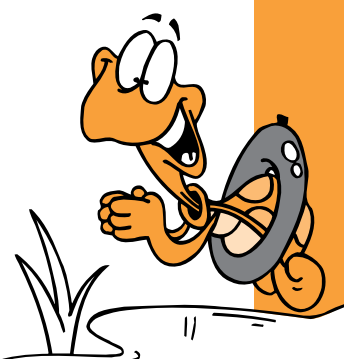
SOSE - Contents



Centuries Of Salt

I

FOCUS

- Where / how has salt been used throughout history?

OBJECTIVES

- To take notes from information presented orally
- To display notes as an information web

CSF II LINKS

ENGLISH 4.1 Listening & Speaking
4.2 Listening & Speaking
4.1 Writing

BACKGROUND

Salt is a natural mineral that has a long and incredibly interesting history. Salt has been used all over the world, for a wide variety of purposes throughout history. Acknowledging these facts provides students with a broader perspective of salt.

NOTES

The historical information can either be read aloud by the teacher with the whole class taking notes, or pre-recorded onto an audio tape with small groups listening and note taking.

LEARNING TASKS

1 **Complete a brainstorming session on what students know about the historical uses of salt.**

2 **Encourage students to listen and jot down as many notes as possible. Remind them of notetaking techniques.**

3 **You may wish to read through the student fact sheet with students listening and taking in what they hear.**
- Read through the information quite slowly the second time, allowing time for notetaking.
- You may wish to read the information a third time, allowing students to fill any gaps they missed or add further details.

4 **Students then complete the student worksheet by adding details around the central topic of *'A History Of Salt'*.**

5 **Complete a class discussion about the surprising and interesting facts learnt during the activity.**

6 **Hold a quiz to see how well students can recall information.**
- You may like to ask the questions or encourage students to do so.

MATERIALS

- ***'Centuries of Salt'***
  Student Worksheets 1 & 2

EXTENSION

Encourage students to write some "Did You Know?" snippets for the school newsletter using some of the historical facts learnt during this session.

ASSESSMENT

How well were students able to comprehend information presented orally? Could they extract key points and write them in note form? Were they able to recall facts?

Centuries Of Salt - Student Worksheet 1

Name _____

READ the following information.
COMPLETE the 'Information Web' (on the next page) using the information.

A History of Salt

In the past, salt was as valuable as gold. In ancient times, traders in India became rich from their vast salt mines. They sold salt to people living in countries around the Mediterranean Sea. Camel caravans carried the salt long distances overland.

In some Mediterranean countries like ancient Greece poor people were often sold to work as slaves. Rich men paid for slaves with salt. The expression 'not worth his salt' may be about a slave who did not work hard for his master.

The best Roman soldiers were often paid with salt. Later they were given wages to buy their salt rations. Our word 'salary' comes from the Latin words salarium argentums, meaning the money used to buy salt.

Because salt was so valuable, the Greeks and Romans sometimes offered it as a gift to their gods.

Many countries put a tax on salt and only the rich could afford it. King Francis I of France, who ruled in the 1500s, had a magnificent salt cellar (salt shakers) made for his table. Cellini, an Italian sculptor, carved it from gold.

In England people were quite snobbish about salt. At a banquet, the salt cellar was placed halfway between the head and the foot of the table. The honoured guests were seated between the head of the table and the salt cellar. Anyone who was seated 'below the salt' at a meal was considered less important.

In Africa, it was not unknown for some natives to sell their wives and children for salt! Luckily, today, salt is cheap and plentiful.

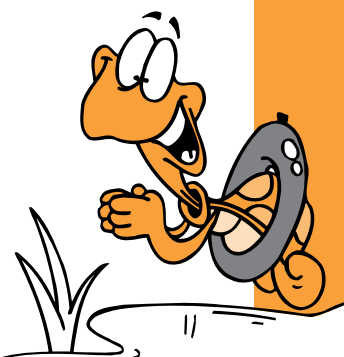
Throughout history, salt has been used to preserve foods. Meat rubbed with salt prevented rotting.

In England, cattle had to be slaughtered in winter because there was no grass for them to eat. By preserving some of the meat, people could eat beef long into winter.

Sailors could preserve meat and fish for long voyages the same way. In Australia, salted meat was carried on long hot droving journeys for months on end. Before refrigeration, salted meat was a common food item in all homes.

