SALINITY ACTIVITY BOOKLET FOR SCHOOLS

This booklet contains a variety of activities and experiments linked to VELS; aimed at providing students with advanced knowledge about salinity and its impacts.

WATERWATCH
North Central
Communities Caring for Catchments

Contents

Activity 1 Complete a salinity crossword

FOCUS
Where does salt in the environment come from and what are its impacts?

OBJECTIVES
- Read/listen to the 'Salinity Explained' reading.
- Recall information and use it to complete a salinity crossword in small groups.

BACKGROUND
Read the background information sheet provided titled 'Salinity Explained'. Read aloud to the class or split into small groups.

NOTES
This activity is designed to introduce the topic of salinity. To many students this information may be quite unfamiliar however consolidation will come with the science experiments and other activities to follow.

VELS links

ENGLISH – *Levels 2-5*
- Reading
- Writing
- Speaking & listening

HUMANITIES – *Levels 3-6*
- Historical knowledge & understanding

PERSONAL LEARNING – *Levels 2-5*
- The individual learner
- Managing personal learning

INTERPERSONAL DEVELOPMENT – *Levels 2-5*
- Working in teams

COMMUNICATION – *Levels 2-5*
- Listening, viewing and responding

THINKING – *Levels 2-5*
- Reflection, evaluation & metacognition

LEARNING TASKS
1. Read the information sheet aloud or have them read it in small groups.
2. Develop the students understanding of the topic by discussing the information as a group.
3. Students demonstrate their recall and knowledge of the topic by completing a salinity crossword.

ASSESSMENT
How well did the student grasp the concepts? What do their completed salinity crosswords indicate about their depth of understanding? How well did the students work as a group? Can they retell the main points to a peer?

Answers to Crossword

Across	*Down*
2. Dryland	**1.** Saline
3. Sick	**4.** Water
5. Watertable	**6.** EC
8. Irrigation	**7.** Dissolve
10. Salt	**9.** Grow
12. Trees	**11.** Meter

Activity 1 BACKGROUND INFORMATION SHEET

Salinity Explained

What is salinity?

The term ***SALINITY*** refers to the movement and amount of salt, dissolved in water, though the landscape. Soils and natural water can both become saline, therefore salinity can be described as either soil or water salinity. Salts include sodium chloride (common table salts), calcium carbonate (limestone) and many others. These salts are dissolved by water as it runs over and through rocks and soils.

All natural waters contain some dissolved salts, which are vital for aquatic plant and animal growth. However, high levels of salt can make water unsuitable for uses such as drinking and irrigation, and may harm plants and animals. High amounts of salt make it hard for many types of plants and animals to take up water, leading to dehydration, upsetting natural salt levels within tissues, and in severe cases leads to death.

The two main types of salinity are dryland and irrigation salinity. Dryland salinity occurs mostly due to the widespread removal of native deep-rooted trees which caused the watertable to rise. Irrigation salinity occurs because large amounts of water are applied to crops; some of this water enters the ground and causes the watertable to rise. Irrigation has similar effects as that of a large rain event falling on cleared land; there is not enough vegetation to take up the rain so most of it enters the groundwater system.

Our salinity problems have resulted largely from human activities which have changed the environment. The reason behind most salinity problems has been a rise in watertable levels which brings salts to the soil surface. This has occurred where large scale clearing of native trees and vegetation was undertaken. Before clearing much of the water that fell was used by the trees which maintained the groundwater level; however after clearing the water that fell soaked into the soil causing the watertable to rise.

Where does the salt come from?

There are three major sources of salt in Australia. Retreating seas, rain and rocks have contributed to the amount of salt in our soils and natural waters.

Rain
Salts can be carried from the sea by strong winds and fall as rain across inland areas. Salt concentration in rainfall is higher nearer to the coast, but still adds a large amount of salt to inland environments. Between 20 and 200 kg/ha of salt can be deposited during a year of average rainfall.

Retreating Seas
Many areas across Australia were once covered by an inland sea. When the sea retreated about 10 million years ago, the sediments that were left behind contained large amounts of salt.

Rocks
Rocks contain salts which are released during the weathering process (water breaking down rocks). Many types of rocks including marine sediments, granites and rhyolites contain high levels of sodium and potassium (salts).

Impacts of salinity

The effects of salinity are broad and include:

- reduced productivity capacity of affected land,
- degradation of the environment and wildlife habitats,
- reduction in the number of plants and animals due to saline soils and water,
- deterioration of water quality which limits the use of water for stock and domestic water supplies and increases the cost of water treatment,
- loss of production causing social, psychological and economic hardship,
- damage to roads,
- damage to other infrastructure such as channels and pipes,
- damage to water using equipment/machinery.

