

**W**  
**ILL**  
**2**  
**0**

**CEAN**

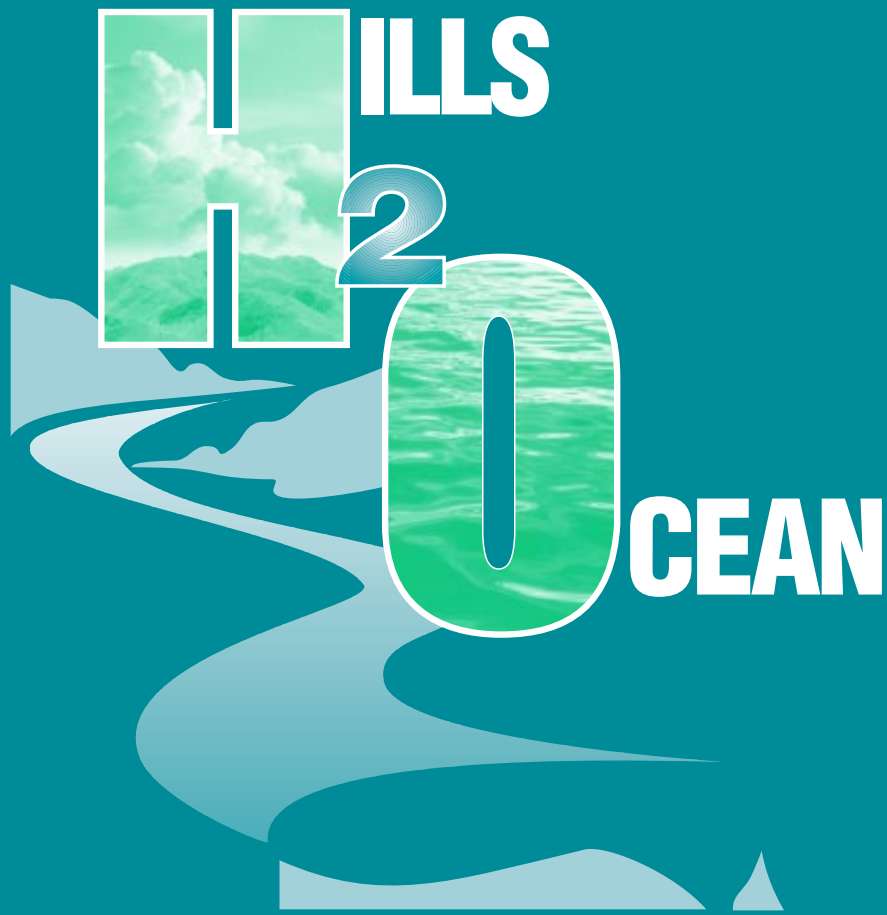
**a cross curricular water resource**

**Heather Bell**  
**Royal Society Teaching Fellow**

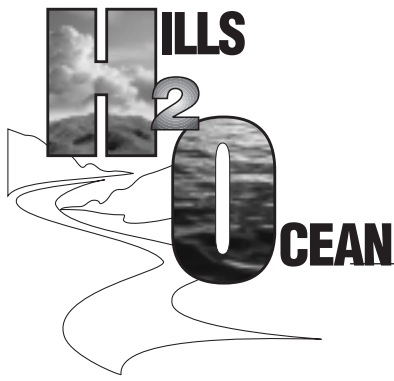


**Napier City Council**

**Hawke's Bay**  
**Regional Council**  
*Safeguarding Your Environment*



**introduction**



Welcome to the Hawke's Bay Regional Council's 'Hills 2 Ocean Water Resource'. This resource is designed as a complete technology cross curricular unit to meet the needs of Levels 3 - 5 (years 7 to 10) teachers and their students. It focuses on two areas. Firstly the waterway, meaning any flowing natural surface water from a small creek to a large river; and secondly supplied water, from town supply to farm collection and storage systems.

### **Intention**

It is the intention of this resource to encourage Education Outside the Classroom, using the environment to reinforce learning. The resource covers four major curriculum areas: technology, science, maths and social studies. There are many applications for language that will naturally evolve from the resource, but these have been left to your imagination. They are better coming from the situations that you create by using the resource than from us.

