



AN EDUCATIONAL UNIT FOR SECONDARY SCHOOLS



# Biomes that produce our food, industrial materials and fibre

YEAR 9

Geography

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*Cover photo courtesy of  
Bob Winters*

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The material in this Unit of Work is made available for the purpose of providing access to general information about food and fibre production and primary industries in Australia.



*As content of the websites used in this unit is updated or moved, hyperlinks may not always function.*

# Introduction

## Rationale

This resource material aims to help teachers and students in primary schools investigate and understand more about primary industries in Australia.

The objectives of the educational resources are to:

- Support Primary Industries Education Foundation Australia and its members in expanding awareness about primary industries in Australia by engaging and informing teachers and students about the role and importance of primary industries in the Australian economy, environment and wider community.
- Provide resources which help build leadership skills amongst teachers and students in communicating about food and fibre production and primary industries in Australia.
- Develop educational resources that can be used across Australia to provide encouragement, information and practical teaching advice that will support efforts to teach about food and fibre production and the primary industries sector.
- Educate school students on ways food and animals are raised and grown.
- Demonstrate to students that everyone can consider careers in primary industries and along the supply chain of food and fibre products.
- Assist school students to spread this message to their families and the broader community.
- Develop engaging learning programs using an inquiry process aligned with the Australian Curriculum.
- Develop in school communities, an integrated primary industries education program that emphasises the relationship between food and fibre industries, individuals, communities, the environment and our economy.

These educational resources are an effort to provide practical support to teachers and students learning about food and fibre production and primary industries in schools.

An integrated primary industries education program that emphasises the relationship between food and fibre industries, individuals, communities, the environment and our economy.

# About the approach

The approach used, is the inquiry approach through five phases: Engage, Explore, Explain, Elaborate and Evaluate.

Several key principles underpin the theoretical and practical application to this unit.

In providing an *integrated framework for inquiry*, complemented by rich explorations of texts that are, in turn, supported by an emphasis on undertaking a challenge or task, the unit requires students to:

- Search for information using both digital and non-digital means
- Use research techniques and strategies
- Use thinking and analysis techniques
- Present findings to a real audience, and
- Reflect both on the product created and the process undertaken.

Rather than seeing knowledge as something that *is taught* the emphasis in this unit is on knowledge and understanding that *is learned*.

The unit involves students in:

- Working from a basis of their prior knowledge and experience
- Seeing a real task or purpose for their learning
- Being directly involved in gathering information firsthand
- Constructing their knowledge in different ways
- Presenting their learning to a real audience
- Reflecting on their learning.

The approach used, is the inquiry approach through five phases: **Engage, Explore, Explain, Elaborate** and **Evaluate**. The phases of the model are based on the 5Es instructional model (Bybee, 1997). This unit of work containing student activities assists students to raise questions, gather and process data, make conclusions and take action. These phases are:

- **Engage:** The 'Engage' phase begins with lessons that mentally engage students with an activity or question. It captures their interest, provides an opportunity for them to express what they know about the concept or skill being developed, and helps them to make connections between what they know and the new ideas.
- **Explore:** The 'Explore' phase includes activities in which they can explore the concept or skill. They grapple with the problem or phenomenon and describe it in their own words. This phase allows students to acquire a common set of experiences that they can use to help each other make sense of the new concept or skill.
- **Explain:** The 'Explain' phase enables students to develop explanations for the phenomenon they have experienced. The significant aspect of this phase is that explanation follows experience.
- **Elaborate:** The 'Elaborate' phase provides opportunities for students to apply what they have learned to new situations and so develop a deeper understanding of the concept or greater use of the skill. It is important for students to discuss and compare their ideas with each other during this phase.
- **Evaluate:** The 'Evaluate' phase provides an opportunity for students to review and reflect on their own learning and new understanding and skills. It is also when students provide evidence for changes to their understanding, beliefs and skills.

Source: Primary Connections <http://www.primaryconnections.org.au/about/teaching>

## Resource description

This is a unit with five inquiry teaching sequences about exploring biomes in Australia and overseas that produces some of the foods and plant material people consume.

This unit encourages students to investigate how humans have altered biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.

The unit also explores the environmental, economic and technological factors that influence crop yields in Australia and across the world and the challenges there are to food, industrial materials and fibre production, including land and water degradation, shortage of fresh water, competing land uses, and climate change, for Australia and other areas of the world.

Having explored these contexts in both an Australian and overseas primary industries sector, students then consolidate and present these understandings to an audience following the study.

As the unit progresses, the emphasis shifts to investigating the capacity of the world's environments to sustainably feed, clothe and house the projected future population to achieve food security for Australia and the world.

At each stage in the investigations, the students are encouraged to share their findings arguments and explanations in a range of appropriate communication forms, selected for their effectiveness and to suit audience and purpose; using relevant geographical terminology, and digital technologies.

**Year level: 9**

## Curriculum focus

In this unit, students:

- Explore a range of biomes in Australia and overseas using digital resources and photographs.
- Explore the human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.
- Examine geographical data and information, using ethical protocols, from a range of appropriate primary and secondary sources.
- Explore environmental, economic and technological factors that influence yields in Australia and across the world.
- Examine the challenges to food production, including land and water degradation, shortage of fresh water, competing land uses, and climate change, for Australia and other areas of the world.
- Evaluate sources for their reliability, bias and usefulness.
- Conduct a presentation about the human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.
- Consider the capacity of the world's environments to sustainably feed the projected future population to achieve food security for Australia and the world.
- Reflect and evaluate what they know about ways that the production of food and fibre has altered some biomes and the environmental/social/economic effects.

*Based on Australian Curriculum, Assessment and Reporting Authority (ACARA) materials downloaded from the Australian Curriculum website in February 2015. ACARA does not endorse any changes that have been made to the Australian Curriculum.*

Investigate how humans have altered biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.

## Australian Curriculum content descriptions

### Geography

**Strand:** Geographical Knowledge and Understanding

The distribution and characteristics of biomes as regions with distinctive climates, soils, vegetation and productivity [ACHGK060](#)

The human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations [ACHGK061](#)

The environmental, economic and technological factors that influence crop yields in Australia and across the world [ACHGK062](#)

The challenges to food production, including land and water degradation, shortage of fresh water, competing land uses, and climate change, for Australia and other areas of the world [ACHGK063](#)

The capacity of the world's environments to sustainably feed the projected future population to achieve food security for Australia and the world [ACHGK064](#)

**Strand:** Geographical Inquiry and Skills: Observing, questioning and planning

Develop geographically significant questions and plan an inquiry that identifies and applies appropriate geographical methodologies and concepts [ACHGS063](#)

**Strand:** Geographical Inquiry and Skills: Collecting, recording, evaluating and representing

Apply geographical concepts to synthesise information from various sources and draw conclusions based on the analysis of data and information, taking into account alternative points of view [ACHGS068](#)

**Strand:** Geographical Inquiry and Skills: Communicating

Present findings, arguments and explanations in a range of appropriate communication forms, selected for their effectiveness and to suit audience and purpose; using relevant geographical terminology, and digital technologies as appropriate [ACHGS070](#)

**Strand:** Geographical Inquiry and Skills: Reflecting and responding

Reflect on and evaluate the findings of the inquiry to propose individual and collective action in response to a contemporary geographical challenge, taking account of environmental, economic and social considerations; and explain the predicted outcomes and consequences of their proposal [ACHGS071](#)

## Cross Curriculum Priorities

### Sustainability

- OI.2:** All life forms, including human life, are connected through ecosystems on which they depend for their wellbeing and survival.
- OI.3:** Sustainable patterns of living rely on the interdependence of healthy social, economic and ecological systems.
- OI.5:** World views are formed by experiences at personal, local, national and global levels, and are linked to individual and community actions for sustainability.
- OI.7:** Actions for a more sustainable future reflect values of care, respect and responsibility, and require us to explore and understand environments.
- OI.8:** Designing action for sustainability requires an evaluation of past practices, the assessment of scientific and technological developments, and balanced judgments based on projected future economic, social and environmental impacts.

*Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), downloaded from the Australian Curriculum website in February 2015.*



## Implementing the unit and activities in the classroom

### Using the unit

The unit can be used in a number of ways. It will be of most benefit to teachers who wish to implement a sustained sequence of activities following the inquiry stages identified in the **About the approach** section of this unit and content descriptions in Year 9 in Geography as stated in the Australian Curriculum.

### Selecting activities

At each stage several activities are suggested from which you are encouraged to select the most appropriate for your purposes. Not all activities in each stage of the unit need to be used. Alternatively, you may add to or complement the suggested activities with ideas of your own.

It is suggested that teachers create a hyperlinked unit. Organise the digital resources for your class's use on a website or wiki or provide them on your interactive whiteboard.

### Resourcing the unit

The resources suggested are on the whole, general rather than specific. Schools and the contexts in which they exist vary widely as does the availability of some resources – particularly in remote areas. There is a strong emphasis in the unit on gathering information and data; research and observations also feature strongly as these methods develop important skills and ensure that the exploration of the topics are grounded in a relevant context.

Some YouTube and online videos in addition to Internet based resources are suggested in the unit. You will need to investigate what is available in your school.

### Adapting the unit

The unit is targeted at Year 9 students. This is a suggested age range only and teachers are encouraged to modify activities to suit the needs of the students with whom they are working.

The unit's topics are based on content descriptions of the Australian Curriculum and on the key cross curriculum priority of sustainability. They embrace content that we believe is of relevance and significance to all students. We encourage you to explore ways in which the content can be adjusted to the context in which you are working.

Many of the activities contain the following icons offering a suggestion on how many students should be involved:



Suggested for individuals



Suggested for pairs or small groups



Suggested for larger groups or entire classes

Resource sheets are provided for some activities. Most are for photocopying and distribution to students. They are identified within units in bold: **Resource 1.1**.

The resource sheets are designed to assist teachers to facilitate learning without having to access a range of other resources.



### What about assessment?

Rather than being a task carried out at the end of the unit, assessment is viewed as integral to the entire unit sequence. Each activity should be regarded as a context for assessment of student learning.

When planning and implementing the unit of work make clear decisions on what you will focus on in assessing learning. The unit provides an opportunity for a range of skills and understandings to be observed. We encourage you to devise an assessment plan or assessment rubric that features areas to be assessed over subsequent lessons.

In planning for assessment, student learning in the following areas can be considered:

- Understandings about the topic.
- Development of skills.
- Exploration and clarification of values.
- Use of language in relation to content.
- Ability to use and critically analyse a range of texts.
- Ability to analyse and solve problems.
- Ability to interpret information, perceive its meaning and significance, and use it to complete real-world tasks.
- Ability to work cooperatively with others.
- Approach to learning (independence, confidence, participation and enthusiasm).

For this unit, the following understandings are provided to assist teachers in planning for assessment.

### Assessment strategies

Each stage in the inquiry sequence provides information about student learning. There are, however, two stages in the unit that are central to assessment: the Engage stage and the Evaluate stage. Work that is undertaken in these stages can assist teachers to monitor growth and observe concrete examples of the way student ideas have been refined or have changed through the unit sequence. Work samples should be retained for this purpose.

This unit contains a 'Student Task' which is well suited for assessment, as it is the summation of the work undertaken by the students in the unit.

