

Environmental Education Resource

Waterways



North Central
Catchment
Management Authority

ISBN 097 504 565 2

© 2003 Published by

North Central Catchment Management Authority

Huntly (03) 5448 7124

Disclaimer

This publication may be of assistance to you, but the Authority, its employees and other contributors do not guarantee that the publication is without flaw of any kind or is wholly appropriate for you particular purposes and therefore disclaim all liability for any error, loss or other consequence that may arise from you relying on any information in this publication.



North Central
Catchment
Management Authority

Acknowledgements

Funding for this resource is a joint initiative of North Central Catchment Management Authority and North Central Waterwatch.

This resource was prepared by Nicole Howie,
Education Consultant for NCCMA.

Editing and review completed by Bronwen Burr and Toni Domaschenz, North Central Catchment Management Authority.

Copy editing by Leisa Macartney, Clarity Editing Service.

Printing and production coordinated by SASI Marketing.

Printed on recycled paper.





Welcome



Welcome - Contents

Welcome	2
Synopsis	3
Waterways Background	4
Program Overview	6
Guide To Each Lesson Plan	7
Waterwatch Activities	8
Planning a Waterwatch Activity	9
Sample Note	10
Evaluation	11



Welcome

Dear Educator,

Welcome to the Waterways Environmental Education Resource. This 'waterways' package provides resources for a themed week in your class.

The North Central Catchment Management Authority (NCCMA) has developed this package which:

- is written and presented in a teacher-friendly format
- focuses on local issues and data
- is aimed at Year 5 and 6 students
- links to the CSF II
- provides a variety of activities
- is easy to implement
- is beneficial for all involved – teachers, students, school, parents and the wider community
- is supported by a resource CD.

Waterway health is a key environmental indicator. There are many challenges facing us if we are to co-exist sustainably with our precious water resources in the future. Understanding the threats to our waterways will help enable us to do so. By raising awareness, providing information and offering opportunities for practical involvement, we can work together to improve waterway health.

NCCMA is the peak body responsible for delivering waterways education programs in this region. 'Value add' to this teaching resource by arranging a presenter to visit your school and involve students in a 'Waterwatch Activity' (see page 8-9 for details and timelines). You may like to extend your experience by becoming involved in the North Central Waterwatch program.

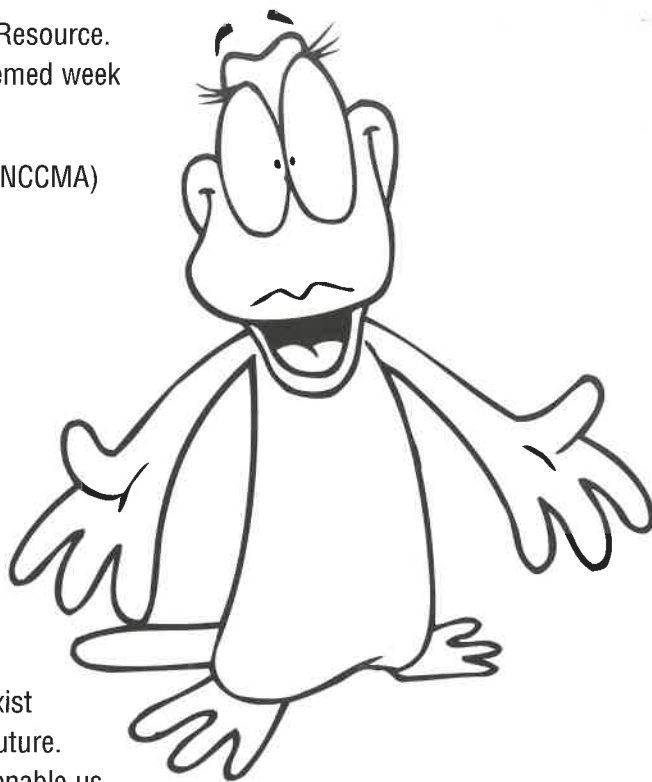
By providing a week of engaging learning tasks across the curriculum, this package aims to take waterways education beyond one isolated experience, thus maximising its impact and student learning outcomes.

For further information about this Environmental Education Resource, or the companion Urban Stormwater and Salinity resource packages, contact North Central Waterwatch, at NCCMA on 5448 7124*.