It has been estimated that salinity costs $304 million per year in the Murray Darling basin alone. This figure includes: loss of agricultural production, damage to infrastructure and water quality associated costs (treatment etc).

Activity 1 STUDENT WORKSHEET

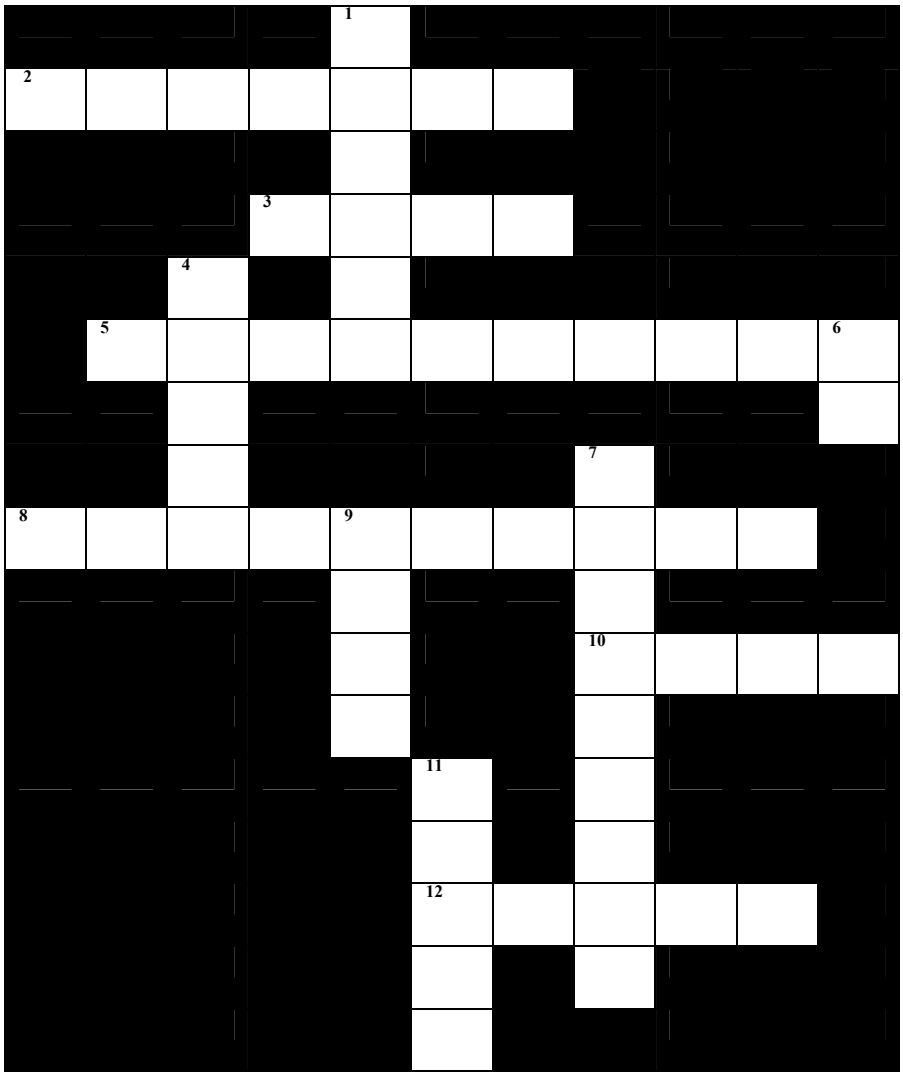
Complete a salinity crossword

Across

2. Type of salinity that occurs due to removal of trees _ _ _ _ _ _ _ (7)
3. If we drink salty water we may become _ _ _ _ (4)
5. The top of the groundwater is called the _ _ _ _ _ _ _ _ _ _ _ (10)
8. Type of salinity caused by adding large amounts of water onto crops _ _ _ _ _ _ _ _ _ _ (10)
10. When it rains the _ _ _ _ in lakes is diluted (4)
12. We plant _ _ _ _ _ to help lower the watertable (5)

Down

1. The sea is very _ _ _ _ _ _ (6)
4. Salinity can be found in soil and _ _ _ _ _ (5)
6. The abbreviation of electrical conductivity _ _ (2)
7. Salt _ _ _ _ _ _ _ _ _ in water (9)
9. Without water trees cannot _ _ _ _ (4)
11. A device used to measure salinity _ _ _ _ _ (5)



Activity 2 Create a word search

VELS links

ENGLISH – *Levels 2-5*
- Reading
- Writing
- Speaking & listening

THE ARTS – *Levels 2-4*
- Creating and making

PERSONAL LEARNING – *Levels 2-5*
- The individual learner
- Managing personal learning

THINKING – *Levels 2-5*
- Creativity

FOCUS
How to differentiate between different forms of words

OBJECTIVES
- Differentiate between grammatical forms of words
- Identify parts of speech in written text
- Construct a word search

BACKGROUND
Salinity is a major environmental, social and economic issue. By using creative and well structured sentences students will be able to describe and comment on salinity issues in a variety of ways.