## Some questions and possible answers

### **Should I do all the activities?**

At each stage of a unit, a number of activities are listed. You would not be expected to do them all. Instead, the unit is designed so that a selection of activities can be made at each stage. You should select the activities according to the needs and interests of your students and the time, relevance to the existing school curriculum and resources available to you.

While you are encouraged to follow the suggested inquiry sequence for each unit, it is quite possible to pick and choose from the range of activity ideas throughout the unit. It may also be used in conjunction with other programs you use.

### **How do these units fit into my weekly program?**

Although the unit integrates a range of key subject areas, it is not designed to be a total program. It is assumed that regular routines that operate in your classroom will continue to run alongside your unit of work. For example, you may have regular times for use of the library, for maths, physical education etc. These things don't change – although student's writing topics or choice of topics to research in the library or in Information and Communication Technology classes may be influenced by this unit.

### **How long should the unit run?**

This will of course depend on your particular circumstances but generally, a few weeks to a term are suggested.

### **I don't know much about food production myself – will I be able to teach it effectively?**

Yes! The unit is designed in such a way that you, as the teacher are a co-learner, and you are therefore provided with teacher notes, plus readily available resources that are mainly web-based. Most importantly, you will find that you learn with the students and make discoveries with them.

# Fast facts about Australian agriculture

## National Farmers' Federation Farm Facts 2012



In 2011, there were 157,000 farmers in Australia.



The gross value of Australian farm production in 2011–12 was \$46.7 billion.

This page provides basic food and fibre production information that may be helpful when you interact with the school students.

- Agriculture plays a vital role in Australia, contributing to our social, economic and environmental sustainability.
- In 2011, there were 157,000 farmers in Australia. Around half of these were mixed crop and livestock farmers (22 percent), beef cattle farmers (20 percent) or dairy farmers (8 percent).

*Sources: Australian Bureau of Statistics, 2010–11 Agricultural Census; Australian Bureau of Statistics, Australian Social Trends, Australian Farming and Farmers, December 2012, Catalogue No. 4102.0.*

- These farmers own or manage Australia's 135,000 farm businesses – 99 percent of which are Australian owned.

*Sources: Australian Bureau of Statistics, 2010–11 Agricultural Census; Australian Bureau of Statistics, Agricultural Land and Water Ownership, December 2010, Catalogue No. 7127.0.*

- Each Australian farmer produces enough food to feed 600 people, 150 at home and 450 overseas. Australian farmers produce 93 percent of Australia's daily domestic food supply.

*Sources: Keogh M, Australian Farm Institute, 2009, "Australia's response to world food security concerns", Address to the 1st National Farmers' Federation Annual Congress – Prime Minister's Science, Engineering and Innovation Council (2010); Australia and Food Security in a Changing World. The Prime Minister's Science, Engineering and Innovation Council, Canberra, Australia.*

- The average Australian farmer is male (72 percent), 53 years old (compared with 40 years old for people in other occupations), and a self-employed owner manager (56 percent).

*Sources: Australian Bureau of Statistics, 2010–11 Agricultural Census; Australian Bureau of Statistics, Australian Social Trends, Australian Farming and Farmers, December 2012, Catalogue No. 4102.0.*

- As of June 2012, there were 290,000 people employed in Australian agriculture. The complete agricultural supply chain, including the affiliated food and fibre industries, provide over 1.6 million jobs to the Australian economy.

*Sources: Australian Bureau of Agricultural & Resource Economics and Sciences (ABARES), Australian Commodity Statistics, 2012; Australia's Farm Dependent Economy: Analysis of the role of Agriculture in the Australian Economy. Modelling undertaken by Econtech.*

- The agricultural sector, at farm-gate, contributes 2.4 percent to Australia's total gross domestic product. The gross value of Australian farm production in 2011–12 was \$46.7 billion.

*Sources: Australian Bureau of Statistics, Value of Agricultural Commodities Produced, 2011–12, Catalogue No. 7503.0; Australian Bureau of Statistics, 2010–11, Australian System of National Accounts, Catalogue No. 5204.0; ABARES, Australian Commodity Statistics, 2012.*

- Australian farmers are environmental stewards, owning, managing and caring for 59 percent of Australia's land mass.

*Sources: Australian Government Department of Agriculture, Fisheries and Forestry, At a Glance, 2012.*

- Farmers are at the frontline of delivering environmental outcomes on behalf of the Australian community, with 94 percent of Australian farmers actively undertaking natural resource management.

*Source: Australian Bureau of Statistics, Natural Resource Management on Australian Farms 2006–07.*

- Australia's primary industries have led the nation in reducing greenhouse gas emissions: a massive 40 percent reduction between 1990 and 2006.

*Source: Australian Government Department of Climate Change, National Inventory by Economic Sector 2006.*

Source: National Farmers' Federation Farm Facts 2012 at <http://www.nff.org.au/form-facts.html>

## Meat and Livestock Industry

- Australia's national cattle herd stands at 28.5 million head with the beef industry accounting for 57 percent of all farms with agricultural activity.
- Australia produced around 2.2 million tonnes of beef and veal in 2012–13 directly contributing to 1 percent of Australia's gross domestic product.
- Australia's national sheep flock is 74.7 million head with the sheep industry accounting for 32 percent of all farms with agricultural activity.
- Australia produces approximately 6 percent of the world's lamb and mutton supply and in 2012–13 exported 51 percent of all lamb and 96 percent of all mutton produced.
- Australia's beef and lamb industry employs approximately 200,000 workers across farm, processing and retail.
- Australian cattle and sheep farmers are the custodians of almost half of Australia's land.
- Australia's beef and lamb industry is committed to ensuring a sustainable food supply for future generations with ongoing research and development projects relating to water, soil, biodiversity, animal welfare, energy, emissions and more.

Source: Meat and Livestock Australia <http://mla.com.au>

## Fishing and Aquaculture Industry

Australia's marine domain, our Exclusive Economic Zone, is one of the largest in the world, covering around 10 million square kilometres. This is larger than mainland Australia (7.69 million square kilometres). Despite the size of this zone Australia ranks 46th in the world for seafood production.


Australia has progressively adopted a more ecosystem-based approach to fisheries management which looks at the effect of fishing practices not just on the target species, but also on the environment and other related species. Fisheries managers monitor both stock and fishing levels as well as a range of other environmental factors to ensure the amount of seafood harvested every year does not deplete stocks. In addition, government observers travel regularly on fishing boats to ensure compliance to quotas, bycatch limits and other regulations.

Source: Fisheries Research and Development Corporation, 2013 <http://frdc.com.au/>

During 2011–12 in Australia:

- There were 6,991 people directly employed in the commercial fishing, hunting and trapping sector, and 3,642 in aquaculture enterprises.
- The sector comprises approximately 120 wild catch fisheries and 70 aquaculture species.
- The gross value of Australian commercial seafood and products (e.g. pearls) was valued at \$2.3 billion, an increase of 3 percent on the previous year.
- Australian imports of fisheries products increased by 5 percent.
- The value of production for the wild-catch sector declined by 1 percent to \$1.3 billion and production volume decreased by 4 percent to 157,505 tonnes. While the gross value of aquaculture production rose by 10 percent (\$100 million) to \$1.1 billion.
- The largest contributor to Australian aquaculture production in 2011–12 was salmonids, which make up 52 percent of the total aquaculture production volume and 49 percent of the value.
- Tasmania accounted for the largest share of gross value of production (30 percent), followed by South Australia (19 percent) and Western Australia (17 percent). Commonwealth fisheries accounted for 13 percent of the gross value of production.

Source: ABARES, 2013 [http://data.daff.gov.au/data/warehouse/9aam/afstad9aamd003/2012/AustFishStats\\_2012\\_v1.0.0.pdf](http://data.daff.gov.au/data/warehouse/9aam/afstad9aamd003/2012/AustFishStats_2012_v1.0.0.pdf)



Australia's marine domain covers around 10 million square kilometres.

## Cotton Industry

Australia's cotton growers produce yields almost three times the world average.

40% less water is needed to grow one tonne of cotton lint compared to 2003.

- Every year cotton farmers make an important social and economic contribution to the nation creating jobs for 8,000 people (in Northern New South Wales and Southern Queensland alone), support for more than 4,000 businesses and over \$2 billion for the national economy in export earnings.

Sources: *Cotton Australia Pocket Guide to Cotton*, Judith Stubbs and Associates Report 2011.

- In 2013, there were 1,181 cotton farms. 63 percent were in New South Wales and 37 percent were in Queensland. Of those farms cotton makes up 17 percent of land area on farm.

Source: *Cotton Annual 2014*.

- Australia's cotton growers produce enough cotton to provide jeans, socks, underwear and a shirt for 450 million people. The overall yield in 2012 was 10.37 bales per hectare – the first time in history that average yields have exceeded 10 bales per hectare. Australia's cotton growers produce yields almost three times the world average.

Sources: *Cotton Australia tables (compilation of industry sources)*, ABARES Crop Report, December 2012, *Pocket Guide to Cotton 2014*.

- The average Australian cotton farmer is 39 years old, has a family owned and operated farm, employs on average six or more people, grows other crops like sorghum, soybeans, wheat and canola, has 496 hectares of cotton and is not only a farmer but also a builder, mechanic meteorologist, agronomist, conservationist, scientist and marketer.

Sources: *Pocket Guide to Cotton 2014*, *Monsanto audited numbers 20.12.13*, *2013 Cotton Practices Grower Survey*, Cotton Research and Development Corporation.

- The Australian cotton crop was worth almost \$2.3 billion at the farm gate.

Source: *Cotton Australia tables (compilation of industry sources)*, *Cotton Compass*.

- The Australian cotton industry has achieved a 40 percent increase in water productivity over the last decade i.e. 40 percent less water is now needed to grow one tonne of cotton lint, compared to 2003.

Source: *The Australian Cotton Water Story 2011*.

- The ratio of dryland cotton (rain grown) to irrigated cotton varies depending on the market and conditions. Of the 2011–12 crop 5 percent was dryland and 95 percent irrigated. Favourable grain and sorghum prices meant many dryland farmers opted not to plant cotton at that time.

Sources: *Cotton Australia tables (compilation of industry sources)*, ABARES Crop Report December 2012.

- Australian cotton growers have reduced their insecticide use by 95 percent over the past 15 years. Source: *Monsanto Audited numbers 20.12.2013*.

- Cotton growers are good environmental stewards, owning and caring for native vegetation equivalent to 40 percent of the area of their cotton farms, on average.

Source: *2011 Cotton Grower Survey (Cotton Research and Development Corporation and Cotton Catchment Communities Co-operative Research Centre)*.

Source: Cotton Australia <http://www.cottonaustralia.com.au>

## Pork Industry



Australia's pig herd is one of the cleanest in the world.

- Australia is the first nation in the world to introduce the voluntary phase-out of gestation stalls.
- Pork accounts for approximately 0.4 percent of the national greenhouse gas emissions – significantly lower than other agricultural sectors, including beef at 11.2 percent, sheep at 3.4 percent, and cattle at 2.7 percent.