Salt solutions, or brine is used to preserve food. Cucumbers are put into salt brine to make pickles. Salt preserves food because bacteria cannot grow in brine.

In the Middle Ages, people used salt in other ways too. They used it to preserve the skins of animals before they made them into leather, they rinsed their mouths with a salt solution to ease toothache and they even rubbed their chimneys with salt.



Centuries Of Salt - Student Worksheet 2

Name _____

Information Web

MAKE your web of key points from the article 'A history of salt' on worksheet 1.

Map Making

M

FOCUS

- Where does salinity occur in Victoria?
- There are four catchments in North Central Victoria?

CSF II LINKS

ENGLISH 4.1 Geography
4.2 Geography

OBJECTIVES

- Complete a map showing the details above
- Identify the extent of salt affected land in the region

BACKGROUND

Salinity occurs throughout Victoria and is increasing in severity. The problem is most concentrated in the Murray-Goulburn Irrigation District, where a shallow watertable threatens productive land. Outbreaks of dyland salting are scattered throughout the state affecting a total of 55 000 ha of farming land.

NOTES

The NCCMA is the region's peak body for managing natural resources, including waterways, environmental and social communities. See www.nccma.vic.gov.au for further information. Students may be able to gain assistance with this activity by contacting the GIS (mapping) officer at NCCMA.

LEARNING TASKS

1 Study the worksheet
- Discuss the structure of the map (title, key, scale) and the features marked on the map so far.

2 Revise mapping skills
- Discuss the importance of light, even shading, the ruling of faint guidelines to prepare for writing and the use of print script.
- All writing should be completed in lead pencil then traced over.

3 Students use the student worksheet to complete the map.

4 Discuss your school location and the catchment you are in.
- Discuss the role of the North Central Catchment Management Authority.

5 Questions for students to consider:
- What is our closest major waterway?
- In what direction does each of the waterways flow?
- What towns are located downstream / upstream of .....
- In which direction would I travel between ..... and .....
- What do you notice about areas of salting and where we live?

MATERIALS

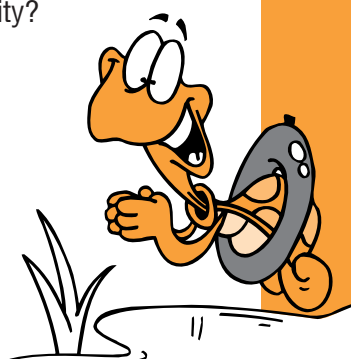
- ***'Map Making'*** **Student Worksheets 1 & 2** (enlarge to A3)
- **Class set of atlas'**
- **Coloured pencils**
- **Ruler**
- **Pens**
- ***'Map Making'*** **Answers** (see *'Resources'* on the CD)

EXTENSION

Using the scale, students set and solve challenges to calculate the distance and direction from town to town within their catchment.

ASSESSMENT

Were students able to shade their map neatly and use faint guidelines and print script to accurately and neatly plot townships? Could they articulate observed relationships between towns in their catchment and the impact of salinity?