NOTES
These activities will help students in various writing tasks throughout their studies. It may be useful to show the students a word search and explain how to plan their own. This activity requires a degree of planning on the students behalf.

LEARNING TASKS
1. Label sentences according to past, present or future tense.
2. Select 10 words and list them.
3. Plan a word search using the selected words.
4. Construct a word search for a classmate to complete.

ASSESSMENT
Did students differentiate between the different tense? How well did they construct their word search? Did they effectively plan their word search content?

Activity 2 STUDENT WORKSHEET

Create a word search

There are three different types of word tense:

- past tense = something that has happened e.g. I planted a tree
- present tense = something that is happening now e.g. I am planting a tree
- future tense = something that will happen e.g. I will plant a tree

1. Read the following sentences, and at the end of each sentence write whether it is written in past, present or future tense.

a. The Waterwatch group tested the river for salinity _____
b. The River Detectives school will participate in Saltwatch next week _____
c. Fish are swimming in the freshwater _____
d. It is going to rain tomorrow and dilute the salty water _____
e. Frogs were heard calling down by the river last Wednesday _____
f. People are fishing in the lake _____

2. Select 10 words from the sentences above, list them below and use them to create a word search.

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

Activity 3 Testing for soil and water salinity

FOCUS
What unit is used to measure salinity? What are the salinity levels of the local waterway and soils? What crops can grow in soils of different salinities? What could the water be used for?

OBJECTIVES
- Calibrate a salinity meter
- Measure the salinity of water and soil
- Record measurements in the appropriate units and compare the soil reading against the salinity thresholds table
- Determine which crops could grow in the soil and what the water could be used for

BACKGROUND
Salinity is measured in Electrical Conductivity (EC) units which relates to micro siemens per centimetre represented by µS/cm. Salinity can occur in both water and soil. It has a range of impacts on the growth and survival of flora and fauna species. It is important to know how much salt is in water as this will determine its use. Similarly, the amount of salt in soil will determine what can be grown in it.

VELS links

ENGLISH – *Levels 2-5*
- Reading
- Writing
- Speaking & listening

SCIENCE – *Levels 1-4*
- Science knowledge & understanding
- Science at work

MATHEMATICS – *Levels 2-5*
- Number
- Measurement, chance & data
- Working mathematically

INTERPERSONAL DEVELOPMENT – *Levels 2-5*
- Working in teams

COMMUNICATION – *Levels 2-5*
- Listening, viewing & responding
- Presenting

DESIGN, CREATIVITY & TECHNOLOGY – *Levels 2-5*
- Investigating & designing
- Producing
- Analysing & evaluating

THINKING – *Levels 2-5*
- Reasoning, processing & inquiry
- Creativity
- Reflection, evaluation & metacognition

NOTES
Read the background information sheet titled ‘Testing for water salinity’ followed by the background information sheet titled ‘Testing for soil salinity’ which outlines how to test for soil salinity. NB: the soil testing will require some preparation prior to testing.

LEARNING TASKS
1. Preparation of a science test.
2. Following written instructions.
3. Recording results and measurement units.
4. Discussion of results and comparison of water and soil salinity levels.
5. Determination of which crops could grow in the soil and what the water could be used for.

ASSESSMENT
Could students write the correct measurement units and calibrate the meter? How well did students follow the experiment instructions? Did they participate in the group discussion? Could they identify what the water could be used for and what crops could grow in the soil? How well did students extract information from the tables?

Activity 3 BACKGROUND INFORMATION SHEET

Testing for water salinity

Aim
To determine the salinity of a water sample.

Materials
- EC/Salinity meter
- Water sample
- Standard solution (1413 or 12880 EC)

Procedure
1. Calibrate the meter using the standard solution (1413 or 12880 EC).
2. Rinse the probe of the meter with the water sample.
3. Ensure the water sample is well mixed and immerse the probe into the sample.
4. Take the reading once the temperature and salinity readings are stable.
5. Record the salinity reading and units.
6. Compare the salinity reading to the Water Salinity Tolerance Levels table below to identify what the water could be used for.