Source: Garnaut, R 2008, *The Garnaut climate change review – final report*, available at: <http://www.garnautreview.org.au/index.htm>

- Whether housed indoors or outdoors, a pig spends more time resting than any other domestic animal.
- Australia's pig herd health is one of the cleanest in the world, free from many detrimental diseases found in most other pig producing countries
- The feed component (mainly grains such as wheat, barley and sorghum) makes up about 60 percent of the total cost of producing pork.
- Pigs have a very wide angle of vision (310 degrees) and are therefore easily distracted.
- On average, a sow will produce 10–12 piglets per litter.
- The average growth rate of Australian pigs is around 600–650 grams a day from birth to sale.
- Pigs have colour vision but they can't focus both eyes on the same spot.
- Pigs are unable to perspire and they lose heat through their mouths. Their ideal growing temperature is 20–22°C.

Source: Australian Pork Limited <http://www.australianpork.com.au>

## Forestry Industry

Australia has 125 million hectares of forest, equivalent to 16% of its land area.

Forests protect soil and water resources as well as storing carbon.

- Forestry plays a vital role in Australia, contributing to our social, economic and environmental sustainability.
- Forests are also the foundation for a broad range of cultural and spiritual experiences for diverse groups of people. They are a major tourist attraction for Australian and overseas visitors, providing for a vast array of recreational and educational activities.
- In 2010–11, the total turnover of Australia's forest product industries was more than \$24 billion.
- Australia has 125 million hectares of forest, equivalent to 16 percent of Australia's land area. Australia has about 3 percent of the world's forest area, and the seventh largest reported forest area of any country worldwide.
- Australia's 123 million hectares of native forests are dominated by eucalypt forests and acacia forests.
- 32 percent of all Australia's native forests (private and public land) are protected for biodiversity conservation. With 73 percent of Australia's identified old growth forests in formal or informal nature conservation reserves.
- 9 percent (36.6 million hectares) of the native forests were available and suitable for commercial wood production in 2010–11 comprising 7.5 million hectares of multiple-use public forests and 29.1 million hectares of leasehold and private forests.
- Forests protect soil and water resources and are increasingly being recognised for their carbon storage and sequestration capability. The total carbon stored in forests, wood and wood products and paper products was in the order of 400 million tonnes in 2010.
- Australia's native and plantation forests provide the majority of the timber and a significant proportion of the paper products used by Australians.
- On average, each year, every Australian consumes the equivalent of about 1 cubic metre of harvested log in the form of timber products, including timber for home building, joinery and furniture and paper products.
- Australia's forest management is among the best in the world in terms of conservation reserves and codes of practice for production forests.
- Australia has two forestry certification schemes that enable users of wood and wooden products to know the source of the wood.
- The sector directly employs 73,267 people in the forest and wood products industry in Australia (2011). This includes full and part time employees with 1.5 percent of all employees being Indigenous.

Sources: <http://www.agriculture.gov.au/forestry>  
<http://au.fsc.org/>  
<http://www.forestrystandard.org.au/>  
<http://www.naturallybetter.com.au/>  
<http://www.forestlearning.edu.au/>





# Step 1: Engage with the topic

## Getting started

### Purpose

To provide students with opportunities to:

- gather information about student's prior knowledge about biomes and those that produce foods and plant materials people consume
- pool ideas and share with others
- build an interest about in biomes and food and fibre production
- explore a range of biomes in Australia and overseas through photographs to develop their understandings of biomes in Australia and overseas
- develop skills in making connections between ideas
- help set directions for an investigation.

### An interdependent world



Much of the food and materials our global community relies upon started as some form of agriculture in a place with distinctive climates, soils and vegetation. Whether it came from a field, a forest, a valley, a lake, a marsh, a desert, a rainforest or grasslands there was a natural or managed environment responsible for its growth.

**CAPTURE** student interest and **FIND OUT** what they know about places where foods and plant materials people consume originate from.

**PRESENT** a scenario.

*This morning you may have been woken up by an alarm clock. After showering and dressing you probably had breakfast; perhaps a bowl of cereal, a slice of toast and jam, and a cup of tea. There may even have been time for a quick glance at your emails on your iPad or your iPhone. You may even have downloaded music from iTunes or watched a podcast before leaving for school.*

*While this may seem an uninspiring start to the day, it is nevertheless one which is permeated by connections with the wider world. As likely as not, the clock was made by a Japanese firm, shipped from an assembly plant in Brazil to Australia in a Greek-owned ship built in South Korea. Your soap was probably made by the multinational company Unilever. Your clothes include cotton grown in both Australia and Tanzania and wool from New Zealand. The cereal and bread contain wheat from Australia. The jam was made from Spanish oranges and sugar grown in Barbados. Your tea came from Sri Lanka. Your iPad was designed by Apple in California and assembled in China. The bus or car you took to school included Zambian copper, iron ore from the United States, lead from Australia, chrome from Zimbabwe, and a wealth of other materials from other countries. In fact, we cannot make anything without being hooked into the global network in some way.*

Source: Adapted from: World Studies 8-13. A Teacher's Handbook, page 3.



**TALK** with students about connections of this nature and how they link humanity together.

**TALK** about the ties which arise from our mutual dependence on the planet itself for survival, and our shared need to preserve and enhance its natural systems.



**BRAINSTORM** other words that could be used to describe 'interdependence'. Other phrases could include global community, the biosphere, one world, biome and global ecosystem.



## Step 1: Engage with the topic

### Biomes



**TALK** with students about what they know about biomes, whether they have ever heard the term before, have an understanding of its meaning or know of sources where information about biomes can be located.

Biomes are defined as “the world’s major communities, classified according to the predominant vegetation and characterised by adaptations of organisms to that particular environment” (Campbell).



**EXPLORE** the world’s biomes.

View a world map at: [http://www.worldbiomes.com/biomes\\_map.htm](http://www.worldbiomes.com/biomes_map.htm)  
or [http://www.blueplanetbiomes.org/world\\_biomes.htm](http://www.blueplanetbiomes.org/world_biomes.htm)



**READ** about aquatic biomes:

[http://www.worldbiomes.com/biomes\\_aquatic.htm](http://www.worldbiomes.com/biomes_aquatic.htm)



**TALK** about their marine and freshwater regions and **BRAINSTORM** food, industrial materials and fibre sources that the global community might source from them. **LIST** these.

**VISUALISE** a desert biome. Find out more about them at:

[http://www.worldbiomes.com/biomes\\_desert.htm](http://www.worldbiomes.com/biomes_desert.htm)



**CONSIDER** the range of desert biomes, including arid, semi-arid, coastal and cold deserts. Consider the food, industrial materials and fibre sources that the global community might source from them. **LIST** these.



A third biome classification has the largest and most ecologically complex system, the forest biome. **FIND OUT** more about the Boreal or Taiga, Temperate Deciduous, Evergreen and Mediterranean forests at:

[http://www.worldbiomes.com/biomes\\_forest.htm](http://www.worldbiomes.com/biomes_forest.htm)



**TALK** about food, industrial materials and fibre sources that the global community might source from them. **LIST** these.

Grassland biomes are found around the globe where grass is the dominant plant life. Grassland biomes include Steppe, Prairie and Savannah. Learn more about them at: [http://www.worldbiomes.com/biomes\\_grassland.htm](http://www.worldbiomes.com/biomes_grassland.htm)



**ASK** questions about food, industrial materials and fibre sources that the global community might source from them. **LIST** these.



Tundra, the “ice desert”, “frozen prairie”, the cold plains of the Far North get their name from the Finnish word “tunturia”, which means treeless land. **EXPLORE** this biome and locate information about it at:

[http://www.worldbiomes.com/biomes\\_tundra.htm](http://www.worldbiomes.com/biomes_tundra.htm)



**THINK** about the different types of food, industrial materials and fibre sources that the global community might source from them. **LIST** these.

Biomes are defined as “the world’s major communities, classified according to the predominant vegetation and characterised by adaptations of organisms to that particular environment”



Discuss the diversity of biomes that exist in Australia, where they are located, what animals and plants live in them and what climate they experience.

### Australian biomes



Using maps of world biomes focus on Australia and **CONSIDER** the range of biomes that exist here.



**DISCUSS** the diversity of biomes that exist in Australia. As students to record what students know about biomes in Australia, where they are located, what animals and plants live in them and what climate they experience?



Using available maps and information ask students to **COLLECT, SELECT, RECORD** and **ORGANISE** relevant geographical data and information about Australian biomes.

Geographers ask questions like:

- Where is it?
- What is it like?
- Why is it there?



Alternatively, **USE** compass directions and **ASK** questions about the biomes that are typically found in Northern Australia; Central Australia; Eastern Australia; South-Western Australia; Southern Australia and Tasmania. Remind students to think inclusively about terrestrial, freshwater and marine biomes.

### Using photographs



**VIEW** a collection of digital resources that feature biomes that produce food, industrial materials and fibres and crop the photos in a way that will encourage students to imagine what is happening outside 'the frame'.



**SEE** websites including images of:

- Aquatic biomes at: [http://www.worldbiomes.com/biomes\\_aquatic-images.htm](http://www.worldbiomes.com/biomes_aquatic-images.htm)
- Desert biomes at: [http://www.worldbiomes.com/biomes\\_desert-images.htm](http://www.worldbiomes.com/biomes_desert-images.htm)
- Forest biomes at: [http://www.worldbiomes.com/biomes\\_forest-images.htm](http://www.worldbiomes.com/biomes_forest-images.htm)
- Grassland biomes at: [http://www.worldbiomes.com/biomes\\_grassland-images.htm](http://www.worldbiomes.com/biomes_grassland-images.htm)
- Tundra biomes at: [http://www.worldbiomes.com/biomes\\_tundra-images.htm](http://www.worldbiomes.com/biomes_tundra-images.htm)



Use questions to **EXPLORE** these biomes.

- Where is this place?
- What is this place like?
- Why is it the way it is?
- How is this place connected to other places?
- What types of animals and plants are found in the biome?
- What foods, industrial materials and plants might be grown here?
- What is the climate of the biome like?



## Step 1: Engage with the topic

### Setting the task



*Note: This is the suggested assessment task.*



**EXPLAIN** to the students that their task in this unit is to use a geographical inquiry process and geographical terminology to **INVESTIGATE** the human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.



## Step 2: Explore the topic

### Explore human alteration to biomes

#### Purpose

To provide students with opportunities to develop their understanding of:

- human alteration to biomes to produce food, industrial materials and fibres
- geographical terminology
- the possible environmental effects of alterations to biomes
- the natural, social, economic and political effects of alterations to biomes
- differences and similarities in alterations to biomes in Australia and overseas examples where biomes are altered to produce food, industrial materials and/or fibres
- the focus for the forthcoming experiences in the 'Explain' stage of the inquiry.

#### Alterations to biomes

Talk with students about natural and human alterations to biomes. **BRAINSTORM** how natural events including volcanic eruptions, flooding, bushfires and drought can alter biomes.



**DISCUSS** human alterations to biomes. **BRAINSTORM** how the production of food, industrial materials and fibres can alter biomes.



**VIEW** a range of photographs in **Resource 1.1** that depict biomes that have been altered to produce food, power supplies, industrial materials and fibres.



Ask students to **CREATE** captions for these photos selecting words for the captions that convey a sense of place, including a sense of relationship between the biomes and what is being produced.

As a class, pick a farm type and complete a 'Y chart' where students contribute words to **DESCRIBE** what the biomes might (with the alteration) look like, sound like and feel like.



**ASK** questions like:

- Where is this biome?
- What is happening in this place?
- Could this place be anywhere else?
- How are foods, industrial materials or fibres produced here?
- How is the biome being affected by the methods of production?
- How is this place affected by seasons or climate?
- How are people adapting the production system to the seasons and changes being experienced?
- What changes to the production system could science and technology influence?