### **Philosophy**

The primary focus for writing this resource is technology, as it is the umbrella from which everything else can be introduced. To achieve this goal, it has been necessary to provide information about the natural waterway and how we get water to our homes, about the procedures professionals use when doing their jobs, as well as an understanding of the historical and present day values and needs that create a requirement for these jobs.

The technology strands are covered as follows, although naturally there is some cross over.

**Technological Knowledge and Understanding:**  
**Technological Capability:**  
**Technology and Society:**

***Procedures the Professionals Use***  
***Activities and Experiments***  
***Background Information***

The resource has been totally based on the philosophy of the new curricula, and to that end it is not directive; rather it encourages the children to be creative and to think in a problem solving manner.

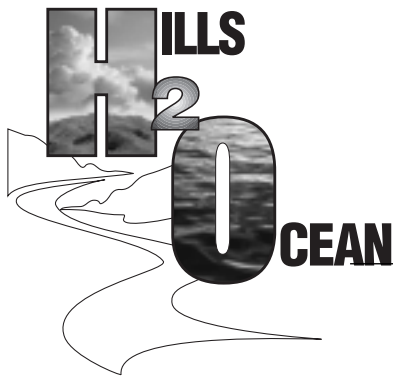
### **Format**

The resource has been written so that children of the target age group can use it directly, although teachers will find the information useful for reference and may like to adapt it for younger children.

The resource has been set out in the following sections:

#### **1. Support material**

- a. *Background Information:* The knowledge needed to complete any activities has been covered, in this section.
- b. *What the professionals do:* These are the procedures that the professionals use to complete their activities. This will be useful when the children are designing their own methods of experimenting and gathering data.



### 2. Activities and Experiments

- a. *The Waterway*: Activities designed to make children aware of the waterway and the influences we can have on it, both positive and negative.
- b. *Pumps, Pipes and Pressure*: Activities designed to make children aware of water that they use in their homes, of the need to conserve water, and to respect the fact that water is a finite resource.

### 3. Worksheets

A small number of worksheets have been provided for children to use. The children may design their own for field work to give them more ownership, but you may like to use these and let them design some other aspect of the unit.

Within the two activities sections, there are technology, science, maths, and social studies activities. They may be taught as an integrated unit or separately by specialist subject teachers. Select the ones you wish to do as they don't rely on completing previous activities. However, they usually rely on the background information, and some rely on a knowledge of the procedures that the professionals use.

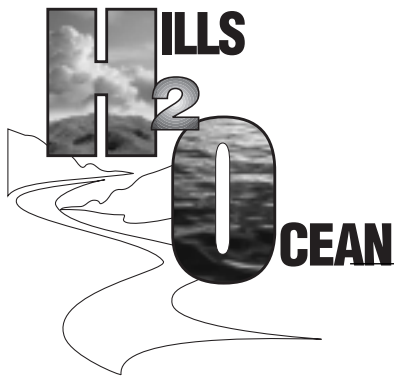
### Overview Sheets

The overview pages give an indication of the curriculum aims or objectives covered. The sheets are a guide only; how you deliver the units will determine the objectives you can link into them.

### A message on safety

All teachers understand the problems associated with having groups of children around water. Please:

- don't do field trips after storms (all the fun things will be washed away anyway)
- have adequate supervision
- take heed of the weather forecast
- give children a list of suitable clothing to take. Be prepared for anything.
- take first aid kits with you, and know how to use them
- don't put children into water that is above knee height for these activities
- ensure you have adequate sanitation facilities. Some waterways contain unseen organisms and none should be used for drinking water.
- teach children simple water safety techniques before you go, how to cross rivers etc. Contact Mountain Safety if you want someone to talk to the children.



Many people and organisations have assisted with the production of this resource.

