

### **Effluent Spreading**

This project investigated efficient methods of effluent spreading limiting the probability of nitrate leaching.

### **Taumatakahu Stream, South Canterbury**

Concerned about this stream's health water samples were collected to assess the levels of sedimentation. Rural sites were found to be dirtier than urban sites.

### **Biofuel: Food To Fuel**

This project used the humble apple to produce an environmentally friendly biofuel. There was also a comparison to kerosene – the biofuel was more efficient and much cheaper!

### **Dripping taps – money down the drain**

The cost of a dripping hot water tap was calculated in both water and power costs.

### **Magnetic Generator**

A prototype was built that worked on battery power and reused magnetic energy. It produced more power than it used therefore would be useful and more environmentally friendly than a diesel generator as back up power.

### **Kiln Fields**

This project investigated cement kiln dust, demonstrating how it could be re-used to create fertilisers, and by extracting heavy metals, to make conductors, and to use for x-rays.

### **Building Site Run-off: a Sedimental Journey**

Building site run-off is a big contributor to muddy waterways. This project experimented with different sediment trapping sausages to filter out the run-off.

### **Alternative Energy Sources**

This project aimed to build awareness about saving energy and the potential of wind, solar and wave energy. A website was developed that includes a calculator to work out the energy use and cost of various household appliances. Solar energy was found to be efficient and cheap and helps to save on hydro-electricity demand.