

# stormwater education manual

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## How to use this manual

This material has been designed for teachers and students of middle primary to middle secondary school. It provides information and activities on a range of issues associated with stormwater. It can be used in conjunction with the *Waterwatch Education Kit*, or can be used as an independent study.

The activities in this *Stormwater Education Manual* address curriculum requirements (CSF II) for SOSE and Science Levels 3, 4 and 5.

The manual is organised into three sections:

### Introduction

Outlines the educational background for the manual, including CSF II links.

### Statewide Section

Contains activities and information to provide an overview of stormwater concepts and issues and identifies some of the positive actions being taken to improve the quality of our waterways and bays. These activities are of relevance to all regions and can be adapted to suit your local area, waterway or bay.

The activities in this section address the focus questions and topics:

- Understanding the stormwater drainage system.
- How can stormwater affect our waterways/bays?
- How can people affect stormwater?
- Why are our waterways/bays important?
- Doing something about stormwater pollution.

### Regional Section

The Regional Section provides site specific information and activities, including where to see local examples of wetlands, waterways, estuary environments and stormwater traps. These activities can be adapted to suit other regions.

INSERTS ARE AVAILABLE FOR OTHER REGIONS IN VICTORIA. CONTACT WATERWATCH VICTORIA FOR FURTHER DETAILS.

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## Why teach about stormwater?

### What is stormwater?

When it rains in our towns and cities, all that water has to go somewhere.

The stormwater system is designed to quickly take the rainwater that falls on our roofs, paved areas and streets to the closest waterway. It does this through a system of gutters, pipes and drains, both open and underground.

The stormwater system is quite separate from the wastewater system. The wastewater system takes the sewage and used water from inside our buildings to a treatment plant where pollutants are removed to strict standards set by the Environment Protection Authority (EPA) before the treated water is discharged.

### Is stormwater a problem?

In some cases, stormwater is filtered by traps or wetlands but in most cases stormwater flows untreated directly from our streets to our waterways, beaches or bays.

Any pollutants that have entered the stormwater system are carried on into the waterway.

There is a direct link between our local stormwater system and our local creeks, rivers, lakes, bays and the ocean.

Litter, leaves, grass clippings, soil, cigarette butts, dog droppings, garden fertiliser, car washing detergent, petrol, oil and grease from roadways can get washed into the stormwater system and end up polluting the local creek or beach.

Polluted waterways and beaches can:

- look ugly and smell bad
- be unsafe for people to swim in
- reduce people's recreation opportunities
- kill fish and other aquatic life.

### How does this manual help?

Use this Stormwater Education Manual to teach your students about stormwater pollution and how they can help care for their local environment.

The activities are linked to CSF II (Curriculum and Standards Framework) Learning Outcomes for Levels 3, 4 and 5 Science and SOSE.

This manual can be used in conjunction with the *Waterwatch Education Kit* to link water quality issues with stormwater pollution.

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## Why teach about stormwater?

The activities in this manual assist students achieve the Learning Outcomes specified for Levels 3, 4 and 5 Science and SOSE, in the Curriculum Standards and Framework II (CSF II).

These activities could be adapted for other levels and Key Learning Areas.

### science

Level 3		
Biological Science	Activities in Statewide section	Activities in Regional Section
3.1 Describe environmental factors that affect the survival of living things.		<ul style="list-style-type: none"><li>• No muck in the ... or</li><li>• No litter in the ...</li><li>• Leap frogs</li></ul>
Earth and Space	Activities in Statewide section	Activities in Regional Section
3.2 Describe how features of the landscape are altered by the processes of weathering and erosion.	<ul style="list-style-type: none"><li>• 12. Run-off surfaces, p 44</li></ul>	

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## science

### Level 4

Biological Science	Activities in Statewide section	Activities in Regional Section
<p><b>Living together: past, present and future</b></p> <p>4.1 Identify relationships between living things which help them survive in their habitat.</p>	<p>8. A stormwater story, p 35</p> <p>10. Types of stormwater pollutants, p 40</p> <p>11. Stormwater sources and impacts, p 42</p> <p><i>Investigate the diversity of life in your local waterway/bay.</i></p> <p><i>Show how pollutants impact on a food chain.</i></p> <p><i>Show how the impact of stormwater pollutants on one organism affects those that rely on it.</i></p>	<ul style="list-style-type: none"> <li>• Stormwater case studies</li> <li>• Leap frogs</li> </ul>
Chemical Science	Activities in Statewide section	Activities in Regional Section
<p><b>Substances: structure, properties and uses</b></p> <p>4.1 Relate properties of common substances to their suitability for particular use.</p>	<p>1. Stormwater versus wastewater, p 3</p> <p>7. Where does your stormwater go?, p 32</p> <p>9. Seen and unseen pollutants, p 38</p> <p>12. Run-off surfaces, p 44</p> <p>14. Surfaces in the school grounds, p 49</p> <p><i>Observe the different physical properties of different stormwater pollutants.</i></p> <p><i>Discuss the value of water as a means for transporting waste.</i></p>	<ul style="list-style-type: none"> <li>• No muck in the ... or</li> <li>• No litter in the ...</li> </ul>
<p><b>Chemical reactions</b></p> <p>4.2 Distinguish between physical and chemical change.</p>	<p>9. Seen and unseen pollutants, p 38</p> <p>17. Street sweeper, p 53</p> <p><i>Investigate different pollutants for their physical and chemical properties.</i></p>	

