

Agriculture in Education Initiative
An Educational Unit for Primary Schools

Agriculture in Education / Current Unit

Using water sustainably through science

Level

7

Curriculum Area

Science

[Print Resource](#)

Resource Description

This is a year 7 science unit developed to understand contemporary issues that are found using science and technology that relate to water use and management within a community.

In this unit

- Consider the competing needs for limited water resources.
- Explore and compare the embedded water required to produce food and fibre products.
- Examine the role of science and technology within the Bureau of Meteorology and BOM's information helps decisions dealing with water management.
- Unpack the concepts of weather, climate, El Nino and drought.
- Investigate the role of science and technology in improving our capacity to manage water
- To explain and evaluate the best methods for making the best use of water resources to meet the needs of residents, agricultural industry and the environment.

- Use their learning to produce a poster about best water use practice to help to meet the needs of residents, agricultural industry and the environment.
- Explore the skills and across disciplines of people who work in the water resources area.
- Produce a job advertisement for a water resources position that shows the skills required to fill the position.

The resource is designed with a suggested lesson sequence. This is to provide you, as the teacher with content to cover, but over a time frame that is flexible to your classroom and school set-up.

[back to top](#)

Rationale

This resource material aims to help teachers and students in secondary 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.

About the approach

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

Curriculum strands

Science:

Solutions to contemporary issues that are found using science and technology, may impact on other areas of society and may involve ethical considerations ACSHE120

- considering issues relating to the use and management of water within a community

Science knowledge can develop through collaboration across the disciplines of science and the contributions of people from a range of cultures ACSHE223

- considering how water use and management relies on knowledge from different areas of science, and involves the application of technology

Using the unit

This unit can be used in a number of ways. It will be of most benefit to teachers who wish to implement the sustained sequence of activities that follow the learning experiences around the content descriptors in Year 7 Science in the Australian Curriculum.

You may add to or complement the suggested activities with ideas of your own activities or investigations.

The resources have been designed as a hyperlinked unit. This is to provide you with a digital format for your class's use on a website or wiki or provide them on your interactive whiteboard.

We encourage you to explore ways in which the content can be adjusted to the context in which you are working.

Resource sheets are provided for some activities. Most are for photocopying and distribution to students.

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

Complementary video resource

This resource has a supporting water video that complements the learning objectives of this topic. The video has been produced with a stand-alone worksheet with activities to complete. This resource can be accessed on the Primezone <http://www.primezone.ed.au> (<http://www.primezone.edu.au>) or access here: <http://hellofriday.com.au/newsite/piefa/YR7-WATER-VIDEO.html> (<http://hellofriday.com.au/newsite/piefa/YR7-WATER-VIDEO.html>)

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.

Some research organisations (Cotton Australia, Grains and Research Development Corporation, Rice Growers Association Australia) welcome invitations to come to speak with students. Look for local links in the industry contact list below.

[back to top](#)

Industry Contacts

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

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

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

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

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

Forestry

<http://www.forestlearning.edu.au/> (<http://www.forestlearning.edu.au/>)

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

[back to top](#)

Assessment

The unit provides an opportunity for a range of skills and understandings to be observed.

A guiding assessment rubric has been developed for two learning experiences included in the resource. This is a guide and can be adapted to fit purpose.

The following student learning areas are considered:

- Understandings about the topic.
- Development of skills.
- 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).

Length of Unit

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

[back to top](#)

Teacher notes

Computer access

Students will need access to computers or tablets connected to the internet. The teacher in lesson 1 could play a YouTube video as part of a class activity.

Teacher background information

In our towns and cities we take for granted that we can drink water straight from a tap. Many of us are fortunate enough that purchased bottled water is no cleaner than our tap water. The continued supply of clean water is essential for all our health. Our town and city clean water supplies are no accident. It has taken detailed long term planning, the securing of catchments and building of infrastructure.

We require even more water to sustain a viable agricultural industry. Most ancient cultures could maintain cities once they had developed irrigation systems. This enabled them to have a stable food supply independent of rain watering their crops and providing water for their stock. It is still the case we can produce more food and fibre when we are able to provide water when it is most needed.

