Lower Secondary: Level 1 2 3 4 5 6

A question of balance: Australian environments

Strand

Time, Continuity and Change Place and Space Culture and Identity

Core learning outcomes

Time, Continuity and Change	TCC 5.5	Students identify values inherent in historical sources to reveal who benefits or is disadvantaged by particular heritages.
Place and Space	PS 5.1	Students synthesise information from the perspectives of different groups to identify patterns that constitute a region.
	PS 5.2	Students design strategies for evaluating environmental impacts of a proposed project, highlighting relationships within and between natural systems.
	PS 5.3	Students participate in geographical inquiries to evaluate impacts on ecosystems in different global locations.
	PS 5.4	Students use maps, diagrams and statistics to justify placing value on environments in Australia and the Asia–Pacific region.
Culture and Identity	CI 5.4	Students describe how governments have caused changes to particular groups.

Purpose and overview

Activities begin with the development of an organic food-growing project which provides a focus on farming methods and the environment. The activities develop an appreciation of natural systems and an understanding of the importance of caring for fragile environments. Students are involved in planting, cultivating, caring for and harvesting herbs and vegetables. They also design strategies to evaluate the environmental impacts of their gardening project. This project provides a common and practical context in which students can develop understandings about environments and explore the impacts farming has on ecosystems.



Phases	Activities	Core learning outcomes	Assessment opportunities
Focusing on the environment	Students begin a gardening project which provides a practical focus for designing strategies that can be used to evaluate the environmental impacts of such a project. 1. Project preparation	PS 5.2	Project journals Discussion
2. Investigating	In this phase students conduct a geographic inquiry to evaluate the possible impacts that different farming methods could have on ecosystems in various global locations. 2. Impacts of farming methods in different global locations	PS 5.1 PS 5.3 PS 5.4	Group reports Observations
3. Evaluating data	Students investigate how governments have influenced land use in Australia and how different groups have been advantaged and disadvantaged by this government involvement. 3. Governments and land use	CI 5.4 TCC 5.5	Project journals
4. Communicating findings	Students complete their inquiry, evaluate and communicate their findings and suggest actions. 4. How farming methods impact on ecosystems	Negotiable	Project journals Debate

Assessment

The assessment opportunities outlined are examples of how to assess students' demonstrations of the identified learning outcomes. As often as possible, negotiate assessment with students and support a variety of ways of demonstrating the learning outcomes. Reflect with students on evidence gathered when making judgments about their demonstrations of learning outcomes. Some students may require more time and/or other contexts in which to demonstrate these learning outcomes. Other modules may provide such time and/or contexts and the 'Levels 1 to 6 module learning outcomes maps' in the *Years 1 to 10 Studies of Society and Environment Sourcebook Guidelines* can be used to identify these modules.

Assessing learning outcomes at different levels Activities are designed primarily for students working towards demonstrations of Level 5 learning outcomes. Some assessment opportunities may be used to decide whether students are demonstrating the learning outcomes at levels before or after Level 5. To guide judgments about students' demonstrations of learning outcomes consider whether students are:

- working towards demonstration of the Level 5 learning outcomes
- demonstrating the Level 5 learning outcomes
- demonstrating the Level 5 learning outcomes and working towards Level 6 learning outcomes.

Learning outcomes in the syllabus at Level 4 and Level 6 could provide a guide for teacher judgments. Studies of Society and Environment learning outcomes are organised so that there is a progression of concepts and processes within a strand. For example, the progression from PS 4.2 and PS 5.2 to PS 6.2 involves increasing sophistication and complexity particularly related to the concept of *processes and environment* and the process of *creating*, though neither of these is exclusive of other concepts and processes. The elaborations provide specific content examples of how the concepts and processes may be levelled from Level 1 to 6. See the Queensland School Curriculum Council website at www.gscc.qld.edu.au for more information.

Using this module

Resource 1

Before beginning this module, consider what plants to grow, the features of an organic approach, possible expertise available within the school and community, and materials needed. The timing and duration of this module should take into consideration natural factors (such as climate and season) and the growth properties of the vegetables and herbs selected. Plants from punnets need less time than plants grown from seeds. As Queensland is a climatically diverse state, local factors such as temperature, wind and insolation levels may influence planting times, locations of plots and tubs, and maintenance practices. Students will benefit from finding out basic information about their climate zone. As soil varies locally, a talk by a member of staff from a local nursery may be useful. The minimum time required to plan, prepare beds and raise 'crops' is ten to twelve weeks. See Resource 1 for ideas about what to grow.