Regards,



Ian McBean
Chairman
North Central Catchment Management Authority



* If your school is not located within North Central Victoria, contact Waterwatch Australia www.waterwatch.org.au for information about your local Waterwatch program.

Synopsis

The Waterways Environmental Education Resource provides you with an opportunity to learn more about waterway issues. Information within the package is relevant to North Central Victoria and contains statewide links.

This Environmental Education Resource:

Focuses on the following key waterway concepts

- waterways include rivers, creeks, streams and wetlands
- waterways are an integral part of the water cycle
- we value our waterways for a variety of economic, social and ecological reasons
- riparian vegetation plays an important role in maintaining waterway health
- a wide diversity of animals live in, on or near waterways
- human activities can threaten waterways
- our region's waterways range from excellent condition to very poor health
- management strategies can be implemented to protect and enhance our waterways
- we all share responsibility to work together in preserving and restoring our waterways
- Aboriginal people maintain a close relationship with waterways.

Utilises the following processes

- introducing waterways
- consolidating ideas
- integrating information
- understanding key processes
- generating solutions
- taking action.

Dispels the following waterway myths

- waterways are isolated from wider catchment activities
- we can't make a difference to waterway health
- waterway health does not affect people living in towns
- it is okay to dump rubbish in waterways
- you should remove fallen timber ('snags') from waterways
- waterways are simple static systems
- Aboriginal culture ended in 1788.

Involves the use of

- technology
- current data and local maps
- mapping, graphing, observing and recording
- experiments, quizzes, art, sport and drama
- discussion between students, the school community and local experts
- generating solutions and taking action!

Includes the following components

- links to the CSF II
- background information
- learning tasks across all curriculum areas
- lesson plans
- student worksheets
- extra resources
- field excursions
- assessment tools.

Incorporates these learning tools

- co-operative learning
- bloom's taxonomy
- alternative learning styles
- hands-on activities
- open-ended investigations
- student directed tasks
- information and communication technologies
- school community involvement
- middle years initiatives
- literacy and numeracy initiatives
- peer tutoring / jigsaw
- student self-evaluation.



Waterways Background

Why are waterways important?

Rivers, creeks, streams and wetlands can all be collectively termed 'waterways'.

While they make up only a small portion of the Victorian landscape, they are fundamental to our economies and quality of life.

Waterways support agricultural industries, provide drinking water and support recreation and tourism. They are entwined in the lives and histories of communities.

Rivers and their associated estuaries and floodplains are highly diverse, incredibly significant, ecosystems. They keep the catchment healthy by treating and removing pollution. Rivers support a large array of native flora and fauna (including threatened or endangered species).

The condition of waterways provides a guide to the health of the catchment.

The state of our waterways

Less than 10% of the rivers and streams are in good to excellent condition. Most waterways are in fair to poor condition. Poor waterway health contributes to the high incidence of algal blooms in the region. This affects human health, agriculture and industry.

What is riparian land?

Riparian land is any land that adjoins, directly influences, or is influenced by a body of water. It is often the most fertile, productive part of the landscape and supports a high diversity of plant and animal life. Many native plants are found only in riparian areas.

Indigenous cultural values

Aboriginal people have successfully maintained waterway systems for over 40 000 years. This includes using waterways for tradition, trade / economics and spirituality. Their relationship with the environment is essential to the survival of their culture. Included in this is the need to adapt to change and preserve links with the past.

Healthy riparian lands protect our waterways

- **Water quality**
Riparian land traps soil, nutrients and contaminants from surrounding land before it reaches waterways.
- **Bank stability**
Root systems stabilise banks and reduce erosion by binding the soil. Leaf litter and debris accumulated on the ground beneath riparian vegetation slows down and absorbs surface runoff.
- **Food supply**
Riparian vegetation provides food for aquatic and terrestrial animals, such as invertebrates, fish, birds, mammals, reptiles and amphibians.
- **Shelter**
Riparian trees have hollows that form breeding, roosting and hiding places. Woody debris in the waterway (snags) provide shelter, feeding and breeding grounds for fish. Riparian vegetation also provides wildlife refuge.
- **Temperature**
Vegetation shades the water, reducing water temperature. Temperature is a controlling factor in the life cycle of many aquatic insects and fish.
- **Aesthetics**
Riparian land provides attractive areas for recreational activities, which can become a source of income through ecotourism.