Living in the driest habitable continent means we can't afford to waste our limited water supplies. While there is less rain in Australia, there is even less chance of it flowing into catchments as the majority is soaked into the soil. Our water supply must be carefully managed so we maintain a clean and adequate water supply for domestic use, for industry and agriculture while leaving enough in the catchments to maintain healthy and sustainable ecosystems.

The balancing act of managing water resources is made more difficult due to cyclic droughts that occur in our populated areas and most productive land. Water storages can't provide the same quantities of water during ongoing droughts.

With a warming climate we must expect new challenges. Only a small increase in average temperature will increase evaporation rates on our farms and water storages. We might expect severe weather events to be even more destructive.

We can start planning and changing for the future by making even better use of our water resources by reducing waste, developing water conservation technologies, discovering better farming techniques, creating new crop varieties and adapting to a changing environment.

This unit focuses on how science and those employed in jobs related to sustainable water management are finding solutions. They are assisting our food and fibre industry to adapt to a changing environment where water supply will at times be even more challenging and reducing the impact on ecosystems.

[back to top](#)

Lesson 1: Setting the scene – managing water

Summary

After students have shared some prior knowledge about water conservation they will explore and compare the embedded water in a range of food and fibre products. They will then investigate how water resources are divided up to meet different needs.

Equipment

Students access to computer or tablets and the internet, equipment to view a YouTube video as a class activity, writing material, whiteboard, smartboard or blackboard, and print student worksheet 1.1

Assessment tasks:

- In a table, compare the embedded water in several products
- Using a Venn diagram explain how the needs of homes, primary industry and catchment ecology overlap.

Activity 1 – Prior knowledge of water conservation

Allow 10 minutes

- Present students with the following open ended question: **How is water wastage reduced?**
- Provide students with three minutes to write a list of anything they know about reducing the waste of water.
- On whiteboard, smartboard or blackboard write a list of all the student ideas.
- Discuss any major misconceptions as the list is written.

- Make a permanent copy of the list that can be added to and modified at the end of the unit.

Activity 2 – Embedded water in food and fibre products

Allow 20 minutes

Teacher information

The concept of embedded water can also be called ‘embodied water,’ ‘water footprint,’ ‘hidden water’ or ‘virtual water.’ Embedded water is all the water required to produce a specific product. To work out the embedded water in one kg of pork we would include how much water the pig drank, how much water was required to grow its food, the amount needed to keep its pen clean and any water required to process the pork including the disposal of waste and cleaning down the truck and factory. To calculate the embedded water for one kg, the total amount of water used by the pig is divided by the total number of kgs of the pig that was used.

The information on embedded water calculated in other countries may not apply to Australia when the food or fibre product has been produced using different methods. American websites will have different units of measurement.

- As a class, discuss the concept of embedded water in products.
- On a whiteboard, smartboard or blackboard, start drawing a bubble map. Choose a food or fibre product such as pork and place it in the centre circle. Discuss everything that is required to grow, transport and process the product. Even its packaging can have an embedded water component.
- Students then look at some websites suggested below to compare how much water is used to produce different food and fibre products. Point out that some foods overseas are grown differently such as cattle raised in feedlots should have much higher embedded water than those grazing on paddocks.
- Students find five or more products they have used or consumed in the past week and present them in a chart using appropriate units to describe and compare the products and the volume of water to produce it.

Wikipedia – Virtual water – scroll down to the chart https://en.wikipedia.org/wiki/Virtual_water
(https://en.wikipedia.org/wiki/Virtual_water)

BBC in UK – Embedded water

http://news.bbc.co.uk/nol/shared/spl/hi/sci_nat/09/embedded_water/swf/embedded_water.swf
(http://news.bbc.co.uk/nol/shared/spl/hi/sci_nat/09/embedded_water/swf/embedded_water.swf)

National Geographic – Embedded water

<http://environment.nationalgeographic.com.au/environment/freshwater/embedded-water/>

(<http://environment.nationalgeographic.com.au/environment/freshwater/embedded-water/>)

Cotton Australia – Water, an example of changing water use (reading fact sheet)

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

(<http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-water>)

Additional resource if time:

ABC splash – 13 minute video Water footprint in food – watch first two minutes

<http://splash.abc.net.au/home#!/media/107290/-water-footprints-in-food-manufacturing>

(<http://splash.abc.net.au/home#!/media/107290/-water-footprints-in-food-manufacturing>)

Does virtual water for Australian beef add up?