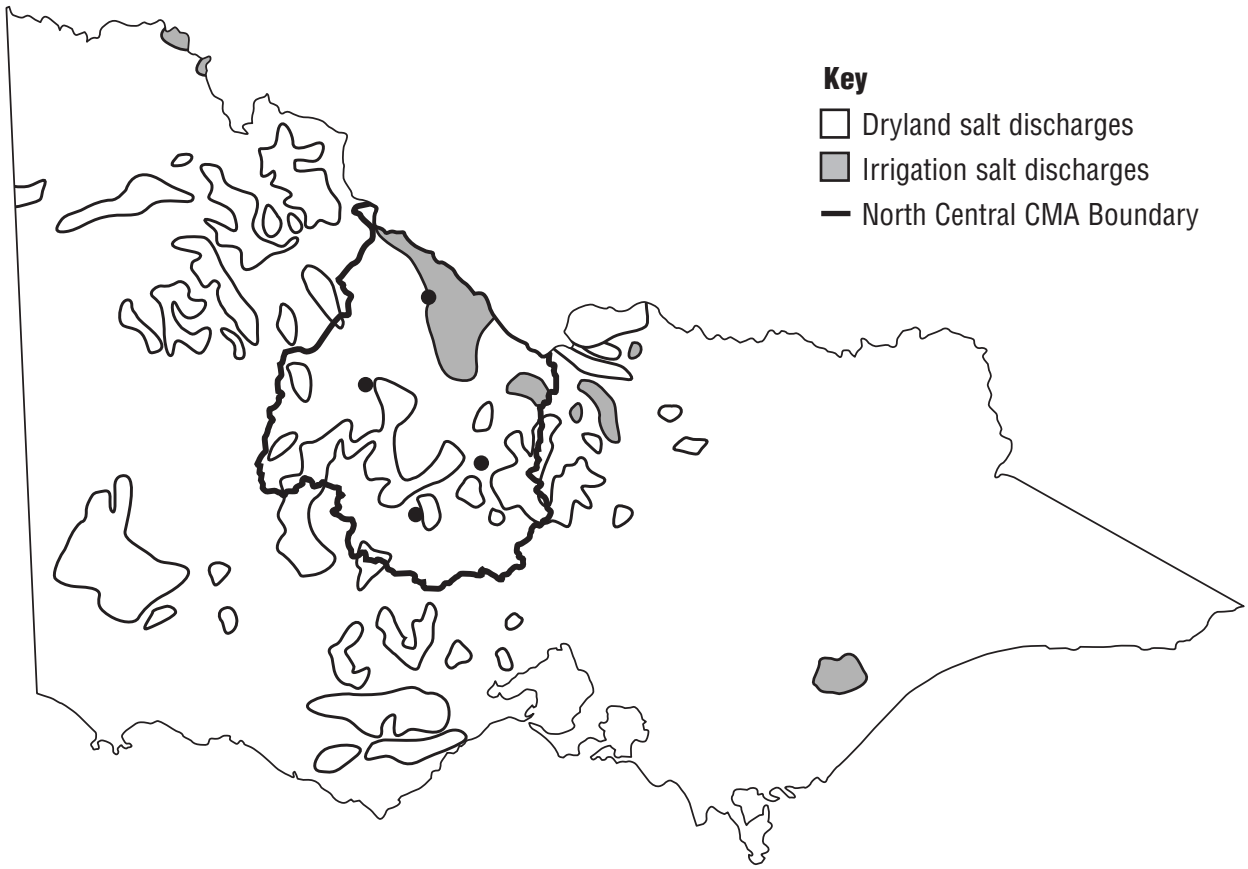
Map Making - Student Worksheet 1

Name _____

REVIEW the information and map below to help you complete worksheet 2.

Salinity occurs throughout Victoria and is increasing in severity. The problem is most concentrated in the Murray-Goulburn Irrigation District, where a shallow watertable threatens about 385 000 ha of productive land. This salt-prone area includes 72% of the Kerang region.

Salty groundwater discharges are scattered throughout the state affecting a total of 55 000 ha of farming land. The North Central region encompasses the Avon-Richardson, Avoca, Loddon and Campaspe river catchments. The region covers about 30 000 sq kms and extends from Swan Hill to Echuca on the River Murray, to the Central Highlands just north of Ballarat, and from Mt Camel Range in the east to the Wimmera-Mallee in the west.



Map Making - Student Worksheet 2

NAME _____

DEVISE a colour code for shading salt affected Dryland and Irrigated land, shade the appropriate areas and complete the key.

SHADE each of the four catchments within the North Central region of Victoria very lightly in different colours and label them in capital letters.

LABEL each town marked by a dot.

COMPLETE the key with detail.

REMEMBER
- Use lead pencil first
- Use only print script
- Rule faint horizontal guidelines
- Shade in colour lightly and evenly

Salt affected dryland and irrigated land

Key

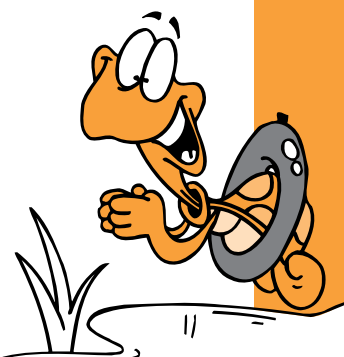
☐ Dryland salt discharges

☐ Irrigation salt discharges

● Towns

☐ Waterways

CHALLENGE Mark in the major waterways in each catchment in blue.



Salt Success Stories

M

FOCUS

- Can new industries use salt in a positive way?