Additional questions that focus on the biomes themselves might include descriptive, analytical, empathetic, political and moral questions. For example:

- What are these biomes like? (Descriptive)
- In what ways are these biomes connected with other biomes? (Descriptive)
- How and why do they differ from, or resemble, other biomes? (Descriptive)
- How are these biomes changing? (Descriptive)
- What are people doing to improve or maintain the biomes? (Analytical)
- How might a changing climate affect these biomes? (Analytical)
- Why are these biomes the way they are? (Political)
- Is it right that these biomes are the way they are? (Moral)
- Should we be doing something in response to what we see about these biomes and how they are altered for the production of foods we eat, industrial materials and fibres we use? (Moral)

Source: Adapted from Inman, S & Wade, R. (1997) *Shaping a Better Future: Development Education*. Oxfam Publication, Oxford UK page 10.

Natural events including volcanic eruptions, flooding, bushfires and drought can alter biomes.



## Step 2: Explore the topic

### Using the land



**TALK** about the statement...

*For many hundreds of years Indigenous Peoples, Europeans and Asian people have been using Australia's natural resources. They have used soil and water to grow and harvest food, and have prepared pastures for animals to graze on. Miners have taken minerals and energy out of the ground. These are resources used to make a number of products we use.*

Explore more about Australian land use at:

<http://www.agriculture.gov.au/abares/aclump/pages/land-use/Default.aspx>

### Resources and the environment



**TALK** with the class about how producing things from natural resources and using the things we make both affect biomes. This, in turn, can affect the animals, vegetation, climate and people of that biome or place.



**SHARE** examples and **CREATE** flow charts to describe these.

For example: Land clearing and the damming of waterways for hydroelectric projects ➔ diminish platypus homes.

Dredging and dredge spoils ➔ damage fish breeding grounds ➔ loss of seabed plants and animals

### Sustainable resource management



**TALK** about environmental management. What does it mean?

**BRAINSTORM** a list of terms that might be associated with the idea of environmental management.



**CONSIDER** land management, water management, weed and pest management, energy management, pasture management, catchment management, waste management.

### Expand on the task

*Note: This is the suggested assessment task.*

Explain to the students that their task in this unit is to **INVESTIGATE** the human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.

For this task, you will **DETERMINE** where things come from and how their production impacts local biomes.



**LOOK** at the label on your shirt, the label on the packaging of foods you consume, or the manufacturing location of your phone. **CHOOSE** one industrial material, one item of clothing and one food you consume on a daily basis. **SOURCE** their origin and trace these chosen items to their point of retail.



**CONSIDER** their route from source, through production and manufacturing to retail and create a visual presentation of this process.

**ANALYSE** the impact on the varying regions your chosen items travel through and consider the possible alternative production pipelines.

Producing things from natural resources and using the things we make both affect biomes. This, in turn, can affect the animals, vegetation, climate and people of that biome or place.



What are the economic, social and environmental consequences of these production processes?

**EVALUATE** which is the optimal method for everyone concerned (farmer, grower, manufacturer, retailer and consumer).

In a geographic context, **CONSIDER** exploring questions in the following way.

### 1: INVESTIGATING WHAT AND WHERE?

Note that this step involves observing, recording and describing how an industrial material, item of clothing and food are produced and their location or setting.



**ASK** questions such as: *Where is it grown, farmed or produced?*  
*What is it like?*

### 2: EXPLAINING HOW AND WHY?

This step involves explaining the causes and processes involved in producing the industrial material, item of clothing and food item.



**ASK** questions such as: *Why is it produced there? Why is it grown there?*  
*How might less water be used? How might more soil be conserved?*  
*How might...*

### 3: EVALUATING AND PREDICTING THE IMPACT AND ON WHAT AND WHOM

Note that this step involves evaluation and prediction. The likely social, environmental and economic impacts are explored and evaluated. Impacts on people, their economies and the environment are considered to make decisions on the better way to improve and/or conserve a situation.



**ASK** questions such as: *What are the economic, social and environmental consequences of these production processes? What economic opportunities are there? Who uses the area and how much? What motivates people to use the area more sensitively? What economic costs and savings can be achieved by food, industrial materials and fibre production ventures?*

### 4: MAKING DECISIONS AND ADVOCATING ACTION

This step is taking action to implement the decisions or bring them to the attention of others.



**ASK** questions such as: *Who decides whether to grow and produce food, industrial materials and fibres here? Who has an interest in the decision making about the production of food, industrial materials and fibres here?*

### Geographical terminology

**DISPLAY** the geographical concepts (location, place, distribution, spatial interaction, spatial change, movement and regions) in the classroom so that students can refer to these terms during the unit.

**TALK** with the class about geographer's use of geographical concepts and terminology. Geographers often organise information using concepts such as:

- **Location** using coordinates of latitude and longitude or grid references.  
For example: Adelaide latitude 34.56 south, longitude 138.36 east; 750 kilometres north west of Melbourne.
- **Place(s)** describing physical (environmental) or human (cultural) characteristics.  
For example: Sydney on the east coast with a population of 4 million. Deep natural harbour, warm wet temperate climate.





## Step 2: Explore the topic

- **Distribution** describing the pattern or spatial arrangement of phenomena over the earth's surface. For example: Most of Australia's population is located close to the coast.
- **Spatial interaction** describing the relationship, degree and type of association or interdependence or interaction of people and the environment. For example: Sugar cane is associated with tropical climates, populations are dependent on water resources.
- **Spatial change** describing changes in locations, places, distributions and movements over time. For example: changes to rural areas, urban areas or biomes over time.
- **Movement** describing the change in location or movement from one place to another of natural phenomena and people. For example: movement of trade, migrants, winds, ocean currents.
- **Regions** defining areas showing uniformity in terms of defined criteria and varying in size in terms depending on scale. For example: nations, neighbourhoods, climates, biomes, continents.

*Adapted from 'Geography for Primary Schools', AGTA & GTASA ISBN 0 909867 92 5*

### Explore some possible food producers

*Note: This is a suggested assessment task.*

Explain to the students that their task is to start researching. Invite students to decide on producers to find out more about.



**EXPLAIN** that their task is to **FIND OUT** more about three industry sectors that produce food, industrial materials and fibres and the natural or managed environment in which the food and fibres are grown.



**RE-STATE** that each student will undertake a geographical inquiry using geographical terminology about three sources, through production and manufacturing to retail and create a visual presentation of this process.



Invite students to **CONSIDER** the following producers and associated reference and maps for their research.

#### OPTION 1

Producers might include fishers who produce food from aquatic biomes.

If researching **fish** production, consider:

##### The Status of Key Australian Fish Stocks 2014

This is a report that brings together available biological, catch and effort information to determine the status of Australia's key wild catch fish stocks and provides a resource to inform the general public, policy makers and industry on the sustainability of stocks. It includes sections on molluscs; crustaceans; sharks and finfish. Each section includes text and photographs of the species; their stock status; location; biology; fisheries statistics and features; and sustainable use and management. These sections include text, graphics, maps and graphs. It also includes a section on fishing methods. This section includes information, photos and graphics about nets; hook and line; traps and pots; dredges; diving; hand-held implements; and bycatch reduction devices.

See: <http://fish.gov.au/>

For locations and maps showing where varieties of species are fished, see <http://www.fish.gov.au>



## Step 2: Explore the topic

As commercial fishing and aquaculture activities in Australia are broadly distributed from the tropics to the Antarctic, and from land to the sea, it is impossible to show this industry on one map. See the FishFiles site for distribution maps  
<http://www.fishfiles.com.au>

### OPTION 2

If interested in researching **vegetable production** in a desert biome, view: <http://splash.abc.net.au/media/-/m/860277/veggies-in-the-desert-i-d-like-to-see-that->

### OPTION 3

Other producers might include rice farmers who produce food from a number of Australian biomes.

If researching **rice production**, consider:

Viewing maps of where rice is grown in Australia in Google images:  
<https://www.google.com/imghp>

Viewing videos about how rice is grown and produced at:  
<http://www.rga.org.au/education/the-story-of-rice.aspx>

### OPTION 4

Other producers might include grain farmers who produce food from a number of Australian biomes.

If researching **grain production**, consider information located at:  
<http://www.grdc.com.au/About-Us/Our-Grains-Industry>  
<https://open.abc.net.au/projects/day-in-the-life-11bh6tz/contributions/a-day-in-the-life-of-a-farmer-at-harvest-70zr7kw>  
<http://www.youtube.com/watch?v=J45iSrofUBs&list=UUFyeUVkzA7w1180mGtqStYA&index=68>

### OPTION 5

Another producer could include pig farmers who farm pigs in many biomes across Australia.

If researching **pig production**, find out where pig farms are located in Australia.

Videos about how pigs are produced can be found at:  
<http://aussiepigfarmers.com.au>

### OPTION 6

Beef and lamb are produced in a range of biomes. Find out where cattle and sheep farms are located.

If researching **beef and lamb production**, consider farmer stories at:  
<http://www.target100.com.au/Home>  
<http://www.target100.com.au/Environment>

Read information located at: <http://www.mla.com.au/Cattle-sheep-and-goat-industries>



## Step 2: Explore the topic

### Explore some possible fibre producers

Explain to the students that if researching fibre producers they may like to **CONSIDER** cotton, wool and timber producers. Invite students to decide on fibre producers to find out more about.

#### OPTION 1

If researching **cotton production**, find out where cotton is grown.

Find out more about cotton production in a video that explains the basics of cotton farming. See 'The Australian Cotton Story' at: <http://youtu.be/cbKh1Xtfmao>

For a full outline of how cotton is grown see the 'Cotton Education Kit' at:

[http://cottonaustralia.com.au/uploads/resources/Cotton\\_Australia\\_Education\\_Kit\\_-\\_Secondary.pdf](http://cottonaustralia.com.au/uploads/resources/Cotton_Australia_Education_Kit_-_Secondary.pdf) (Note this is a large file with 10 chapters.)

#### OPTION 2

If researching **timber production**, locate where both native and plantation forests are located. See page 35 of the Australian Government Department of Agriculture and ABARES *Australia's State of the Forests Report 2013* report at:

<http://www.daff.gov.au/ABARES/forestsaustralia/Documents/sofr2013-web2.pdf>

View a range of videos to learn more about timber production.

<http://forestlearning.edu.au/find-a-resource/article/28/going-bush-various-demand-for-plantation-and-native-forests.html>

<http://forestlearning.edu.au/find-a-resource/article/33/going-bush-south-australia-s-pine-tree-experts.html>

<http://forestlearning.edu.au/about/forest-information.html>

#### OPTION 3

If interested in **wool production**, view a website about Australian wool, production systems and practices at: <http://www.wool.com/on-farm-research-and-development/>

### Develop a retrieval chart

When investigations are completed as drafts, remind groups to **DEVELOP** a retrieval chart on which students' **DOCUMENT** information and ideas are collected.

### Research task

Remind students of the remaining focus of their geographical task, to:

- **FIND OUT** more about three industry sector's environmental effects on biomes in Australia and what the industry is doing to minimise the impact of production.
- **SOURCE** their origin and trace these chosen items to their point of retail.
- **CONSIDER** their route from source, through production and manufacturing to retail and create a visual presentation of this process.
- **ANALYSE** the impact on the varying regions your chosen items travel through and consider the possible alternative production pipelines.
- **EVALUATE** which is the optimal method for everyone concerned (farmer, grower, manufacturer, retailer and consumer).