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## science

### Level 4 cont.

Physical science	Activities in Statewide section	Activities in Regional section
<p><b>Forces and their effects</b></p> <p>4.2 Link the effects of simple combinations of forces to investigations of the motions of objects</p>	<p>3. Stormwater pollution traps, p 9</p> <p>5. Stormwater transport and flooding, p 26</p>	

## science

### Level 5

Biological science	Activities in Statewide section	Activities in Regional section
<p><b>Living together: past, present and future</b></p> <p>5.2 Describe interactions between living things and between living things and their non-living surroundings.</p>	<p>7. Where does your stormwater go?, p 32</p> <p>8. A stormwater story, p 35</p> <p>10. Types of stormwater pollutants, p 40</p> <p>11. Stormwater sources and impacts, p 42</p> <p>17. Street sweeper, p 53</p> <p><i>Describe the impact of stormwater pollutants on aquatic organisms</i></p>	<ul style="list-style-type: none"> <li>• Stormwater case studies</li> <li>• Leap frogs</li> </ul>
<p><b>Structure and function</b></p> <p>5.4 Explain how plants and animals obtain, transport and use nutrients.</p>		

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## science

Level 5 cont.

Chemical science	Activities in Statewide section	Activities in Regional section
<p><b>Substances: Properties, structure and uses</b></p> <p>5.2 Relate the safe use and disposal of common substances to their physical and chemical properties</p>	<p>1. Stormwater versus wastewater, p 3</p> <p>2. Finding out about stormwater systems, p 5</p> <p>3. Stormwater pollution traps, p 9</p> <p><i>Identify items to be put into rubbish sewerage system or chemical collection system rather than down the stormwater system.</i></p>	
<p>5.4 Relate simple procedures for preparing and separating mixtures to medical and industrial procedures.</p>	<p>3. Stormwater pollution traps, p 9</p> <p><i>Describe how sediment and litter traps work in terms of separating pollutants from stormwater.</i></p>	<ul style="list-style-type: none"> <li>• No muck in the ...</li> <li>or</li> <li>• No litter in the ...</li> </ul>
Physical science	Activities in Statewide section	Activities in Regional section
<p><b>Forces and their effects</b></p> <p>5.4 Explain how mechanical systems can control and modify force and motion</p>	<p>3. Stormwater pollution traps, p 9</p> <p>5. Stormwater transport and flooding, p 26</p>	<ul style="list-style-type: none"> <li>• No muck in the ...</li> <li>or</li> <li>• No litter in the ...</li> </ul>
Earth science	Activities in Statewide section	Activities in Regional section
<p><b>Rocks</b></p> <p>5.2 Relate the properties of rocks to the way they are used.</p>	<ul style="list-style-type: none"> <li>• 11. Run-off surfaces, p 44</li> </ul>	

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## sose

Level 3		
Society + environment	Activities in Statewide section	Activities in Regional section
3.3 Compare how people use environments in Australia.	7. Where does your stormwater go?, p 32 13. School stormwater catchment map, p 48 15. Litter mapping your school, p 51 17. Street sweeper, p 53	<ul style="list-style-type: none"> <li>• ... Catchment ... our back yard</li> <li>• Where does the water go?</li> <li>• A birdseye view</li> <li>• Laying down the law</li> <li>• Stormwater case studies</li> </ul>

## sose

Level 4		
Economics	Activities in Statewide section	Activities in Regional section
4.2 Explain how and why local rules and laws are made and changed.	19. What's their value?, p 56 20. Who's responsible?, p 58 21. Stormwater management plans, p 61 <i>Discuss laws relating to littering and disposal of stormwater and pollutants.</i> <i>Discuss why there are more laws now than ever before about littering and stormwater pollution.</i>	<ul style="list-style-type: none"> <li>• Laying down the law</li> </ul>
Geography	Activities in Statewide section	Activities in Regional section
4.1 Locate and explain the distribution of significant natural and built features both in regions of Australia and globally, using maps and other geographical techniques.	2. Finding out about stormwater systems, p 5 3. Stormwater pollution traps, p 9 4. Where can water flow?, p 32 13. School stormwater catchment map, p 42 <i>Locate and map major waterways in Victoria.</i> <i>Locate and describe patterns relating to stormwater drainage.</i> <i>Create a catchment map.</i>	<ul style="list-style-type: none"> <li>• ... Catchment ... our back yard</li> </ul>

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## sose

Level 4

cont.