OBJECTIVES

- Understand that salinity can be managed
- Develop a positive outlook for the future

CSF II LINKS

SOSE	4.2 Geography
	4.3 Geography
HPE	4.2 Health of Individuals & Populations

BACKGROUND

While many people focus on the size and impact of the salinity problem, there are also those out there who are doing their bit to make a difference. This activity leads you to a website and articles where you can find out lots of information about positive actions to reduce the impact of salinity.

NOTES

It is important for students to acknowledge that scientific and technological advances in agriculture are changing the farming practices of the past and opening up a variety of new possibilities for reducing the impacts of salinity. As web pages constantly change, over time you may need to find alternate sites with salinity information.

LEARNING TASKS

1 **As a whole class, in small groups or individually, students go to:** www.abc.net.au/landline/
   - Look at current stories for any relating to salinity. Alternatively search under 'Archives' using the key words 'salinity on farms'.

2 **Read a variety of articles and complete the student worksheet.**
   - You may use the landline stories on pages 48-49 to supplement the article review.
   - Add personal comments about each article.

3 **Students then form pairs and take on roles of interviewer and interviewee.**
   - Use the information they've gained from the articles to role-play.

4 **Set individual research projects that encourage students to use the Internet to search for other salinity stories.**
   - Students then write summaries of their findings, design posters or prepare PowerPoint presentations to display their research.

MATERIALS

- ***'Salt Success Stories'* Student Worksheets 1, 2 & 3** (enlarge Worksheet 1 to A3 or use student workbooks for extra space)
- **Computers** with Internet access

EXTENSION

Invite a local Landcare member to talk about their experiences with salt, discuss any management techniques they use and share their opinions on the methods that the students have researched.

ASSESSMENT

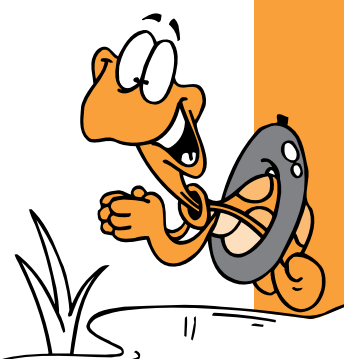
Were students able to locate information from the website and extract the necessary details to complete the table? Could they use the information as answers in an interview?

Salt Success Stories - Student Worksheet 1

Name _____

COMPLETE this table using information from each article your read.

	Article			
Details				
Where in Australia?				
Who is involved?				
What was the problem?				
How is the problem being addressed?				
Benefits?				
My comments				



Salt Success Stories - Student Worksheet 2

Name

Landline Stories 1

Pyramid Salt

August 23 1998

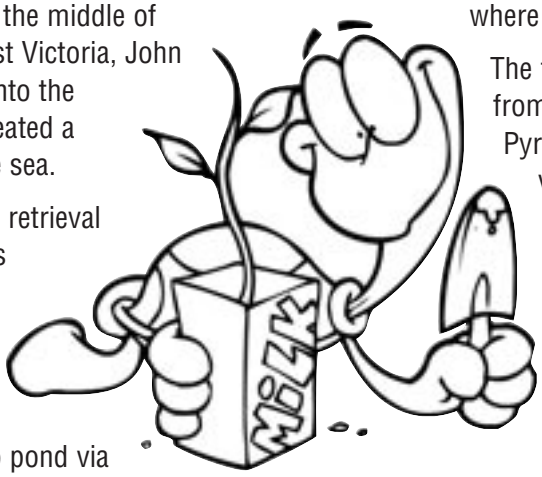
Reporter: Pip Courtney

Instead of reclaiming farmland in the middle of the Tragowell Plains of North West Victoria, John Ross sank bores in order to tap into the underground salt aquifers and created a salt farm 250 kilometres from the sea.

There are 13 evaporation and salt retrieval ponds which are fed by two bores which pump around 120 000 to 130 000 thousand litres of water a day.

The water, which is as salty as sea water, is moved from pond to pond via gravity feeding. By the time the water has reached the last pond, the concentration of the salt has reached total saturation. At this point the solution is pumped into a crystaliser and the salt is allowed to grow.

The salt is cleaned, drained, stockpiled, redissolved in tanks and then put into a polyhouse where it recrystalises.



The finished product is worth from $150 to $300 a tonne. Pyramid Salt is doing more than value adding to salty land. It's also lowering ground water, removing salt permanently from the system and reclaiming land, which was once useless for cropping and grazing.

Kerang Salt

August 2 1998

Reporter: Pip Courtney

The treeless plains of the Kerang and Pyramid Hills districts of Victoria have a salinity problem, which originated from their seabed origins.

