

Level

F	1	2	3	4	5	6	B6
---	---	---	---	---	---	---	----

# Water, waste and our health

## Strand

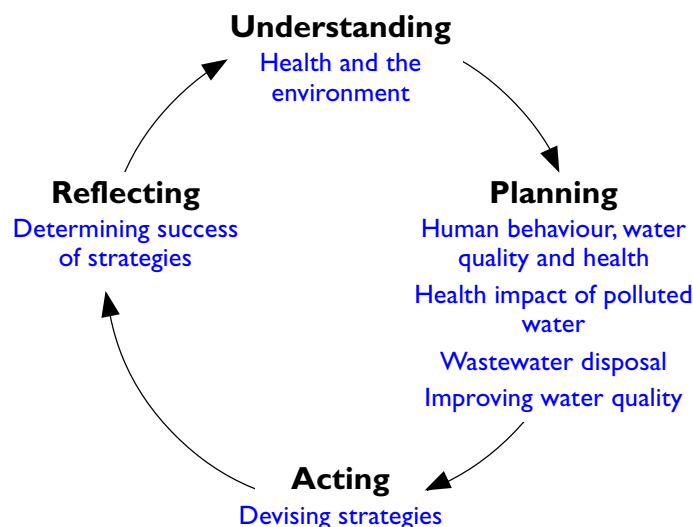
Promoting the Health of Individuals and Communities

## Purpose

Students investigate how poor waste disposal impacts on the quality of water and how this affects health. They propose environmentally friendly strategies for reducing waste or minimising the impact of waste disposal through local waterways to promote the health of themselves and others.

## Overview of activities

Activities in this module are based on a learner-centred approach with an emphasis on decision making and problem solving. As the following diagram shows, activities are sequenced in **understanding**, **planning**, **acting** and **reflecting** phases.



## Core learning outcomes

This module focuses on the following core learning outcomes from the Years 1 to 10 Health and Physical Education Syllabus:

### Promoting the Health of Individuals and Communities

- 4.1 Students recommend actions they can take to promote their health in response to social, biological or environmental factors.
- 4.5 Students identify aspects of their social and physical environments that enhance, or pose threats to, their health, and plan strategies for achieving healthy environments for themselves and others.

## Core content

This module incorporates the following core content from the syllabus:

### Promoting the Health of Individuals and Communities

- health effects of human behaviours on social and physical environments including home, work and recreation and on pollution;
- factors influencing health in relation to individual and group actions and behaviours;
- strategies to promote personal and community health;
- creation and maintenance of environments that promote and protect health, in particular, the role of individuals and communities.

## Assessment strategy

The following is an example of an assessment task that provides an opportunity for students to demonstrate the core learning outcomes identified in this module. Other activities in this module provide opportunities for teachers to gather evidence about students' demonstrations of outcomes for assessment purposes.

### Promoting the Health of Individuals and Communities 4.1, 4.5

- **Students investigate the health impacts of materials entering the waterways from home wastewater. They suggest actions they or others can take to improve the water quality in their catchment and to promote their own health.**
  - Can the student identify poor water quality as posing a threat to his or her health?
  - Can the student identify strategies to reduce the impact of human behaviour on the environment?
  - Can the student identify how his or her actions will improve health?
  - Can the student identify the relationship between his or her physical environment and his or her health and the health of others?

## Background information

### Water quality

Water quality plays an important role in our health and the health of our environment. Without clean water our health will decline. Many Third World countries provide evidence of this. Polluted water, which contains viruses, bacteria and/or parasites, has the potential to cause stomach viruses and other illnesses. Some common health problems resulting from poor water quality are hepatitis and gastroenteritis. Poor water quality also causes health problems for animals, crops and other plants. In the longer term this has a further impact on people who eat the foods produced from these animals or plants.

Other problems include:

- a reduction in dissolved oxygen in water that can lead to algal blooms that cause problems for the use of water for drinking and in many farming and industrial processes;
- phosphorus and nitrogen may also cause algal blooms and are found in many detergents and laundry powders;
- oil, grease, heavy metals and many chemicals can poison fish and other organisms in our local waterways.