Run this information past students and ask their opinion.

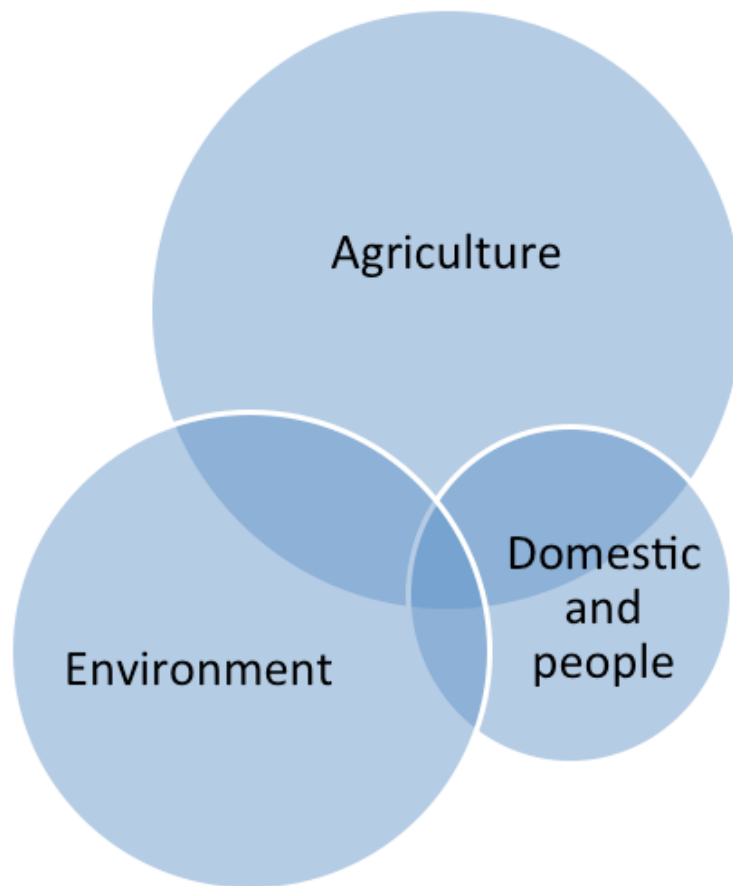
Many countries raise their cattle in feedlots. The animals are kept in pens, food is brought to them and their pens cleaned. The Virtual Water Wikipedia table claims that about 17,000 litres of water is used to grow 1 kg of Australian beef. This might be true if the cattle are raised in a feedlot, but is this true when they live in a paddock. Do you think the rain that lands in a paddock and most will end up being soaked into the ground, running into a creek or evaporating through plants should be counted? The cattle in the paddock over their life drink 515 litres of water to produce one kg of beef. Do you think the facts add up?

Activity 3 – Sharing water resources

Allow 20 – 30 minutes

Draw on a whiteboard, smartboard or blackboard or project the image of this Venn diagram.

Sharing water resources



This Venn diagram shows how the amount of water could be shared in an agricultural region of Australia with some large towns.

Play the You Tube video below about the Murrumbidgee Irrigation area. The video goes for nine minutes. While the video has quality information it also takes up time by promoting itself so the teacher may wish to stop the video when they feel their students have enough information.

Australia's food bowl the Murrumbidgee Irrigation Area (9 min)

<https://www.youtube.com/watch?v=SZNTER1fE8c> (<https://www.youtube.com/watch?v=SZNTER1fE8c>)

Answer the following questions

- Use the diagram to compare how water is shared.
- If there is a drought resulting in less available water, how could the water allocation be changed?
Will halving domestic water have a big impact?
- How might environmental water help domestic use and people?
- How might the environmental water help agriculture?
- How might agricultural water help the environment?
- How will Agricultural water and its produce help domestic households?
- How might domestic water use help the environment?