Consider their route from source, through production and manufacturing to retail and create a visual presentation of this process.



## Step 3: Explain understandings

### Purpose

To provide students with opportunities to:

- describe the human alteration of biomes to produce food, industrial materials and fibres and what the industry is doing to minimise the impact of production
- gather information about the topic
- develop geographical skills of formulating questions and gathering data
- develop communication skills
- develop the understanding of how we can learn from others
- develop a storyboard.

Explore the consequences of decisions and choices primary producers make relating to the production of their products.

### Consequences to approaches



Invite students to **DEVELOP** a 'consequence wheel' to explore the consequences of decisions and choices primary producers make relating to the production of their products.

Ask students to **FOCUS** on the methods and approaches used and their impacts on the environment.

For example, if researching **meat production**, develop a consequence wheel about the production of sheep, grass-fed cattle, or grain-fed cattle (lot feeding).



**LEARN** more about what happens on Australian feedlots at:

[http://www.feedlots.com.au/index.php?option=com\\_content&view=article&id=89&Itemid=118](http://www.feedlots.com.au/index.php?option=com_content&view=article&id=89&Itemid=118)



**VIEW** videos about some of the different methods used to produce cattle and sheep.

Commit to Sustainable Farming: Farmer Stories

<https://www.youtube.com/watch?v=yNM203FWohl&index=72&list=UUFyeUVkzA7w1180mGtqStYA>

Sustainability in Farming

[http://www.youtube.com/watch?v=zT2IS2pHf\\_A&list=UUFyeUVkzA7w1180mGtqStYA&index=66](http://www.youtube.com/watch?v=zT2IS2pHf_A&list=UUFyeUVkzA7w1180mGtqStYA&index=66)

Organic sheep farming

<http://www.youtube.com/watch?v=uifA-Hn31qY&index=67&list=UUFyeUVkzA7w1180mGtqStYA>

Farmers saving water with science

[https://www.youtube.com/watch?v=MqJARv3YoPA&list=PL7a3T42VogLYyPbRSuJP3\\_Qy4SzbYkXH-](https://www.youtube.com/watch?v=MqJARv3YoPA&list=PL7a3T42VogLYyPbRSuJP3_Qy4SzbYkXH-)

If researching **wild catch fishing** and fishing practices and approaches used **DEVELOP** a consequence wheel about either the use of nets; hook and line; traps and pots; dredges; diving; or hand held implements that are used to catch and produce different fish species for consumers.



**LEARN** more about what fishes are caught by what fishing method at:

[http://fish.gov.au/fishing\\_methods/Pages/default.aspx](http://fish.gov.au/fishing_methods/Pages/default.aspx) and use the fishing methods drop down tab to explore deeply into the different methods used for specific catches.

If researching **aquaculture** or **fish farming**, **DEVELOP** a consequence wheel about by what method species are farmed and what technologies are used.

For example: compare marine/freshwater on-land (ponds/tanks) or offshore farms (salmon). **LEARN** more about aquaculture developments at:

<http://www.youtube.com/watch?v=4eAXwk2orYQ>

If researching **pork production**, **DEVELOP** a consequence wheel about either indoor conventional piggeries, free range piggeries or outdoor bred piggeries and the technologies involved. Check out:

<http://www.aussiepigfarmers.com.au>

If researching **cotton production**, **DEVELOP** a consequence wheel about the methods used to grow and produce cotton in Australia including using conventional or transgenic cotton crops varieties, using crop rotations and managing soils, using integrated pest management (multiple ways of managing pests – such as using plants



## Step 3: Explain understandings

that have resistance to the pests, removing pest insect food sources and habitats over winter, using trap crops, tolerating damage to the crop that has no economic impact, sampling and monitoring pest control thresholds, using insecticides as a last resort) as opposed to one method. Other issues to consider for the consequence wheel are growing irrigated or dryland cotton or implementing water use monitoring, assessment and evaluation practices.



**LEARN** more about what happens on cotton farms at:

<http://www.youtube.com/watch?v=vDR8c3hzm3w>

**CHECK OUT:**

Conventional versus Transgenic Cotton

<http://publish.viostream.com/embed/>

[player?video=xbz189ab7i97&width=640&height=360](http://publish.viostream.com/embed/player?video=xbz189ab7i97&width=640&height=360)

<http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-biotechnology>

[http://cottonaustralia.com.au/uploads/resources/CEK\\_Chap\\_8\\_Cotton\\_As\\_A\\_Competitive\\_Commodity.pdf](http://cottonaustralia.com.au/uploads/resources/CEK_Chap_8_Cotton_As_A_Competitive_Commodity.pdf)

Crop rotations and managing soils

<http://www.csiro.au/Outcomes/Food-and-Agriculture/Sustainable-Cotton-Industry/Cotton-management.aspx#a2>

Water

[http://cottonaustralia.com.au/uploads/resources/CEK\\_Chap\\_2\\_A\\_Sustainable\\_Cotton\\_Industry.pdf](http://cottonaustralia.com.au/uploads/resources/CEK_Chap_2_A_Sustainable_Cotton_Industry.pdf)

If researching **timber production**, **DEVELOP** a consequence wheel about by what different types of timber are grown in Australia and what species are grown to produce different types of products. For example, consider both softwood and hardwood species grown in both native forest and plantations with the timber being used for different purposes.



<http://forestlearning.edu.au/find-a-resource/article/28/going-bush-various-demand-for-plantation-and-native-forests.html>

<http://forestlearning.edu.au/links.html>

<http://www.agriculture.gov.au/forestry/australias-forests/plantation-farm-forestry>

If researching **timber products**, what has been the response by countries such as Australia to stem the illegal logging from countries overseas? A great place to start your investigation is with the two timber certification processes used in Australia that oversee domestic and overseas production and importation. See the Forest Stewardship Council Certification process at <http://au.fsc.org> and the Australian Forest Standard <http://www.forestrystandard.org.au> that certify Australian Standards.

If researching **wool production** and practices and technologies used **DEVELOP** a consequence wheel about either the use of mustering; shearing; classing the fleece; pressing the wool or practices that are used to grow and raise the sheep and produce wool for consumers.



**LEARN** more about what sheep are grown for wool and by what methods

at: <http://www.wool.com/on-farm-research-and-development/sheep-health-welfare-and-productivity/> and <http://www.youtube.com/watch?v=68FFxoNj4vE>

What different types of timber are grown in Australia and what species are grown to produce different types of products.



## Step 3: Explain understandings

Research the use of mustering; shearing; classing the fleece; pressing the wool, or practices that are used to grow and raise the sheep and produce wool for consumers.



Before developing the consequence wheel, **BRAINSTORM** the types of issues the class thinks might be associated with the approaches used or not used in the ways food, industrial materials and fibres are processed into everyday products.



**CONSIDER** issues like:

- Water management
- Shortages of water
- Land and water degradation
- Riparian management
- Wildlife corridors
- Management of soils and groundcovers
- Pasture management
- Weed and pest management
- Feed management
- Herd/stock management
- Animal welfare management
- Competing land uses
- Improving biodiversity
- Overstocking
- Fishing limits
- Seasonal closures for fishing
- Waste/manure management
- Use of fertilisers and pesticides
- Food miles
- Managing gene technology
- Managing people
- Continual Improvement
- Profitability
- Supporting communities

To **DEVELOP** a consequence wheel the issue is written in the centre of a sheet of paper and a series of concentric circles are then drawn lightly around it. The first question asked is “What are the immediate consequences?” See **Resource 1.2** for an example.



Ask groups to **DISCUSS** what the repercussions might be and briefly write them around the first circle. Ask groups to **LINK** each statement to the central point by a single line. Next, students discuss what consequences may follow on from the first ones. Following on, third and fourth order consequences can be **EXPLORED** and marked in a similar way.



**SHARE** consequence wheels and **EXPLORE** the difference between intended and unintended consequences for a range of issues.



## Step 3: Explain understandings



Encourage the students to **ASK** critical questions of one another's work. For example:

- What do you feel, hope and fear in relation to this particular issue?
- Do you think everybody agrees?
- Why might other people think and feel differently?
- How did the issue come about?
- Who do you think influenced your opinions?
- Who gains and who loses?
- Who has power in this situation and how do they use it?
- Is it used to the advantage of some and to the disadvantage of others?
- What values can we use to guide our choices in the way food, industrial materials and fibres are produced?
- What are the possible courses of action open to primary producers?
- What are the technologies available to primary producers?
- What are others already doing?
- How might the industries work together?
- Whose help might they need?
- How do we measure their success?
- What are some of the things that industry is doing to combat these consequences?

*Adapted from 'Education For the Future – a practical classroom guide', D. Hicks, World Wildlife Fund, 1994, page 10*

Prepares a presentation about human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.

### Presentation planning



Using the information gathered, each student **PREPARES** a presentation about human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.



Remind students to **CONSIDER** a presentation technique that will use geographical terminology and engage others to learn more about biomes that produce food, industrial materials and fibres and the environmental effects of these alterations.





## Step 3: Explain understandings

### Geographical terminology



Remind the class about the task requiring them to use geographical concepts and terminology. Invite them to **REFLECT** and see if their research includes information using concepts using the geographical terminology that is displayed in the classroom. For example: location, place, distribution, spatial interaction, spatial change, movement and regions.

### Decide on what to present and how to do so



*Note: This is the suggested assessment task.*



Re-state the purposes of the task and ask students to **CONSIDER** how they are going to bring their information together and present it so that the main points come across clearly. **MODEL** the construction of video and slideshow tools. Students now use the information they have gathered to **CONSTRUCT** a presentation for the research being undertaken.

See: <http://cooltoolsforschools.wikispaces.com/> for ideas.



## Step 4: Elaborate on concepts and ideas

### Deeper thinking and presentation planning

#### Purpose

To provide students with opportunities to:

- consider the differences and/or similarities to ways food, industrial materials and fibres are produced overseas compared to Australia
- view and read stories from other cultures about the way food, industrial materials and fibres are produced
- identify the environmental, social, economic and political factors that influence the human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.
- identify what is being done to combat these effects
- share their geographical inquiries
- apply what they have learned and communicate the human alteration of biomes to produce food, industrial materials and fibres and the environmental effects of these alterations
- plan their presentation
- conduct their presentation
- share investigation findings
- consider the capacity of the world's environments to sustainably feed the projected future population to achieve food security for Australia and the world
- consider the potential threats to the world environments to sustainably feed the projected future population to achieve food security for Australia and the world.

#### Using a global perspective



**TALK** with the class about how food, industrial materials and fibres are produced differently in countries and their respective biomes across the world.



**VIEW** videos from ABC Splash to inform a global perspective.

Joburg: diamond in the rough

<http://splash.abc.net.au/media/-/m/1436568/joburg-diamond-in-the-rough>

Poor man's crop, rich man's food

<http://splash.abc.net.au/media/-/m/1003856/poor-man-s-crop-rich-man-s-food>

View additional videos from Oxfam Australia, World Wildlife Fund, World Vision Australian and Global Education for perspectives about how food, industrial materials and fibres are produced overseas.