- The Royal Society for the teaching fellowship which provided an opportunity to research and write the resource material.
- The Hawke's Bay Regional Council which hosted the fellowship. They provided the professional support to explain how water monitoring systems work. Many interesting field trips allowed first hand knowledge of the systems used by the professionals. They also funded the production and publicity of the resource.
- Napier City Council for the information for the 'Pumps Pipes and Pressure' section, and some financial support for the production of the resource.
- Other Regional Councils in New Zealand for providing information, in particular:
  - Environment Waikato
  - Taranaki Regional Council
  - Otago Regional Council (which also provided photos of macroinvertebrates)
- NIWA in Christchurch, for ideas for the 'Waterway' section based on their stream testing kit for NZ farmers which was under trial.
- Advisors at Massey University College of Education, Ruawharo Campus, for assisting with the direction of the philosophical focus of the resource.
- Children and teachers in local Hawke's Bay schools for their willing assistance in trialing the activities.

Artwork by Bruce Churchhouse.

Photography by Heather Bell.

This material may only be photocopied for use in schools.

### References

Biggs et al (1990) *The 100 Rivers Project*.

Environment Waikato. *Draft Stream Sense Manual* (1998)

Moore, S., (1997) *A Photographic Guide to Freshwater Invertebrates*. Otago Regional Council.

Otago Regional Council. *Aquatic flora and fauna monitoring*.

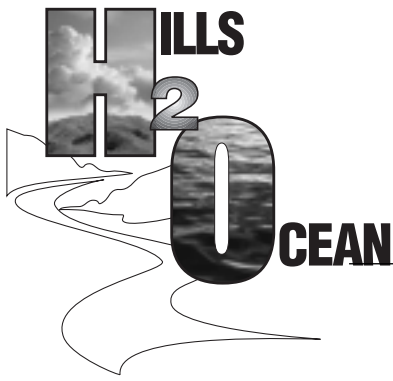
Stark, J.D., (1993) *Performance of the Macroinvertebrate Index: effects of sampling method, sample replication, water depth, current velocity and substratum on index*. New Zealand Journal of Marine and Freshwater Research.

Stark, J.D., (1985). *A macroinvertebrate community index of water quality for stony streams*. Water and Soil miscellaneous publication.

Taranaki Regional Council. *Living with the river Te Awa*. A river unit produced for schools.

*Hydromike*. no 53, Autumn 1967.

HBRC – The Water Cycle.



## feedback form

To help us with your future requirements, we would appreciate you filling in the following evaluation form after you have used some of the material. Please photocopy the form for other teachers who may use the resource.

Send to:  
The Environmental Education Co-ordinator  
Hawke's Bay Regional Council  
Private Bag 6006  
NAPIER

1. Please circle the age group you have used the resource with.

Level 3

Level 4

Level 5

other (specify)

2. How would you rate the level of information and activities? (please circle)

easy

appropriate

hard

3. How appropriate were the activities?

inappropriate

useful

excellent

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

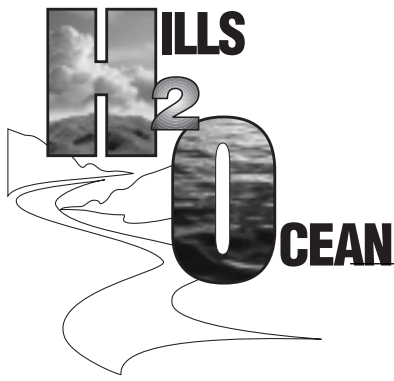
4. Which parts were the most useful? Please explain. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. How would you like us to improve the resource? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. What other areas of environmental education would you like developed in a similar way?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Any further comments. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Thank you for taking the time to give us your feedback.



## The Waterway Units

### Unit 1:

#### Introduction

**Aim:**

To introduce the waterway and find out what children already know

**Core:**

Science: Planet Earth and Beyond, Living World

**Curriculum Link:**

Social Studies

### Unit 2:

#### Waterway Monitoring System

**Aim:**

To make children aware of some ways to test the quality of the waterway

**Core:**

Technology: Information and Communication, Structures and Mechanisms

Context: Environmental, Community

**Curriculum Links:**

Social Studies, Science

### Unit 3:

#### Go with the Flow (all versions)

**Aim:**

To apply skills of measurement and time to realistic situations

**Core:**

Maths: Measurement, Number

**Curriculum Links:**

Science, Technology

### Unit 4:

#### Catching Bugs: A Statistical Investigation

**Aim:**

To develop statistical data gathering and interpretation skills

**Core:**

Maths: Statistics, Number

**Curriculum Links:**

Science, Technology

### Unit 5:

#### People and the Water

**Aim:**

To discover and understand the different values placed on water by various members of the community in which we live