Why people who grow food and fibre need to know about changes in climate?

<p style="text-align: center;">Need</p> <p style="text-align: center;">What does the farmer need to know about weather and changes to climate?</p>	<p style="text-align: center;">Information</p> <p style="text-align: center;">What information does the Bureau of Meteorology provide?</p>	<p style="text-align: center;">Response</p> <p style="text-align: center;">How might farmers respond?</p>

Students should provide this completed worksheet as part of their assessment.

Print Worksheet 1.1

[Download Worksheet 1.1 \(PDF\) \(pdf/worksheet1-1.pdf\)](#)

[back to top](#)

Lesson 2: Core knowledge on Weather, Climate, El Nino and Drought

Summary:

Students will unpack the concepts of weather, climate, El Nino and drought so they can apply these concepts while working on this unit. They will investigate the role of the Bureau of Meteorology and their application of technology in compiling data, predicting weather, climate and El Nino events.

Equipment:

Students access to computer or tablets and the internet, equipment to view a YouTube video as a class activity, writing material, whiteboard, smartboard or blackboard, print the student worksheet 2.1 and 2.2

Assessment tasks:

Students will explain why people who grow food and fibre need to know about changes in climate by completing activity 5.

Teacher information:

The Bureau of Meteorology was officially started in 1906. It is a very large organisation that has systematically collected data about Australia's weather. Among its responsibilities is to provide a wide range of weather warnings and forecasting changes in climate. This is a vital service for those producing food and fibre.

Activity 1 – What's today's weather?

This activity can be done as a class using a smartboard or digital projector/computer or by small groups of students.

Go to the Bureau of Meteorology website www.bom.gov.au (<http://www.bom.gov.au>)

If your school is not in one of the State's capitals, then click on your State on the top menu bar and choose forecasts in the dropdown menu. On the top left of the page that comes up, find 7-day town forecast below the green Land Areas banner. Click on the closest town for forecasts.

Find the student worksheet in appendix 2.1 and print

Questions

- What is the predicted top temperature for today?
- What is the predicted minimum temperature for today?
- If the forecast is accurate calculate the temperature change for today.

As a throw away question ask students who provides the best forecasts, the TV stations (which one), the radio stations, the newspaper, internet services or Bureau of Meteorology website. Once the conversation is complete explain that all other services get their information from Bureau of Meteorology.

Activity 2 – Climate maps

Do this activity as a class using a smartboard or digital projector/computer

Go to the following Bureau of Meteorology webpage.

<http://www.bom.gov.au/climate/averages/maps.shtml>

(<http://www.bom.gov.au/climate/averages/maps.shtml>)

With students discuss how average rainfall has been built up over many years and the same goes for average temperature.

This page links to a variety of climate maps for temperature, rainfall, humidity, evaporation etc.

Click on some of the maps starting with rainfall

http://www.bom.gov.au/jsp/ncc/climate_averages/rainfall/index.jsp

(http://www.bom.gov.au/jsp/ncc/climate_averages/rainfall/index.jsp)

Ask students to use a computer to find a definition for climate.

Print student worksheet 2.1

Questions

[Download Worksheet 2.1 \(PDF\) \(pdf/worksheet2-1.pdf\)](#)

- What is climate?
- What is the difference between climate and weather? (Weather is what occurs on any day or a particular time and climate is the average weather over many years)

Activity 3 – Drought and El Nino

As a class watch the video below. Students only need to understand the link between El Nino which is changes in sea surface temperature in the Pacific Ocean and drought in Australia.

ABC Splash Patterns of El Nino and La Nina (3min)

<http://splash.abc.net.au/home#!/media/1542363/> (<http://splash.abc.net.au/home#!/media/1542363/>)

<http://www.bom.gov.au/climate/change/?ref=ftr#tabs=Tracker&tracker=trend-maps>

(<http://www.bom.gov.au/climate/change/?ref=ftr#tabs=Tracker&tracker=trend-maps>)

Activity 4 – Bureau of Meteorology tools

Exploring the latest satellite technology

This can be explored as a class or in small groups. The class should discuss their answers.

