



Humanities and Social Sciences

Geography



Year 7 | Stage 4



Table of Contents

	Page
Australian Curriculum	2
Facts about Australian agriculture	4
Virtual video excursions	5
Almonds	6
Beef	10
Careers	15
Cherries	20
Milk	28

Curriculum focus

The resources in the Geography Teacher Manual help teachers and students explore how environmental changes challenge and influence sustainable farm management practices in agriculture. Students explore the Virtual Video Excursion/s for one or more industries and use this information to explore water security and soil management and the significance of geographical locations and landforms.

How to use this Teacher Manual

The Geography Teacher Manual consists of lesson plans and supplementary activities about several agricultural industries in Australia. There are facts about Australian agriculture for your use on page 4, 6, 10, 15, 20 and 28.

First, start with the Springboard virtual video excursions on page 5.

Then, move on to the products or industries within this manual that match your learning aims or interests.

Additional research sources, facts and vocabulary are included within each industry section. They can be used in class discussion or provided to students for their projects.

Use of the From Paddock to Plate Schools Program is subject to Terms of Use, which are available on www.frompaddocktoplate.com.au

Acknowledgements

Founder of From Paddock to Plate, Louise FitzRoy, has produced this national educational resource to be incorporated into the curriculum programs of schools across Australia. Louise would like to sincerely thank passionate farmers, orchardists and producers, for dedicating their valuable time to show her around and answer numerous questions about their industry and livelihood. Louise would also like to acknowledge all the sponsors and supporters of From Paddock to Plate.

Themes and topics:

- Animal welfare
- Biodiversity
- Communications
- Community
- Drought & natural disasters
- Economics
- Employment
- Environment
- Ethics
- Food miles
- Food security
- Food waste & recycling
- Innovation
- Marketing
- Nutrition
- Pests & diseases
- Profitability
- Seasonality
- Soil & pasture management
- Sustainability
- Technology
- Traceability
- Waste management
- Water security



Australian Curriculum Links

All Industries

Year 7

Stage 4

Cross-curriculum priorities

Aboriginal and Torres Strait Islander histories and cultures 

Asia and Australia's Engagement with Asia 

Sustainability 

Lesson 1 Almond Orchards and Water	ACHGK037	Classification of environmental resources and the forms that water takes as a resource
Lesson 1 Almond Orchards and Water	ACHGK039	The quantity and variability of Australia's water resources compared with those in other continents
Lesson 2 The Effects of Water	ACHGK038	The ways that flows of water connect places as it moves through the environment and the way this affects places
Lesson 2 The Effects of Water	ACHGS053	Present findings, arguments and ideas in a range of communication forms selected to suit a particular audience and purpose; using geographical terminology and digital technologies as appropriate
Lesson 2 Plant Science Professionals	ACSHE223	Science knowledge can develop through collaboration and connecting ideas across the disciplines of science
Lesson 2 Plant Science Professionals	ACSHE120	Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations
Lesson 2 Plant Science Professionals	ACSHE121	Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management
Lesson 3 Water Scarcity	ACHGK040	The nature of water scarcity and ways of overcoming it, including studies drawn from Australia and West Asia and/or North Africa
Lesson 3 Water Scarcity	ACHGS053	Present findings, arguments and ideas in a range of communication forms selected to suit a particular audience and purpose; using geographical terminology and digital technologies as appropriate
Lesson 3 Water Scarcity	ACHGS054	Reflect on their learning to propose individual and collective action in response to a contemporary geographical challenge, taking account of environmental, economic and social considerations, and predict the expected outcomes of their proposal
Lesson 4 Case Studies in Water	ACHGK039	The quantity and variability of Australia's water resources compared with those in other continents
Lesson 4 Case Studies in Water	ACHGK040	The nature of water scarcity and ways of overcoming it, including studies drawn from Australia and West Asia and/or North Africa
Lesson 4 Case Studies in Water	ACHGS053	Present findings, arguments and ideas in a range of communication forms selected to suit a particular audience and purpose; using geographical terminology and digital technologies as appropriate



Australian Curriculum Links

All Industries

Year 7

Stage 4

Lesson 4 Case Studies in Water	ACHGS054	Reflect on their learning to propose individual and collective action in response to a contemporary geographical challenge, taking account of environmental, economic and social considerations, and predict the expected outcomes of their proposal
Lesson 5 Liveability	ACHGK043	The factors that influence the decisions people make about where to live and their perceptions of the liveability of places
Lesson 5 Liveability	ACHGK044	The influence of accessibility to services and facilities on the liveability of places
Lesson 5 Liveability	ACHGK045	The influence of environment quality on the liveability of places
Lesson 5 Liveability	ACHGK046	The influence of social connectedness, community identity and perceptions of crime and safety on the liveability of places

Supplementary activity cards relate to these learning outcomes:

Resourcing the Farm – ACHGK037 (classification of resources)

Water Everywhere – ACHGK038 (water connects places)



Facts about the Australian agricultural industry

- The gross value of Australian agriculture increased by \$3.7 billion from 2014–15, to \$58.1 billion in 2015–16.
SOURCE: ABARES, *Agricultural Commodities – June Quarter 2017*.
- In Australia, individuals spent on average \$4739 for food in 2015–16. This includes eating out and non-alcoholic beverages. This amount has risen by 16% during the past six years.
SOURCE: ABS, *Household Expenditure Survey, Australia: Summary of Results, 2015–16, Catalogue No.6530.0*.
- Food imports, particularly for processed food, accounted for only 15 per cent of household food consumption in Australia in 2015–16.
SOURCE: Hogan, Linsday. (2017) *Food demand in Australia: Trends and food security issues*. ABARES research report 17.7, Canberra.
- Out of the \$58.1 billion worth of food and fibre Australian farmers produced in 2015–16, 77 per cent (\$44.8 billion) was exported.
SOURCE: ABARES, *Agricultural Commodities – June Quarter 2017*
- More than 99% of Australia’s agricultural businesses are wholly Australian owned, owning 88% (or 343.3 million hectares) of Australia’s agricultural land. Wholly Australian owned businesses also control 87% of Australia’s agricultural water entitlements (or 13.3 million megalitres).
SOURCE: ABS, *Agricultural Land and Water Ownership, 2015–16, Catalogue No. 7127.0. 2017*
- As of May 2017, 304,200 people were employed in the Australian farm sector — accounting for about 3% of the national workforce.
SOURCE: Australian Bureau of Statistics, *Labour Force, Australia, Detailed, Quarterly, May 2017 Catalogue No. 6291.0.55.003*.
- Across the supply chain agriculture powers 1.6 million jobs.
SOURCE: *Australia’s Farm Dependent Economy: Analysis of the role of Agriculture in the Australian Economy*.
- 216,100 males and 88,100 females are employed in the Australian farm sector
SOURCE: Australian Bureau of Statistics, *Labour Force, Australia, Detailed, Quarterly, May 2017 Catalogue No. 6291.0.55.003*.
- Agricultural businesses occupy and manage 48% of Australia’s landmass, as such, they are at the frontline in delivering environmental outcomes on behalf of the broader community.
SOURCE: Australian Bureau of Statistics, *Land Management and Farming in Australia, 2015–2016, Catalogue No. 4627.0*.
- At 30 June 2016 there were 371 million hectares of agricultural land in Australia, a 1.4% increase on the previous year.
SOURCE: Australian Bureau of Statistics, *Land Management and Farming in Australia, 2015–2016, Catalogue No. 4627.0*.
- Australian primary industries have led the nation in reducing greenhouse gas emissions intensity — a massive 63% reduction between 1996–2016.
SOURCE: Australian Bureau of Statistics, *Australian Environmental-Economic Accounts, 2017, Catalogue No. 4655*
- Australian water consumption decreased in 2014–15 by 7% from 2013–14. The largest decrease in water consumption was in the agriculture industry.
SOURCE: Australian Bureau of Statistics, *Water Accounts, 2014, Catalogue No. 4655*.
- Agricultural businesses spend a significant amount on managing pest animals and weeds. An average of \$19,620 was spent per agricultural business on undertaking pest animal and weed management activities.
SOURCE: Stenekes, N, Kancans, R and Binks, B, 2017, *Pest animal and Weed Management Survey: National landholder survey results*, ABARES research report 17.5, May. CC BY 4.0.
- Australian farmers are among the most self-sufficient in the world, with government support for Australian farms representing just 1% of farming income. By comparison, in Norway it is 62%, Korea 49%, China 21%, European Union 19% and United States 9%.
SOURCE: OECD (2017), *Agricultural Policy Monitoring and Evaluation 2017*, OECD Publishing, Paris.