WATER SALINITY TOLERANCE LEVELS	
	MAXIMUM LIMIT (EC µS/cm)
Sheep- dry feed	21,800
River Blackfish	16,600
Beef cattle	15,600
Lactating ewes and weaners	10,000
Dairy cattle	9,300
Tall wheat grass	9,000
Poultry and pigs	6,250
Mixing herbicides	4,700
Wheat and barley germination	4,000
Pears, apples and tomatoes	3,000
People	2,300
Roses and camellias	1,800
Peas, carrots, apricots and grapes	1,500

Testing for soil salinity

Aim
To determine the approximate salinity of a soil sample.

Materials
- EC/Salinity meter
- Dry soil sample, preferably oven dried
- 100 ml beaker
- Weighing scales
- Mortar and pestle or rolling pin
- 50 ml distilled water
- Stirring rod
- Standard solution (1413 or 12880 EC)

NB: three or four soil samples should be collected from the site area and thoroughly mixed together to provide a representative sample. Dry the soil in an oven for approximately one hour at 150 °C.

Procedure
1. Weigh out 10 grams of dry soil.
2. Grind the soil with a mortar and pestle or rolling pin until all the lumps are gone. Remove any gravel.
3. Put the 10 grams of soil into a 100 ml beaker and add 50 ml of distilled water.
4. Stir thoroughly then let it stand for 5 minutes.
5. Calibrate the meter using a standard solution (1413 or 12880 EC).
6. Rinse the meter probe with tank water.
7. Stir the soil/water sample again.
8. Immerse the meter probe into the soil/water sample and record the reading, taking note of the measurement unit.
9. Rinse the meter probe.
10. Compare your reading to the ones below to identify what could be grown in the soil.

Plants vary in their ability to survive in saline conditions. The table below outlines the soil salinity thresholds (upper limits) that a small selection of crops can tolerate.

SOIL SALINITY CROP THRESHOLDS		
Tolerance rating	**Crop**	**Salinity threshold (EC µS/cm)**
Very High	Barley	5,300
High	Cotton	5,100
Medium	Sugarbeet	4,700
Low	Wheat	4,000
	Soybean	3,300
	Oats	3,300
	Peanut	2,100
	Rice	2,000
	Maize	1,100
	Potato	1,100
	Onion	800

Activity 4 Water movement in plants

FOCUS
How water travels through plants

OBJECTIVES
- To identify how water travels through plants.
- To undertake a science experiment and follow instructions.
- To obtain results and discuss the findings.

BACKGROUND
All flowering plants have the same basic structure. The main parts of the flowering plant are: the roots, stems, leaves and flowers. Each of these parts carries out its own special function, so that the plant as a whole is able to grow and reproduce itself. These simple experiments are designed to show how water travels through plants.

NOTES
You could extend this activity by asking the students to produce a diagram of the results and explain the findings to another class.

LEARNING TASKS
1. Preparation of a science experiment.
2. Following written instructions.
3. Recording results for both experiments.
4. Discussion of findings and water movement through plants as a class.
5. Presentation of the findings.

VELS links

ENGLISH – *Levels 2-5*
- Reading
- Writing
- Speaking & listening

SCIENCE – *Levels 1-4*
- Science knowledge & understanding
- Science at work

MATHEMATICS – *Levels 1-4*
- Number
- Measurement, chance & data
- Working mathematically

INTERPERSONAL DEVELOPMENT – *Levels 2-5*
- Working in teams

COMMUNICATION – *Levels 2-5*
- Listening, viewing & responding
- Presenting

DESIGN, CREATIVITY & TECHNOLOGY – *Levels 2-5*
- Investigating & designing
- Producing
- Analysing & evaluating

THINKING – *Levels 2-5*
- Reasoning, processing & inquiry
- Creativity
- Reflection, evaluation & metacognition

ASSESSMENT
How well did students follow the instructions of the experiment? Did the students all contribute to the experiment set up? How well did they grasp the concept of water movement through plants? Did they participate in the discussion of the findings?

Activity 4 BACKGROUND INFORMATION SHEET

Water movement in plants

Aim
To carry out two simple experiments that will provide evidence of how water travels through plants.

Background
All flowering plants have the same basic structure. The main parts of the flowering plant are: the roots, stems, leaves and flowers. Each of these parts carries out its own special function, so that the plant as a whole is able to grow and reproduce itself.

The roots absorb water and dissolved substances, such as mineral salts, from the soil. Solutions are carried up the stems to the leaves through a system called xylem vessels. The living plant does not retain all the water it receives from the soil; much of it evaporates into the atmosphere through tiny openings in the leaves called stomata. This process is called transpiration. It is essential to the life of the plant since this water movement helps to pull solutions up the stem, providing rigidity for the plant. If the leaves are removed the roots absorb water at a much slower rate.