Geography	Activities in Statewide section	Activities in Regional section
<p>4.2 Describe the distribution of population in Australia and explain changing patterns of land use. This is evident when the student is able to:</p> <ul style="list-style-type: none"> <li>describe the location of major land uses in Australia</li> <li>identify factors which have contributed to the use of areas for settlement and industry in Australia</li> <li>explain the changing nature of the use of areas for settlement &amp; industry in Australia.</li> </ul>	<p><i>Explain why floodplains are now being built upon.</i></p>	<ul style="list-style-type: none"> <li>Stormwater case studies</li> </ul>
<p>4.3 Analyse different views about the use and care of Australian places.</p>	<ol style="list-style-type: none"> <li>Stormwater versus wastewater, p 3</li> <li>Where does your stormwater go?, p 32</li> <li>A stormwater story, p 35</li> <li>Seen and unseen pollutants, p 9</li> <li>Types of stormwater pollutants, p 40</li> <li>Stormwater sources and impacts, p 42</li> <li>Litter mapping your school, p 51</li> <li>Rubbish diary, p 52</li> <li>Street sweeper, p 53</li> <li>Survey – what do you know?, p 55</li> <li>What’s their value?, p 56</li> <li>Prevention is best: what can I do?, p 63</li> </ol> <p><i>Describe how pollutants can affect environments/habitats/plants/animals.</i></p> <p><i>Describe how people have affected stormwater quantity and quality.</i></p> <p><i>Describe ways to reduce stormwater impacts.</i></p> <p><i>Describe how views about stormwater have changed.</i></p>	<ul style="list-style-type: none"> <li>Corporate clean up</li> <li>Stormwater case studies</li> </ul>

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## SOSE

### Level 5

Geography	Activities in Statewide section	Activities in Regional section
5.1 Compare the characteristics of significant regions in Australia and the world.	<ol style="list-style-type: none"> <li>1. Stormwater versus wastewater, p 3</li> <li>2. Finding out about stormwater systems, p 5</li> <li>3. Stormwater pollution traps, p 9</li> <li>4. Where can water flow?, p 32</li> </ol> <p>13. School stormwater catchment map, p 48</p> <p><i>Describe the drainage features of a local environment.</i></p> <p><i>Describe drainage features of a natural and a built environment.</i></p>	<ul style="list-style-type: none"> <li>• Laying down the law</li> </ul>
5.2 Explain how natural processes and human activities change environments.	<ol style="list-style-type: none"> <li>4. Where can water flow?, p 23</li> <li>5. Stormwater transport and flooding, p 26</li> <li>6. Changing times, p 30</li> <li>7. Where does your stormwater go? , p 32</li> <li>8. A stormwater story, p 35</li> <li>9. Seen and unseen pollutants, p 38</li> <li>10. Types of stormwater pollutants, p 40</li> <li>11. Stormwater sources and impacts, p 42</li> <li>12. Run-off surfaces, p 44</li> <li>13. School stormwater catchment map, p 48</li> <li>14. Surfaces in the school grounds, p 49</li> <li>16. Rubbish diary, p 52</li> <li>17. Street sweeper, p 53</li> </ol> <p><i>Describe changes to an environment and the impact on drainage and stormwater flows.</i></p> <p><i>Describe how human activities have affected drainage and stormwater flows and pollution levels.</i></p>	<ul style="list-style-type: none"> <li>• ... Catchment ... our back yard</li> <li>• Where does the water go?</li> <li>• Laying down the law</li> <li>• Stormwater case studies</li> </ul>

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## SOSE

Level 5

cont.

Geography	Activities in Statewide section	Activities in Regional section
<p>5.3 Explain how people's use of natural and human environments changes over time.</p>	<p>6. Changing times, p 30            15. Litter mapping your school, p 51            17. Street sweeper, p 53            19. What's their value?, p 56  <i>Predict how an environment will change if stormwater impacts are not reduced.</i>  <i>Classify people's activities according to whether it impacts slightly or highly on stormwater quality or quantity.</i>  <i>Describe changes to the way waterways have been viewed in terms of stormwater and drainage.</i></p>	<ul style="list-style-type: none"> <li>• Corporate clean up</li> <li>• Meet the challenge</li> <li>• A birdseye view</li> </ul>
<p>5.4 Develop a plan to address impacts of change.</p>	<p>7. Where does your stormwater go?, p 32            19. What's their value?, p 56            20. Who's responsible?, p 58            21. Stormwater management plan, p 61            22. Prevention is best: what can I do?, p 63  <i>Describe how stormwater quantity and quality affects people and/or changes places.</i>  <i>Suggest and evaluate ways of reducing stormwater problems.</i>  <i>Conduct water quality monitoring to monitor the health of a local waterway and assess the impact of stormwater on it.</i></p>	<ul style="list-style-type: none"> <li>• Meet the challenge</li> <li>• A birdseye view</li> <li>• Stormwater case studies</li> </ul>