**Core:**

Social Studies: Resources and Economic Activities

**Curriculum Link:**

Technology

### Unit 6:

#### From the Mountains to the Sea.

**Aim:**

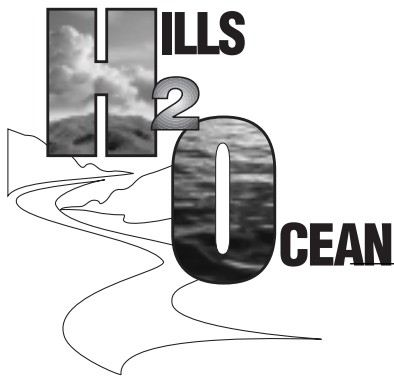
To discover how a river is formed and what things can affect it on its journey

**Core:**

Science: Planet Earth and Beyond, Material

**Curriculum Link:**

Social Studies



## Pumps, Pipes and Pressure

### Unit 7:

#### Rural Water Supplies

#### Aim:

To become aware of the physical and health related problems of rural water supplies and how these can affect people

#### Core:

Technology: Structures and Mechanisms

Context: Environmental, Home, Community

#### Curriculum Links:

Science, Social Studies

### Unit 8:

#### Good Gardening

#### Aim:

To become aware of ways of conserving water and wise watering

#### Core:

Technology: Structures and Mechanisms

Context: Home

#### Curriculum Links:

Science, Social Studies

### Unit 9:

#### What Does a Plant Need?

#### Aim:

To discover where plant roots are and the most effective way to water garden plants

#### Core:

Science: Living World, Physical World

#### Curriculum Link:

Maths

### Unit 10:

#### Making Water Work

#### Aim:

To discover the relationship between water pressure and height

#### Core:

Science: Physical

#### Curriculum Links:

Technology, Social Studies

### Unit 11:

#### Lets Get Pumping!

#### Aim:

To be able to solve practical number problems, sketch and interpret graphs and develop measurement systems

#### Core:

Maths: Number, Algebra, Measurement

#### Curriculum Links:

Science, Social Studies

### Unit 12:

#### How Much Water Do We Use?

#### Aim:

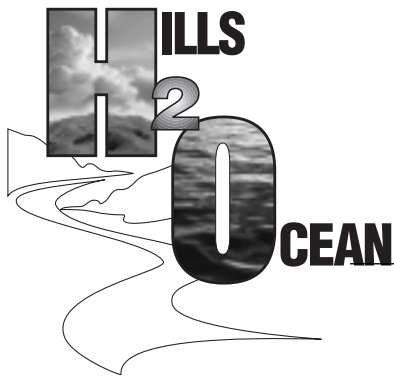
To be able to interpret and apply statistical data