Virtual video excursions Let's get started

All Industries

Year 7

Stage 4

If this is your first time teaching with the From Paddock to Plate Schools Program, welcome! When planning your lessons, you may first like to read the Welcome Guide on our website.

www.frompaddocktoplate.com.au/school-programs/

Assessing prior knowledge

Kick off by understanding the level of knowledge your students have of farming in Australia. This will determine your structure of delivery.

- ASK the students to describe and list what they know about farming in Australia.
- EXPLORE the facts about Australian agriculture (page 4).
- BRAINSTORM and gather ideas, questions and information from the class and use this as a platform to begin this unit. What information do students want to confirm, check, debate or explore?
- DISCUSS any questions that arise.



Now is the time to choose and watch a selection of the **From Paddock to Plate Virtual Excursions**.

You can find them all on the From Paddock to Plate website. Log in and choose your year level, subject or industry of interest:

www.frompaddocktoplate.com.au

Ask students to reflect on what they already know about this industry and what the video showed them that was new, or that changed their thinking.



WATCH
THE VIRTUAL
EXCURSION





ALMONDS

Almonds

Year 7

Stage 4



Ask students first to reflect on the *From Paddock to Plate Almonds Virtual Video Excursion*:

- How do almonds grow?
- What does an orchard look like?
- What can they say about the paddock to plate journey of almonds and almond products?
- What did they learn that they hadn't considered before?
- What would they like to know more about the almonds industry in Australia?

Facts and Vocabulary - Almonds

Facts about the Australian almond industry

- Australian growers produce approximately 10% of the total volume of almonds grown in the world.
- Orchard area planted to almonds increased by 15.8% or 4,904 hectares in 2016 to now total 35,886 hectares
- The number of almond trees now planted in orchards totals more than 10 million.
- Two million virus tested buds were delivered by the ABA to nurseries for grafting to produce healthy trees
- 2016 production of 82,333 tonnes was slightly less than the 2015 harvested crop
- Australia produced 7.7% of the global crop to remain the world's second largest producer behind the USA that grew 80% of world production
- Almonds were 62% of Australia's total tree nut crop that includes macadamias, walnuts, pistachios, hazelnuts and chestnuts (measured as inshell tonnage)
- 97% of almond orchards are efficiently irrigated using drip systems managed by soil moisture monitoring technology
- Annual per capita consumption of almonds in Australia is increasing strongly and exceeded one kilogram for the first time in 2016/17
- Australia ranks 6th in per capita consumption globally
- Domestic sales tonnage increased by 9.9%
- 46.7% of Australian households purchased almonds in the year ending February 2017
- Almond demand by manufacturers was boosted with 274 new products reaching supermarket shelves in 2016
- Australian almonds were exported to 46 countries
- Almond exports earned the nation \$464 million
- For every one tonne of almonds sold in Australia, 2.7 tonnes were sold overseas
- India was the single largest destination for exports
- Europe as a region consumed 43.2% of Australia's almond exports with sales of \$200.3 million
- East Asia is an emerging market for Australian almonds taking 13.8% of total exports

SOURCE: ABS, Household Expenditure Survey, Australia: Summary of Results, 2015–16, Catalogue No.6530.0.



Useful words and phrases

- Activated almonds
- Almond meal
- Almond milk
- Australian Stock Exchange
- Bacteria
- Belly dumper
- Biomass
- Blanch
- Conveyor belt
- Deciduous
- Drupe
- Export
- Fertigation
- Foliage
- Geographic diversity
- Hi vis clothing
- Hulling process
- Husk
- Irrigation
- Kernel
- Laser sorter
- Microorganisms
- Non-pollinator
- Pasteurisation
- Pollination
- Prune
- Quality assurance
- Renewable energy
- Salmonella
- Self-pollinator
- Shelling
- Stock feed
- Stock pad
- Stockpile
- Weighbridge



Lesson 1

Almond Orchards and Water

Themes

Resources Harvest	Sustainability	Seasonality	Environment
----------------------	----------------	-------------	-------------

Almonds

Year 7

Stage 4

ACHGK037

Classification of environmental resources and the forms that water takes as a resource

ACHGK039

Classification of environmental The quantity and variability of Australia's water resources compared with those in other continents



Water in context

Students DETERMINE just how important water is for growing and processing almonds.

Direct them to consider:

- Water helps in the germination of seeds.
- Water helps in the process of photosynthesis by which plants prepare their food.
- Water helps in the transport of nutrients and minerals from the soil to the plants.
- Water helps in the maintenance of the plant structure by providing the appropriate pressure to the plant tissues.
- Water provides habitat in the form of ponds, rivers, lakes and sea for a large number of plants.

Students FIND OUT whether too much rain can cause problems for almond farmers. What happens?

Fert and irrigation

DISCUSS the methods used by Select Harvests to water the almond trees.



LOOK at the irrigation system set up in this almond orchard. (4:46)

As a class, TALK about fertigation.

Recommended source material:

'Analysis of 112 studies into drip vs flood irrigation (in comparable situations) revealed that water savings of 15–55% and yield increases of 18–50% are achievable.'

– Irrigation Australia



Lesson 1: Almond Orchards and Water (continued)



“In terms of these trees and the tree health, for 12 months of the year we’re irrigating with water. Because of the harvesting process where we put nuts onto the ground to do drying, we don’t put fertiliser on top of the soil because it can contaminate the nuts. So we put the fertiliser into the irrigation lines and it comes out through these pipes and that’s called fertigation. We do this throughout the year to make sure that the trees have the nutrients to grow big and strong for the harvesting process.”

