



Fieldwork in Braeside Park  
~ an initiative of LandLearn and  
Parks Victoria Braeside Park

## Salinity in an urban landscape

This fieldtrip is designed to give students of Science and SOSE (Levels 5 & 6 and VCE) the opportunity to experience salinity first hand and to provide teachers with ideas for class fieldwork and activities in the Greater Melbourne area.

The journey looks at the causes, impacts and management of salinity in an urban environment.

The themes for the fieldwork are:



Where have we come from?



What is being done?



What does it mean?

# Contents

Page

Curriculum links	3 - 4
Site Information	5
Site access, activities and teacher notes	6
Braeside Park fieldtrip questions - Science and SOSE	7-12
Braeside Park class investigations - Science and SOSE	13
Braeside Park fieldtrip questions - VCE Env. Science	14 - 15
Braeside Park class investigations - VCE Env. Science	16
Braeside Park fieldtrip questions - VCE Geography	17 - 18
Braeside Park class investigations - VCE Geography	19
Acknowledgments, Contacts, Resources and References	20 - 21

## ***Tables***

Upper limits of water salinity for various uses	22
Braeside Park bore salinity levels summary 2002	23
Braeside Park rainfall figures 2003	24 - 26

	Learning outcomes	Learning activities
<b>SCIENCE</b>		
4 Biological Science	4.1 Identify relationships between living things which help them survive in their habitat.	<ul style="list-style-type: none"> <li>Collect data in the field to investigate plant communities in salt affected habitats. Research the changes that have occurred as salting affected specific sites. ✓</li> <li>Undertake experiments in the classroom to investigate the affects different levels of salt have on plant growth and production. ✓</li> <li>Participate in Saltwatch activities as an extension of fieldwork.</li> </ul>
5 Biological Science	5.2 Describe interactions between living things and their non-living surroundings.	<ul style="list-style-type: none"> <li>Describe the effects of salinity on both living things and non-living elements at fieldwork sites. ✓</li> <li>Predict the effects if nothing is done to manage and control salting. Develop a concept map based on discussion. ✓</li> <li>Apply and practise plant identification and classification skills in the field.</li> <li>Participate in Saltwatch activities as an extension of fieldwork.</li> </ul>
	5.4 Explain how plants obtain, transport and use nutrients.	<ul style="list-style-type: none"> <li>Explain how the process of plants transporting and using water is connected to the issues of salinity.</li> <li>Design experiments to illustrate and support explanations.</li> <li>Identify examples in the field.</li> </ul> <p style="text-align: right;">Logbook / Report ✓</p>
6 Biological Science	6.1 Explain how ecosystems are maintained in terms of energy and matter.	<ul style="list-style-type: none"> <li>Explain how salt is cycled through specific landscapes and the impacts on different ecosystems, eg. agricultural, natural bushland, wetland. ✓</li> </ul>
	6.6 Relate concepts of adaptation, biodiversity and evolution to the survival of the species.	<ul style="list-style-type: none"> <li>Identify and describe the characteristics of salt tolerant plant species.</li> <li>Investigate the impact of salinity on different environments. Evaluate management strategies using fieldwork examples and data. ✓</li> </ul>
<b>SOSE</b>		
5 Geography	5.2 Explain how natural processes and human activities change environments.	<ul style="list-style-type: none"> <li>Use maps, photos, interviews and websites to describe the process of salinity in an environment.</li> <li>Assess the extent to which natural and human activities contribute to salinity in an area.</li> </ul> <p style="text-align: right;">Report / presentation ✓</p>
	5.3 Explain how people's use of natural and human environments changes over time.	<ul style="list-style-type: none"> <li>How are people using these human/natural environments at the site?</li> <li>How has the fieldwork site changed over time – what have the impacts of different uses been?</li> <li>Map the change over time and any predicted future changes. Responses ✓</li> </ul>
	5.4 Develop a plan to address impacts of change	<ul style="list-style-type: none"> <li>Develop a management plan for a salinity-affected fieldwork site. ✓</li> <li>Evaluate current management of a salinity-affected site.</li> </ul>
6 Geography	6.1 Explain the processes and interactions between people and major natural systems	<ul style="list-style-type: none"> <li>Investigate the impact of salinity on urban/rural areas.</li> <li>Investigate via the web some strategies to reduce the impact of salinity on urban and rural areas.</li> </ul> <p style="text-align: right;">Report / presentation ✓</p>
	6.3 Predict the effects of resource development and use on a selected natural and human environment	<ul style="list-style-type: none"> <li>Explore how salinity can be more sustainable managed into the future – what human practices need to be changed or modified for this to happen?</li> <li>Investigate management options already occurring on the site – will this be enough to manage the resource into the future?</li> </ul>
	6.4 Develop a comprehensive strategy to resolve an issue related to the use and management of a natural or human environment	<ul style="list-style-type: none"> <li>Develop a management plan for a fieldwork site ✓</li> <li>Use a range of geographical media to describe the site and illustrate the impact of salinity in the area. ✓</li> </ul>