Materials
- Freezer bags
- Rubber bands
- Coffee jars
- Celery sticks
- Food dye
- Water
- Single edged razor blade
- A plant in the school yard or a pot plant

Procedure

Activity 1

1. Place a dry freezer bag over some of the leaves of a plant in the school yard and secure the bag with a rubber band.
2. The next day observe the bag and carefully remove it.
3. Record your observations.
4. Discuss the results as a class.

Activity 2

1. Obtain a stick of celery and carefully cut straight across the base.
2. Place the cut end into a coffee jar containing food dye and water. Ensure that the celery stick stands upright.
3. Leave the celery stick in the food dye and water overnight.
4. Remove the celery stick from the solution.
5. Carefully slice the stem of the celery stick at three different heights.
6. Record your observations.
7. Discuss the findings as a class.

Activity 5 Desalinisation experiment

FOCUS
How to convert salt water into fresh water using a simple experiment.

OBJECTIVES
- To learn how to convert salt water to fresh water.
- To carryout a science experiment and follow written instructions.
- To make observations and attempt to explain what has occurred.

BACKGROUND
Most of the world's water is held in oceans and is unfit for human use. Desalinisation plants have the ability to convert salty water into fresh water, although this process is very costly. Fresh water supplies are dropping rapidly, in response many people are looking for alternative water sources and in many cases are hoping to make use of salt water.

NOTES
This activity could go on to investigate the pros and cons of desalinisation and also the process that large scale desalinisation plants use.

VELS links

ENGLISH – *Levels 2-5*
- Reading
- Writing
- Speaking & listening

SCIENCE – *Levels 1-4*
- Science knowledge & understanding
- Science at work

MATHEMATICS – *Levels 1-4*
- Number
- Measurement, chance & data
- Working mathematically

INTERPERSONAL DEVELOPMENT – *Levels 2-5*
- Working in teams

COMMUNICATION – *Levels 2-6*
- Listening, viewing & responding
- Presenting

DESIGN, CREATIVITY & TECHNOLOGY – *Levels 2-5*
- Investigating & designing
- Producing
- Analysing & evaluating

THINKING – *Levels 2-5*
- Reasoning, processing & inquiry
- Creativity
- Reflection, evaluation & metacognition

LEARNING TASKS
1. Preparation of a science experiment.
2. Following written instructions.
3. Recording findings of the experiment.
4. Discussion of findings and attempt to explain what has occurred.
5. Presentation of the findings in a written report.

ASSESSMENT
How well did students follow the instructions of the experiment? Did the students all participate in the experiment? Could they explain what happened to another peer? Did they participate in the discussion of the findings? Was their report well structured and include the main findings? How well did they work as a group?

Activity 5 BACKGROUND INFORMATION SHEET

Desalinisation experiment

Aim
To convert salt water to fresh water.

Background
97% of the world's water is held in the oceans. This water cannot be used for drinking or washing because it is too salty and can have adverse impacts on machinery and our health. It is possible however to obtain fresh water from the oceans or other salty water through a process called desalinisation. This process removes a large proportion of the salt from the water by reverse osmosis which produces fresh water and salt as a by-product.

Materials
Prepare the following for each group carrying out the experiment:
- A large beaker which does not have a pouring lip
- A small beaker (which will fit inside the large beaker with a lot of room to spare)
- A concave dish which will fit over the top of the large beaker
- Some table salt
- A lead sinker
- A tablespoon

Procedure
1. Dissolve 2 tablespoons of salt into a litre of water in the large beaker.
2. Place the small beaker inside the large beaker ensuring that none of the salt water gets into the small beaker. If the small beaker floats, place a sinker in the bottom to weigh it down.
3. Place the concave dish face up over the large beaker.
4. Place the experiment in a sunny spot.
5. After 3-4 days remove the concave dish and observe what has happened.
6. Write a report describing what you have observed and attempt to explain what has occurred.
7. Discuss as a class. Would this method be appropriate for large scale desalinisation? Why/why not?

Activity 6 Effect of salinity on crop germination

FOCUS
To investigate the effect of salinity on crop germination.

OBJECTIVES
- To simulate the effect of salinity on crop germination.
- To carryout a science experiment and follow written instructions.
- To make observations and attempt to explain what has occurred.

BACKGROUND
Salinity affects the growth and survival of many crops. The impact of saline water on a crop will be determined by its salinity threshold, with some crops being naturally more tolerant than others.

NOTES
The experiment is best run over a period of one or two weeks in order to give the seeds adequate time to germinate. If there has been no seed germination after two weeks you may chose to extend the experiment for another week. Bean and sunflower seeds are suggested however barley, alfalfa, wheat, oats etc are equally worth investigation. Students are asked to record the number of seeds germinated for each dish every two days. At the end of the experiment they will use this information to create a graph of the results.