Salt is being leached from the subsoil to the surface as a result of irrigation. The flatness of the land, which made it attractive to irrigators, has aided the salting and waterlogging of the plains.

The saline conditions were so extreme that large tracts of land were being abandoned or fenced off and excluded from production. In a quest to find answers to their problem, local farmers formed a group to come up with a pro-active battle plan to deal with the salt.

The group's priority was to build a network of drains and dams to move the excess water off the farms. This lead to whole farm planning composed of classification of the land, conducting regular surveys to monitor the salinity levels and rehabilitation strategies.

Rehabilitation included fencing, the sowing and establishment of salt tolerant plants, planting trees and using more efficient methods of irrigation.

Quantification of the salt problem induced investment by farmers of both time and money and of government resources resulting in the plains once again becoming a viable and productive area.

Salt Success Stories - Student Worksheet 3

Name

Landline Stories 2

Salty Salmon

March 8 1998

Reporter: Pip Courtney

The Salty Salmon story looks at Serial Biological Control (SBC), a system being trialled at Undera in the Goulburn Irrigation District near Shepparton in northern Victoria. Undera has a serious rising groundwater and salinity problem, and every year more and more farmland is lost to salt degradation and waterlogging.

SBC aims to reduce the amount of ground water on a farm while increasing the concentration of salt in that water. Ground water is pumped up and used to irrigate a salt tolerant woodlot. The trees use some of the water and what's left passes through the soil into a tile drain several metres under the surface. As the salty water passes through the soil it takes more salt with it.

The salty water in the tile drain is piped to an evaporation basin housing caged marine fish. As water evaporates salt concentration increases. The salty water is moved to a second evaporation basin where salt levels increase even more.

The system:

- reduces ground water
- renovates salt-affected land
- provides income from the woodlot
- provides income from marine fish
- provides income from the salt.

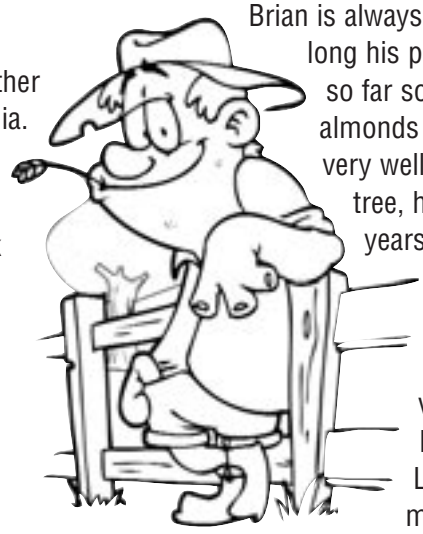
Salt Gardener

March 3 1998

Reporter: Ian Henschke

Brian Powell has been called the father of the quandong industry in Australia. He established the nation's first quandong orchard in 1974.

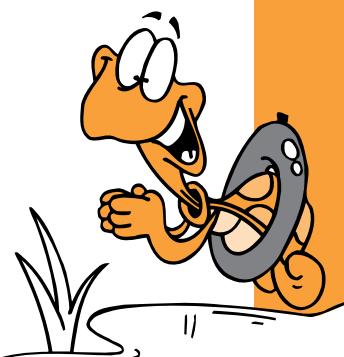
However, the truly remarkable work done by Brian Powell is his use of highly saline bore water to produce a variety of good crops. His bore water is
4500 parts per million of salt while the top of the range for viable horticulture is normally seen as being around 1500 parts per million.



Brian's secret is simply to use drip irrigation onto a quite large and thick area of mulch at the base of the plant. By not overwatering and by always keeping the dripper on a good mulch base he is able to achieve good results.

Brian is always willing to say he doesn't know how long his plants will survive on the salt water but so far so good. Some trees such as olives, almonds and pistachios appear to be doing very well after more than 22 years. An apricot tree, however, did start to 'salt up' after ten years.

While he did not plan it, Brian's property has become a tourist attraction. Now in his seventies his voluntary work as an experimental horticulturalist and with outback Landcare has been recognised with many awards.



Everybody Makes A Difference

C

FOCUS

- What factors contribute to rising / falling watertables?
- What effect does my behaviour have?