Print Worksheet 2.2 worksheet

[Download Worksheet 2.2 \(PDF\) \(pdf/Lesson 2_Activity 4.pdf\)](#)

Find out how the new Japanese weather satellite called Himawari is helping Australia weather forecasts.

Bureau of meteorology satellite technology video (YouTube) – Himawari-8: The weather comes alive (2 min)

<https://www.youtube.com/watch?v=d-GFADBBfcA> (<https://www.youtube.com/watch?v=d-GFADBBfcA>)

Bureau of meteorology – High-definition satellite images. Click on large green button near top of page 'Explore images now.



[Bureau Home](#) > [Australia](#) > High-definition satellite images

High-definition satellite images

See images from Himawari-8 in the new satellite viewer

This demonstration product is most suitable for people with fast internet connection and high data allowance.

Icons: Satellite, Sun, Cloud, Person, Explore images now button, Arrow

Low-definition satellite images

[Satellite Viewer Help](#)

Satellite View Selection

Region:

View:

Clouds from infrared image combined with static colour image of surface.

<http://www.bom.gov.au/australia/satellite/?ref=ftr> (<http://www.bom.gov.au/australia/satellite/?ref=ftr>)

Bureau of meteorology – image and description of the satellite

<http://www.bom.gov.au/australia/satellite/himawari.shtml>

(<http://www.bom.gov.au/australia/satellite/himawari.shtml>)

New BOM supercomputer

Why does the Bureau of Metrology need the most powerful computer in Australia? How much did the computer cost?

Sky News BOM supercomputer to give faster warnings

<http://www.skynews.com.au/business/tech/2015/07/21/bom-supercomputer-to-give-faster-warnings.html>

(<http://www.skynews.com.au/business/tech/2015/07/21/bom-supercomputer-to-give-faster-warnings.html>)

Itnews - Cray to build Australia's biggest supercomputer

<http://www.itnews.com.au/news/cray-to-build-australias-biggest-supercomputer-406827>

(<http://www.itnews.com.au/news/cray-to-build-australias-biggest-supercomputer-406827>)

Weather stations

What is required to get data each day about Australia's weather?

Bureau of Meteorology – the equipment being used to collect daily weather data.

<http://www.bom.gov.au/climate/cdo/about/sites.shtml>

(<http://www.bom.gov.au/climate/cdo/about/sites.shtml>)

Australian Weather News – Clickable map of all weather stations around Australia

<http://www.australianweathernews.com/sitepages/data/StationMapAustralia.shtml>

(<http://www.australianweathernews.com/sitepages/data/StationMapAustralia.shtml>)

Bom – WOW <http://www.bom.gov.au/wow-support/> (<http://www.bom.gov.au/wow-support/>)

Activity 5 - Why people who grow food and fibre need to know about changes in climate?

How does weather and climate focusing help farmers growing food and fibre? Students complete the Need, Information, Response table.

Need	Information	Response
What does the farmer need to know about weather and changes to climate?	What information does the Bureau of Meteorology provide?	How might farmers respond?

[back to top](#)

Lesson 3 and 4: Investigating science's role in managing water resources

Summary:

Pairs or small groups of students will choose one or two investigations provided or choose their own investigation. One of their investigations will be designed into a poster presentation that they will have two to three minutes to present to the class.

The teacher will decide what methods can be used for the poster presentation. It may be designed on paper, but teacher may allow students to use a computer application or even a short play, rap etc.

Teacher information:

Australia can adopt and apply technologies from overseas to help make better use of water resources. However Australia has many unique water issues and only Australian research and development of new technologies will provide solutions.

Equipment and materials:

[Download Worksheet 3.1 \(PDF\) \(pdf/worksheet3-1.pdf\)](#)

Internet, writing materials, materials for designing a poster and printed worksheets 3.1, 3.2, 3.2.1 and 3.3.