VELS links

ENGLISH – *Levels 2-5*
- Reading
- Writing
- Speaking & listening

SCIENCE – *Levels 1-4*
- Science knowledge & understanding
- Science at work

MATHEMATICS – *Levels 2-5*
- Number
- Measurement, chance & data
- Working mathematically

INTERPERSONAL DEVELOPMENT – *Levels 2-6*
- Working in teams

COMMUNICATION – *Levels 2-6*
- Listening, viewing & responding
- Presenting

DESIGN, CREATIVITY & TECHNOLOGY – *Levels 2-6*
- Investigating & designing
- Producing
- Analysing & evaluating

THINKING – *Levels 2-5*
- Reasoning, processing & inquiry
- Creativity
- Reflection, evaluation & metacognition

LEARNING TASKS
1. Preparation of a science experiment.
2. Following written instructions.
3. Recording findings of the experiment.
4. Discussion of findings and attempt to explain what has occurred.
5. Presentation of the findings in the form of tables and graphs.

ASSESSMENT
How well did the students follow the experiment instructions? Did the students all participate in the experiment? How well did students work as a group? Were their tables and graphs accurate? Could they explain through tables and graphs what happened to the seeds at different salinity levels?

Activity 6 BACKGROUND INFORMATION SHEET

Effect of salinity on crop germination

Aim
To investigate the effect of salinity on crop germination.

Background
This experiment is best run over one or two weeks to give the seeds adequate time to germinate. Bean and sunflowers seeds are suggested however barley, alfalfa, wheat, oats etc can be used and are equally worth investigation.

Materials
- Seeds of sunflowers and beans
- 10 petri dishes
- Filter papers
- Distilled water
- 5 salty solutions in plastic squirt bottles. Concentrations of solutions are to be made up to: 1) distilled water, 2) 2.5 grams salt in 1 litre of distilled water, 3) 5 grams salt in 1 litre of distilled water, 4) 10 grams salt in 1 litre of distilled water, 5) 15 grams salt in 1 litre of distilled water.
- Plastic film (glad wrap)

Procedure
1. Place filter paper in the bottom of each petri dish.
2. Label two sets of petri dishes from 'A' to 'E', one set for the sunflower seeds and the other for the beans. Ensure that the petri dishes for the different seeds are labelled to avoid confusion.
3. Spread bean seeds across the filter paper of one set of the petri dishes (not to thickly!).
4. Spread the sunflower seeds across the filter paper of the other set of petri dishes. There should be 5 bean dishes and 5 sunflower seed dishes.
5. Add solution 1 (distilled water) to both 'A' dishes. Add only enough water to moisten the seeds- do not over water!
6. Repeat for each of the petri dishes, using the different salty solutions. Add solution 2 (2.5g salt solution) into each 'B' labelled petri dish. Add solution 3 (5g salt solution) into each 'C' labelled petri dish. Add solution 4 (10g salt solution) into each 'D' labelled petri dish. Add solution 5 (15g salt solution) into each 'E' labelled petri dish.
7. Cover each dish with plastic film to prevent it drying out and place the dishes in a safe place (not necessarily in sunlight, but ensure the same conditions for all dishes).
8. Check the dishes at least once every two days and add solution as necessary to keep the seeds moist. At each check, count and record the number of seeds germinated.
9. Continue to check and record the number of seeds germinated in the different petri dishes for a period of one to two weeks on the student worksheet provided.
10. Complete the tables of observed seed germination and graph the results for each of the seed types.

Activity 6 STUDENT WORKSHEET

Effect of salinity on crop germination

1. In the tables below record the number of bean and sunflower seeds germinated for each petri dish at each check.

Bean seeds germination

Day	*Dish A*	*Dish B*	*Dish C*	*Dish D*	*Dish E*
1					
3					
5					
7					
9					

Sunflower seeds germination

Day	*Dish A*	*Dish B*	*Dish C*	*Dish D*	*Dish E*
1					
3					
5					
7					
9					

2. After completion of the above tables, use this information to create a graph of your results in the space below. Compare the results for the two seed types and discuss which seeds grew best in which solutions.

Activity 7 Catchment game

VELS links

HEALTH & PHYSICAL EDUCATION – *Levels 2-4*
- Movement & physical activity

HUMANITIES – *Levels 2-6*
- Historical knowledge and understanding

ENGLISH – *Levels 2-3*
- Speaking & listening

MATHEMATICS – *Levels 1-4*
- Number

INTERPERSONAL DEVELOPMENT – *Levels 2-5*
- Working in teams

COMMUNICATION – *Levels 2-5*
- Listening, viewing & responding

THINKING – *Levels 2-5*
- Reasoning, processing & inquiry
- Reflection, evaluation & metacognition

FOCUS
How do trees and the watertable interact?