Stopping illegal logging of forests in overseas countries:

[http://wwf.panda.org/what\\_we\\_do/footprint/forestry/forest\\_illegal\\_logging/](http://wwf.panda.org/what_we_do/footprint/forestry/forest_illegal_logging/)

45,000 reasons to swap to fair-trade chocolate

<https://www.oxfam.org.au/act/resources-for-teachers/term-two-features-resource-fairtrade/>

Food Security – Bali and Sumba

<http://www.worldvision.com.au/resources/SchoolResources/IndonesianResource.aspx?id=e6251963-cd63-4dd9-a0a1-f3845bb44726>

Green Revolution in Timor-Leste

<http://www.globaleducation.edu.au/1839.html>



**READ** about aquaculture in Thailand at:

<http://www.globaleducation.edu.au/case-studies/aquaculture-in-thailand.html>

**LEARN** about how the Chinese are reversing desertification in China at:

<http://www.globaleducation.edu.au/case-studies/reversing-desertification-in-china.html>



**VIEW** videos about how cotton is produced in Brazil, China, India, Mali and Pakistan by farmers who are part of the World Wide Fund for Nature funded Better Cotton Initiative.

<http://bettercotton.org/about-better-cotton/stories-from-the-field/>



**TALK** with students about what makes food, industrial materials and fibre production systems interesting to study.

There is a wide variety across the world, some are dominated by cash crops for export; others are devoted to staple crops for domestic consumption and some are small crops for family consumption and regional or local demands.

**TALK** about how they all use resources from and within biomes and about how their different systems and approaches to production might impact on the physical conditions of the land and water environments within biomes.



## Step 4: Elaborate on concepts and ideas

Talk about how food, industrial materials and fibres are produced differently in countries and their respective biomes across the world.

### Compass rose



**TALK** with the students about how all ideas, approaches, methods, processes and actions, or lack of them, carry a range of implications. Some can affect places/environment, people/society, economies and policies.



Then, **DRAW** a compass in the centre of the class's board or use **Resource 1.3** or access compass images. Search Google images for *compass rose worksheets* at: <https://www.google.com/imghp> or [http://www.globaleducation.edu.au/verve/\\_resources/dev-compassrose.pdf](http://www.globaleducation.edu.au/verve/_resources/dev-compassrose.pdf)

Instead of naming the four compass points north, south, east and west use:

- **N**atural environment/ecological questions
- **S**ocial and cultural questions
- **E**conomic questions
- **W**ho decides? Who benefits? i.e. political questions

*Note: Diagonal points represent relationships between the four main points. For example, **North East** highlights ideas and questions about how economic considerations might impact on natural environments; **South East** highlights ideas and questions about economic considerations and people's lives.*



Using this 'compass' in nominated groups, **IDENTIFY** the environmental, social, economic and political factors that influence the ways in which the group's chosen food, industrial material or fibre production practices might impact or affect the biome it is produced in, the farm or fishery, mine or forest, their products, budgets and consumer's perceptions.



Complete this activity for all ideas to really **UNDERSTAND** all of the implications involved in the production of food, industrial material and fibres. Ask students to **SHARE** and **DISCUSS** their compass rose and ideas.



Alternatively use a flow chart to **LIST** a series of events that might happen, sequentially as a result of the production practice. Other boxes could be added to show related events.

### Going further with the planning of the presentation



Invite students to confirm the idea planned for their presentation.

Ask students to **CREATE** a final plan for completing the presentation. Students may need to **DOCUMENT** their key messages, **CREATE** an image bank and **COLLATE** references and acknowledgements for their work sample. Invite them to **SUMMARISE** these and the learning achieved in a journal log or reflection.



## Step 4: Elaborate on concepts and ideas

### Review and submit

Invite students to **REVISE** and fine-tune their presentation about the human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.

### Food security

*Note: This is an extension activity.*

Extend thinking about the capacity of the world's environments to sustainably feed the projected future population to achieve food security for Australia and the world.



**TALK** about World Food Day being acknowledged each year on October 16.



**VIEW** the video at:

<https://www.un.org/apps/news//story.asp?NewsID=46269&Cr=Food+Security&Cr1>

**TALK** about the countries depicted in the video where the population has insufficient food to eat. **REFLECT** on the people depicted who do not have sufficient quantities of food available on a consistent basis and those who do not have sufficient resources to obtain foods.



**READ** about food security on the Global Education and World Health Organisation websites.

See <http://www.globaleducation.edu.au/global-issues/gi-food-security.html> and <http://www.who.int/trade/glossary/story028/en/>



As a class, **FOCUS** on the range of people in different countries facing food security issues and **DISCUSS**:

- Which food group was missing from nearly every person's diet?
- What they consider to be the main problems or issues for people living in these areas?
- What other countries can do about these problems?
- What scientists, organisations and industries might be able to do about these problems?

Much has been written about both small-scale and large-scale farming systems.



Invite students to **CONSIDER** both in their chosen sector and ask questions like:

- What food systems do we need to feed the world? (Both the developed and developing world).
- If we know about food production systems that lead to the long-term health of populations, ecosystems and environmental quality, why don't we use them in all instances?
- Are we going to rely on sustainable food systems more or less in the future?
- What answers might there be to meeting the challenges of efficient, well managed and sustainable food production systems?



**TALK** with students about the fact that our global population is rising at a fast rate and that by 2050 we will need to feed a global population of 9.6 billion people.

If we know about food production systems that lead to the long-term health of populations, ecosystems and environmental quality, why don't we use them in all instances?



## Step 4: Elaborate on concepts and ideas

Are we going to rely on sustainable food systems more or less in the future?



**READ** more at: <https://www.un.org/apps/news/story.asp?NewsID=46647&Cr=Food+Security&Cr1#.UqUoek24bIU>

**TALK** with the students about how we might achieve the goal of feeding so many people worldwide and where efforts should be directed.



**TALK** about whether efforts should be directed at both small-scale farming systems that primarily meet local and regional demands and large-scale systems that meet global and national demands.



**VIEW** and **READ** case studies about how many global communities with aid support are improving their food security.



**SEE** *Aquaculture in Thailand* <http://www.globaleducation.edu.au/case-studies/aquaculture-in-thailand.html> and *Sweet potato biodiversity in Papua New Guinea* <http://www.globaleducation.edu.au/case-studies/sweet-potato-diversity-in-papua-new-guinea.html>



**RECORD** understandings about both small-scale farming systems that primarily meet local and regional demands and large-scale systems that meet global and national demands in student's learning logs.



## Step 5: Evaluating

### Think back and evaluate

#### Purpose

To provide students with opportunities to:

- reflect on their own learning
- collate data for assessment.

To provide teachers with:

- insights into students' understanding and attitudes, as well as their perceptions of their own strengths and weaknesses.

#### Reflective writing

Begin by modelling reflective writing through a whole class learning log.

**PROVIDE** students with a set of focus questions for their writing:

- Write about something new you learnt in this unit about the human alteration of biomes to produce food, industrial materials and fibres, and the environmental effects of these alterations.
- What is one thing you have learned about when it comes to producing food, industrial material and fibres?
- Describe what you now know about the similarities and differences between production practices of food, industrial materials and fibres in developed and developing countries.
- Describe what you know about sustainable farming practices.
- How might you help others know more about how Australian farmers produce industrial materials, fibres and food?
- What have you learned about a food security?
- What would you still like to find out about biomes that produce food, industrial materials and fibres?
- How well did you participate in any group/team learning activities?
- What questions do you have about the topic at the moment?
- What piece of work are you most satisfied with?

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- Fisher, S. (1985) *World Studies 8-13. A Teacher's Handbook*. Oliver & Boyd, Edinburgh.
- Head, K., Simmons, J., Wilson, J., Nockolds, K., Colliver, A., Hunt, P., O'Sullivan, P. & Harris, D. (1989) *Geography For Primary Schools*. Australian Geography Teachers' Association & Geography Teachers' Association of South Australia.
- Gardner, H. (1985) *Frames of Mind: the theory of multiple intelligences*, Basic Books, New York.
- Hamston, J. and Murdock, K. (1996) *Integrating Socially: units of work for social education*, Eleanor Curtain, Melbourne.
- Inman, S and Wade, R. (1997) *Shaping a Better Future: Development Education*. Oxfam Publication, Oxford UK.

## Websites (viewed February 2015)

This is a list of websites used in this unit for teacher use. As content of the websites used in this unit is updated or moved, hyperlinks may not always function.

Australian Broadcasting Corporation

ABC Open. A day in the life of a farmer at harvest <https://open.abc.net.au/projects/day-in-the-life-11bh6tz/contributions/a-day-in-the-life-of-a-farmer-at-harvest-70zr7kw>

ABC Splash:

Veggies in the desert - I'd like to see that! <http://splash.abc.net.au/media/-/m/860277/veggies-in-the-desert-i-d-like-to-see-that->

Joburg: diamond in the rough <http://splash.abc.net.au/media/-/m/1436568/joburg-diamond-in-the-rough>

Poor man's crop, rich man's food <http://splash.abc.net.au/media/-/m/1003856/poor-man-s-crop-rich-man-s-food>

Australian Curriculum, Assessment and Reporting Authority. Australian Curriculum

<http://australiancurriculum.edu.au>

Australian Forestry Standard

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

Australian Government Department of Agriculture

<http://www.agriculture.gov.au/forestry/>

Australian Fisheries Statistics 2012 [http://data.daff.gov.au/data/warehouse/9aam/afstad9aamd003/2012/AustFishStats\\_2012\\_v1.0.0.pdf](http://data.daff.gov.au/data/warehouse/9aam/afstad9aamd003/2012/AustFishStats_2012_v1.0.0.pdf)

ABARES State of the Forests Report 2013 <http://www.agriculture.gov.au/ABARES/forestsaustralia/Documents/sofr2013-web2.pdf>

Land use overview <http://www.agriculture.gov.au/abares/aclump/pages/land-use/Default.aspx>

Plantations and farm forestry <http://www.agriculture.gov.au/forestry/australias-forests/plantation-farm-forestry>

Australian Government Grains Research Development Corporation

Our grains industry <http://www.grdc.com.au/About-Us/Our-Grains-Industry>

Australian Lot Feeders' Association. What happens on a cattle feedlot?