Historic management

In the past, the links between land and water were not well recognised. Extensive clearing and intensive cropping, grazing and irrigation occurred along riparian lands. Waterways were used as drains. These practices were not sustainable and waterways suffered.

Current thoughts and practices

We now understand that waterways are 'arteries', supporting the land around them. Riparian land is the 'last line of defence' for aquatic ecosystems and water quality. Landholders, community groups and government agencies are working together to develop waterway and riparian land management strategies. This includes working with local Aboriginal people. These practices will improve waterway health.



Waterways Background



Some threats to our waterways

Altered flows and instream barriers

Flow can be altered through irrigation, construction of dams, levees or weirs. Changes to flow can favour introduced species (e.g. carp) over native species. Water storage structures or crossings create barriers to fish passage.

Temperature changes

Increased or reduced water temperatures can prevent reproduction in aquatic plants and animals.

Nutrients

Nutrients are natural components of waterways. However, increased nutrient levels can lead to excess plant growth.

Removal of riparian vegetation

Riparian vegetation provides a buffer from surrounding catchment activities. Removing this buffer exposes the waterway to pollution, temperature increases and exotic species.

Sedimentation

Sedimentation is a natural process in waterways. However, increased sediment loads from the catchment can impact on the physical form of the waterway and on aquatic life.

Pollution

Catchment activities have the potential to create waterway pollution. Litter, nutrients, sediments and toxic materials all pollute waterways. Toxic materials has greatest impact on large carnivores, like platypus and tortoises.

Salinity

The removal of deep-rooted native vegetation, planting of shallow-rooted crops and inefficient irrigation leads to a rise in saline groundwater levels. Saline groundwater entering waterways interrupts physiological processes in aquatic plants and animals.

Snag removal

Historically woody debris (snags) were thought to reduce stream flow and cause flooding, thus desnagging was common practice. Snags play an essential role in freshwater ecosystems, providing feeding, breeding and hiding places for native fish.

River channel modifications

Natural erosion and deposition processes shape waterways. Modifications to river channels have occurred to remove floodwaters and free-up land. This causes onsite problems like bank erosion and creates flooding and sedimentation downstream. It also reduces habitat for native plants and animals.

Exotic species

Thirteen of the 22 exotic fish species in Australia are present in Victorian waterways, competing with native species for food and shelter. Exotic plants like willows and blackberries, and animals like rabbits also impact on waterways and riparian lands.

Conclusion

Waterways are the lifeline of our communities. It is essential that we work together to protect our waterways.

There are many actions we can all take to reduce threats to waterways.

- fence and revegetate riparian lands
- stop weeds and vermin
- educate the community about the benefits of natural streams
- reduce pollution entering waterways
- ensure environmental flows are kept in waterways
- learn about Aboriginal people and their culture.
- participate in 'Waterwatch' activities.

By protecting waterways we will benefit from clean and safe water for drinking, agriculture, industry, the environment and recreation for generations to come.



Program Overview

- I** = Introductory lesson
M = Midweek
C = Conclusion
A = Action

This resource provides a wide variety of activities for your class. Feel free to choose any combination from the list below. The coding beside each activity indicates where the activity will best fit into a week-long program.

ENGLISH

	Page
I Watery Words	14
I Pizza Smart Spelling	16
M Vital Vegetation	17
M Wanted	20
M Quirky Cinquains	22
C A River Recount	24
C A Day In The Life Of ...	26
C Indigenous Australians	28

SOSE

I In Days Gone By	32
M The Life And Times Of A Waterway	34
M Community Questionnaire	36
C Catchment News	38
C Potential Problems	42
C Indigenous Heritage	45
C Wetland Wonders	48

SCIENCE

I A Meandering Map*	52
I Virtual Habitat Survey	54
M Miraculous Minibeasts	56
M Feathery Friends	60
C Habitat Survey*	62
A Involve Me And I'll Understand	66

MATHS

I Rating River Health	68
M Stream Speed*	70
M Woolly Waterways	72
M Creeklines Of Colour	74
C Brain Benders	76

