

## Environmental Education Resource

# Salinity



North Central  
Catchment  
Management Authority



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North Central  
Catchment  
Management Authority

#### **Acknowledgements**

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

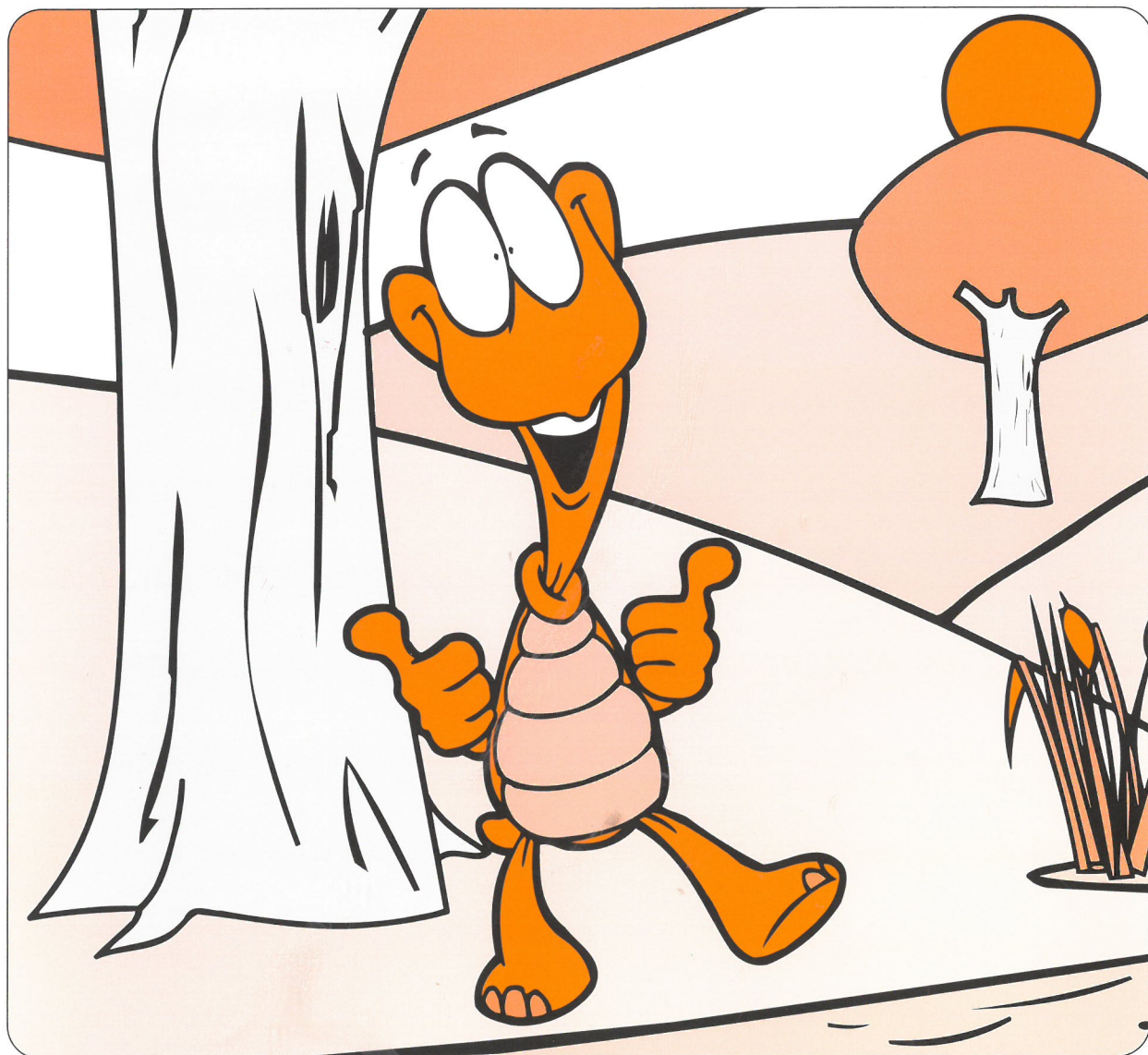
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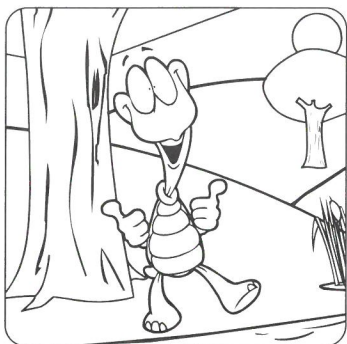


# Welcome

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## Welcome - Contents

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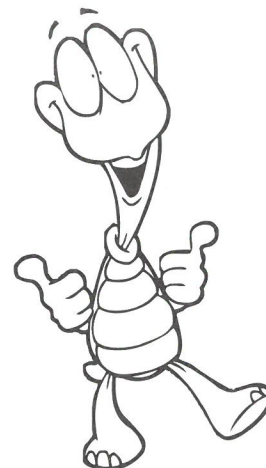
# Welcome

Dear Educator,

Welcome to the Salinity Environmental Education Resource. This 'salinity' 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.