## TECHNOLOGY

Cross KLA connections	<p><b>Technology</b></p> <ul style="list-style-type: none"> <li>• Students make the equipment required for fieldwork.</li> <li>• Use ICT to record, manipulate and report data collected on fieldwork. ✓</li> <li>• Conduct fieldwork in partnership with Agriculture and Horticulture Studies class.</li> </ul>
-----------------------	--

✓ indicates activities which may be appropriate for assessment

## Salinity Fieldwork ~ VCE curriculum links

VCE Environmental Science	<p>Unit 1 Outcome 3 Analyse one human induced environmental change and the options for remediation – <i>use salinity as an example and fieldwork to investigate the change, environmental impacts and management or remediation strategies.</i></p> <p>Unit 2 Outcome 2 Investigate and report on a local example of environmental degradation, using an appropriate monitoring program – <i>demonstrate a monitoring program and techniques using salinity focussed fieldwork. Some data is available on Catchment, Waterwatch, ParkWeb websites and through Saltwatch.</i></p> <p>Unit 3 Outcome 2 Describe the characteristics of biodiversity and evaluate strategies to reduce the effects of threatening processes – <i>investigate salinity as a threatening process for biodiversity – use fieldwork to demonstrate and explore.</i></p> <p>Unit 4 Outcome 1 Describe the characteristics of one pollutant and evaluate management options for reducing the risk of the pollutant affecting the health of the environment – <i>investigate salt as a pollutant; use fieldwork to assist understanding of management strategies.</i></p>
VCE Chemistry	<p>Unit 1 – Water – <i>the issue of salinity provides a relevant, meaningful topic to investigate environmental issues associated with the solvent properties of water.</i></p>
VCE Biology	<p>Unit 1 Outcome 1 Describe the nature of ecosystems and the interrelationships of organisms within them. <i>Investigate the change in interrelationships of living organisms in a salinity-affected area – eg: look at macro-invertebrates in a creek or wetland affected by salinity and compare to a site with no salinity-related problems.</i></p> <p>Unit 1 Outcome 2 Describe and explain the nature of environmental changes, both natural and human induced, and their effects within the ecosystem. <i>Study the impact of salinity through field and class work as an example of human induced change</i></p> <p>Unit 1 Outcome 3 Design, conduct and report on field and laboratory investigations related to the nature of ecosystems and the interrelationships of organisms within them. <i>Design and conduct fieldwork at a site affected by salinity, investigating the impact on relationships in that ecosystem.</i></p>
VCE Geography	<p>Unit 1 Outcome 1 Describe the geographic characteristics that have been changed by mainly natural processes and places that have been changed by mainly human activities. <i>Investigate how a salinity-affected site has changed over time due to natural processes and human actions- collect data using a range of geographic techniques demonstrating the characteristics of a salinity affected site.</i></p> <p>Unit 1 Outcome 2 Describe and analyse the natural processes and human activities that alter places – <i>Investigate change over time of a salinity affected area. What are the greater impacts – social, economic and physical of salinity in this landscape?</i></p> <p>Unit 1 Outcome 3 Predict how natural processes and human activities may alter places. – <i>Salinity is a problem that has been caused by a combination of natural and human processes. How might salinity alter another place in intensity and scale (ie: in the city of Melbourne or in a regional centre)?</i></p>