(4:30 – 5:00)



“If you’re wondering where the water comes from to irrigate our trees, it actually comes from the Murray River. We pump about seven kilometres of inland pipe up to a dam, and then throughout the day we irrigate the trees.”

(5:00 – 5:13)

Did you know?

‘Irrigation water that contains high levels of total soluble salts (salinity) can affect the growth and yield of fruits and vegetables. Good management can reduce the effect of salty irrigation water on crop yields. It is important to:

- Maintain adequate soil moisture at all times.
- Schedule irrigations to match crop water requirements.
- Allow a leaching fraction above demand to reduce salt build up.
- Regularly monitor salinity levels.’

– Victorian Department of Agriculture

Students DEFINE salinity and DETERMINE how salinity affects crop production.

For example:

- Salt makes it more difficult for the plants to absorb water from the soil.
- Excessive uptake of salts by plants from the soil may also have a direct toxic effect on the plants.
- Saline water applied through sprinkler irrigation, depending on the concentration of salts, can also damage the leaves by burning the leaf edge.
- Sodium in irrigation water can also damage plants causing leaf burn and scorch.



BEEF

Beef

Year 7

Stage 4



Ask students first to reflect on the *From Paddock to Plate Beef Virtual Video Excursion*:

- What does a cattle farm look like?
- What can they say about the paddock to plate journey of beef?
- What are three concerns about resources that beef farmers consider?
- What did they learn that they hadn't considered before?
- What would they like to know more about the beef industry in Australia?

Facts and Vocabulary - Beef

Facts about the Australian beef industry

- In total, Australian beef cattle farmers produce 2.5 million tonnes of beef and veal each year
SOURCE: ABARE, Australian Commodity Statistics, 2016.
- The beef industry accounts for 55% of all farms with agricultural activity.
SOURCE: Meat & Livestock Australia, Fast Facts 2017: Australia's Beef Industry.
- The gross value of Australian cattle and calf production (including live cattle exports) in 2015–16 was \$12.7 billion
SOURCE: Meat & Livestock Australia, Fast Facts 2017: Australia's Beef Industry.
- Australians eat an average 26kg of beef per person, per year. Remarkably, this has remained relatively constant for the past 15 years
SOURCE: Meat & Livestock Australia, Fast Facts 2017: Australia's Beef Industry.
- In 2015–16, Australians spent \$8.5 billion on beef. In terms of volume, beef is the third most popular fresh meat consumed through the food service industry after chicken and seafood
SOURCE: Meat & Livestock Australia, Fast Facts 2017: Australia's Beef Industry.
- Australians remain the second-largest consumers of meat per capita, and the sixth-largest consumers of beef in the world, averaging 26 kg per person in 2016
SOURCE: Meat & Livestock Australia, Fast Facts 2017: Australia's Beef Industry.
- Australia exported 962,983 tonnes of beef in 2016–17, worth \$8.5 billion. The major export markets for beef are Japan (29%), the United States (21.7%) and Korea (16.8%).
SOURCE: Meat & Livestock Australia, Fast Facts 2017: Australia's Beef Industry.
- Australian live cattle exports are worth \$1.2 billion in 2016–17 – predominantly exported to Indonesia (58.7%), Vietnam (17.7%) and China (8.2%).
SOURCE: Meat & Livestock Australia, Fast Facts 2017: Australia's Beef Industry.
- Australia produces 3% of the world's beef, and was the third largest beef exporter during 2016–17.
SOURCE: Meat & Livestock Australia, Fast Facts 2017: Australia's Beef Industry.



Useful words and phrases

- Abattoir
- Arbitrage
- Australian Certified Organic
- Barley
- Bear market
- Boning room
- Bovine
- Bovine spongiform encephalopathy (also known as 'mad cow disease')
- Bull
- Bull market
- Butcher
- By-product
- Carcase weight
- Chorizo
- Dressed weight
- Eastern Young Cattle Indicator (EYCI)
- Export market
- Fat score
- Feedlot
- Grain-fed
- Grass-fed
- Heifer
- Holistic
- Livestock agent
- Marbling
- Meat Standards Australia
- Muscle score
- National Livestock Identification System
- Omega-3
- Organic
- Pastrami
- Premium
- Restocker
- Rotational grazing
- Rump steak
- Sold to the trade
- Steer
- Stocking density
- Store sale
- Trade buyers
- Vealer
- Yearling
- Wagyu



Lesson 2

The Effects of Water

Themes

Community	Conservation	Economics	Rivers
Water use	Sustainability		

Getting started

ASK students to answer the question: how does water connect places?

Suggestions may range from two townships sharing the same lake or beach; areas upstream affecting those downstream or rubbish from one place washing up at another; shared and managed water allocations; tourism; the environmental value of water to a place and its living things (e.g. wetlands to breeding bird populations or migration).

Effects of water

DISCUSS the environmental, economic and social effects of water. Some ideas are presented below, but there are many more effects under each of these categories.

Environmental effects of water:

- Water can benefit a place and it can destroy it (e.g. flooding).
- Conservation in one place should not be achieved at the expense of the environment in another place.

Economic effects of water:

- Water is an essential resource for all living things.
- Water should be affordable so that it is accessible to all.

Social effects of water:

- People connect to places of water (beaches, rivers, lakes) and these places can have significant cultural value.
- Any land use or activity should seek to benefit a range of people in society, and not exploit, endanger or disrespect any group.

As a whole class, add other suggested effects of water under these three categories: environmental, economic and social.

Beef

Year 7

Stage 4

ACHGK038

The ways that flows of water connect places as it moves through the environment and the way this affects places

ACHGS053

Present findings, arguments and ideas in a range of communication forms selected to suit a particular audience and purpose; using geographical terminology and digital technologies as appropriate





Lesson 2: The Effects of Water (continued)

The Blackwood River

Explain the following using a map of the Blackwood River. Trace the path of the river on a digital or print map, pointing out to the class where it begins and where it emerges into Flinders Bay.

The Blackwood River is a major river and catchment that runs by Warren's farm at Boyup Brook in the South West of Western Australia.

The upper or larger catchment area of the river is in agricultural areas, while the middle catchment area passes through forest areas, and the lower portion of the river passes into mixed forest, agricultural and residential lands.

Research assignment



Write the following statement on the board:

The Blackwood River is of considerable importance to farmers and teachers in the region.

Students will respond to this statement either in a written or spoken presentation.

They should use the source material below (as well as other sources, time permitting – including Warren's comments in the Beef Virtual excursion video). Students could even use the Paddock to Plate app to locate and contact farmers around Australia to comment on the question, if time permits.

Tell students that their response must talk about the environmental, economic and social aspects of the Blackwood River.

Recommended source material:

'The results of this study indicate that the Blackwood River downstream of Nannup is a key outdoor education site for the State. The importance of this part of the river is highlighted by the large number of high school students that use it for outdoor and nature-based education activities such as paddling, nature walks and camping.

Excursions to the river occur through individual school-based programs and through commercial tour operators. It is estimated that in recent years around 1,700 school students per annum use the Blackwood River for outdoor education. Explorus Adventure Learning is a large commercial tour operation that caters for a large percentage of the outdoor education camps that occur on the Blackwood River. Explorus currently spends approximately 1000 student days for canoeing and 1800 student days for camping and nature walks in the Blackwood River area, which equates to approximately 800 students per annum...'