### Human waste

A potentially major contributor to poor water quality is human waste. In the majority of Australian towns and cities this waste from toilets, bathrooms and laundries is carried away from homes, schools, offices and factories by the sewerage system. This is a system of underground pipes leading to a sewage treatment plant. At the plant the sewage or wastewater is treated and released back into the environment. If this system is not working efficiently, there is potential for great harm to the environment and to our health.

In many country areas people use septic tanks. If these tanks overflow or are not maintained, they leak into the local waterways. This untreated sewage can lead to many hygiene and environmental problems.

Whether the type of waste system in your area is sewerage, septic or some other type, it is essential that only appropriate items are placed into it. Some items, because they are poisonous or toxic, cannot be treated in the sewage disposal process and will be released untreated into the environment. Items such as paint, paint thinners, herbicides and pesticides and other poisons should never be disposed of in the sewerage system.

### Actions that affect water purity

We affect our waterways not only by putting items in the sewerage system. Most of our actions have an impact on water quality throughout the catchment. For example:

- Litter left on the footpath may find its way into the stormwater system, which is not treated before it enters the waterways;

- Garden pesticides, herbicides and fertilisers and animal droppings may be washed by rain into the stormwater system and into our waterways;
- Pollution from our motor vehicles is released into the air and, after rain, is washed into our soils and waterways, contributing to water and soil pollution;
- Oil and rubber from tyres also pollute water since the contaminants are washed from the roads through the stormwater system and into our waterways.

All these actions have an impact on our health, whether we use the water for recreation, drinking, gardening, farming or fishing.

### Terminology

Activities in this module involve use of the following language in the context of Health and Physical Education:

catchment	pollution	stormwater system
diseases	septic tank	waste
environment	sewage	wastewater
health impact	sewage treatment plant	
monitoring	sewerage system	

### School authority policies

Teachers need to be aware of and observe school authority policies that may be relevant to this module.

### Social justice principles

This module provides opportunities for students to increase their understanding and appreciation of supportive environments and equity. It includes activities that encourage students to:

- create and maintain physical environments that are supportive of health, including the development of individual and group skills for taking action and planning strategies to minimise pollution and improve health;
- understand, plan and demonstrate actions that support the rights of all to have equitable access to clean water;
- accept responsibility as individuals and within groups to ensure the health of themselves and others.

Students with disabilities or learning difficulties may require some activities to be modified to optimise both their participation and their ability to demonstrate the outcomes. Teachers should consult with parents/carers and specialist support staff to determine whether modification is necessary.

## Support materials and references

---

Alice Ferguson Foundation, Inc.

Available URL: <http://www.fergusonfoundation.org> (accessed May 2000).

Alice Ferguson Foundation Inc., *Who Polluted the Potomac?* Available

URL: [http://www.mpt.org/learningworks/teachers/ntti/5-8/oceanpt2\\_wks3.html](http://www.mpt.org/learningworks/teachers/ntti/5-8/oceanpt2_wks3.html) (accessed May 2000).

Department of Environment 1998, *Questions and Answers about Wastewater*, Brisbane.

Department of Natural Resources 1998, *Natural Resource Management Education Catalogue*, Brisbane.

Department of Natural Resources 1998, *WaterWise Resources*, Brisbane.

Environmental Protection Agency.

Available URL: <http://www.env.qld.gov.au> (accessed May 2000).

Pine Rivers Catchment Association, *Lesson One: The Catchment Story*.

Available URL: <http://environment.prsc.qld.gov.au/PRCA/wwproject01.asp#attachment%20STORIES> (accessed May 2000).

# Activities

## Understanding

**HEALTH AND THE ENVIRONMENT**      **Understanding the effect of human behaviours on the environment and the effect of the environment on health**

► Students discuss the ways in which a polluted or damaged environment could affect their:

- emotional health
- social health
- physical health
- spiritual health
- mental health

► Students identify and record their everyday activities that have either a negative or positive impact on their local environment and on people’s health and any actions taken to minimise that impact. They list their everyday activities under the following headings in a five-column table:

Activity	Negative environmental impact	Negative health impact	Measures taken to reduce impact	Positive environmental impact

**Focus questions could include:**

- What impact do you have on the local and global environment?
- What measures do you take to manage all waste products in an environmentally friendly way?
- What potential impact do your behaviours have on your health?
- How does human behaviour in your local area affect water quality?