[http://www.feedlots.com.au/index.php?option=com\\_content&view=article&id=89&Itemid=118](http://www.feedlots.com.au/index.php?option=com_content&view=article&id=89&Itemid=118)

Australian Pork Limited

<http://australianpork.com.au/>

<http://www.aussiepigfarmers.com.au>

Australian Wool Innovation Limited

On-farm Research & Development <http://www.wool.com/en/on-farm-research-and-development>

Sheep health, welfare and productivity <http://www.wool.com/on-farm-research-and-development/sheep-health-welfare-and-productivity/>

Better Cotton Initiative. Stories from the field

<http://bettercotton.org/about-better-cotton/stories-from-the-field/>

Blue Planet Biomes

[http://www.blueplanetbiomes.org/world\\_biomes.htm](http://www.blueplanetbiomes.org/world_biomes.htm)

Commonwealth of Australia Global Education Website

Aquaculture in Thailand <http://www.globaleducation.edu.au/case-studies/aquaculture-in-thailand.html>

Development compass rose [http://www.globaleducation.edu.au/verve/\\_resources/dev-compassrose.pdf](http://www.globaleducation.edu.au/verve/_resources/dev-compassrose.pdf)

Food security <http://www.globaleducation.edu.au/global-issues/gi-food-security.html>

Green revolution in Timor-Leste video <http://www.globaleducation.edu.au/1839.html>

Reversing desertification in China <http://www.globaleducation.edu.au/case-studies/reversing-desertification-in-china.html>

Sweet potato diversity in Papua New Guinea <http://www.globaleducation.edu.au/case-studies/sweet-potato-diversity-in-papua-new-guinea.html>



## References

Cool Tools for Schools

<http://cooltoolsforschools.wikispaces.com/>

Cotton Australia

<http://cottonaustralia.com.au/>

Cotton and biotechnology fact sheet <http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-biotechnology>

Cotton Australia Education Kit - Secondary [http://cottonaustralia.com.au/uploads/resources/Cotton\\_Australia\\_Education\\_Kit\\_-\\_Secondary.pdf](http://cottonaustralia.com.au/uploads/resources/Cotton_Australia_Education_Kit_-_Secondary.pdf)

Cotton Australia Education Kit - Chapter 2: A sustainable cotton industry [http://cottonaustralia.com.au/uploads/resources/CEK\\_Chap\\_2\\_A\\_Sustainable\\_Cotton\\_Industry.pdf](http://cottonaustralia.com.au/uploads/resources/CEK_Chap_2_A_Sustainable_Cotton_Industry.pdf)

Cotton Australia Education Kit - Chapter 8: Cotton as a competitive commodity [http://cottonaustralia.com.au/uploads/resources/CEK\\_Chap\\_8\\_Cotton\\_As\\_A\\_Competitive\\_Commodity.pdf](http://cottonaustralia.com.au/uploads/resources/CEK_Chap_8_Cotton_As_A_Competitive_Commodity.pdf)

Creative Commons. Attribution 3.0 Australia

<http://creativecommons.org/licenses/by/3.0/au/deed.en>

CSIRO

Working towards building a sustainable cotton industry <http://www.csiro.au/Outcomes/Food-and-Agriculture/Sustainable-Cotton-Industry/Cotton-management.aspx#a2>

Fisheries Research Development Corporation

<http://frdc.com.au/>

The Status of Key Australian Fish Stocks 2014 <http://fish.gov.au/>

Fish Files <http://www.fishfiles.com.au/>

Fishing methods [http://fish.gov.au/fishing\\_methods/Pages/default.aspx](http://fish.gov.au/fishing_methods/Pages/default.aspx)

Forest Learning

<http://forestlearning.edu.au/>

Forest Information <http://forestlearning.edu.au/about/forest-information.html>

Going bush - South Australia's pine tree experts <http://forestlearning.edu.au/find-a-resource/article/33/going-bush-south-australia-s-pine-tree-experts.html>

Going Bush - Various demand for plantation and native forests <http://forestlearning.edu.au/find-a-resource/article/28/going-bush-various-demand-for-plantation-and-native-forests.html>

Related websites: <http://forestlearning.edu.au/links.html>

Forest Stewardship Council Australia

<http://au.fsc.org>

Garnaut Climate Change Review - Final Report

<http://www.garnautreview.org.au/index.htm>

Google Images

<https://www.google.com/imghp>

Meat and Livestock Australia

<http://www.mla.com.au>

Cattle, sheep and goat industries <http://www.mla.com.au/Cattle-sheep-and-goat-industries>

National Farmers' Federation. Farm Facts 2012

<http://www.nff.org.au/farm-facts.html>

Oxfam Australia

Term two featured resource: Fairtrade <https://www.oxfam.org.au/act/resources-for-teachers/term-two-features-resource-fairtrade/>

Primary Connections

<http://www.primaryconnections.org.au/about/teaching>

Ricegrowers' Association of Australia Incorporated

<http://www.rga.org.au/education/the-story-of-rice.aspx>

Target 100

<http://www.target100.com.au/>

Environment <http://www.target100.com.au/Environment>

## References

United Nations. News Centre

Sustainable food systems vital to end hunger, malnutrition, UN says on World Food Day <https://www.un.org/apps/news/story.asp?NewsID=46269&Cr=Food+Security&Cr1=>

World must sustainably produce 70 per cent more food by mid-century <https://www.un.org/apps/news/story.asp?NewsID=46647&Cr=Food+Security&Cr1#.UqUoek24bIU>

Viostream. CSIRO cotton

<http://publish.viostream.com/embed/player?video=xbz189ab7i97&width=640&height=360>

Wood, Naturally Better

<http://www.naturallybetter.com.au/>

World Biomes

Aquatic Biomes [http://www.worldbiomes.com/biomes\\_aquatic.htm](http://www.worldbiomes.com/biomes_aquatic.htm)

Aquatic Biomes: Images [http://www.worldbiomes.com/biomes\\_aquatic-images.htm](http://www.worldbiomes.com/biomes_aquatic-images.htm)

Desert Biomes [http://www.worldbiomes.com/biomes\\_desert.htm](http://www.worldbiomes.com/biomes_desert.htm)

Desert Biomes: Images [http://www.worldbiomes.com/biomes\\_desert-images.htm](http://www.worldbiomes.com/biomes_desert-images.htm)

Forest Biomes [http://www.worldbiomes.com/biomes\\_forest.htm](http://www.worldbiomes.com/biomes_forest.htm)

Forest Biomes: Images [http://www.worldbiomes.com/biomes\\_forest-images.htm](http://www.worldbiomes.com/biomes_forest-images.htm)

Grassland Biomes [http://www.worldbiomes.com/biomes\\_grassland.htm](http://www.worldbiomes.com/biomes_grassland.htm)

Grassland Biomes, Images [http://www.worldbiomes.com/biomes\\_grassland-images.htm](http://www.worldbiomes.com/biomes_grassland-images.htm)

Tundra Biomes [http://www.worldbiomes.com/biomes\\_tundra.htm](http://www.worldbiomes.com/biomes_tundra.htm)

Tundra Biomes: Images [http://www.worldbiomes.com/biomes\\_tundra-images.htm](http://www.worldbiomes.com/biomes_tundra-images.htm)

World map [http://www.worldbiomes.com/biomes\\_map.htm](http://www.worldbiomes.com/biomes_map.htm)

World Health Organisation. Food Security

<http://www.who.int/trade/glossary/story028/en/>

World Vision. Food and Human Wellbeing (Years 9, 10)

<http://www.worldvision.com.au/resources/SchoolResources/IndonesianResource.aspx?id=e6251963-cd63-4dd9-a0a1-f3845bb44726>

World Wildlife Fund. Stopping illegal logging of forests

[http://wwf.panda.org/what\\_we\\_do/footprint/forestry/forest\\_illegal\\_logging/](http://wwf.panda.org/what_we_do/footprint/forestry/forest_illegal_logging/)

YouTube videos:

Art for Agriculture - Agriculture is the place for you and me says Young Farming Champion Adele Offley <https://www.youtube.com/watch?v=68FFxoNj4vE>

Art for Agriculture - Cotton for Generations to come by Ben Egan <https://www.youtube.com/watch?v=vDR8c3hzm3w>

Cotton Australia. The Australian Cotton Story Primary Version <http://youtu.be/cbKh1Xtfmao>

Target 100 - Broken Hill organic sheep farming <https://www.youtube.com/watch?v=uifA-Hn31qY&index=67&list=UUFyeUVkzA7w1180mGtqStYA>

Target 100 - Farmers saving water with science [https://www.youtube.com/watch?v=MqJARv3YoPA&list=PL7a3T42VoqLYyPbRSuJP3\\_Qy4SzbYkXH-](https://www.youtube.com/watch?v=MqJARv3YoPA&list=PL7a3T42VoqLYyPbRSuJP3_Qy4SzbYkXH-)

Target 100 - Grain and Cattle Farming. Farmer Stories <https://www.youtube.com/watch?v=J45iSrofUBs&list=UUFyeUVkzA7w1180mGtqStYA&index=68>

Target 100 - Sustainability in farming is critical [https://www.youtube.com/watch?v=zT2IS2pHf\\_A&list=UUFyeUVkzA7w1180mGtqStYA&index=66](https://www.youtube.com/watch?v=zT2IS2pHf_A&list=UUFyeUVkzA7w1180mGtqStYA&index=66)

Target 100 - Commit to sustainable farming. Farmer stories <https://www.youtube.com/watch?v=yNM203FWohl&index=72&list=UUFyeUVkzA7w1180mGtqStYA>

Food and Agriculture Organisation of the United Nations - Turning Points in modern aquaculture <https://www.youtube.com/watch?v=4eAXwk2orYQ>

Food and Agriculture Organisation of the United Nations - Turning Points in modern aquaculture <https://www.youtube.com/watch?v=4eAXwk2orYQ>

Food and Agriculture Organisation of the United Nations - Turning Points in modern aquaculture <https://www.youtube.com/watch?v=4eAXwk2orYQ>

## Resource 1.1

**Explore biomes in Australia that produce food, power and fibres**



*An alpine forest, in Victoria.  
Photo courtesy of Bob Winters*



*An irrigation channel, on the Murray  
River, New South Wales. Photo  
courtesy of Bob Winters*





*Dairy cattle grazing in the La Trobe Valley, Victoria.  
Photo courtesy of Bob Winters*



*A sheep farm, located on the Central Tablelands, New South Wales.  
Photo courtesy of Bob Winters*



*A sugar cane farm, located in Queensland. Photo courtesy of Bob Winters*



*Wind farming, north of Perth,  
Western Australia.  
Photo courtesy of Bob Winters*



*A cabbage farm, located north of  
Melbourne, Victoria.  
Photo courtesy of Bob Winters*



*Harvesting at sea, on Port Phillip  
Bay, Victoria.  
Photo courtesy of Bob Winters*