Lesson 2: The Effects of Water (continued)

Recommended source material (continued):

'...These students represent in the order of 10 to 20 schools, the majority being metropolitan-based.'

- Social water requirements for the Blackwood groundwater area, Department of Water, Government of Western Australia

Activity card:

Resourcing the Farm

After watching the Beef Virtual Video Excursion, DISCUSS and EXPLORE the different resources that beef producer, Warren, uses on the farm. Make a list.

For example:

- Rainfall
- Wind
- Solar energy
- Diesel
- Timber

CLASSIFY resources into environmental, renewable, non-renewable and continuous resources.

ACHGK037

Classification of environmental resources and the forms that water takes as a resource



Activity card:

Water everywhere - but not a drop to drink!

Explain that 70% of the earth's surface is covered with water – but only 1% of the world's water is fresh and available for human use.

EXPLAIN and CREATE an annotated diagram to DEMONSTRATE how water flows through the environment and connects places.

DISCUSS how water is a limited resource, under threat due to increasing population, overconsumption and pollution, and how it must be carefully managed to ensure its availability now and into the future.

ACHGK038

The ways that flows of water connect places as it moves through the environment and the way this affects places





CAREERS

Careers

Year 7

Stage 4



Ask students first to reflect on the *From Paddock to Plate Careers Virtual Video Excursion*:

- What are some of the varieties of grains they saw in the video?
- What different careers do people have in the grains industry?
- Are there careers they had not heard of before? What were they?
- Are there any careers they would like to explore in more detail?

Facts and Vocabulary - Careers

Facts about careers in the Australian agricultural industry

- About 50% of all jobs in the agriculture industry are in capital cities. These jobs include environmental management, research, development, agribusiness and education.
SOURCE: St Joseph's College Geelong, Weekly Career News, 19 June 2018
- The demand for agricultural science graduates grew strongly over the past 5 years and around 6000 job openings will be available by 2020.
SOURCE: St Joseph's College Geelong, Weekly Career News, 19 June 2018
- Experts are needed in the areas of sustainable farming practices, land management, land conservation, climate change practices, food security, agricultural research and policymaking.
SOURCE: St Joseph's College Geelong, Weekly Career News, 19 June 2018
- 'Here are the top 10 most in-demand and highest-paying agriculture careers:
 10. Agricultural Operations Manager: Not to be confused with farm managers, agricultural operations managers are typically in charge of maintaining processes in huge agribusinesses such as grain manufacturing and mills.
 9. Animal Geneticist: Nope. Animal geneticists aren't responsible for creating the Indominus Rex (a writer did that!), but they are responsible for discovering what makes animals weak and what keeps them strong.
 8. Food Scientist: If you've ever wondered who's responsible for creating the nutritional information printed on the back of your pack of chips, well, you've guessed it: it's food scientists.
 7. Agricultural Engineer: If you're fascinated with the film Transformers, and you enjoy the idea of machines helping humans, then you might want to be to be an agricultural engineer.
 6. Agronomy Sales Manager: One of the main drivers of the agricultural industry is agronomy sales managers. These professionals are responsible for training the team that will travel to different places to educate farmers on how to care for their land and crops properly.
 5. Bioinformatics Scientist: Plant and animal life is widely diverse, which is why gathering and updating information on all of them is incredibly difficult – and that's where bioinformatics scientists come in.
 4. Environmental Engineer: There would be nothing to harvest if the conditions for planting and growing are poor; that's why the work of environmental engineers is so important to agriculture.
 3. Biochemist: Biochemists study and analyse different living organisms to look for new ways to improve human lives. In the field of agriculture, their work primarily involves developing new crops that are more resistant against natural elements like drought, storms or even insect infestations.
 2. Agricultural Economist: To work as an agricultural economist, you must be prepared to wear different hats. Not only do they work as researchers and market analysts, but they're also business advisors, consultants and land appraisers.
 1. Agricultural Lawyer: Agricultural lawyers are responsible for mitigating disputes on land while making sure that all government regulations are adhered to.'

SOURCE: CareerAddict, Top 10 Highest-Paying Careers in Agriculture, by Michi Ancheta, 27 September 2018



Useful words and phrases

- Aptitude
- Attitude
- Body language
- Budget
- Career
- Career clusters
- Communication
- Consumers
- Coworkers
- Decision-making process
- Discriminate
- Economy
- Employee
- Employer
- Ethics
- Entrepreneur
- Free enterprise
- Full-time
- Goods
- Income
- Interest inventory
- Income tax
- Interests
- Job market
- Job
- Learning styles
- Lifestyles
- Minimum wage
- Overtime
- Part-time
- Personality
- Producers
- Salary
- Skill
- Supervisor
- Time management
- Values
- Wages
- Workers' compensation
- Work place



Lesson 3

Water Scarcity

Themes

Conservation Sustainability	Drought Water scarcity	Economics Water security	Environment
--------------------------------	---------------------------	-----------------------------	-------------

Getting started

Ask the class to DEFINE water scarcity.

EXPLAIN that there are different kinds of water scarcity, including:

- An absolute shortage of water (physical scarcity)
- Inadequate development of water resources (economic)
- Unsustainable or inequitable access to water

DISCUSS the circumstances in which each of these types of scarcity might occur, e.g. a drought, a country's reliance on purchasing water from another country, privatisation of the source of safe water in poverty-stricken areas (people can't afford it).

ADD to the class definition to take into account these kinds of scarcity.

Causes of water scarcity

Read these facts to the class:

'At least one-eighth of the world's population does not have access to safe drinking water'

– World Health Organization

'Eighty per cent of diseases in the developing world are caused by contaminated water.'

– WaterAid

INVESTIGATE and QUESTION the causes of water scarcity. Who is responsible for addressing:

- local water scarcity;
- national water scarcity; and
- global water scarcity?

Careers

Year 7

Stage 4

ACHGK040

The nature of water scarcity and ways of overcoming it, including studies drawn from Australia and West Asia and/or North Africa

ACHGS053

Present findings, arguments and ideas in a range of communication forms selected to suit a particular audience and purpose; using geographical terminology and digital technologies as appropriate

ACHGS054

Reflect on their learning to propose individual and collective action in response to a contemporary geographical challenge, taking account of environmental, economic and social considerations, and predict the expected outcomes of their proposal





Lesson 3: Water Scarcity (continued)

Our water supplier

Students VISIT the state or territory's water corporation website.

They find out where the state or territory obtains its water for agricultural, industrial and domestic use.

Students INVESTIGATE the price a local household pays for water consumption per litre. Students compare this price to the price per litre of other liquid commodities such as soft drinks and petrol.

DISCUSS the advantages and disadvantages of pricing water in this way (e.g. is petrol a universal human need for survival?)

Students explore the range of careers in their local water authority, perhaps by asking a local water education representative. They find out what role water authorities play in communicating with the public, industry and government to prevent water scarcity.

What's the difference between conservation and sustainability? You may want to discuss this with students.