[Download Worksheet 3.2 \(PDF\) \(pdf/worksheet3-2.pdf\)](#)

[Download Worksheet 3.3 \(PDF\) \(pdf/worksheet3-3.pdf\)](#)

Print each Investigation sheet as required for each student

[Investigation 1 \(pdf/Investigation 1.pdf\)](#)

[Investigation 2 \(pdf/Investigation 2.pdf\)](#)

Assessment task:

Students produce a poster presentation that shows how science is used to improve our management of water resources.

[Investigation 3 \(pdf/Investigation 3.pdf\)](#)

[Investigation 4 \(pdf/Investigation 4.pdf\)](#)

[Investigation 5 \(pdf/Investigation 5.pdf\)](#)

[Investigation 6 \(pdf/Investigation 6.pdf\)](#)

Process:

Provide students with worksheet 3.1 and then explain the process. You may wish to allow students to work in groups. Suggest to students they divide up in skill sets ie a person good at researching on computers, another who is good at summarising information, a student who likes designing posters etc. The teacher may prefer all six investigations to be answered by groups, prioritise some or add additional investigations.

Step 1 – Small groups of students decide what they will investigate that can address the question ‘What is the role of science in managing water resources?’

Step 2 – If choosing one of the six investigations provided, watch the first introduction video for each investigation.

Step 3 – Students decide what issues require solving with the help of the chart below and then

(Print student worksheet 3.2 and worksheet 3.2.1)

What is your group going to investigate?

What are the issues that need solving?

Tick one or more boxes and additional issues.

- Rain is not reliable
- Not enough water resources to go around
- Need to make better use of water resources
- Salinity or other problems are affecting soils
- Droughts when they happen are devastating
- The climate could be changing
- Could improve the way wetlands and ecosystems are being looked after
- Other (list)

Step 4 – Students are to refine the questions they want to investigate. Sample questions have been provided for each of the six investigation topics.

Step 5 – Students use the Source, Information, Evaluate chart (Worksheet 3.3) to collect their information. While they are doing their research they write the source of the information which is the title of the organisation providing it and the relevant information that was found to be useful.

There are links provided and where possible these are videos. Decide how much time student have to do further searches. The links provided will cover the basics.

Step 6 – Students using the third column called ‘evaluate’ evaluate how reliable, biased etc the source might be.

Step 7 – Students process and analyse their information as they develop their poster:

- Write the title of their investigation
- List their questions
- Provide text, diagrams, illustrations and images to communicate what they have learned.
- Provide their own opinions supported by what they have investigated about solutions to any issues.

Step 8 – Plan how the group will in two or three minutes present their poster to the class.

Investigation 1: Application of GPS on farms

First introduction video

Reasons for irrigation water waste (video 2.47 min) <https://www.youtube.com/watch?v=R0P30b-woOA> (<https://www.youtube.com/watch?v=R0P30b-woOA>)

Sample questions

- How can irrigators reduce the amount of water being wasted?
- How is GPS technology helping irrigation and ploughing?

- What are some of the new GPS technologies being used in farming?
- How does the reduction of water wastage help farmers?

Useful links

Splash – How GPs works (video 4 min) <http://splash.abc.net.au/home#!/media/85602/>
(<http://splash.abc.net.au/home#!/media/85602/>)

Splash – Hi Tech Farming (video 2.33 min) <http://splash.abc.net.au/home#!/media/1423209/high-tech-farming>
(<http://splash.abc.net.au/home#!/media/1423209/high-tech-farming>)

Farmers of the future will utilize drones, robots and GPS (reading) <http://theconversation.com/farmers-of-the-future-will-utilize-drones-robots-and-gps-37739>
(<http://theconversation.com/farmers-of-the-future-will-utilize-drones-robots-and-gps-37739>)

How to use the GPS Mod - Farming Simulator 2015 game (video 11 min)
<https://www.youtube.com/watch?v=UGd2Jt9RGJc> (<https://www.youtube.com/watch?v=UGd2Jt9RGJc>)

GPS guidance of a tractor (video 1 min) <http://www.precisionagriculture.com.au/gps-guidance-and-network-rtk.php>
(<http://www.precisionagriculture.com.au/gps-guidance-and-network-rtk.php>)