**Teaching consideration**

Students need to consider their everyday activities — for example, going to the toilet, washing their hands, having a shower, littering, purchasing overpackaged products, taking a plastic bag from the shop when it isn’t needed, washing clothes, disposing of paints and chemicals.

► Students define a ‘water catchment’. They determine the need for high quality water in catchments and the relationship between water quality and the health of themselves and their community.

**Focus questions could include:**

- How do you use the water in the catchment?
- How may this water affect your health?
- What might be the impact of poor quality water in the catchment?

WATER, WASTE AND OUR HEALTH • UPPER PRIMARY

**Teaching considerations**

Define the term ‘catchment’ for students. (A catchment is the area of land around and including the creeks and rivers. It is the area from which a lake, river, reservoir or other body of water gets its water.)

Uses of water in the catchment may include irrigation for farms, household use, swimming, fishing, boating or scenic views.

The impact of a poor-quality water supply on community health will depend on how the water is used. A common negative effect, however, is an outbreak of gastrointestinal infections in the community.

**Planning**

**HUMAN BEHAVIOUR,  
WATER QUALITY  
AND HEALTH**

**Determining the relationship between human behaviour, water quality and health**

► Students research the health impacts of poor water quality in their catchment. They test the water in different parts of their local area to determine the quality of the water and what may have caused it to be polluted.

**Focus questions could include:**

- What is the water quality in your catchment like?
- Are there any water pollution problems? If so, what are they? What may have caused these problems?
- Are any of these problems related to sewage? What else may affect water quality?
- What impact would water pollution from sewage have on water quality?
- What would be the impact of poor water quality on the health of animals? On human health? On the environment?

**Teaching considerations**

Students could contact the local council for information about water quality in the catchment.

Water quality may also be affected by fertilisers, animal life, litter, industrial waste and chemicals.

If industry has caused part of the problem, advise students that industry owners can be made responsible for their actions.

► Students discuss their ideas about pollution and catchments. In groups, they conduct a survey of local people to identify activities and the associated pollutants that could contribute to water pollution in the catchment area.

**Teaching considerations**

The survey should include an investigation of water run-off into the catchment, including from roads, homes, farms, factories and other industries.

Suggest students use street directories, local area maps and business directories to identify the types of activities that occur in their catchment area.

The survey could include a questionnaire asking local community members questions relating to waste disposal and pollution of the catchment area —

for example, how they dispose of particular waste items such as chemicals, paint, cooking oil and where they wash their cars.

A walk or canoe expedition along a local creek or waterway could provide first-hand evidence of pollution.

► Students conduct an experiment to see how pollutants affect the quality of water. To a container of clear water, preferably rainwater, they add small amounts of the pollutants (or imitations of these) that they identified as affecting the water quality in their local catchment area.

#### **Focus questions at the completion of the experiment could include:**

- Can you imagine being a fish and living in this water?
- If fish were able to survive in this water, how might eating them affect your health?
- Could you drink this water without it being treated? What effect might drinking it have on your health?
- What are the ways this water pollution could be stopped?
- What roles do individuals, groups, business, industry and government — local, State or Federal — play in preventing water pollution?

#### **Teaching considerations**

Materials required for the experiment include a large see-through container of clear water and small containers of the 'pollutants' to be added.

'Pollutants' should be added one at a time and could include cooking oil to simulate motor oil and grease, brown vinegar to simulate acid, litter including food scraps, paper, bottle tops or ring-pulls from soft-drink cans and fishing line, washing detergent, thick muddy water, baking soda to simulate fertiliser, yellow water and small pieces of toilet paper.

*Who Polluted the Potomac?* by the Alice Ferguson Foundation Inc. is a story that could be used as a model for the activity. (See Support materials and references.)

► Students discuss their ideas about water pollution and catchments.

#### **Focus questions could include:**

- What is water pollution? How can we help prevent it?
- What is a catchment?
- Who is responsible for polluting the river?