Conservation is the preservation and repair of places. In environmental terms, this includes plants and living communities, soil, habitat and water. Conservation also means prevention of the wasteful use of something, e.g. conservation of water.

Sustainability is the maintenance of balance in natural systems. It has been defined as 'enough, for all living things, forever'.

Ask students to explain to you how conservation and sustainability are the same, how they are different, and how they relate to each other.

Water for the future

Water for the Future is the Australian Government's long-term initiative to better balance the water needs of communities, farmers and the environment.

It is built on four key priorities:

1. Taking action on climate change
2. Using water wisely
3. Securing water supplies
4. Supporting healthy rivers and wetlands

DISCUSS and LIST students' suggestions for actions on each of the four key priorities above.



Lesson 3: Water Scarcity (continued)

Disruption and water

Students CONSIDER how water scarcity and a changing climate could cause disruptions to global grain production. What problems do they anticipate, and what questions do they recommend agriculture research and development teams work on to help alleviate the impact of such problems?

They explore these quotes from the *From Paddock to Plate Careers Virtual Video Excursion* as a part of their research.



“We’re a no-till farm or a minimum till farm. We only work the ground once. We don’t plough. Everything is just sprayed in front and then the crop is directly sown into that ground with the seeding equipment.”

(1:32 – 1:45)



“To deal with climate change and global warming, we’ve had to change our farming practices over the last 20 years. Before minimum till it was all plough, work back, seed, sometimes you’d have to cultivate a second time. Now the whole operation is done in one pass. A lot of it is done dry before the season breaks so we can maximise our water use.”

(7:23 – 7:47)



Students PRESENT a report, supported by graphic representations, to communicate a reasoned argument for specific actions to ensure future water security.

Teacher resource:

- Global Water Partnership: www.gwp.org



CHERRIES

Cherries

Year 7

Stage 4



Ask students first to reflect on the *From Paddock to Plate Cherries Virtual Video Excursion*:

- How do cherries grow?
- What role does water play in cherry growing and processing?
- What can they say about the paddock to plate journey of Australian cherries?
- What did they learn that they hadn't considered before?
- What would they like to know more about the fruit growing / orcharding industry in Australia?

Facts and Vocabulary - Cherries

Facts about the Australian cherry industry

- Cherries are a small, plump stone fruit and a member of the Rosacea (rose) family that also includes almonds, peaches, apricots and plums.
- The top four cherry producing countries (Turkey, USA, Iran and Italy) account for approximately 50% of the world's cherry production.
- Australia is a relatively small cherry producer by world standards, only producing approximately 0.5% of the world's total cherry production.
- Currently up to 15,000 tonnes of Australian cherries are produced every year with 30% exported. This number is expected to rise to 20,000 tonnes and 50% exported by 2020.
- The Australian industry is spread over six states with around 2,845 hectares under production and 485 grower enterprises currently operating.
- New South Wales and Victoria are the two largest producers of cherries. Tasmania has had a rapid expansion in plantings and is currently the third highest producer. It has a strong export focus, enhanced by its relative pest and disease freedom. South Australia is the fourth largest producer with a significant proportion of its production sold interstate and a small percentage also exported. Both Western Australia and Queensland are relatively small producers primarily focusing on their domestic markets.
- Australian cherries are available from mid/late October to late February, depending on the state and seasonal calendar due to climatic variation, varieties and growing season.
- There are two main cherry species:
 - Sweet cherries (*Prunus avium* L.) are often sold as just generic fresh cherries.
 - Sour cherries (*Prunus cerasus* L.) are mostly used in processed products such as freezing, canning and juices or typically preserved and used in cooking or for making cherry brandy.
- Today there are over 50 varieties grown and many more are being developed in Australia.
- Sour cherries are more commonly grown in Europe but some plantations exist in Victoria South Australia and Tasmania.
- The most well known sour cherry is the Morello.
- A study published in the American Journal of Clinical Nutrition found that sour cherries ranked 14 in the top 50 foods for highest antioxidant content per serve – and are among well-known 'superfoods' such as red wine, berries and dark chocolate.

SOURCE: Cherry Growers Australia Inc.



Useful words and phrases

- Bird damage
- Blossom
- Certified organic
- Cherry season
- Cherry variety
- Commercially available
- Cool store
- Cross compatibility
- Cultivar
- Domestic market
- Earwigs
- Export
- Fertigation
- Fertiliser
- Flowering
- Frost
- Fruit maturity
- Fruit set
- Grading equipment
- Gross value
- Growing season climatic conditions
- Global cherry production
- Hail netting
- Hand picked
- Harvest
- Irrigation
- Microclimate
- Morello
- Orchardists
- Packing shed
- Pollenisers
- Providence
- Pruning
- Rootstock
- Seasonality
- Shelf life
- Sour cherries
- Sweet cherries
- Sweetheart
- Thinning
- Topography
- Tree vigour
- Verticillium wilt fungus



Lesson 4

Case Studies in Water

Themes

Conservation Sustainability	Environment Water scarcity	Economics Water security	Drought
--------------------------------	-------------------------------	-----------------------------	---------

Getting started

Students select one of the two following case studies to research further. They present a report, discussion paper, slide show or short essay on the topic: 'How water scarcity and a changing climate could impact the sustainability of the world's overall fruit production.'

Case study 1

Students focus on the Middle East. They INVESTIGATE how water scarcity in Middle Eastern and North African countries is affecting food trade and peace. They will first need to define the region and summarize its food production, specifically fruit growing, before presenting their thoughts on the question:

How water scarcity and a changing climate could impact the sustainability of the world's overall fruit production.

Recommended source material:

'The MENA (Middle Eastern and North African) region is dominated by an arid and semi-arid climate. Irrigation is of crucial importance for agricultural production. However, the lack of water resources has limited the expansion of irrigation, posing a constraint to food production. On the other hand, the continuous population growth has led to ever greater demand for food. Increasing amount of food has been imported to fill in domestic shortfalls. The import, in essence, reduces the water demand in domestic food production. Allan (1997) termed the food import for compensating the water scarcity as 'virtual water'.

– *Water Scarcity and Food Trade in the Middle Eastern and North African Countries*, The Modelling and Simulation Society of Australia and New Zealand Inc. (MSSANZ)
www.mssanz.org.au/MODSIM07/papers/16_s9/WaterScarcity_s9_Yang_.pdf

Cherries

Year 7

Stage 4

ACHGK039

The quantity and variability of Australia's water resources compared with those in other continents

ACHGK040

The nature of water scarcity and ways of overcoming it, including studies drawn from Australia and West Asia and/or North Africa

ACHGS053

Present findings, arguments and ideas in a range of communication forms selected to suit a particular audience and purpose; using geographical terminology and digital technologies as appropriate

ACHGS054

Reflect on their learning to propose individual and collective action in response to a contemporary geographical challenge, taking account of environmental, economic and social considerations, and predict the expected outcomes of their proposal





Lesson 4: Case Studies in Water (continued)

Recommended source material (continued):

'Given Jordan's high water prices and the large costs and energy demands associated with new projects, conventional supply-side water management is reaching its limit. Demand management options have not yet been implemented and have great potential. Demand management options include: greater reliance on food imports (with associated virtual water imports); reducing water loss in urban systems which is over 50 per cent of total volumes (Potter 2010); substituting treated waste water for freshwater use in agriculture; increased energy efficiency in the water sector; and energy recovery from waste water.'