Salts are a natural component of all landscapes, however salinity is an environmental issue of major concern in North Central Victoria across the four catchments of the Campaspe, Loddon, Avoca and Avon-Richardson rivers. The term 'salinity' refers to the concentration of dissolved salts in soil or water, it also describes one of the greatest threats facing Victoria's environment. Land affected by salinity shows a number of symptoms including tree die back, reduced productivity, change in or loss of plant species, breakdown of infrastructure including road cracking and crumbling bricks on buildings.

The Department of Primary Industries together with NCCMA are the peak bodies responsible for delivering salinity education programs in North Central Victoria. 'Value add' to this teaching resource by arranging a Presenter to visit your school and involve students in a 'Salinity Snapshot' (see page 8 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 salinity 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 Waterways 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](http://www.waterwatch.org.au) for information about your local Waterwatch program.





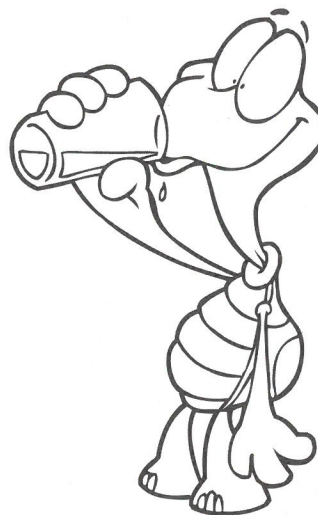
# Synopsis

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

## **This Environmental Education Resource**

### **Focuses on the following key salinity issues**

- The water cycle and salinity
- Processes involved in salinisation
- Factors contributing to salinity, such as land use
- Environmental, economic, agricultural and social impacts of salinity
- Management techniques and alternative uses of land and resources
- Study of salt in a broader sense, such as the historical and everyday uses of salt



### **Utilises the following processes**

- Introducing salinity
- Consolidating issues
- Integrating information
- Understanding key processes
- Generating salinity solutions
- Taking action

### **Dispels the following salinity myths**

- We cannot make a difference to the salinity problem
- Salinity is a localised problem
- Salinity does not affect people living in urban environments
- Groundwater is an underground river

### **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



# Salinity Background

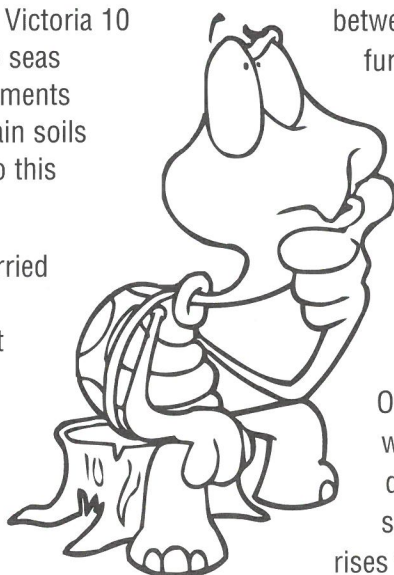
## What is salinity?

The term 'salinity' refers to the concentration of dissolved salts in soil or water. It also describes one of the greatest threats facing Victoria's environment. Land affected by salinity shows a number of symptoms including vegetation death, reduced productivity, change in plant species, breakdown of infrastructure including road cracking and crumbling bricks.

## Where does the salt come from?

Salts are a natural component of all landscapes. In Victoria, salt has been derived from three main sources:

- Inland seas covered parts of Victoria 10 million years ago. When the seas retreated, the salt in the sediments remained. Many areas contain soils that are naturally salty due to this process.
- Rainfall over the ocean is carried inland by winds. This rain contains salt, and although it affects coastal areas more significantly, inland Victoria receives 6-8 kg of salt per hectare per year from this process!
- Soils and rocks naturally contain salts. When rocks and soils are weathered, the salts are dissolved by rainfall and transported by water.



## Responsibility and extent of salinity

Humans have sped up natural salinity processes by removing deep-rooted vegetation and replacing it with shallow-rooted vegetation. This has led to an increase in the area of land affected by salinity

In Victoria alone, 55 000 ha of farming land is affected by dryland salting

There are three different types of salinity: dryland, irrigation and urban. All three types occur within the North Central region.