THE ARTS

I Let's Act It Out	82
I River Role Play	85
M Create A Critter	88
C Diorama Design	89
C Dramatic Waterway Scenes	90
C Care For Our Country	92

HPE

I Homeless	94
I Walk A Waterway	96
M Racing Rivers	97

EXTRAS

For the teacher

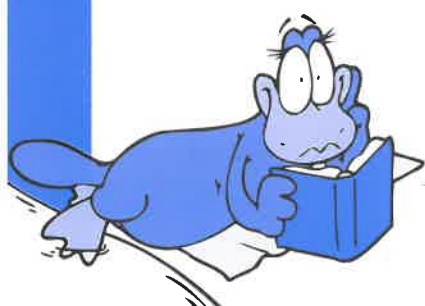
Record Sheet	102
Waterway Quiz	103
Bits and Pieces	104
Waterway Photos	105
Certificates	106

For students

Waterways Booklet Cover	108
Waterways And Me	109
Crossword	110
Waterways Find-A-Words	111
Acrostic Poem	115
Brain Boosters	116
Waterways Cartoons	117
Waterways To Scale	118
Spot The Difference	119
Link It All Together	120
3Rs Bingo	121
Waterway Birds	122

For a glossary of waterways terms see
www.vic.waterwatch.org.au

* can be complete simultaneously



Guide To Each Lesson Plan

Activity Title

FOCUS

- The focus of the activity

OBJECTIVES

- A brief outline of what students will be able to do after the activity.

BACKGROUND

You are not expected to be an expert. You will find notes to help you here. If you require further background information, see Welcome, 'Waterways Background' pages 4-5.

NOTES

Important details about the activity including organisational tips, pre-requisites, suggested variations and links to other activities.

CSF II LINKS

Learning outcomes that are addressed but not necessarily met. This resource aims to achieve conceptual understanding. Codes included here relate to CSF II Level 4 e.g. SCIENCE 4.1 Chemical = CSF II Level 4 point number 1 under Chemical Science.



LEARNING TASKS

A variety of learning tasks are suggested here, sometimes as a range to choose from, sometimes as a possible sequence to follow.

Discussion points and question examples are often provided.

MATERIALS

- A list of everyday materials and / or teaching resources you will require.

EXTENSION IDEAS

Challenges for gifted learners, suggested home tasks or extension for the whole class.

ASSESSMENT IDEAS

Questions to keep in mind when evaluating student understandings. A variety of assessment methods are suggested with templates provided.



Waterwatch Activities

CONTACT

The Regional Waterwatch Coordinator at the North Central Catchment Management Authority on (03) 5448 7124 to express your interest in undertaking a Waterwatch activity.

If you are studying outside North Central Victoria, visit www.waterwatch.org.au to find contact details for your local Waterwatch Coordinator.

'Water Week' can occur at any time during your school year. Work with the Waterwatch Coordinator to determine where it will best fit into your school's Integrated Curriculum Plan and your community's calendar of events. Make sure you also consider the seasonal conditions that may influence local waterways.

MAY OR SEPTEMBER

'Is Your Stream Bugged?' Aquatic Invertebrate Sampling

This interactive program involves students in the identification of aquatic invertebrates. They will learn about the role of aquatic invertebrates and threats to invertebrates in our waterways. A fantastic follow up activity is the 'Create-a-critter' competition run during third term.



MAY

Salinity Snapshot

Run across Victoria, this water quality monitoring event provides students with an opportunity to compare the salinity level of local waterbodies to others in the state. Using an interactive website, students enter their results to compare with those found by other schools. Teachers wishing to be involved are encouraged to use the 'Environment Education Resource – Salinity' to maximise student outcomes.



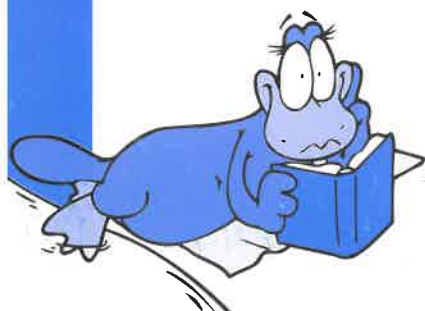
OCTOBER

'National Water Week' Events

Each year events are planned for National Water Week. Traditionally we have run 'Catchment Tours' with students from a number of schools. They sample water quality, aquatic invertebrates and conduct habitat surveys at a number of sites throughout a catchment. Students from upper and lower catchments come together over lunch to share their results and discuss current and future catchment management.