*A chicken farm, in Central New South Wales.  
Photo courtesy of Bob Winters*



*Harvest time, in Southern New South Wales. Photo courtesy of Bob Winters*

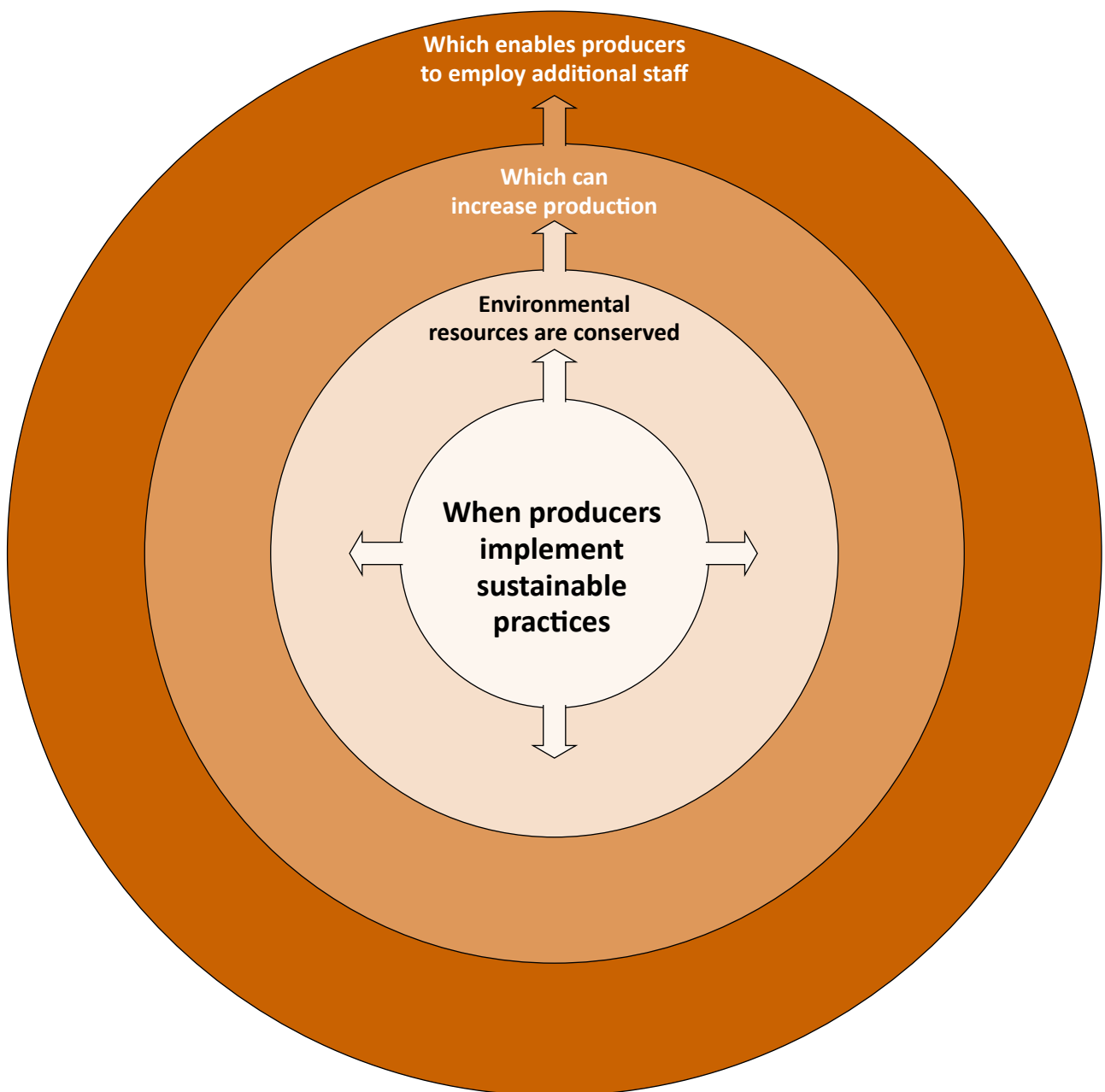


*Two cattle drinking from a tropical stream, Cairns, Queensland.  
Photo courtesy of Bob Winters*

## Resource 1.2

### Consequence wheel

Consequence wheels are used to explore wide ranging consequences that can follow from actions, issues or trends in the present. Look at the example below.

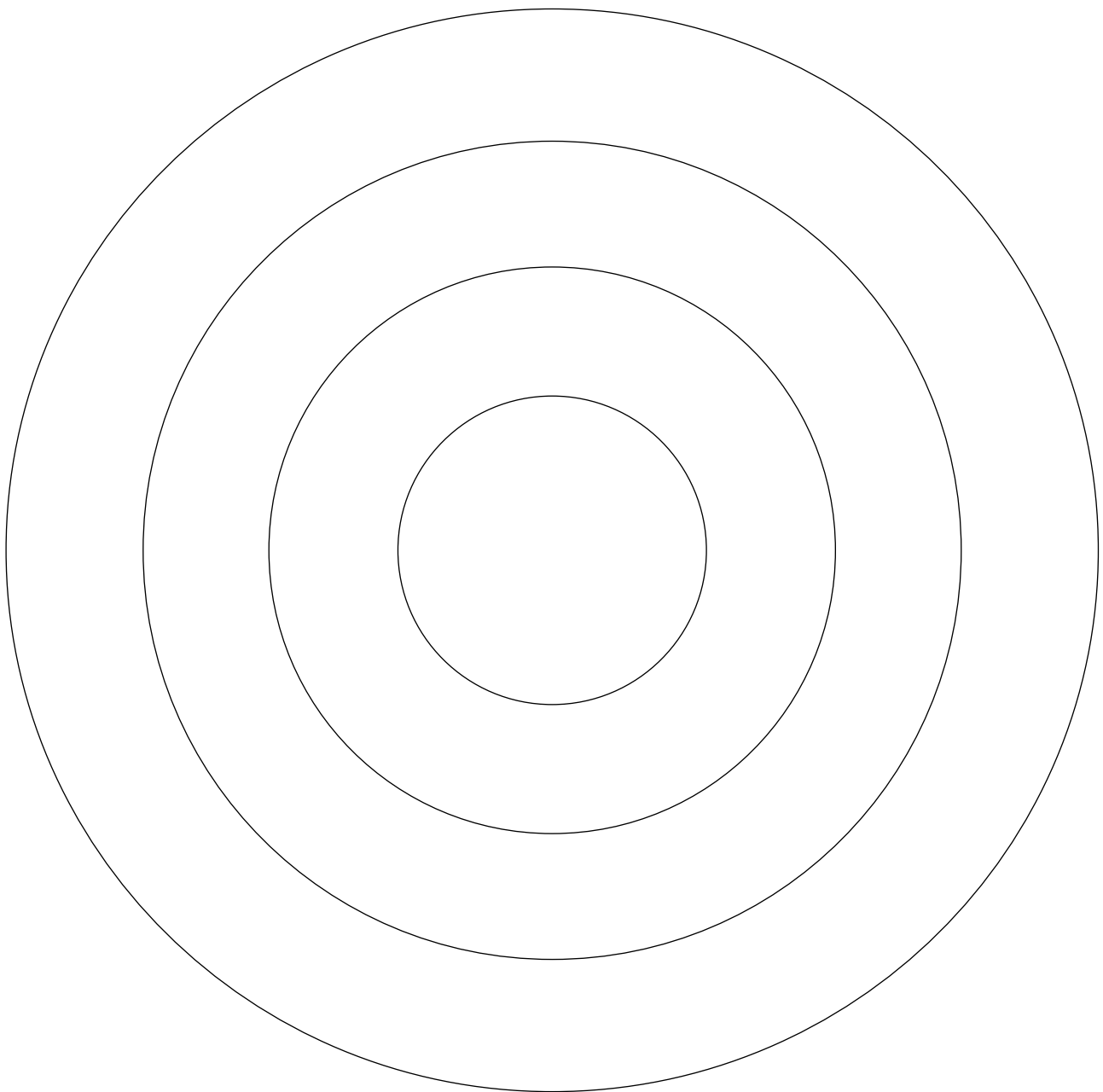


**DECIDE** on an issue that affects changes to the land or sea caused by the production of food. Place the **FOCUS** in the centre of the consequence wheel. Then, **EXPLORE** the focus by asking the question "What are the immediate consequences?"

**DECIDE** on an issue that affects changes to the land by the growing or production of a food or fibre source. Place the focus in the centre of the consequence wheel. Then, **EXPLORE** the focus by asking the question “What are the immediate consequences?”

**WRITE** the immediate consequences in the inner ring around the main idea. **LINK** each consequence to the main idea with a single line. This indicates that they are first order consequences. Continue exploring second, third and fourth order consequences using the outer circles.

Use the four concentric circles below to **EXPLORE** the consequences of an action, issue or trend relevant to the production of food, industrial materials and fibres.

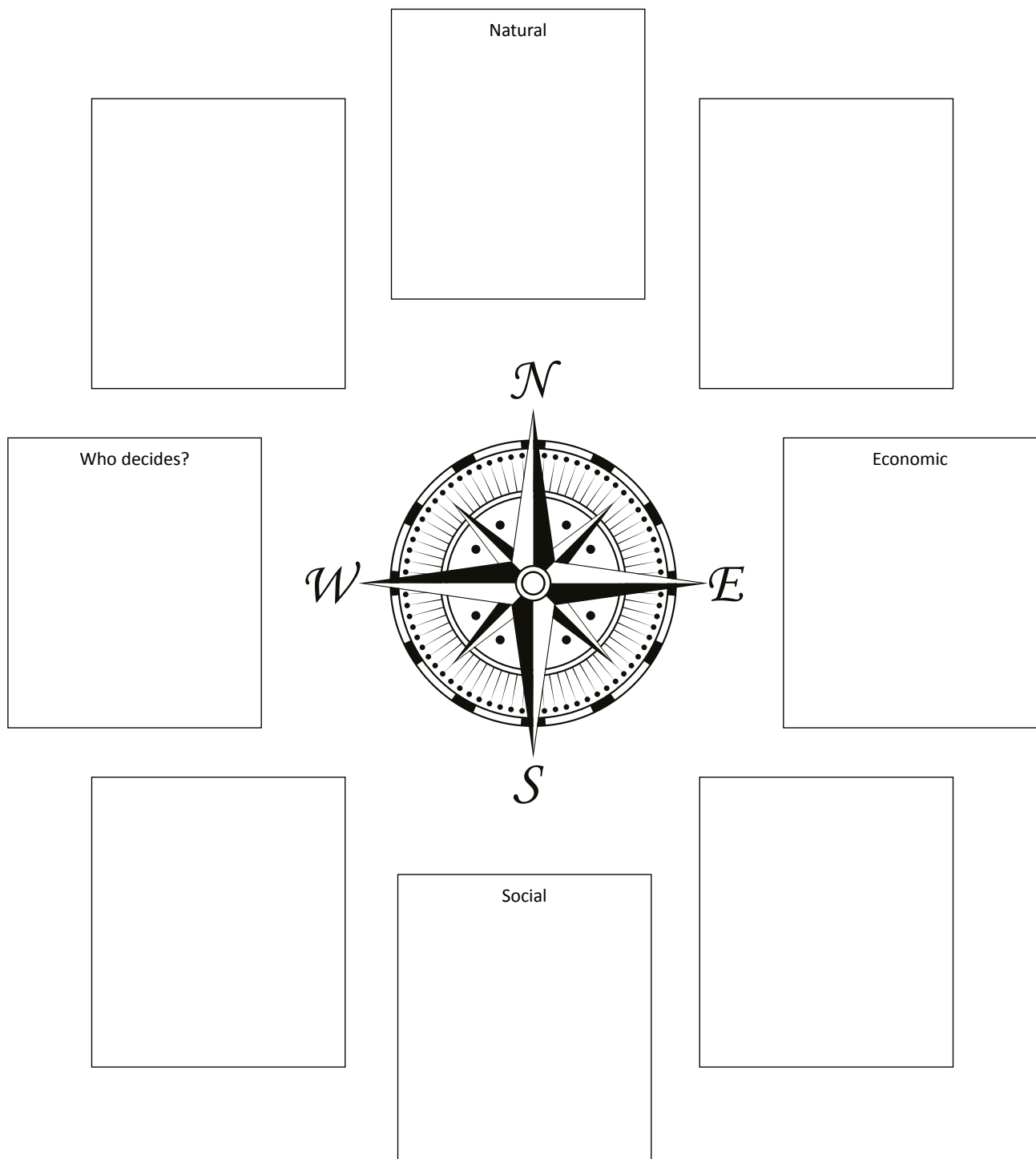




## Resource 1.3

### Compass rose

Use the compass rose to examine your chosen primary industry and its use of sustainable production practices from a variety of perspectives — the 'natural', 'economic', 'social' and 'who decides'.



Source: *Long Ago and Far Away* ISBN: 0 948838 28 0

