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How to use this kit

This education kit provides information on water quality related issues and over 30 activities for upper primary and lower secondary level students. It accompanies *A Community Water Quality Monitoring Manual for Victoria* and is part of the Waterwatch program.

This unit of study provides schools with the means of teaching a coherent coverage of water quality within the Curriculum and Standards Frameworks (CSF) key learning requirements for Levels 4 and 5 Science and Studies of Science and Society (SOSE).

The materials have been designed and presented so that they can be used individually, as sub-units of study, or sequentially as part of the full unit of study.

Waterwatch Victoria

Waterwatch Victoria is part of a national community water quality monitoring program which began in 1993. Water is our most valuable renewable resource - we cannot live without it. Yet water quality is declining in some areas of Victoria as a result of land management practices, urban, industrial and rural development and the clearing of native vegetation. The Waterwatch program provides techniques for measuring and assessing the health of our waterways and catchments. This knowledge can guide us to take appropriate actions to improve those waterways identified as having fair, poor or degraded water quality, and to maintain the health of those with excellent and good water quality.

Barwon Water

Barwon Water is Victoria's largest regional water authority. It is responsible for the supply of fresh water and removal of waste water for over 250,000 Victorians living in the south-west. In addition, Barwon Water has a commitment to environmental enhancement with a particular focus on waterways' health.

By improving the health of waterway we improve the quality of the water reaching our water storages. This in turn means that the water needs less treatment before it is piped to households, farms and businesses. These cost savings can then be passed onto all these consumers.

Barwon Water believes the Waterwatch Program alerts school children and community groups to water quality issues and empowers the community to make a positive contribution to the improvement of our living environment through water quality improvement actions.

Ford Motor Company

The Ford Motor Company, as a major stakeholder in Geelong and a significant water consumer, has a commitment to the social well-being of the people of the region and to the region's environment.

Ford is pleased to demonstrate this commitment through sponsorship of the Waterwatch Education Kit and believes this education resource will stimulate enquiring minds, and equip them with strategies to enhance our lives.



The Waterwatch Education Kit



The first step in the process of improving and maintaining Victoria's waterways and wetlands is to understand how human activities are affecting them. The second step is to become part of the Waterwatch program and monitoring a local waterway. The third step is to take appropriate action to help look after your particular monitoring site.

Curriculum and Standards Frameworks (CSF)

This kit helps you with all three steps as well as fulfilling learning requirements from the Curriculum and Standards Frameworks. It provides learning experiences that apply science skills and knowledge to a real life practical application.

CSF Learning Areas for Levels 4 and 5 Science and Studies of Science and Society (SOSE) are identified for each activity in the Kit.

The kit contains a full unit of study covering 3 topics:

1. Understanding water quality and aquatic ecosystems
2. People and water
3. Looking after waterways and our catchment.

Teachers can teach the whole unit, or select topics or individual activities, according to their needs.

These activities can of course be modified by teachers to apply to other age levels. They allow skills to be applied or provide ideas for similar topics covered in other subject areas such as:

- Technology
- Mathematics
- Health & Physical Education
- Geography
- History
- English
- The Arts.

Kit organisation

The tabs divide the Kit into three sections.

Introduction

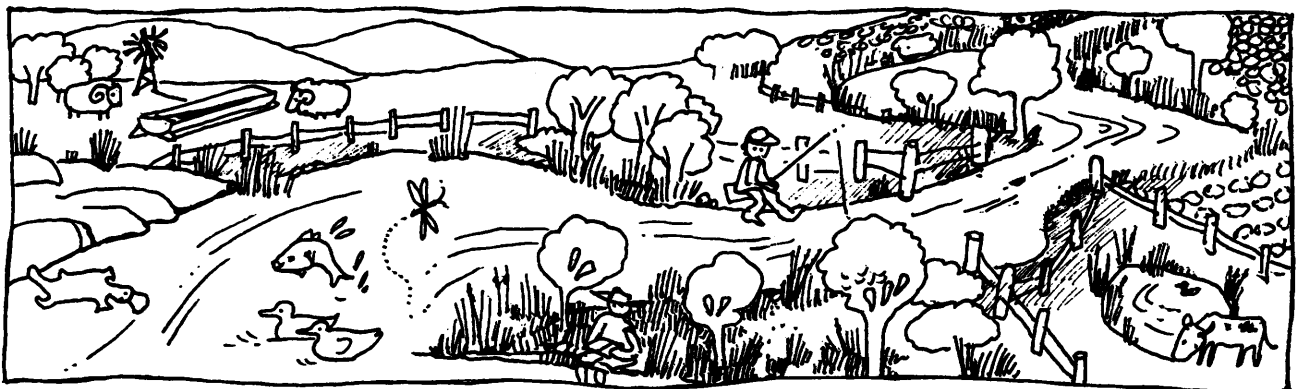
the educational background information for the Kit

Statewide

information and activities of Statewide relevance and application

Regional

information and activities specific to a particular Waterwatch Catchment Region. In this first edition of the *Waterwatch Education Kit*, the regional section covers the Corangamite Catchment region.