# Braeside Park

## Dandenong Catchment

### Site Information

#### Location:

Braeside Park covers 312 hectares in Melbourne's south eastern suburb of Braeside. Managed by Parks Victoria, it is a large recreation and conservation venue that features picnic facilities amongst heathlands, wetlands and redgum woodlands. Braeside Park is the largest remnant of Grassy Woodland vegetation in south east Melbourne.

#### Local Information:

The Braeside area is in a rain shadow and receives just under 600 mm/year of rainfall (see rainfall tables pp 32-34).

The Friends of Braeside Park group is working together with Parks Victoria staff on site to implement a management plan for the Park.

#### What you will see:

Located in the southern area of the Park, thirty hectares of red gum woodland has been affected by salinity. Parts of this site have been fenced off and revegetated as part of the management plan for the Park.

The site was once covered with a Redgum Grassy Woodland. With increased urban development in the area, a sewerage treatment plant was constructed on the site in 1939. The area was also irrigated with wastewater and extensively grazed by cattle.

The treatment plant was decommissioned in 1978 when an underground trunk sewer line was dug to a depth of 6 metres (in the area adjacent to the dead trees).

This has changed the hydrology of the site and has contributed to the salinity that you see here today

Part of the remnant vegetation in the Park is under stress from disturbance, fragmentation and salinity, which is leading to dieback of red gums.

Other issues affecting the vegetation in the Park are:

- a large possum population,
- insect attack on plants,
- high winds,
- a large ibis population,
- drought and low rainfall,
- soil compaction.

#### Issues:

The Redgums in the area have been progressively dying off.

The water table appears to have risen (see bore water readings table p 31) further affecting the vegetation in areas of the Park.

#### Action:

Revegetation in the Park has been ongoing for 20 years. Recently, the very active 'Friends of Braeside Park' ([www.braesideparkfriends.org.au](http://www.braesideparkfriends.org.au)) has applied for funding through Parks Victoria Grants to revegetate the salinity-affected area. Much of the revegetation you see in this area has been undertaken since 1999. A grazing regime for the area is currently in place as a management tool, however grazing is being progressively reduced throughout the Park.

Parks Victoria has sunk six bores on the site for the Friends group to monitor water tables and salinity levels. Bores 4 and 5 can be tested by school groups with prior organisation with Park staff (see p 6 for details).

#### Interesting facts....

The Park used to be a racetrack and Phar Lap was stabled here. The stables burnt down in 1984.

There is a growing echidna population in the Park.

## Access to site

Download the maps of Braeside Park from ParkWeb at [www.parkweb.vic.gov.au](http://www.parkweb.vic.gov.au) and follow the links to Braeside Park.

Parks Victoria is more than happy for you and your students to visit Braeside Park. If you would like **to organise a visit you will need to do so in writing one month in advance** by e-mailing the Ranger In Charge at the Park on [dlucas@parks.vic.gov.au](mailto:dluca@parks.vic.gov.au). A Ranger will be available on site to unlock bores 4 and 5 and lend you the testing equipment (\$20 refundable deposit required) and give a 10 minute introductory talk on the salinity issues in the park – please request this in your e-mail.

The Park staff members are very interested in your results and would appreciate you sharing your results with them. If students are developing management plans for the area, testing surface and ground water quality, doing surveys etc, the Park staff would be interested in your class' findings.

Email your students' work to the park to the e-mail address above or post them to Braeside Park PO Box 608 Braeside Vic 3195 – your results will contribute to the management of the Park's salinity problems.