An 'organic approach' means farming as much as possible without the use of chemicals. Using an organic approach will help students to understand the connections between nutrients, nutrient cycles and food grown. Student safety is enhanced if chemical sprays are avoided. If a pest problem occurs, encourage students to make organic sprays from natural ingredients, such as chilli, capsicum and garlic. Some pests can be removed manually without recourse to sprays.

School ground staff may be able to help locate the materials that are needed. For example:

- secure space for planting or storing tubs
- watering systems (hand-held or manual/automated sprinkler)
- tubs for growing plants
- compost

- tools (trowel, spades, mattocks, rakes and garden forks)
- mini garden stakes (or small sticks if plants are being grown in tubs) and ties
- supplementary potting mix
- supplementary organic fertiliser
- seeds and punnet plants
- mulch.

Background information

Terminology

In this module students have opportunities to become familiar with and use the

following terminology:

agriculture ecologically sustainable mini-farm biodegradable energy value mulch

biodiversity farming natural pesticide biological chemical fertiliser nutrient

chemical pesticide genetically engineered organic farming chemical residue green waste permaculture companion planting herbs pest

companion plantingherbspestcompostIndigenous foodsrecyclableconservationintensive farmingself-sufficiency

container farming irrigation soil

conventional farming leaching sustainable production

dehydrated food local foods

School authority policies

Be aware of and observe school authority policies that may be relevant to this module, particularly those that relate to workplace health and safety and the handling, storage and use of chemicals and garden tools.

Equity considerations

Activities take place in a supportive environment. They provide opportunities for students to increase their understanding and appreciation of equity through valuing diversity and challenging inequities. Activities encourage students to:

- recognise how different groups have been advantaged or disadvantaged by past uses of the natural environment
- acknowledge how future generations can be affected by the type of foods we grow and how we grow them. In this way, concepts of intergenerational equity are developed.

Some students with disabilities may need assistance with some activities. Advice should be sought from their support teachers.

It is important that these equity considerations inform decision making about teaching strategies, classroom organisation and assessment.

Links

Studies of Society and Environment This module is one of a suite of modules for Levels 1 to 6. See the Queensland School Curriculum Council website at www.gscc.gld.edu.au for more information.

This module develops concepts associated with human–environment relationships, processes and environments, stewardship, spatial patterns, cultural change and heritage. It also develops processes associated with investigating, creating, participating, communicating and reflecting. It is linked to the following learning outcomes:

TCC 4.5, PS 4.1, PS 4.2, PS 4.3, PS 4.4, CI 4.4 TCC 6.5, PS 6.1, PS 6.2, PS 6.3, PS 6.4, CI 6.4.

Other key learning areas Activities may offer opportunities for planning across key learning areas. However, it is important that the integrity of the key concepts, organising ideas and processes within key learning areas is maintained.

Evaluation of a unit of work

After completion of units of work developed from this module, collect information and make judgments about:

- teaching strategies and activities used to progress student learning towards demonstrations of core learning outcomes
- opportunities provided to gather evidence about students' demonstrations of core learning outcomes
- future learning opportunities for students who have not yet demonstrated the core learning outcomes and to challenge and extend those students who have already demonstrated the core learning outcomes
- the extent to which activities matched needs of particular groups of students and reflected equity considerations
- the appropriateness of time allocations for particular activities
- the appropriateness of resources used.

Information from this evaluation process can be used to plan subsequent units of work so that they build on, and support, student learning. The evaluated units of work may also be adapted prior to their reuse. For further information, refer to the 'Curriculum evaluation' section in the sourcebook guidelines.

Activities

Phase 1 Focusing on the environment

Core learning outcomes emphasis: PS 5.2

Students begin a gardening project which provides a practical focus for designing strategies that can be used to evaluate the environmental impacts of such a project.

Focus questions:

- What is this project about?
- What materials are needed?
- Why is compost needed and how is it best created?
- How should soil for growing vegetables and herbs be prepared?
- What is organic gardening?
- What should we plant?
- How might we evaluate the environmental impact of this gardening project?

Activity 1 Project preparation

Gardening project Explain the gardening project (Resource 1). Emphasise that students will grow plants and investigate the possible impacts that this will have on the environment. Provide a copy of core learning outcome PS 5.2 and explain that the 'project' is vegetable and herb growing. Explain that students will work in teams of two or three and record their observations and investigations in a project journal. The journal will provide evidence of demonstrations of the learning outcomes particular to this module. If possible, take photographs of the processes throughout the project.

Making compost Introduce the organic farming concept of compost making. Ask students to investigate how to make compost. Compare and discuss findings. Discuss suitable composting materials, ideal locations for a compost heap, maintenance, time needed, the importance of soil for the growth of plants, the role of compost in building soil fertility and the role of mulch in improving conditions for plant growth.