– Water Scarcity Regional Collaborative Platform in the Near East and North Africa
(WATERSCOP NENA)

'Water supplies across the Middle East will deteriorate over 25 years, threatening economic growth and national security and forcing more people to move to already overcrowded cities, a new analysis suggests. As the region, which is home to over 350 million people, begins to recover from a series of deadly heatwaves which have seen temperatures rise to record levels for weeks at a time, the World Resources Institute (WRI) claims water shortages were a key factor in the 2011 Syria civil war. "Drought and water shortages in Syria likely contributed to the unrest that stoked the country's 2011 civil war. Dwindling water resources and chronic mismanagement forced 1.5 million people, primarily farmers and herders, to lose their livelihoods and leave their land, move to urban areas, and magnify Syria's general destabilisation," says the report. New WRI rankings place 14 of the world's 33 most water-stressed countries in the Middle East and north Africa region (Mena), including Bahrain, Kuwait, Qatar, the United Arab Emirates, Palestine, Israel, Saudi Arabia, Oman, Iran and Lebanon. Companies, farms and residents in these countries are all highly vulnerable to the slightest change in supplies, says the WRI.'

– *Middle East faces water shortages for the next 25 years, study says* by John Vidal, The Guardian, 28 April 2015: www.theguardian.com/environment/2015/aug/27/middle-east-faces-water-shortages-for-the-next-25-years-study-says

'With regional violence and political turmoil commanding global attention, water may seem tangential. However, drought and water shortages in Syria likely contributed to the unrest that stoked the country's 2011 civil war. Dwindling water resources and chronic mismanagement forced 1.5 million people, primarily farmers and herders, to lose their livelihoods and leave their land, move to urban areas, and magnify Syria's general destabilization. The problem extends to other countries. Water is a significant dimension of the decades-old conflict between Palestine and Israel. Saudi Arabia's government said its people will depend entirely on grain imports by 2016, a change from decades of growing all they need, due to fear of water-resource depletion...'



Lesson 4: Case Studies in Water (continued)

Recommended source material (continued):

'... The U.S. National Intelligence Council wrote that water problems will put key North African and Middle Eastern countries at greater risk of instability and state failure and distract them from foreign policy engagements with the U.S.'

– *Ranking the World's Most Water-Stressed Countries in 2040* by Andrew Maddocks, Robert Samuel Young and Paul Reig, World Resources Institute, 26 August 2015: www.wri.org/blog/2015/08/ranking-world's-most-water-stressed-countries-2040

Case study 2

Students focus on Tasmani and Turkeya. They EXAMINE plans to plant a cherry orchard in a 'patch of dry sheep farming country' in Tasmania and COMPARE this region to Hatay, a southern Turkish province on the Mediterranean coast, that both have economies and communities based on irrigation. They will first need to examine fruit orcharding in both areas and summarise these before presenting their thoughts on the question:

How water scarcity and a changing climate could impact the sustainability of the world's overall fruit production.

Recommended source material:

'A patch of dry sheep farming country in Tasmania is set to be transformed, by way of new irrigation and a giant greenhouse, into a cherry orchard. The Midlands irrigation scheme in the state's south has allowed prominent fruit growing family the Reids to turn the windswept hills of Jericho into prime agricultural land, and the new frontier for fruit growing. Tim Reid said it was a great opportunity for Tasmanian growers. "With the Midlands water scheme it's a possibility and so we are going to take advantage of that," he said. "So all these paddocks up over the hills, the dry hills here, you'll see cherry orchards in the next 12 months."

– *Cherry orchards set to be planted in Tasmania's formerly dry Southern Midlands after new irrigation* by Fiona Breen, ABC News, 30 November 2015: www.abc.net.au/news/2015-11-29/cherries-orchards-planted-in-newly-irrigated-southern-midlands/6980790



Lesson 4: Case Studies in Water (continued)

Recommended source material (continued):

'A southern migration from Victoria to Tasmania has proven a sound choice, helping a trio of dairy farmers flourish. Mr Williamson said when he moved to Waaia, demand for properties in the highly productive region was intense. "When my wife and I went there in 1992 it was the place to go," he said. But a succession of droughts and changes in water policy changed the outlook. The Murray Valley farmers were flood irrigated, but the Murray–Darling Basin Plan created uncertainty for dairy farmers. "We were involved with Goulburn–Murray Water shutting our channel down so we weren't sure whether our future water availability was going to be there," Mr Williamson said. "They were forced into making us get our water through alternative ways because they wanted to shut channels down for water savings, which was fine, but a lot of the time it came at the cost of the farmer. As time went on they kept on changing their water policy rules and they'd give you less water and charge you more for it. We were just over it. That's why we are here. We'd had enough." Over the past 10 years, Tasmania has seen a rapid expansion in irrigation schemes. State-owned Tasmanian Irrigation has set up 13 schemes with 95 per cent surety with more schemes under development. Mr Williamson said paying for scheme water in Tasmania was drastically more affordable than under the Basin Plan. "To give you an example, our power costs this year were less than our fixed charges from Goulburn–Murray Water over there for the year, if you were not irrigating," he said. "We irrigated for the season here for less than what our fixed charges were in Victoria."

– *Dairy farmers' relocation to lush Tasmania from dry Victoria a success for three young families* by Margot Kelly, ABC News, 8 October 2018: www.abc.net.au/news/rural/2018-10-08/southern-migration-for-dairy-farmers/10348882

"There are claims that as Tasmanian farmers face an impending drought, some are taking water from river systems they have not paid for. Melbourne-based investor David Williams owns \$15 million worth of water in Tasmania's irrigation schemes. He believes more water is going missing than can be accounted for through evaporation losses and wants authorities to keep a closer eye on the state's catchments. "If there's no policing there's going to be anarchy," he said. "We have to have some policing, it's not acceptable to let people take some water out of those river systems and irrigation systems for free when farmers have paid good money — including myself — have paid good money to get access to that water." Mr Williams owns water in state-owned company Tasmanian Irrigation's Midlands and Lower South Esk schemes. He said taking water without a licence was unfair for farmers and businessmen who have contributed money to fund the state's irrigation schemes.'

– *Irrigation scheme investor raises allegations some Tasmanian farmers are taking water illegally* by Alex Blucher, ABC News, 9 November 2015: www.abc.net.au/news/2015-11-08/tasmanian-irrigators-want-policing-to-prevent-water-theft/6922156



Lesson 4: Case Studies in Water (continued)

Turkey

Recommended source material:

'Studies to determine production potential and possible problems in the Hatay region revealed that the origins of the sweet cherries grown in the region are unknown, and an important cultivar mixture was observed as well. Moreover, significant problems were determined for orchard establishment, cultivar selection, irrigation, fertilization, pruning, cultivation techniques, harvesting and postharvest applications. Future studies to find solutions to these problems should increase sweet cherry production and may, therefore, increase both domestic consumption and export potential. The importance of irrigation is well understood and most orchards are irrigated. The most common irrigation techniques are basin and furrow irrigations, and some growers bring their irrigation water from distant sources (from 15 to 20 km). Use of drip irrigation in all orchards would increase the benefits of irrigation.'