## Site Information

- The site is in the south eastern suburb of Braeside. Bore 5 Melways reference is 93 F1.
- There is bus access to a car park close to the site – the best entrance is from Governor Rd. Melways Reference 93 F2. This entrance will lead you to the Red Gum picnic area and car park (see Parks Victoria map).
- There are toilets on site – close to Bore 5 and the information shelter.
- There are picnic shelters adjacent to the car park in case of inclement weather.

## Activities to undertake at Braeside Park

- Combine your visit with a wetland walk.
- There have been 150 species of birds recorded on the site - do a bird survey from the bird hide at the northern end of the wetland where there are bird identification pictures to help you.
- Explore the Heathland trail with its abundance of plants – there is a very good Self Guided Heathland Trail for Braeside Park on the Parks Victoria website [www.parkweb.vic.gov.au](http://www.parkweb.vic.gov.au) and search under Braeside.
- Do some analysis of the ground water and rainfall trends using the background information available. **Remember the Park staff is interested in your results.** (Data on readings taken over the past 18 months from all the bores on the sites and rainfall data from the past 12 months is available to download in table format on the LandLearn website).

## Suggestions on use of this resource:

- The fieldwork questions are divided into Levels 5 & 6 Science and/or SOSE, VCE Environmental Science and VCE Geography. There are fieldtrip questions and classroom questions in each section. Teachers can select the questions and activities best suited to their students, the particular focus of the study and time available.
- It is suggested that some classwork or student research on salinity is undertaken prior to the fieldtrip to provide background to help students better understand the issue.
- If possible, teach how to use the equipment for monitoring prior to the fieldtrip.

\* Teachers' notes to accompany the student worksheets are available. Please email [landlearn.program@dpi.vic.gov.au](mailto:landlearn.program@dpi.vic.gov.au) requesting Braeside Park teachers' notes

## Acknowledgments

LandLearn gratefully acknowledges the help and support of the Parks Victoria Staff at Braeside Park, and Julie White DPI Box Hill.

## Contacts

**Parks Victoria** 131963  
Braeside Park  
Email [d Lucas@parks.vic.gov.au](mailto:d Lucas@parks.vic.gov.au)

### LandLearn Contacts

**Ann Fagan**  
Ph: (03) 5833 5366

### Education Officer (Melbourne)

Ph: (03) 9296 4609

Email: [landlearn.program@dpi.vic.gov.au](mailto:landlearn.program@dpi.vic.gov.au)

## Website Resources

Saltwatch – Learning through involvement.

To download the Saltwatch book visit

[http://www.saltwatch.org.au/saltwatch/info\\_resources.htm](http://www.saltwatch.org.au/saltwatch/info_resources.htm)

DPI / DSE website also has plenty of Salinity information visit

[www.dpi.vic.gov.au](http://www.dpi.vic.gov.au) or [www.dse.vic.gov.au](http://www.dse.vic.gov.au) search for salinity.

The Murray Darling Basin Commission website:

[http://www.mdbc.gov.au/naturalresources/env\\_issues/water\\_and\\_land\\_salinity.htm](http://www.mdbc.gov.au/naturalresources/env_issues/water_and_land_salinity.htm)

The National Dryland Salinity Program website:

<http://www.ndsp.gov.au/>

Australian Conservation Foundation website:

<http://www.acfonline.org.au>

CSIROOnline website:

[www.csiro.au](http://www.csiro.au)

Environment Australia website [www.ea.gov.au](http://www.ea.gov.au)

Environment Gateway [www.environment.vic.gov.au](http://www.environment.vic.gov.au) search for salinity.