Digging trenches (reading) <http://www.cisirrigate.com.au/about-us/115>
(<http://www.cisirrigate.com.au/about-us/115>)

Agriculture (Victoria), Using satellite technology to improve irrigation management on Victorian farms (reading) <http://agriculture.vic.gov.au/agriculture/horticulture/horticulture-research/using-satellite-technology-to-improve-irrigation-management-on-victorian-farms2>
(<http://agriculture.vic.gov.au/agriculture/horticulture/horticulture-research/using-satellite-technology-to-improve-irrigation-management-on-victorian-farms2>)

Investigation 2: Sustaining wetlands in the Murray Darling Basin

First introduction video

ABC Splash Murray-Darling - a big balancing act (4 min)
<http://splash.abc.net.au/home#!/media/107334/murray-darling-a-big-balancing-act>
(<http://splash.abc.net.au/home#!/media/107334/murray-darling-a-big-balancing-act>)

Sample questions

- How does climate including drought affect the Murray Darling Basin?
- Why are water resources an issue in the Murray Darling Basin?

- How are environments in the region such as wetland being affected?
- What have scientist found out about the wetlands and species that depend on the wetlands?
- What is being done?
- Do you think the changes will work?

Useful links

Link to MDBA-Basin-Map-poster-2013.pdf

ABC Splash How might water shortages in the Basin affect you? (video 3 min)

<http://splash.abc.net.au/home#!/media/860145/how-might-water-shortages-in-the-basin-affect-you->
(<http://splash.abc.net.au/home#!/media/860145/how-might-water-shortages-in-the-basin-affect-you->)

ABC Splash Murray-Darling - a big balancing act (video 4 min)

<http://splash.abc.net.au/home#!/media/107334/murray-darling-a-big-balancing-act>
(<http://splash.abc.net.au/home#!/media/107334/murray-darling-a-big-balancing-act>)

La Trobe research – Be the protector of my species (video 2.41 min) <http://www.latrobe.edu.au/be-the-difference/species> (<http://www.latrobe.edu.au/be-the-difference/species>)

Australian Science Chanel – The science behind the headlines: The Murray Darling Basin Plan (video 1 first six min) <http://riaus.org.au/events/science-behind-the-headlines-march-2012/>
(<http://riaus.org.au/events/science-behind-the-headlines-march-2012/>)

ABC Mildua Swan Hill - Scientists trial new methods for saving wetlands at Bottle Bend near Mildura (2.16 min) <http://www.abc.net.au/local/videos/2009/08/24/2664889.htm>
(<http://www.abc.net.au/local/videos/2009/08/24/2664889.htm>)

Investigation 3: Recycled water

First introduction video

Altona treatment plant – processing waste water (video 3 min) <https://www.youtube.com/watch?v=7dGcOntEkTY> (<https://www.youtube.com/watch?v=7dGcOntEkTY>)

Sample questions

- What water is being recycled?
- What technology is used to recycle water?
- What is the recycled water being used for?
- How can recycling water help everyone and the environment?
- Any other ideas about recycled water that could help?

- Is it worth the money to build processing plants and providing new pipes to supply recycled water?

Useful links

ABC splash – How a desalination plant work

<http://splash.abc.net.au/home#!/media/524895/how-does-desalination-work->
(<http://splash.abc.net.au/home#!/media/524895/how-does-desalination-work->)

ABC splash – Using recycled waste water for trees

<://splash.abc.net.au/home#!/media/30879/water-recycling-wastewater-to-wealth>
(<http://splash.abc.net.au/home#!/media/30879/water-recycling-wastewater-to-wealth>)

Melbourne Water – Recycled water (reading)

<http://www.melbournewater.com.au/whatwedo/recyclewater/pages/producing-recycled-water.aspx>
(<http://www.melbournewater.com.au/whatwedo/recyclewater/pages/producing-recycled-water.aspx>)

<http://www.melbournewater.com.au/whatwedo/recyclewater/Pages/Using-recycled-water.aspx>
(<http://www.melbournewater.com.au/whatwedo/recyclewater/Pages/Using-recycled-water.aspx>)