OBJECTIVES

- Identify positive / negative influences on watertables
- Understand the importance of a catchment approach

CSF II LINKS

SOSE	4.3 Geography
	4.1 Economy & Society
SCIENCE	4.1 Biological

BACKGROUND

Everybody lives in a catchment, and their actions influence their environment. We need to work together to stop the watertable rising and causing salinity. Everyone plays a part in either adding to groundwater (increasing the watertable) or helping to lowering the groundwater level (decreasing the watertable).

NOTES

This game will be most effective when played at the conclusion of the week. It can be played as a whole class or with students in groups representing the four catchments in the North Central region. This game could be used as an assessment tool.

LEARNING TASKS

1 **Inspect the action cards and discuss as a class if the action would have a positive or negative influence on groundwater.**
   - Discuss the number on each card (the degree that action influences groundwater).

2 **Divide the class into groups.**
   - Each group receives a groundwater jar, glass of water and teaspoon.

3 **Groups write action statements on blank cards (assign a value) and swap cards with another group. Shuffle cards, place face down and begin the game:**
   - Group members take turns to draw a card and read aloud. The group decides if the action will have a positive / negative impact.
   - Use the teaspoon to add or remove water to / from the Groundwater jar according to the number on the card.
   - The game ends when a group's (catchment's) groundwater jar is empty, when it overflows or when each group member has had an even amount of turns.

4 **Following the game discuss:**
   - How actions have an impact on an area; what your class can do to help your catchment; and what the game has taught students.

MATERIALS

(One set of materials per group)

- **'Everybody Makes a Difference' Action Cards** (precut the page of cards)
- **Small glass jar** labelled 'Groundwater'
- **Teaspoon**
- **Glass of water** twice the size of the jar
- **Newspaper**

EXTENSION

Using the action statements create a 'Snakes & Ladders' style salinity game for other classes in the school.

ASSESSMENT

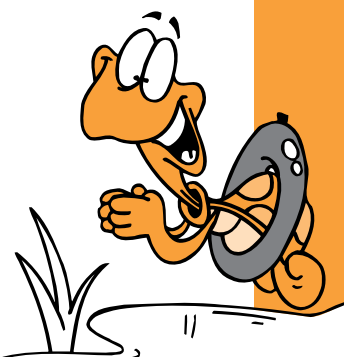
Were students able to describe how people's use of land affects the environment, and demonstrate their knowledge by writing such examples and discussing their impact?

Everybody Makes A Difference - Teacher Task Card

Action Cards

COPY and cut out a set of action cards for each student group.

It rains for ten days 10	You fix a leaky pipe 2	You think a watertable is where water jugs are kept at a restaurant 2
You install a groundwater pump 15	You experience a very dry winter 3	You overgraze your farm leaving bare soil 3
You plant Lucerne rather than leaving your paddock fallow 7	Rivers overflow causing floods 10	You bulldoze your trees and plant wheat 3
You have short showers 2	You install drippers in your garden 2	You forget to turn off the hose and it runs all night 1
A fence falls down and stock enter your regeneration area 2	You are completely ignorant of rising watertables 5	You plant saltbush in discharge areas 3



I'm Naturally Salty

C

FOCUS

- What are the characteristics of a wetland?

OBJECTIVES

- Construct a food web for wetland.
- Gain an understanding of the interrelationships in a wetland ecosystem.

CSF II LINKS

SOSE	4.3 Geography
SCIENCE	4.1 Biological
	4.2 Biological
ENGLISH	4.4 Writing
THE ARTS	4.1 Art

BACKGROUND

In North Central Victoria we have a many wetlands. The plant and animal species that live in these wetlands have adapted over hundreds of years to survive in these often unpredictable environments. Each part of the ecosystem is interdependent, and the benefits of these wetlands span continents (including migratory birds which travel from South East Asia!).

NOTES

This activity can be modified to become an introductory lesson if the lesson incorporates food webs only. Wetlands are extremely dynamic systems, they make great places to attend on a fieldtrip.

LEARNING TASKS

1 **Discuss with students how wetlands form.**
   - What plants and animals may be found in wetland environments?
   - What adaptations have they got to cope with fluctuating water levels and quality?

2 **Allow time for students to review the characteristics of living features of a wetland ecosystem on the worksheet.**
   - Note that illustrations are not to scale.