As students begin to make compost, discuss:

- How much is to be made? (several plastic shopping bags full)
- How can pests be kept away? (turn the heap over at least once a week)
- How can the smell be controlled? (turn the heap over at least once a week)
- How much water does a compost heap need? (enough to keep it slightly damp)

Use a binocular microscope (sometimes called a stereoscope) to examine a maturing compost sample. Compost is a living, dynamic ecosystem, a system of life forms that consume decaying materials and each other. It is a food web based on the nutrients and energy that remain in decomposing kitchen scraps and garden wastes. Students should be able to see tiny creatures consuming, growing, reproducing and dying in the compost.

Soil preparation Soil preparation can occur while the compost is being prepared. Soil will need to be turned, especially if it was previously under growing grass. Do not use poisons or artificial chemical fertilisers. Once the soil has been prepared, cover it with mulch to avoid erosion by rain. Explain that soil needs to be nurtured and allowed to breathe, so that the worms can live.

Planting Once the soil has been prepared, plant the selected crops.

Evaluating environmental impact Discuss strategies that students may use to evaluate the environmental impacts of their project. Students may choose to investigate dependence and interdependence, the addition of an element to a system or the removal of elements, or the introduction of chemicals. Explain that research will be conducted throughout the project, and findings and discussions will be recorded in project journals.

In their journals, ask students to:

- suggest what impacts this project may have on local natural environments
- identify aspects that they may need to learn more about for example, bacteria, air, soil (pH level, moisture content, worm activity)
- identify features of the local environment that may impact on the garden for example, soil types, insects, climate and weather, water, recycling strategies, shade and wind, and the amount of air pollution
- speculate about how one natural system may influence another and suggest possible
 ways that these speculations could be tested for example, collaborate with
 science teachers to conduct controlled experiments to assess how increases in the
 moisture content of soils affect worm activity, how the level of worm activity and/or
 soil bacteria affects plant growth and how companion planting can control insect
 infestations.

Students continue to tend their gardens, record their observations, investigate the environmental impacts of the project and eventually harvest their crops.

Phase 2 Investigating

Core learning outcomes emphasis: PS 5.1, PS 5.3, PS 5.4

In this phase students conduct a geographic inquiry to evaluate the possible impacts that different farming methods have on ecosystems in various global locations.

Focus questions:

- What farming methods are used?
- How do the farming methods we use in our project compare with those used on local commercial farms and on farms elsewhere in the world?
- How do different farming methods impact on ecosystems?
- What are agricultural regions and how did they come about?

Activity 2 Impacts of farming methods in different global locations

Explain the processes involved in geographical inquiries (refer to 'Geography in Years 1 to 10 Studies of Society and Environment Key Learning Area' available on the Queensland School Curriculum Council website).

Discuss the issue to be investigated — that is, how farming methods impact on ecosystems. Remind students that they have begun investigating how their own farming methods impact on the environment and that their observations and findings should be considered during their inquiry.

Review the meaning of ecosystem, referring to the interdependence between systems.

Discuss key questions to assist students to frame their inquiries:

- What are the issues and regions being studied?
- How and why are these regions defined?
- Why have these issues arisen?
- What are their impacts or consequences?
- What is being done and what could be done to improve the environment?

Remind students to record their findings in their journals.

Assist students to locate resources and work through the processes of inquiry to answer the key questions.

Provide maps of land use in Australia (see Chapter 10 of McCauley, Brown & Mills 2000). Assist students to interpret the maps and decide on the major agricultural land use in their local area. Discuss why these agricultural land uses may occur.

Use climatic maps to discuss the temperature and rainfall requirements of crops grown in nearby areas. Consider irrigation and where the water may be obtained. Use topographical maps of the local area to identify creeks, rivers, dams or other water sources.

Assist small groups of students to compare the perspectives provided by the different maps and to identify patterns that relate to a region. Provide resources and assist students to explore the impacts agricultural practices have on ecosystems in different parts of Australia and around the world. For example, select extracts from:

- texts describing the ecological impacts of agriculture in areas of Australia, such as the Darling Downs (see Chapter 10, McCauley, Brown & Mills 2000)
- texts describing dams built for irrigation purposes, such as on the Yangtze in China (see Chapter 4, Alexander & Rouen 2000).

Have each group explore a different area. Assist them to use the key questions to identify the location of agricultural practices and to explore why they are used in those locations and their impacts or consequences. Share and discuss findings.

Discuss how the gardening project may provide opportunities to investigate solutions to environmental problems created by food production elsewhere. Discuss ideas for improving the ecological impact of the project and invite students to implement ideas and report on these — for example, the use of rainwater instead of tap water for irrigation.