## The salinisation process

When it rains, water either runs off, evaporates, or soaks in. Where vegetation is present, roots act like a sponge, soaking up water and drying out the soil. Water can also be stored in the soil, attached to soil particles and in the spaces between them. Irrigating land can have the same effect as rainfall on the soil (this includes watering gardens in urban areas).

When there is no vegetation and/or when the space between soil particles is saturated, the water seeps further below until it is stopped by rock or layers of clay. Water builds up in this part of the soil and is known as groundwater. The upper surface of groundwater is called the watertable. Regions where water soaks into the watertable are called recharge areas and are typically found on hillsides where fractured rock 'outcrops' or is close to the surface.

Over time, if rainfall is greater than the amount of water used, the watertable rises. The groundwater dissolves salts in the soil and brings them to the surface in discharge areas. When the watertable rises to within 2 m of the soil surface, it enters the plant root zone, limiting growth and eventually killing vegetation.

The dry soil above the watertable sucks up groundwater in much the same way as a piece of tissue paper sitting on a wet surface picks up water. This process is known as capillary rise. Capillary rise can bring the salty water to the soil surface. When the water evaporates, salt crystals remain, forming a salt crust.

*See poster in back of folder for illustrations.*

## What land uses have contributed to salinity?





# Salinity Background

## What land uses have contributed to salinity?

For 40 000 years Indigenous people maintained their environment for their survival. This meant living in harmony with their surroundings. Australia's first European settlers tried to make a living off the land the only way they knew – by clearing trees and planting crops and pastures. They also required vast quantities of timber for buildings, fences, firewood, fuelling machinery, railway sleepers and telegraph poles. They did not understand how clearing would affect the environment.

In dryland regions the clearing of deep-rooted vegetation upsets the natural water balance. Shallow-rooted crops only use some of the water at the surface while the rest filters down into the watertable.

In urban areas, over-watering of gardens and recreation areas contribute to salinity problems. Inefficient watering practices in irrigation areas also cause salinisation of the land.

## What affects does salinity have, and who is affected by it?

Increased groundwater levels bring salts to the soil surface. Most plants cannot cope with a heavy concentration of salt and will slowly die. Areas where this occurs, or where groundwater emerges as a permanent seep or flow, are called discharge areas.

Land affected by salinity shows a number of symptoms including vegetation dieback, reduced productivity, change in plant species, breakdown of infrastructure including road cracking and crumbling bricks.

Recharge and discharge areas may be many kilometres apart. This means that landholders in one area may be suffering with salinity caused by the over-clearing of land many kilometres away. Likewise, over-watering of gardens or irrigation blocks can have local or remote impacts.

Discharge areas may include lakes, rivers, swamps and streams. Discharge in lakes and swamps will cause local salinity levels to rise, affecting the plants and animals living in and around the wetland.

Where watertables are high, salty groundwater can discharge into rivers and streams, and then flow downstream.

Salinity seriously impacts the natural environment, agriculture, public infrastructure and the economic and social well-being of whole communities.

## How can salinity be prevented or controlled?

Salinity is best managed co-operatively by many landholders within a catchment, rather than by individual landholders.

There is a multitude of ways in which salinity can be managed and prevented.

The focus of controlling salinity is to devise new land management systems that reduce additions to the groundwater and keep the watertable down.

## What can we do to help reduce salinity and its impacts?

- Use water wisely so as not to contribute to the rising watertable.
- Plant native deep-rooted trees and grasses to use the rainfall and help lower the watertable.
- Investigate ways to use water efficiently on farms.
- Identify areas where groundwater recharge and discharge are occurring and manage them accordingly.
- Establish deep-rooted perennial pasture instead of shallow-rooted annual pastures.
- Learn about Indigenous Australians' land management practices.

*Reference: Saltwatch Resource Book (1990) Catherine Burton, Burton Connections.*

See the Saltwatch Website for further information  
[www.saltwatch.org.au](http://www.saltwatch.org.au)



# 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 be best fit into a week program.

## ENGLISH

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Spot The Difference	135

\* activity is used in subsequent lessons.





# 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, 'Salinity 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 understanding. A variety of assessment methods are suggested with templates provided.



# Salinity Snapshot Timeline

Your guide to organisation of and participation in 'Salinity Snapshot' activities.