YEAR ROUND

For more upcoming events visit www.nccma.vic.gov.au/waterwatch.



Planning A Waterwatch Activity

Your guide to organisation of and participation in a Waterwatch activity.

Start of term 2 or term 4	<p>CONTACT the Regional Waterwatch Coordinator, at the North Central Catchment Management Authority, on 5448 7124 to express your interest.</p> <p>PROVIDE the following details</p> <ul style="list-style-type: none"> • name and location of school • the extent to which you may be implementing activities from this resource package either prior to or following the visit. • number of students / year level / number of classes • preferred day and time • your name and contact details. <p>EARLYBIRDS can borrow the Campaspe River or Bendigo Creek 3D Catchment Model. An area of 3 m x 1 m will be required.</p> <p>SAFETY discuss Occupational Health and Safety requirements with the Regional Waterwatch Coordinator.</p> <p>CONFIRM the date, day, time, name of presenter and any other relevant details of the visit.</p>
Two weeks prior to the day of the activity	<p>SEND a note home with students to inform parents of their child's participation.</p> <p>ENCOURAGE students' parents / guardians to come on field trips.</p> <p>ARRANGE a meeting prior to the activity over lunch or morning tea to discuss any ideas or issues relating to the implementation of this resource with the Waterwatch Coordinator (optional).</p>
On the day	<p>MEET the presenter upon arrival at your school. Induct them to the site and provide all necessary resources to enable set-up prior to the presentation.</p> <p>REMEMBER that teachers are responsible for student supervision and the school is responsible for the provision of sufficient staff members to ensure adequate student supervision.</p> <p>ENJOY the activity.</p> <p>REVIEW the Snapshot and provide feedback. We would love to receive comments about the Snapshot and the Resource Package. Mail feedback to 'Waterwatch Coordinator' North Central Catchment Management Authority, PO Box 18, Huntly 3551.</p>



Sample Note To Parents

Dear Parent / Guardian,

As part of our school's participation in a field trip during Water Week from _____ to _____, your child will be involved in a wide variety of activities to increase their awareness of waterways - one of Victoria's most important environmental assets.

During the week, we will be fortunate to have a presenter from the North Central Catchment Management Authority's 'Waterwatch Program' visit our school. The Waterwatch Program aims to increase awareness of water quality issues within the region and provide practical actions that we can all take to improve water quality.

Students will be actively involved a field activity to _____ (waterway), learning about waterways, catchment management and environmental monitoring. They will complete a number of activities including water quality and aquatic invertebrate sampling. The results collected in the field will be assessed to rate the health of your local waterway.

Your assistance is greatly appreciated,

Yours sincerely



This letter is a guide only. Other details may be included.

- Consent form and medical emergency form
- Details of payment if applicable
- Invitation to adults to join the field trip / request for adult helpers



Evaluation

The North Central Catchment Management Authority would greatly appreciate a short moment of your time to complete the evaluation below at the end of your 'Water Week'. Feedback from teachers will be highly valuable and used while reviewing the success of this program.

Please photocopy this page and forward your evaluation to:

Waterwatch Coordinator
North Central Catchment Management Authority
PO Box 18, HUNTLY, VIC, 3551
Facsimile: (03) 5448 7148
E-mail: info@nccma.vic.gov.au

Name (optional) _____ Date ____ / ____ / ____

School _____

Address _____

Please cross the box you feel most accurately describes your opinion.

The Resource

	Very happy	Satisfied	Disappointed
The format of the resource package as a whole	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The format of teacher notes for each activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The format of student worksheets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The variety of activities provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The number of activities provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The quality of suggested learning tasks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The learning outcomes achieved by students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ease of implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The type and amount of materials required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The support provided by background information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level of interest shown by students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Waterwatch Activity

The details provided to you prior to the activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality of the presentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level of interest shown by students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please feel free to add further comments.