## Resources to support field and classwork

ABC Four Corners Water pressure – March 2001 – good info on water management and salinity issues <http://www.abc.net.au/4corners/water/default.htm>

ABC – Salinity Australia's Silent Flood – good info and student activities related to this 4-part documentary broadcast December 2002 <http://www.abc.net.au/learn/silentflood/>

CRC for plant based management of dryland salinity – good introductory info on salinity

<http://www1.crcsalinity.com/>

CSIRO Land and water section – good salinity summary

<http://www.csiro.au/index.asp?type=sector&id=Land%20and%20Water&xml=sector&style=sectorAustralianContext>

Sunsalt – [www.sunsalt.com.au](http://www.sunsalt.com.au) – salt processor turning saline groundwater into a range of salt products

## Resources that might be on your bookshelf

Casinader, N. et al. **A Place for Geography Book 3** (1998) Addison Wesley Longman Australia Pty Ltd South Melbourne

Chapter 5 – ‘Agriculture 2050: A future problem solving approach’

This chapter is a good start for researching salinity. It also has case studies of salinity with exercises to complete and examples of management options.

Hanna, D and Fagan, A. **Agriculture and Land Management Fieldwork Kit** (2001) Food and Agriculture in the Classroom, Department of Natural Resources and Environment

Birkett, L. Thorp, V & Van Gameren, M. **Monitoring Ecosystems - VCE Environmental Science units 1&2** (2001), Victorian Association for Environmental Education Inc

Marshall, D. **Biodiversity Education Resource Book** (CSF levels 5&6) (1999)  
Department of Natural Resources and Environment

Australian Conservation Foundation for The ACF-Southcorp Alliance, **Salt : Nature in the Balance**.

“Habitat” Australian Conservation Foundation, **Salinity supplement, Vol 29 N. 3**  
**June 2001**

Department of Natural Resources and Environment (1998) **Catchment Education Resource Book**

The DSE/DPI Information Centre is the Departmental bookshop which holds a large range of publications

Cnr Nicholson St and Victoria Pde East Melbourne

Ph: 9637 8080

Fax: 9637 8150

Email: [infocentre@nre.vic.gov.au](mailto:infocentre@nre.vic.gov.au)

## References

This information was adapted from the following resources:

Department of Primary Industries (2003) **Draft Port Phillip Salinity Framework**

Natural Resources and Environment (2000) **Victoria’s Salinity Management Framework**

Department of Natural Resources and Environment (1997) **Saltwatch – a resource book for schools** or [http://www.saltwatch.org.au/saltwatch/info\\_resources.htm](http://www.saltwatch.org.au/saltwatch/info_resources.htm)

Department of Natural Resources Queensland (1997) **Salinity Management Handbook**

## Upper Limits of water salinity for various uses

The table below summarises the upper limits to maintain maximum production. The long term use of irrigation water above these limits will result in a loss of production, although the limits will differ slightly according to soil type. These figures are based on flood irrigation or sprinklers or drippers for horticultural crops. The limits for water applied through overhead sprinklers or sprays that wet the plants leaves are much lower.

Uses	$\mu\text{S/cm}$ EC units	TDS ppm Mg/L
Rain	10	6
Apricots/Peaches	330	200
Citrus/grapevines	370	220
Sub-clover	500	300
White clover	600	360
Permanent pasture (ryegrass & clover)	800	480
Desirable upper limit for drinking water	830	500
Pears	900	540
Apples	1000	600
Tomatoes, sweet corn (maize)	2300	1400
Perennial ryegrass	2300	1400
Lucerne	2400	1440
Poultry, pigs	4100	2460
Wheat	500	3000
Dairy cattle	5400	3240
Lactating ewes/weaned lambs	6000	3600
Horses	7800	4680
Beef cattle	11,400	6840
Dry sheep	15,700	9420
Sea water	50,000	30,000
Dead Sea	550,000	330,000