End of Term One	<b>CONTACT</b>	The Regional Waterwatch Co-ordinator, at the North Central Catchment Management Authority, on <b>5448 7124</b> to express your interest*.
	<b>PROVIDE</b>	<p>The following details:</p> <ul style="list-style-type: none"> <li>• Name and location of school</li> <li>• The extent to which you may be implementing activities from this resource package either prior to or following the visit</li> <li>• Number of students / year level / number of classes</li> <li>• Preferred day and time</li> <li>• Space available i.e. Multi-purpose room, classrooms, etc.</li> <li>• Your name and contact details</li> </ul>
Start of Term Two	<b>EARLYBIRDS</b>	Borrow the Campaspe River or Bendigo Creek 3D Catchment Model for Saltwatch Week. An area of 3 m x 1 m will be required.
	<b>REGISTER</b>	<p>Your school as a participant in Salinity Snapshot online at <a href="http://www.vic.waterwatch.org.au">www.vic.waterwatch.org.au</a></p> <p>Look for links to Snapshots – Salinity</p>
Prior to Saltwatch Week	<b>CONFIRM</b>	The date, day and time and any other relevant details of the visit.
	<b>SEND</b>	A note home with students to inform parents of their child's participation (see page 9). Request parental support for students collecting water samples.
Saltwatch Week (usually the second week in May)	<b>ASK</b>	Students to collect water samples from local water sources. Water samples can be collected in any well-washed container and labelled with the labels found on the Saltwatch website. Ideally, it would be very useful to ensure some samples include water from local waterways, a rainwater tank and a tap.
	<b>CONDUCT</b>	Saltwatch Week activities, choosing from the enormous selection in this resource package.
	<b>MEET</b>	The presenter upon arrival at your school. Induct them to the site and provide all necessary resources to enable setup prior to the presentation.
	<b>ENJOY</b>	Your visit by a Presenter with students actively involved in testing their water samples.
	<b>ENTER</b>	The Salinity Snapshot data onto the website.
Following Saltwatch Week	<b>REVIEW</b>	<p>The Snapshot and provide feedback. We would love to receive comments about the Snapshot and the resource package. Mail evaluation forms to: 'Waterwatch Coordinator' North Central Catchment Management Authority, PO Box 18, Huntly 3551.</p>

\* If your school is not located within North Central Victoria, contact Waterwatch Australia [www.waterwatch.org.au](http://www.waterwatch.org.au) for information about your local Waterwatch program.





# Sample Note To Parents

Dear Parent / Guardian,

As part of our school's participation in a Salinity Snapshot during Saltwatch Week from May \_\_\_\_ to \_\_\_\_, your child will be involved in a wide variety of activities to increase their awareness of salinity – one of Victoria's most serious environmental issues.

During the week, we will be fortunate to have a Presenter from the North Central Catchment Management Authority's 'Waterwatch Program' visit our school and run a two hour session called 'Salinity Snapshot'. 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 in this session, learning about the process of salinity and testing water samples from our local area with EC (salinity) Meters to determine salt levels. This data will then be entered on a statewide database to build a broad picture of the health of our region's waterways during Saltwatch Week.

Your child will be required to collect water samples from around your home or local area and bring the samples to school on \_\_\_\_\_. Sampling should take place with parental / guardian supervision. You may consider collecting samples from rivers, lakes, creeks, dams, taps, tanks, puddles or pools.

Containers used for collecting water samples should be well-washed. Rinse the container with a sample of water and tip out before collecting a sample to take to school. Each jar should be labelled to detail: waterbody type, location of source, student name and CFA map reference (if known).

Please take care to inform your students about safely collecting water. They should take a buddy or adult to the site, wear appropriate attire, access water from a safe vantage point and ensure they return promptly home to check in.

Results, when entered, will be available at:  
[www.vic.waterwatch.org.au](http://www.vic.waterwatch.org.au) Snapshots – Saltwatch Snapshot Events

Your assistance is greatly appreciated,

Yours Sincerely



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

- Consent form and medical emergency treatment form
- Details of payment if applicable
- An invitation to parents to join the field trip / request for parent helpers



# Evaluation

The North Central Catchment Management Authority would greatly appreciate a short moment of your time to complete the evaluation form below at the end of your 'salinity' 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  
**Waterwatch Coordinator**  
**North Central Catchment Management Authority**  
**PO Box 18, HUNTLY, VIC, 3551**  
**Facsimile: (03) 5448 7148**  
**E-mail: [info@nccma.vic.gov.au](mailto:info@nccma.vic.gov.au)**

Name (optional) \_\_\_\_\_ Date      /      /

School \_\_\_\_\_

Address \_\_\_\_\_

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

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"/>
<b>The Salinity Snapshot</b>			
The details provided about the Snapshot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ease of arranging the presenter and snapshot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your participation in the presentation and snapshot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please feel free to add further comments

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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