OBJECTIVES
- To learn the process that has caused dryland salinity
- To understand the relationship between trees and the watertable.

BACKGROUND
The Catchment game aims to demonstrate the link between deep rooted native trees and the watertable by showing the difference in water that enters the ground before and after European settlement. By simulating the vegetation and its removal in a catchment students are able to understand the role of vegetation. In the North Central region less than 13% of our native vegetation remains intact. Read the background information sheet titled 'Catchment Game'.

NOTES
The game can be played with groups of any size, by changing the ratio of trees to clouds. Swap over the trees and clouds if time permits. What would happen if the cleared land was revegetated?

LEARNING TASKS
1. Following and listening to game instructions.
2. Understand the relationship between vegetation and the watertable.
3. During, or at the end of the game, discuss what has happened and why.

ASSESSMENT
What level of physical skill did they demonstrate? Were students able to identify relationships between the game variables and draw parallels with salinity as an issue?

Activity 7 BACKGROUND INFORMATION SHEET

Catchment game

Aim
To demonstrate what happens to water once the majority of deep-rooted native trees are removed.

Background
Native deep-rooted trees help to keep the watertable below the soil surface by acting like natural water pumps.

Materials
- 20-30 balls (tennis or plastic golf balls) dependent on class size
- A large flat grassed area or oval

Procedure
1. Ask ¾ of the class to spread out and pretend they are trees. Remind the students that trees cannot move as their roots are attached to the ground and they also cannot talk.
2. Explain to the group that the trees represent the vegetation found in the catchment before European settlement.
3. Ask the remaining ¼ of the class to stand in a line in front of the trees. Give each of these students 4 balls (depending on class size). These students represent the clouds and the balls represent rain drops. The trees are to catch as many balls as possible without moving their feet (roots)! Ask the clouds to lob the balls gently, one at a time, into the air above the trees on the count of three.
4. Count the number of balls on the ground and remember it. Point out that the majority of the balls were caught. Get them to repeat this part again if necessary.
5. Now demonstrate what the catchment is like by clearing over ¾ of the trees. Get the clouds to lob the same number of balls as above over the remaining trees. Notice how many balls landed on the ground and compare it to the first scenario. What was the difference between the cleared scenario and the vegetated scenario? What does this mean? What will happen to the water?

Activity 8 Create a salinity poem

VELS links

ENGLISH – *Levels 2-6*
- Writing
- Reading

PERSONAL LEARNING – *Levels 2-5*
- The individual learner
- Managing personal learning

ARTS – *Levels 2-5*
- Creating & making
- Exploring & responding

THINKING – *Levels 2-4*
- Creativity

FOCUS
Recall information gathered from previous activities and use this knowledge to create either a Cinquain or Acrostic poem about salinity.

OBJECTIVES
- Learn the structure and rules of two different poem types.
- Brainstorm and select appropriate vocabulary.
- Write either a Cinquain or Acrostic poem.

BACKGROUND
Salinity can be very emotive, and this activity allows students to express their feelings about the issue. If necessary, re-read the Salinity Explained reading for Activity 1 before asking the students to develop a poem about salinity. As further background reading you could access poetry from your school or local library that deals with salinity or other environmental issues.

NOTES
A ***Cinquain*** poem follows the following rules:
Line 1 - One word (a noun) naming the subject of the verse.
Line 2 - Two words (adjectives) describing the subject.
Line 3 - Three words (verbs) describing the subject's actions.
Line 4 - Four words giving the writer's opinion of the subject.
Line 5 - One word (noun) giving another name for the subject.

An ***Acrostic*** poem is a form of a short verse constructed so that the initial letters of each line taken consecutively form a word or words.

E.g. **S**odium chloride
Affects
Living organisms that are not
Tolerant

This activity is designed to test the student's ability to recall information and help them remember key words relating to salinity; as well learn different poem structures and rules. Students could read their poem to the class or another student.

LEARNING TASKS
1. Learn the structure of two different poem types.
2. Brainstorm salinity related words and feelings as a class.
3. Students select a poem type and plan their poem content.
4. Students create a draft poem for a peer or teacher to review.
5. Students share their poems with the class.

ASSESSMENT
Were students able to generate expressive poems using descriptive vocabulary? Did they follow the structure and rules of the poem type?

Activity 9 Salinity quiz

VELS links

ENGLISH – *Levels 2-5*
- Reading
- Writing

SCIENCE – *Levels 1-4*
- Science knowledge & understanding

PERSONAL LEARNING – *Levels 2-5*
- The individual learner
- Managing personal learning

THINKING – *Levels 3-5*
- Reflection, evaluation & metacognition

FOCUS
Consolidate and recall information gathered from previous activities.