– *The Current and Future Situations for Sweet Cherry Production in the Eastern Mediterranean Region, Hatay, Turkey* by A.A. Polat, C. Durgaç & S. Serçe Mustafa, Kemal University, Agricultural Faculty, Department of Horticulture, Antakya, Hatay, Turkey: www.researchgate.net/publication/257334948_The_Current_and_Future_Situations_for_Sweet_Cherry_Production_in_the_Eastern_Mediterranean_Region_Hatay_Turkey

'I first visited the cherry production regions of Turkey in 1995. At that time I found evidence of generally high quality fruit being produced with little understanding of sound horticultural principles. In 2005 I returned to attend the 5th International Cherry Symposium, in Bursa, about 4 hours due south of Istanbul across the Marmara Sea. Much has changed in the 10 years since I was there last. In 1995 Turkey was just starting to impact the European market in such a way that European cherry growers were fearful of the competition. Turkish growing techniques were very primitive, wages were extremely low, and the war in the Balkans often disrupted the shipment of cherries from Turkey to Europe.'

– *Turkey: The Sleeping Giant Awakens* by Lynn E. Long, Oregon State University Extension Horticulturist



Lesson 4: Case Studies in Water (continued)

Recommended source material (continued):

'Getting enough water to crops is a major problem for many Turkish farmers. Rainfall tends to be relatively abundant and regular in the coastal areas because of the mountains behind them. However, the bulk of the agricultural land is on the Anatolian Plateau, which receives less rainfall because it is ringed by mountains. Although rainfall on the plateau varies considerably among regions, it is barely adequate over large areas. In addition, the amount and time of rains vary sharply from year to year, causing sharp fluctuations in harvests. Since World War II, officials have stressed irrigation as a means of increasing and stabilizing farm output, and irrigation projects have consumed more than half of public investment in agriculture. In the mid-1980s, observers estimated that private irrigation, depending on weirs and small barrages to direct water into fields, reached up to 1 million hectares. In addition, some farmers pumped water from wells to irrigate their own fields. Development of large-scale irrigation was delayed until the 1960s. Public-sector irrigation systems, built and operated by the General Directorate of State Hydraulic Works (Devlet Su Isleri, DSI) under the Ministry of Energy and Natural Resources, tend to be large and costly. Most provide water for entire valleys, and some large projects--for example, the Southeast Anatolian Project (Güneydogu Anadolu Projesi, GAP) – combine water supplies for urban areas, protection from flooding, hydroelectric power, and irrigation. Irrigation projects are dispersed throughout the country, but most are concentrated in the coastal regions of the Aegean and Mediterranean seas, where the longer growing seasons are particularly favorable to crops. Public irrigation water was available to 3.7 million hectares in the mid-1990s, although the area irrigated with public water totaled about 3 million hectares.'

– Source: U.S. Library of Congress: http://extension.oregonstate.edu/wasco/sites/default/files/horticulture/cherries_around_world/documents/GFGTurkey05.pdf



MILK

Milk

Year 7

Stage 4



Ask students first to reflect on the *From Paddock to Plate Milk Virtual Video Excursion*:

- Where does milk come from?
- What would it be like to live on a dairy farm?
- What can they say about the paddock to plate journey of Australian milk?
- What did they learn that they hadn't considered before?
- What would they like to know more about the dairy industry in Australia?

Facts and Vocabulary - Milk

Facts about the Australian milk industry

- There are 6102 dairy farms in Australia. The national herd is 1.663 million dairy cows.
SOURCE: Dairy Australia, Australian Dairy Industry In Focus 2016.
- The average herd size has increased from 93 cows in 1985 to an estimated 284 currently. There is also a steady trend emerging to very large farm operations of more than 1,000 head of dairy cattle.
SOURCE: Dairy Australia, Australian Dairy Industry In Focus 2016.
- Australian dairy farmers produce 9,539 million litres of whole milk per year with the farmgate value of milk production being \$4.3 billion.
SOURCE: Dairy Australia, Australian Dairy Industry In Focus 2016.
- The average milk production per farm has increased from 311,000 litres to 1,563,000 litres per year over the past 30 years.
SOURCE: Dairy Australia, Australian Dairy Industry In Focus 2016.
- Dairy farming employs about 38,000 people throughout Australia.
SOURCE: Dairy Australia, Australian Dairy Industry In Focus 2016.
- In terms of the utilisation of Australian milk in 2015–16, the share of volume produced is as follows: cheese (30%), skim milk or butter milk powder, (29%), drinking milk (26%), whole milk powder (6%), and other (9%).
SOURCE: Dairy Australia, Australian Dairy Industry In Focus 2016.
- Australia exports about 34% of its annual milk production.
SOURCE: Dairy Australia, Farm Facts 2016.
- Dairy is the third largest agricultural industry in Australia, worth \$3 billion in exports in 2015–16.
SOURCE: Dairy Australia, Farm Facts 2016.
- Australia accounts for 6% of the world trade in dairy products, behind New Zealand (38%) the European Union (33%), and the United States of America (12%).
SOURCE: Dairy Australia, Australian Dairy Industry In Focus 2016.



Useful words and phrases

- Baler
- Bovine
- Bulk tank
- Butterfat
- Calcium
- Calf
- Colostrum
- Combine
- Cultivator
- Curds
- Dairy cows
- Dairy plant
- Fluid milk
- Grain bin
- Harvester
- Hay
- Heifer
- Herbivore
- Holstein
- Homogenisation
- Industrial milk
- Jersey
- Lactose
- Mammal
- Milk claw
- Milk fat
- Milk house
- Milk solids
- Pasteurisation
- Pasture
- Pipeline
- Plow
- Processing plant
- Raw milk
- Ration
- Ruminants
- Silage
- Silo
- Teat
- Teat dip
- Udder
- Veterinarian
- Whey



Lesson 5

Liveability

Themes

Community	Environment	Infrastructure	Liveability
Sustainability			

Getting started

Take a hands-up poll of the class:

- Would you prefer to live in a city or rural area?

What are the results? Are they what students expected?

- Ask city people to suggest which cities of the world they would love to live in every day.
- Ask those who love rural areas where they would love to live each day.
- (Reminder: anyone can **visit** the other extreme!)

Ask students to DESCRIBE what makes the Bannister Downs Dairy Farm liveable based on what they saw in the video. Make a class list of ideas and include things the students infer – such as being out of doors each day, and how this contributes to, or detracts from, liveability. (Does everyone in the class have the same opinion? Ask students to tell you why or why not?)

Would you live there?

Together, DEFINE what liveability means.

- What makes one place a better place to live than another? Why?
- Are there some things that most people want in a place to live? What are they?
- Does everyone value the same things? Explore examples.
- Does what you want change with age? What is important to teens and young adults?

INVESTIGATE multiple interpretations of the concept of liveability. EXPLORE influencing factors, such as age.