Scientific skills

Biological knowledge has been built up over the centuries on the firm base of direct observations and the careful recording of these observations.

The scientific process also often involves conducting experiments. Experiments need to be conducted so that only one factor at a time is varied. This allows the effects of changing that factor (called a variable) to be tested. A **variable** is anything that can differ in an experiment and so affect the outcome, e.g. temperature, light intensity, length of time.

A **control** is needed from which comparisons can be made. For example, in an experiment to test the affect of fertiliser of water, the control would be the jar that has no fertiliser added. The effect of fertiliser can be determined by seeing what happens in the jar with fertiliser added compared to what happens in the control jar that had no fertiliser added. Remember, both control and variable jar must be the same size and type, and both placed in identical situations for the same length of time.

Properly controlled experiments do not have just a single test and a single control as the one test result may be an atypical result. In the scientific process it is best to have **duplicate** or **multiple** test and control specimens and average the results of each before comparing the test to the controls' results.

Median or average figure?

When comparing and analysing some of the water quality readings taken over time, it is best to take the **median** rather than the **average** figure.

The median is the middle figure in a range of figures.

Example

	Test 1	Test 2	Test 3	Test 4	Test 5
Temp.	12°	13°	14°	15°	32°

Average = the sum of all 5 figure divided by 5 = 17.2°

Median = the middle figure (3rd) between 12° to 32° = 14°

For many Waterwatch monitoring tests, the median is a more accurate representative figure because an occasional atypically high or low reading will make the averaged figure too high or low.

The activities in this Kit, and the Waterwatch monitoring program, help students develop skills in:

- **observation**
- **recording**
- **conducting experiments**
- **interpreting and analysing results**
- **drawing conclusions from their findings**

Teacher notes for conducting experiments

When conducting the experiments in this Kit, make sure all the small groups:

- use the same size and type of jars or containers
- place all their jars or containers in identical situations (i.e. all left for the same length of time, all placed where they receive the same amount of sunlight)

If when you conduct the experiments in this Kit, you observe no changes, you could try changing one of the variables, e.g.

- extend the experiment time by leaving all the jars for a longer period to see if any results are then observable OR
- conduct the experiment again but increase the amount of the variable (e.g. add a larger quantity of fertiliser) OR
- place all the jars in a sunnier position OR
- use pond or creek water rather than tap water (tap water is treated water)

In some experiments, you may want to try reducing the amount of the added pollutant to be able to observe more subtle differences between different types of pollutants (e.g. if the algae growth is too rapid, add less than the suggested amount of fertiliser).





CSF matrix for Statewide section

Each of the following Teacher sheets listed in the matrix has accompanying Student activity sheets, and in some cases, Information sheets.

Science Level 4

Living together

Identify living and non-living things that affect the survival of organisms in an ecosystem.

- Teacher sheet 1: The story of a river
- Teacher sheet 2: Water: who needs it?
- Teacher sheet 3: Introducing water quality
- Teacher sheet 4: Measuring water quality
- Teacher sheet 5: Interpreting sample data
- Teacher sheet 6: Victoria's major rivers
- Teacher sheet 7: River habitats
- Teacher sheet 8: Life in our waterways
- Teacher sheet 9: Freshwater macro-invertebrates
- Teacher sheet 10: Choking our waterways
- Teacher sheet 11: Please don't feed the river
- Teacher sheet 17: Spot the differences
- Teacher sheet 18: Mapping your catchment
- Teacher sheet 19: One plus one plus . . .
- Teacher sheet 20: The platypus
- Teacher sheet 21: Monitoring with Waterwatch
- Teacher sheet 22: Interpreting your results
- Teacher sheet 24: Local action to improve stream habitat
- Teacher sheet 25: A local action for water quality

Structure and function

Describe the functioning of the support, transport and reproductive systems in plants and animals.

- Teacher sheet 8: Life in our waterways
- Explain how animals uses their senses to detect and respond to their environment.*
- Teacher sheet 8: Life in our waterways

Biodiversity, change and continuity

Suggest why some species have become extinct.

- Teacher sheet 17: Spot the differences
- Identify current endangered species and examine strategies to conserve them.*
- Teacher sheet 23: Introduced impacts