OBJECTIVES
- Demonstrate understanding of the key points learnt from previous activities

BACKGROUND
If necessary, re-read the Salinity Explained reading for Activity 1 before asking the students to complete this quiz.

NOTES
This activity is designed to test the student's ability to recall information and help them remember the key words. An extension to this activity could involve the students creating their own salinity quiz for peers to complete and evaluate.

LEARNING TASKS
1. Read the Salinity Explained reading if necessary.
2. Students to complete salinity quiz by recalling information.

ASSESSMENT
How well did they recall information learnt from previous readings and activities?

Answers to salinity quiz

1a) water **b)** salt **c)** salinity
2. c
3. b
4. b
5a) irrigation **b)** dryland

Activity 9 STUDENT WORKSHEET

Salinity quiz

1. Unjumble the following words:

a) tawer _ _ _ _ _

b) ltas _ _ _ _

c) sinality _ _ _ _ _ _ _ _ _

2. How do we measure the amount of salt in water?

a) smell it

b) listen to it

c) using an EC meter

d) looking at it

3. What does EC stand for?

a) energy concentration

b) electrical conductivity

c) easy calculation

4. Where do we find the watertable?

a) in the sky

b) under the soil surface

c) at restaurants

5. Fill in the blanks to spell out the names of the two main types of salinity:

a) I _ R _ G _ T _ O _

b) D _ Y _ A _ D

Activity 10 Creating Crystals

FOCUS
Creating salt crystals

OBJECTIVES
- Conduct a science experiment
- Make observations and record results
- Write a science report

BACKGROUND
Salt occurs naturally in our soils. When the watertable rises the salts that are dissolved in the water rise with it. If the dissolved salts reach the root zone of plants their growth rate will be reduced or they may even die. Where the dissolved salts reach the soil surface visible discharge areas occur which can form salt crusts. When the salt crystals form in the glass above the waterline it models these discharge areas. The crystals attached to the string demonstrate the way that salt can affect the roots of trees.

NOTES
This experiment can be conducted as a class activity, or by small groups who present their findings as a written report.

VELS links

ENGLISH – *Levels 2-5*
- Reading
- Writing
- Speaking & listening

SCIENCE – *Levels 1-4*
- Science knowledge & understanding
- Science at work

MATHEMATICS – *Levels 2-5*
- Number

INTERPERSONAL DEVELOPMENT – *Levels 2-6*
- Working in teams

COMMUNICATION – *Levels 2-6*
- Listening, viewing & responding
- Presenting

DESIGN, CREATIVITY & TECHNOLOGY – *Levels 2-6*
- Investigating & designing
- Producing
- Analysing & evaluating

THINKING – *Levels 2-5*
- Reasoning, processing & inquiry
- Creativity
- Reflection, evaluation & metacognition

LEARNING TASKS
1. Preparation of a science experiment.
2. Following written instructions.
3. Recording findings of the experiment.
4. Discussion of findings and attempt to explain what has occurred.
5. Presentation of the findings in the form of a science report.

ASSESSMENT
Did the student actively participate in the experiment? Did they produce a written report outlining the experiment and findings? Was the report well structured and include the main findings? Did they understand the meaning of crystallising and dissolving?

Activity 10 STUDENT WORKSHEET

Creating Crystals

Aim
To create salt crystals

Background
This experiment is designed to help demonstrate how salt crystals form.

Materials
- Table salt
- Tablespoon
- Glass jar
- Pencil
- Fine string
- Warm water
- Button (that will sink)

Procedure
1. Make a salt solution by adding 2 tablespoons of table salt to half a cup of warm water in a glass jar.
2. Stir the solution with a spoon to dilute the salt.
3. When the salt has dissolved add 1 more tablespoon of salt. Now all of the salt will not dissolve- some will settle on the bottom. You have created a very saline solution called BRINE.
4. Tie a piece of string to a pencil and tie a button to the other end of the string. Lay the pencil across the top of the glass so the button hangs down into the brine.
5. Put the glass in a warm place where it won't be disturbed and leave it for 4 or 5 days.
6. Start a science report including the date, aim and method. Make notes and observations during the 4 or 5 day period.
7. Complete the results section of your report by making detailed notes or sketches of your observations of the glass over the 4 or 5 day period. Note things like: Where have the crystals formed? How are the crystals grouped? What size and shape are they?
8. State any conclusions about the experiment and how it relates to salt in the environment.
9. Present your report to the class.

CONGRATULATIONS...
You are a salinity superstar!

This certificate is awarded to

_____

For successfully completing a range of activities and experiments from the Salinity Activity Booklet for Schools.

You now have superior knowledge and understanding to help combat the salinity issue!