For example:

- Connections to social and cultural groups (where my friends are).
- The attraction of 'bright lights' (excitement, things to do).
- Retired people making a tree-change that is quiet, peaceful and relaxing.
- Families with children wanting to live near schools.

Milk

Year 7

Stage 4

ACHGK043

The factors that influence the decisions people make about where to live and their perceptions of the liveability of places

ACHGK044

The influence of accessibility to services and facilities on the liveability of places

ACHGK045

The influence of environment quality on the liveability of places

ACHGK046

The influence of social connectedness, community identity and perceptions of crime and safety on the liveability of places





Lesson 5: Liveability (continued)

Examples (continued):

- Workers relocating to be near jobs.
- People who love the outdoors / beach / mountains living where they can access these natural areas (even if their job is town-based).

Researching Liveability



Students RESEARCH and EXPLORE some of the measureable factors on which liveability of a place can be determined, including:

Pollution:

- Students RESEARCH the effects of air pollution and water quality on the liveability of cities.

Transport:

- Can people move around freely? How is this measured?

Population density:

- Students use aerial images of contrasting places to identify differences in population density (e.g. compare Brisbane's New Farm suburb to Alice Springs. Be sure to use the same Scale if using Google Maps.)

Crime:

- What statistics about crime can be used? Can people hold the opinion that a place is safer (or less safe) than the statistics show?

Happiness and wellbeing:

- Happier people are healthier – leading to less illness, disease, family breakup, death and crime. How do you measure happiness?

Students EXAMINE whether liveability and environmental sustainability can be enhanced at the same time. Are they related? How can this be measured?

Students EXAMINE the availability of a wide range of services and facilities between different types of settlements (urban, rural and remote) in Australia and other countries, including:

- Access to clean water
- Sanitation
- Access to education
- Access to health services
- Employment
- Food security
- Cost of essential services: housing, food, water



Lesson 5: Liveability (continued)

ASK: How could researchers measure subjective factors (opinions and choices), such as access to natural areas such as mountains, beaches and National Parks?

Using sources listed below, students collate a list of the metrics (measurable data) on which the title 'most liveable' should be based. Tell the class they have to choose the 7 most important metrics out of the many available options.

Students work in groups to assemble these lists. Have each group present why their top seven are the best choice for determining liveability.

Recommended source material:

'In an interview with *The West Australian*, Minister for Cities Jamie Briggs said mass transit projects were critical to improving the livability of cities.'

– The West Australian, 29 September 2015

'Roughly 80 percent of Americans live in urban areas, according to the U.S. Census Bureau. But new data from Gallup suggests many of them aren't doing so by choice. Asked what kind of community they'd live in if they could move anywhere they wished, Americans overall said their No. 1 choice would be in a rural area. Twenty-seven percent, specifically, said a rural area would be their ideal community, with an additional 12 percent opting for a small town. Just 12 percent said they'd prefer a big city, with an additional 21 percent preferring a big city suburb, the second-most-popular choice. Seventeen percent said a small city would be ideal, while just 10 percent said they'd like to live in a small city suburb. So why do they stay put? Quite simply, big metro areas tend to be where the jobs and opportunities are.'

– Washington Post, 18 December 2018

'In 2006 very remote areas had (AIHW 2009):

- 58 generalist medical practitioners per 100 000 population (compared to 196 per 100 000 in capital cities)
- 589 registered nurses per 100 000 population (compared to 978 per 100 000 in major cities)
- 64 allied health workers per 100 000 population (compared to 354 per 100 000 in major cities).

Almost a quarter (23%) of people living in outer regional and remote areas felt they waited longer than was acceptable for an appointment with a GP, compared with 16% of those living in major cities. People living in outer regional and remote areas were also four and a half times as likely as those living in major cities to travel over one hour to see a GP (ABS 2011).'

– National Strategic Framework for Rural and Remote Health



Lesson 5: Liveability (continued)

Recommended source material (continued):

'The Economist's Global Liveability Index uses 30 indicators to measure five categories of liveability: stability (safety), health care, culture and environment, education, and infrastructure. And 26 of the indicators are based on the "judgement of in-house expert country analysts and a field correspondent based in each city". These unknown critics score the performance of a city as acceptable, tolerable, uncomfortable, undesirable or intolerable. There is no freely available information about the qualifications of these judges, why the categories were chosen to represent liveability, or how indicators in a category are weighted. While the summary report is free, a more detailed report will set you back US\$620 and the actual data sets a smooth US\$9,210, which we didn't purchase. Our comments are based on the freely available information. Two indicators rate the availability and quality of private education, but there are no equivalent indicators for public education. Most students (65.6%) in Australia are enrolled in government schools. So, for the average family in Australia the availability and quality of the public education system is more important than private. And, most importantly, the index seems to miss the things that affect the lived experience of city residents. Although housing "quality" and the availability and quality of private education are included, housing affordability, traffic congestion, walkability and lack of public transport, bike paths and essential services don't appear to be in the index. Yet these are some of the real problems facing Australians.'

– The Conversation, 15 August 2018

'COPD (chronic obstructive pulmonary disease) is most often associated with smokers, but Ajay, like many seeking help at Kathmandu emergency rooms, has never smoked. He has, however, worked at road construction in the capital for many years, labouring with a pickaxe and inhaling fumes daily from the eclectic mix of vehicles: ancient buses spewing black smoke, three-wheeled tempos in varying degrees of disrepair and tractors with open motors. Countless cars and legions of motorcycles add to the exhaust fumes, through which pedestrians, bicycles and animals weave in a chaotic flow of traffic that somehow remains in motion.'

– The Guardian, 21 March 2014

'In Quito, Ecuador, for example, the provision and supply of clean water is an ongoing challenge. Quito is 2,800m above sea level, and 80 streams or rivers descending from the Pichincha volcano feed it. However, climate change is affecting the water supply for the city, which is home to two million people. Water scarcity and drought are an ever-growing risk. On the other hand, Quito is also endangered by floods and landslides when rain comes in short periods.'

– The Huffington Post, 16 September 2015



Lesson 5: Liveability (continued)

Teacher resources:

- ABC News – Melbourne loses world’s most liveable city crown but still has a few things on Vienna: <https://www.abc.net.au/news/2018-08-15/melbourne-loses-most-liveable-city-crown-but-why-live-in-vienna/10120356>
- Finder – The best places to live in Australia: <https://www.finder.com.au/moving-to-australia/best-places-to-live-in-australia>
- YTravel – What makes a place liveable? <https://www.ytravelblog.com/makes-place-livable/>
- Business Insider – Map of population density across Australia: <https://www.businessinsider.com.au/this-map-shows-population-density-across-australia-2017-7?r=US&IR=T>
- SBS Australia – New Delhi chokes as air pollution reaches hazardous levels: <https://www.sbs.com.au/yourlanguage/hindi/en/article/2017/11/08/new-delhi-chokes-air-pollution-reaches-hazardous-levels>
- About the UN’s Sustainable Development Goals (SDGs): <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>
- The Happy Planet Index: <http://happyplanetindex.org/>
- World Happiness Report: <http://worldhappiness.report/ed/2018/>