#### **Teaching considerations**

Highlight to students:

- Water pollution is water contaminated by foreign additives.
- We can help prevent water pollution by not putting things down the stormwater drain — for example, placing rubbish in the bin, recycling oil rather than putting it down the drain, using mulch and compost waste in the garden instead of fertiliser.
- A catchment is the area of land around and including creeks and rivers. This means that anything you put down the stormwater drain or leave in the street eventually will flow into them.
- We are all responsible for polluting waterways — farmers, industry, government, animals and, of course, families.



**HEALTH IMPACT OF POLLUTED WATER**

**Investigating the health impact of poor wastewater disposal**

► Students investigate and list the health impacts of raw sewage pumped into a waterway.

**Focus questions could include:**

- What are the health effects of each of the major items entering the sewerage system from our homes?
- What is the impact on plant and animal life?
- Does the impact on plant and animal life also have an impact on humans using the waterway — for example, fishing, boating, farming activities, swimming?

**Teaching consideration**

Define the differences between 'sewage', a 'sewage treatment plant' and a 'sewerage system' for students:

- Sewage is the wastewater from homes, businesses, industry, schools and public places — for example, toilet waste, detergent, water used while washing hands or brushing teeth, cooking water;
- A sewage treatment plant is the facility where the wastewater/sewage is treated before it is released;
- A sewerage system is the system of pipes under homes and streets which carries the sewage to the sewage treatment plant.

► Students investigate the health impacts of materials entering the waterways from the wastewater of their homes.

**Focus questions could include:**

- What impact on your health do the major chemicals entering the waterways from your homes have — for example, paint, cleaners, thinners, washing powders?
- What impacts do these chemicals have on plant and animal life?

**Teaching considerations**

Students could create a three-column table. In the first column they list the items disposed of in the sewerage system. The second column should be titled 'Health effects' and the third, 'Appropriate disposal'. (This column can be used in a later activity.)

Suggest students use the library and Internet to search for what effects these items may have on health. They could also read the labels of products to learn about health impacts.

**WASTEWATER DISPOSAL**

**Investigating wastewater disposal in the local area and its effect on the environment**

► Students create pictures of their homes, marking the ways in which wastewater leaves their properties.

---

### Teaching consideration

Wastewater outlets could include the bathroom sink, kitchen sink, toilet, laundry and stormwater drains. Ensure areas outside the home, such as the garage and any sheds, are included.

---

- ▶ Students consider what happens to wastewater once it leaves their home.

#### Focus questions could include:

- Will this wastewater travel directly to the waterway without being treated?
  - If this wastewater is to be treated, where will it be treated and by whom?
  - Will wastewater be released to the waterway or land once it is treated?
  - Will wastewater be safe to use once it is treated?
- 

### Teaching consideration

Discuss with students how stormwater drains are generally not filtered before entering the waterway, necessitating some care about what goes into them.

---

- ▶ Students list the types of waste disposed of in their home through the sewerage system.

#### Focus questions could include:

- What are the major items disposed of as waste entering the sewerage system?
  - What are the activities carried out by people in this room that lead to waste?
  - Will this waste be disposed of as wastewater? If so, how will it leave the house — for example, toilet, sink, stormwater?
- 

### Teaching considerations

Students could add these items to the picture of their home.

Prompt students to include items not regularly placed down the drain or through the sewerage system such as paints, pesticides, chemicals, medication, feminine hygiene products, disposable nappies, and poisons.

---

- ▶ Students investigate the disposal of sewage in their local area.

#### Focus questions could include:

- Are homes and schools connected to the sewerage system or do they have a septic system or other form of sewage disposal?
- Is there a sewage treatment plant in the local area?
- Is treated sewage released to the waterways?
- To what level is sewage treated at the sewage treatment plant?
- How are residents educated about what they can and cannot place in the sewerage system?
- What else could be done to educate residents?

### Teaching considerations

Information can be obtained from the local council about the local wastewater or sewage treatment and disposal system — for example, where it goes, how it is treated and whether it is released to water or land. Use a map or point out landmarks near the facility to give students a greater understanding of where the facility and outlets are situated.

► Students investigate sewage disposal in other countries and determine the health effects of these systems.

#### Focus questions could include:

- How is sewage disposed of in other countries?
- What are the potential health effects of such systems?
- Do other countries have alternative systems available to them? Why?