## Braeside Park Bore Salinity Levels Summary 2002

	Dec '01	1/15/02	2/19/02	3/19/02	4/16/02	5/2/02	6/16/02	Jul	8/16/02	9/20/02	10/15/02	11/17/02	Dec
<b>SALINITY</b>													
<b>Bore 1</b>	10000	8900	7800	6500	6700	7600	7500	6900	7400	5000	5400	7300	
<b>Bore 2</b>	4000	3700	4000	3800	3900	4000	4300	5600	5300	4000	3800	3800	
<b>Bore 3</b>	3400	3500	4200	4100	4600	4900	5600	5700	6300	5200	6200	6600	
<b>Bore 4</b>			3900	3600	3800	4000	4000	4100	4600	4500	4200	4500	
<b>Bore 5</b>			9000	8400	9600						9600	9200	
<b>Bore 6</b>			dry										
<b>Bore 7</b>			7400	900	1100	1100	1200	1100	1300	1300	1200	1600	
<b>Bore 8</b>													
<b>Bore 9</b>													
<b>Bore 10</b>													
<b>DEPTH (m)</b>													
<b>Bore 1</b>	1.0	1.4	1.4	1.6	1.5	1.3	1.3	1.1	1	1	1.1	1.5	
<b>Bore 2</b>	0.8	1.15	1.3	1.4	1.3	1.1	0.95	0.8	0.75	0.8	0.9	1.3	
<b>Bore 3</b>	1.5	2.85	1.9	2.1	2.1	1.9	1.85	1.7	1.6	1.7	1.7	2	
<b>Bore 4</b>			1.55	1.75	1.55	1.2	1	0.9	0.85	0.9	1	1.6	
<b>Bore 5</b>			1.9	2	2						1.6	2	
<b>Bore 6</b>			dry										
<b>Bore 7</b>			0.55	1.1	0.5	0	0.2	0.6	0.04	0.1	1	1.2	
<b>Bore 8</b>													
<b>Bore 9</b>													
<b>Bore 10</b>													

# Braeside Park Rainfall Figures 2003

**TFB** = Total Fire Ban Day  
Measured in Milimetres

	Jan	Feb	Mar	April	May	June	July	August	Sep	Oct	Nov	Dec
1	9.2		4				1.4	0.4	2.4		11.2	
2	1.6		4.8	1.6		0.6	0.6			8.2	0.3	
3			0.2	0.6						1.6		
4				0.2	0.4		0.2					
5			0.2			0.6			0.2			
6		1						1.2	0.4	0.2		
7	TFB 1					10			0.4			
8				4.2					0.2	2.6		
9					1.2		2.2	7		0.6		
10					2.8		0.2		0.4	3.6		
11				10.6				0.4	1.8	2.2		
12				15			3.8	0.4	0.6	1		
13	TFB 2					1.2		9.8				
14				27.4		3		2.6	5.6			
15				3	7.4	1.4		3.5	1.4			
16		0.4	TFB 8		0.2		9.4		2.6	4.6		
17			TFB 9	2.2		1.8			1			
18					4.8	0.2		2.8	2.2			
19			4		0.8	1		1				
20	TFB 3		9.4		4	0.8				12	2	

<b>21</b>		6.4	4.6		3.2				1	4.8	27	
<b>22</b>		14.8	4.4		2	1	3.2	3.6	1	10.6		
<b>23</b>					2.6	1.6				3.6		
<b>24</b>	TFB 4			0.6	0.4	2	30.2	12.2	5.2	5.6		
<b>25</b>	TFB 5			0.4			12.2	6.6	1.2	0.2		
<b>26</b>	TFB 6						14	0.4		1.8		
<b>27</b>	1						0.6		6.4	4.2		
<b>28</b>		0.2		19.2	0.6			0.8				
<b>29</b>	TFB 7						12		3	8.4		
<b>30</b>					0.4	4.2	12.2			2.6		
<b>31</b>	9.8						1.6	8.6	0.4	3.7		
<b>Total</b>	21.6	22.8	31.6	85	30.8	29.4	103.8	61.3	37.4	82.1	40.5	0
<b>Running Total</b>	21.6	44.4	76	161	191.8	221.2	325	386.3	423.7	505.8	546.3	546.3

# Braeside Park Summary Rainfall 2003