#### Core:

Maths: Statistics, Algebra, Number

#### Curriculum Link:

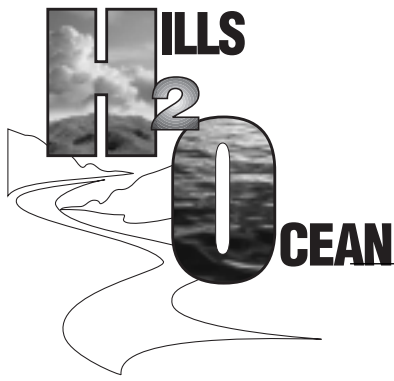
Social Studies



**Technology**

Unit Number	2	3	4	5	7	8	10
<b>Knowledge and Understanding</b>							
1 The use and operation of technologies							
2 Technological principles and systems							
3 The nature of technological practice							
4 Strategies for the communication, promotion, and evaluation of technological ideas and outcomes							
<b>Capability</b>							
5 Identify needs and opportunities to provide information for possible technological practice							
6 <i>With reference to identified needs and opportunities</i>							
a. generate possible options and strategies, and select, develop and adapt appropriate solutions							
b. product technological outcomes to agreed quality standards, managing time, and using human and physical resources skillfully, safely and effectively							
c. present and promote ideas, strategies, and outcomes throughout technological practice							
d. evaluate designs, strategies, and outcomes throughout technological practice in relation to their own activities and those of others							
<b>Technology and Society</b>							
7 Develop awareness and understanding of the ways the beliefs, values, and ethics of individuals and groups: – promote or constrain technological development; – influence attitudes towards technological development							
8 Develop awareness and understanding of the impacts of technology on society and the environment: – in the past, present and possible future; – in local, national and international settings							

	2	3	4	5	7	8	10
<b>Technological Areas</b>							
Information and Communication							
Structures and Mechanisms							
<b>Contexts</b>							
Home							
Environmental							
Community							



**Science**

Unit Number	1	2	3	4	6	7	8	9	10	11
<b>Skills and Attitudes</b>										
Find questions to investigate										
Use own science ideas to make testable suggestions and predictions										
Design and carry out fair tests										
Observe, measure and record observations										
Use information and sources purposefully including people, media										
Identify trends and relationships										
Relate results of investigations appropriately to audience										
<b>Science and its Relationship to Technology</b>										
Understand and carry out scientific investigations										
Investigate examples of technology and use science ideas to explain how it works										
Investigate the effects of changes in science and technology on people										
<b>Living World</b>										
Appreciate the diversity of life and be able to classify plants and animals, esp. New Zealand species										
Recognise parts of plants and animals and explain their adaptations to habitat, variations and life cycles										
Care for living things and their interdependence										
<b>Physical World</b>										
Explore and seek trends and relationships in physical phenomena, and consider explanations for what is observed										
Investigate and explain how simple items of technology work										
<b>Material World</b>										
Understand properties and uses of materials and describe changes										
Recognise technology changes materials and how this affects the environment										
<b>Planet Earth and Beyond</b>										
Recognise patterns and changes in local land forms and in weather										
Understand that the Earth changes and has a long geological history										
Observe patterns associated with the day and night time sky, and relate these to models of space and ideas about time										
Understand and take action on a local environment issue										



**Maths**

	Unit Number	3	4	9	11	12
<b>Maths Processes</b>						
Pose maths questions to investigate						
Effectively plan a maths investigation						
Devise and use problem solving strategies						
Create and use mathematical models to solve problems						
Choose and use appropriate equipment						
Classify objects, numbers and ideas						
Interpret information and results in context						
Make conjectures						
Use words and symbols to describe and generalise patterns						
Use mathematical language and diagrams to explain ideas						
Devise and follow a set of instructions to carry out an activity						
Record and reports results of investigations concisely and coherently						
<b>Number</b>						
Understand and explore numbers						
Calculate accurately, efficiently and confidently						
Apply fractions, decimals and percentages						
Use estimating skills						
<b>Measurement</b>						
Understand and use a variety of measurement systems						
Use measuring instruments and devices accurately						
Apply concepts of time, rate or change						
<b>Geometry</b>						
Apply properties of 2D and 3D shapes						
Understand and applies symmetry						
Use models to solve problems						
Use scale maps, bearings, compasses, etc., to specify location and direction						
<b>Algebra</b>						
Recognise and uses patterns and rules						
Use symbols, graphs and diagrams to represent and communicate ideas						
Use equations to solve problems						
<b>Statistics</b>						
Plan and carry out a statistical investigation						
Interpret data and make sensible statements						
Understand and use probability						



**Social Studies**

As this resource covers the processes and focuses only on one strand of Social Studies, this tracking sheet does not show the full scope of the curriculum.

Unit Number	1	2	5	6	7	8	11	12
<b>Processes</b>								
<b>Inquiry</b> Collect, process and communicate information about human society								
<b>Values Exploration</b> Explore and analyse values								
<b>Social Decision Making</b> Make decisions about possible social action								
<b>Resources and Economic Activities</b>								
Understand people’s different views about resources, how resources are allocated and managed and the consequences of this								
Understand people’s participation in economic activities								