Assist students to use maps, diagrams and statistics to further investigate farming regions in Australia and begin to justify placing value on environments. Students could investigate:

- the percentage of land in Queensland devoted to primary industries
- the number of people worldwide who use Australian food and fibres
- current employment statistics in the agricultural sector
- changes in the population in regional Queensland compared with changes in Brisbane
- trends in pesticide and fertiliser use on commercial farms
- statistics related to sustainable management of natural resources in modern agriculture.

Assist students to explore the impact different environments have on food production. For example, use diagrams and/or sketch maps that show:

- the impact of weathering on unvegetated soil
- the effect of buildings on climate and vegetation
- the structure of artesian basins
- coastal management practices such as riprap stone protection
- the layers of a tropical rainforest
- the location of major vegetation types in Australia
- the location of vegetation types in relation to tectonic plates
- codes of practice for timber production.

Phase 3 Evaluating data

Core learning outcomes emphasis: CI 5.4, TCC 5.5

Students investigate how governments have influenced land use in Australia and how different groups have been advantaged and disadvantaged by this government involvement.

Focus questions:

- How have government changes affected groups that have used the land for food?
- What traditions or heritages do we have in Australia concerning land use?
- Who has been advantaged and who has been disadvantaged by these heritages?

Activity 3 Governments and land use

Discuss core learning outcomes TCC 5.5 and CI 5.4, focusing particularly on government involvement in land use.

Review students' investigations and discuss the importance of ecological interdependence and biodiversity. Discuss whether governments should legislate for water quality, biodiversity and chemically free environments. Assist students to locate historical sources that can be used to investigate government involvement in land use and who may have been advantaged or disadvantaged by government decisions. Ask students to analyse sources (Whose voices are represented/not represented?), interpret sources (What groups were immediately affected and advantaged or disadvantaged?) and evaluate sources (Why is this source reliable/unreliable?).

Assist students to investigate sources and record their findings in their journals. Discuss findings and consider how governments have caused changes to particular groups — for example, the changes brought about by the 1992 Mer (Murray) Island High Court decision or Mabo case and the *Native Title Act 1993* (Cwlth). (Although it is offensive to Aboriginal people, Torres Strait Islander people and members of some other cultures to use the name of a dead person publicly, the 1992 Mer Island decision is still regularly referred to using the name of the Aboriginal person — Mabo — who launched the action.)

Phase 4 Communicating findings

Core learning outcomes emphasis: Negotiable

Students complete their inquiry, evaluate and communicate their findings and suggest actions.

Focus questions:

- What is being done and what could be done to improve the environment and maintain balance?
- What issues, if any, are there to be debated?

Activity 4 How farming methods impact on ecosystems

Encourage students to review their research and make sure they have answered the key questions posed in Phase 2:

- What are the issues and regions being studied?
- How and why are these regions defined?
- Why have these issues arisen?
- · What are their impacts or consequences?
- What is being done and what could be done to improve the environment?

Ask students to reflect on their journal entries and add further information, maps and diagrams to present a logical inquiry. Assist students to use their findings to prepare for a debate. Topics for a debate may include:

- The sooner all farming is organic the better.
- Genetic modification of foods is the way forward.
- Soil is a nation's most important natural resource.
- Farmers comprise the group that contributes most to Australia.
- The sooner we irrigate and farm the desert the better.
- Hydroponic farming is the cure for many environmental problems.
- The contribution urban dwellers make to food production can never be significant.
- All students should study agriculture.

Discuss with students how their involvement in the gardening project provided opportunities for them to consider how farming methods impact on the environment. Encourage students to share the findings of their inquiry and the evaluation of their methods.

Students' journals and their participation in a debate may provide evidence of demonstrations of the core learning outcomes that are the focus of this module.

Getting started

Resource 1

Begin by talking to any keen gardeners you know. Describe the size and location of your proposed garden and ask them what vegetables or herbs you could grow. Explain that your garden is to be organic and seek advice about preparing the soil.

Search the library for gardening books and videos of gardening shows that might provide some useful advice. Search the Internet. Refer to www.vnc.qld.edu.au/ORGANIC for information related to the topics in this module. Refer to www.vnc.qld.edu.au/etveg00.htm for a flowchart on an organic food-growing and nutrient-recycling project.

Large plants and vegetables are suited to farm plots, while most herbs and vegetables can be grown in tubs. Staff at local nurseries may be able to offer advice, and seed packets usually provide information.