### Teaching considerations

Encourage students to search the Internet and other resources for information about other countries and their wastewater or sewage disposal systems. Remind students to be critical of the information they find, giving due consideration to its source and the purpose for which it was written.

Students could create a table in which to list health advantages and disadvantages of different systems.

## IMPROVING WATER QUALITY

### Devising ways students and others can improve water quality and promote health

► Students identify possible solutions for reducing negative health impacts of the sewage leaving our homes or our schools.

#### Focus questions could include:

- What are some alternative ways to dispose of the chemicals contained in the products used in the home or school?
- What are some alternative products that could be used in the home or school to reduce negative effects on the environment and on health?
- What mechanical means are available to reduce the amount of waste entering our waterways?

### Teaching considerations

Utilise the third column ('Appropriate disposal') from the earlier activity related to the investigation of the health impact of materials entering the waterways to list ways other than the sewerage system to dispose of chemicals.

Other ways to lessen the load of chemicals in our waterways include:

- using only the required amount of detergent for washing;
- only washing clothes or dishes when there is a full load;
- reducing the use of chemicals to clean the toilet (using less toxic cleaners);
- pouring cooking oil into a container and placing it into the bin rather than pouring it down the sink;
- reducing the need for a garbage disposal system by making a compost heap;
- not using the toilet as a garbage bin — for example, not putting tissues, chemicals and other non-toilet waste down the toilet.

Examples of alternative products are detergents lower in phosphate, which helps to reduce the incidence of algal blooms in waterways that can lead to fish deaths and pollution, and alternative 'environmentally friendly' cleaners.

Refer students to the Environmental Protection Agency's 'Green Cleaners' brochure or some of the many other relevant publications.

► Students consider if the current level of sewage treatment is adequate and decide whether further treatment is needed. They list some of the associated health benefits of further sewage treatment.

**Focus questions could include:**

- What further levels of treatment could be undertaken?
- What are possible related health benefits of further treatment?
- What further treatment may be needed if the population increases?

**Teaching considerations**

A class list of 'further treatments' could be generated.

Discuss the options and come to an agreed class position about whether there needs to be further treatment.

► Students suggest personal and group actions to improve the water quality in their catchment area and to promote their health.

**Focus questions could include:**

- Which chemicals should not be disposed of in the sewerage system?
- How can the community be educated about the negative health effects of these chemicals in the sewerage system?
- What pressure can be applied on those individuals, groups and industries that persist in polluting our waterways?
- Which items in sewage affect health the most?
- Of these items, which ones can be removed or reduced and how?
- What should the actions be in the short, medium and long term?
- What is achievable for the group in the timeframe provided?
- Is there any evaluation or review that could be done? If so what, how and by whom?

**Teaching considerations**

Students could develop a short report, poster, brochure or video outlining the findings, the action plan and recommendations.

Note the timeframe available to students to achieve their recommended actions.

Recommendations and actions can be developed individually or in small groups and then combined to create the most appropriate plan from all ideas submitted.

► Students suggest actions other individuals and groups could take to improve the water quality in their catchment and predict the benefits to community health.

**Focus questions could include:**

- Other than the actions raised in the previous activity, how can others help to improve the water quality in the catchment?
- What can community groups, like this class or school community, do to improve water quality?
- What actions can be taken by industries in the catchment area to improve water quality?
- How can governments — local, State and Federal — act to improve the water quality in catchment areas for which they are responsible?
- How may these actions influence health in the short term? In the long term?

---

**Teaching consideration**

This information could be included in a more comprehensive action report at a later stage.

---

**Acting**

**DEVISING STRATEGIES**

**Presenting the findings, plan and recommendations to reduce the negative human impact on waterways and to promote community health**

- ▶ Students organise a meeting with the school principal, parents and community organisations (for example, local councillors, business and industry representatives, farmers) to present their findings and possible actions that could be taken by themselves, their families or the school community to reduce any negative health effects from pollution of their local catchment area.
- ▶ Students present the plan they believe they can best implement within their school environment to reduce the negative human impact on local waterways. The plan should indicate how the health of the community will be promoted.

---

**Teaching considerations**

The plan presented is the one that the class has chosen from the final activity in the Planning phase.

Students should note responses from the school principal and parent and community organisations to use in a later activity.