3 **Students then cut out the images and use them to make a food web as an introduction to wetland ecosystems.**

4 **Each student is then required to complete a research assignment on one of the following wetland ecosystem topics.**
   - What are some impacts of draining wetlands?
   - How might introduced species affect the systems?
   - If it is a drought, how do living things survive?
   - What adaptations to the species have?
   - What indigenous cultural values are associated with wetlands?
   - What industries have economic benefits from wetlands?

5 **Provide time for students to report their research results to the class.**

MATERIALS

- ***'I'm Naturally Salty'* Student Worksheet**
- **Reference Materials**
- **Poster Paper**
- **Computers** (with internet access)

EXTENSION

Visit a wetland ecosystems. Organise a guest speaker and complete plant, animal and water quality surveys. Identify the food webs at the wetland.

ASSESSMENT

Were students able to design a food web that reflected accurate interactions in wetlands. Did students make thoughtful analyses of their webs and contribute to class discussion on wetland ecosystems?

I'm Naturally Salty - Student Worksheet

Name _____

LOOK at the plants and animals that can be found in and around a salty wetland (not to scale).
CUT out the pictures.
MAKE a food web using the pictures.

Salty wetland plants and animals

Blood Worm

Water Buttons

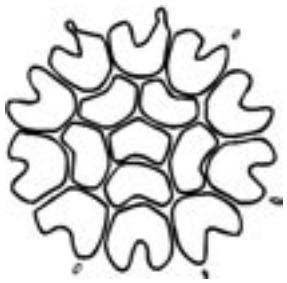
Seed Shrimp

Fairy Shrimp

Avocet

Kite

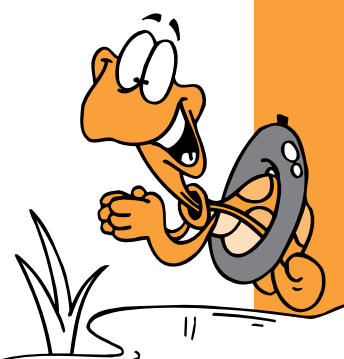
Dragonfly



Microscopic algae

Saltbush

Bat



Involve Me And I Will Understand

A

FOCUS

- How can I reduce salinity problems?
- What effect does my behaviour have?

OBJECTIVES

- Plant native vegetation within the catchment
- Get dirty to discover how to make a difference

CSF II LINKS

SOSE	4.3 Geography
SCIENCE	4.1 Biological
HPE	4.2 Health of Individuals & Populations

BACKGROUND

Planting vegetation is recognised as great way to reduce salinity problems. Many farmers, Landcare groups and organisations are 'revetating' sites to help lower the water table. Each tree, shrub or grass planted makes a difference to our environment. Taking students out of the classroom and into the environment can improve their understanding of salinity issues.

NOTES

It is recommended that you contact North Central Catchment Management Authority to organise assistance in your revegetation project. They can help with choosing a salinity recharge or discharge site, provide trees, funding or staff to assist you on the day.

LEARNING TASKS

1 **Contact North Central Catchment Management Authority to obtain equipment and location for planting.**
   - Ask for staff assistance to help you on the day.

2 **Send home permission forms.**
   - Include requests for parent helpers, appropriate fieldwork attire and resources to assist e.g. shovels, gloves, digging fork.

3 **Divide class into working parties.**
   - Assign each group plants, tools and an area.
   - Demonstrate the planting process including getting the plant out of the container, digging a good sized hole, replacing dirt and erecting the tree guard (and watering if applicable).

4 **Revegetate your site.**
   - Make sure students take turns at each of the jobs

SAFETY Make sure that students take regular breaks and share the workload. You will need to ensure students receive regular fluids and have adequate sun protection.

5 **End the planting session well before you need to leave the site.**
   - Take time to discuss the achievements of the day
   - Discuss what you might do to maintain the site in the future
   - Put a marker in the ground. Take a photo from this point
   - The school can take a photo each year from this marker point.

MATERIALS

- **Protective clothing** including sturdy shoes or gumboots, weatherproof jacket, hat, sunscreen, gloves
- **Shovel**
- **Plants**
- **Tree guards**
- **Stakes**
- **Food and drinks** for participants
- **Buckets** (optional)

EXTENSION

Regularly return to weed and replace dead vegetation. Develop a report for your school and review the revegetation site annually. Complete a mathematics activity on plant survival rate.

ASSESSMENT

Did students participate actively in the revegetation exercise? Did they use due care in planting? How did they work with classmates? Did students participate in discussions?