Information about each plant should be presented in a table and added to project journals. This table should include:

common namescientific namegrowing timesize at maturity

where grown (geographical distribution)
 climatic requirements
 food value (nutritional information)
 labelled diagram of plant (with scale)

planting details (e.g. spacing)common pests

growing requirements (e.g. watering details)
 other interesting information

What to grow depends on regional climatic factors. The following table shows some of the vegetables and herbs that may be suitable. Y = suitable, N = not particularly suitable.

	Tub suitability	Farm plot suitability
Vegetable		
Beans	Y (dwarf beans)	Y (all varieties)
Beet/spinach	Y (small varieties)	Y (all varieties)
Capsicum	Υ	Y (all varieties)
Carrot	Y (baby carrots)	Y (all varieties)
Corn	N	Y (small varieties)
Cucumber	N	Y (all varieties)
Lettuce	Y (leafy varieties)	Y (all varieties)
Pea	Y (snow/dwarf peas)	Y (all varieties)
Radish	Y (baby belle)	Y (all varieties)
Rocket salad	Υ	Υ
Shallot/spring onion	Υ	Υ
Tomato	Υ	Y (suggest cherry tomato)
Zucchini	N	Y (all varieties)
Herb		
Basil	Υ	Υ
Chives	Y (all varieties)	Y (all varieties)
Mint	Y (all varieties)	Y (all varieties)
Parsley	Y (all varieties)	Y (all varieties)
Thyme	Υ	Υ

Related projects:

- Operate a worm farm that converts food scraps into fertiliser for vegetables and herbs. See: www.vnc.qld.edu.au/et8gqscc.htm - SOIL
- Use natural materials to produce an organic bug spray. See: www.vnc.qld.edu.au/et8gqscc.htm PEST
- Explore the use of grass-based animal fertilisers. See: www.vnc.gld.edu.au/et8ggscc.htm PERMACULTURE
- Use hydroponic methods to grow food plants in containers. See: www.vnc.qld.edu.au/et8gqscc.htm -CONTAINER
- · Grow flowers.
- Use a purchased kit to grow mushrooms.
- Establish a permanent herb garden.
- Establish a large-scale composting scheme.
- Collect shredded paper for composting.
- Capture rainwater for use in food plant growing.

Other topics, such as agriculture and weather, permaculture, solving problems relating to gardening, urban ecology and plant use by Indigenous people, can be found at the website www.vnc.qld.edu.au/et8gqscc.htm

Support materials and references

Alexander, D. & Rouen, M. 2000, SOSE for Queensland Book 2, Heinemann, Melbourne.

Fahey, S. & Duggan, S. 1993, *Pacific People and Place,* Cambridge University Press, Cambridge.

Gilbert, A. 1991, Yates Green Guide to Gardening: A No Fuss Guide to Organic Gardening, Angus & Robertson, Pymble, NSW.

Hendrek, K. 1978, Composting: Making Soil Improver from Rubbish, CSIRO – Division of Soils, Glen Osmond. SA.

Jones, D. & Elliot, W. 1986, *Pests, Diseases and Ailments of Australian Plants*, Lothian, Melbourne

McCauley, D., Brown, P. & Mills, M. 2000, SOSE 1 for Queensland, Jacaranda, Milton, Qld.

Mollison, B. 1994, Introduction to Permaculture, Tagari Publications, Tyalgum, NSW.

Queensland Department of Education 1993, *P–12 Environmental Education Curriculum Guide*, Brisbane.

Seymour, J. & Girardet, H. 1987, *Blueprint for a Green Planet*, Angus & Robertson and Dorling & Kindersley, North Ryde, NSW.

Yates Garden Guide For Australian Gardeners 1998, Collins, Sydney.

Websites

(All websites listed were accessed in June 2002.)

ANZFA (food safety and labelling). www.anzfa.gov.au

Biotechnology Australia. www.biotechnology.gov.au

CSIRO. www.csiro.au

Queensland Department of Natural Resources and Mines.

www.nrm.qld.gov.au/resourcenet/education/teaching/index.html

Provides teaching resources related to biodiversity and a range of other relevant topics that are linked to the Science and Studies of Society and Environment core learning outcomes, especially at the upper primary school level.

Queensland Department of Primary Industries. www.dpi.qld.gov.au/home/default.html

Queensland Fruit and Vegetable Growers. www.qfvg.org.au Provides useful content for most phases of this module.

Villanova College's environment webpages. www.vnc.qld.edu.au

Go to the environment section and look for information on soil, compost, vegetables and much more.

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

Years 1 to 10 Studies of Society and Environment Syllabus Years 1 to 10 Studies of Society and Environment Sourcebook Guidelines Studies of Society and Environment Initial In-service Materials

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