---

- ▶ Students write a short media release or editorial for the local newspaper or school newsletter about their findings.

---

**Teaching consideration**

Some of these releases or editorials could be sent to the local media or displayed in the school or council library, school administration building, local council office, local shopping centre or community hall.

---

- ▶ Students take action to implement their plan, revising it according to feedback from the groups to whom it was presented.

---

**Teaching consideration**

Students will need to be given time to carry out their plan and observe any effects on the environment and on health. A follow-up of the effectiveness of the plan could be carried out by another class in the future.

---

**Reflecting**

**DETERMINING SUCCESS OF STRATEGIES**

**Reflecting on the degree of success in reducing the negative human impact on waterways**

- ▶ Students reflect on their role as agents of change in influencing the adoption of actions to reduce the possible negative health effects of human impact on waterways.

**Focus questions could include:**

- What changes were made as a result of the actions taken?
- How successful were these actions?
- Were they easy to implement or did something not succeed?
- What impact will these actions have on health in the short, medium and long term?
- How will group members continue to reduce the possible negative health effects of poor waste disposal?
- Can this process of change continue without the support provided by the group? If not, how can others be encouraged to participate?
- Did you enjoy working with others in bringing about a change to reduce the possible negative health effects from poor waste disposal on the local community? What helped you? What hindered you?

---

**Teaching considerations**

Students could prepare a collage of thoughts, write a newspaper article, draw pictures, produce a videotape or work in small groups to present a report indicating their response to these questions.

If there is a 'next' class or group, they should be encouraged to evaluate the actions of the first group and build on their findings. Over time, information trends about the pollutants found will be forthcoming and students will gain a greater understanding of the possible negative health effects of waste disposal and the quality of the waterways or land where it is treated and disposed of.

---

- ▶ Students consider what future actions need to be taken to continue to reduce the possible negative health effects of poor waste disposal in our waterways.

---

### Teaching considerations

At a later date, students could conduct a survey to see if their plan has been effective. Allow some time between the implementation of their plan and the review to allow for behavioural changes to be implemented and monitored.

Students could meet with members of their community to determine what future actions need to be taken to further reduce the possible negative health effects of waste disposal. This would allow students to appreciate how community action operates and the role of different members of the community in contributing to a healthy environment.

---

- ▶ Students brainstorm the advantages and disadvantages of using an inquiry approach to take action on a health-related issue.

### Focus questions could include:

- Did the inquiry process assist you to identify information you needed? If so, how? If not, why not?
- What are the advantages and disadvantages of conducting inquiries to discuss health issues?
- What are other ways of resolving health issues?

**This sourcebook module should be read in conjunction with the following Queensland School Curriculum Council materials:**

*Years 1 to 10 Health and Physical Education Syllabus*

*Years 1 to 10 Health and Physical Education Sourcebook: Guidelines*

*Health and Physical Education Initial In-service Materials*

ISBN 0 7345 2049 2

© The State of Queensland (The Office of the Queensland School Curriculum Council) 2000

Queensland schools are permitted to make multiple copies of this module without infringing copyright provided the number of copies does not exceed the amount reasonably required for teaching purposes in any one school. Copying for any other purposes except for purposes permitted by the Australian *Copyright Act 1968* is prohibited.

Every reasonable effort has been made to obtain permission to use copyright material in all sourcebook modules. We would be pleased to hear from any copyright holder who has been omitted.

The State of Queensland and the Queensland School Curriculum Council make no statements, representations, or warranties about the accuracy, quality, adequacy or completeness of, and users should not rely on, any information contained in this module.

The State of Queensland and the Queensland School Curriculum Council disclaim all responsibility and liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs whatsoever (including consequential loss) users might incur to person or property as a result of use of the information or the information being inaccurate, inadequate, or incomplete.

Any inquiries should be addressed to:  
Queensland School Curriculum Council  
PO Box 317  
Brisbane Albert Street, Q 4002  
Australia

Telephone: (07) 3237 0794  
Facsimile: (07) 3237 1285  
Website: <http://www.qscc.qld.edu.au>  
Email: [inquiries@qscc.qld.edu.au](mailto:inquiries@qscc.qld.edu.au)

PIP 994027

---