<http://www.melbournewater.com.au/whatwedo/recyclewater/Pages/Recycled-water-research.aspx>
(<http://www.melbournewater.com.au/whatwedo/recyclewater/Pages/Recycled-water-research.aspx>)

Target 100 – Using recycled water in Abattoirs

<http://www.target100.com.au/100-Initiatives/All-industry-initiatives/Reusing-water-in-abattoirs>
(<http://www.target100.com.au/100-Initiatives/All-industry-initiatives/Reusing-water-in-abattoirs>)

Investigation 4: New and future water saving technologies

First introduction video

Splash – Hi Tech Farming (video 2.33min)

<http://splash.abc.net.au/home#!/media/1423209/high-tech-farming>
(<http://splash.abc.net.au/home#!/media/1423209/high-tech-farming>)

Sample questions

- Why are farmers trying to use less water?
- How can new technology help farmers use less water?
- What other new technologies help farmers manage the water on their farms and in their homes?
- What future technologies would farmers find helpful? (Include your opinion)

Useful links

Target 100 – Water use in the feedlot (reading)

<http://www.target100.com.au/Environment/Water/Water-use-in-the-feedlot?gclid=CMiQtLTjzcgCFYKavAodrsUCFw> (<http://www.target100.com.au/Environment/Water/Water-use-in-the-feedlot?gclid=CMiQtLTjzcgCFYKavAodrsUCFw>)

Target 100 – Water use in the paddock (reading)

<http://www.target100.com.au/Environment/Water/Water-use-in-the-paddock>
(<http://www.target100.com.au/Environment/Water/Water-use-in-the-paddock>)

Seametrics – 5 Effective Water Conservation Tools for Farmers

<http://www.seametrics.com/blog/farming-water-conservation-tools/>
(<http://www.seametrics.com/blog/farming-water-conservation-tools/>)

Various methods of using irrigation water efficiently (reading)

<http://wateruseitwisely.com/100-ways-to-serve/landscape-care/principles-of-xeriscape-design/efficient-irrigation/> (<http://wateruseitwisely.com/100-ways-to-serve/landscape-care/principles-of-xeriscape-design/efficient-irrigation/>)

Bloomberg, Farm, Innovation: Cheap solar irrigation (reading)

<http://www.bloomberg.com/bw/articles/2013-10-10/innovation-sunwaters-cheap-solar-powered-irrigation> (<http://www.bloomberg.com/bw/articles/2013-10-10/innovation-sunwaters-cheap-solar-powered-irrigation>)

Bloomberg, Farm Bots and Two-Month-Old Bread: Innovations in Food and Agriculture (reading)

<http://www.bloomberg.com/bw/articles/2013-01-10/farm-bots-and-two-month-old-bread-innovations-in-food-and-agriculture> (<http://www.bloomberg.com/bw/articles/2013-01-10/farm-bots-and-two-month-old-bread-innovations-in-food-and-agriculture>)

ABC news website – Agricultural machinery news (reading and video)

<http://www.abc.net.au/news/topic/agricultural-machinery>
(<http://www.abc.net.au/news/topic/agricultural-machinery>)

ABC news website – Water management news (reading and video)

<http://www.abc.net.au/news/topic/water-management> (<http://www.abc.net.au/news/topic/water-management>)

ABC The new inventors – Water purifier (reading)

<http://www.abc.net.au/tv/newinventors/txt/s1649590.htm>

(<http://www.abc.net.au/tv/newinventors/txt/s1649590.htm>)

Sustainability matters, Providing clean tank water to rural homes without using chemicals (reading)

<http://www.sustainabilitymatters.net.au/content/water/article/providing-clean-tank-water-to-rural-homes-without-using-chemicals-1228669156>

(<http://www.sustainabilitymatters.net.au/content/water/article/providing-clean-tank-water-to-rural-homes-without-using-chemicals-1228669156>)

Investigation 5: Adapting to Climate Change

First introduction audio

ABC news, Climate change will force farmers to adapt: CSIRO (audio 3.23 min)

<http://www.abc.net.au/news/2013-01-15/climate-change-will-force-farmers-to-adapt-csiro-says/4464506> (<http://www.abc.net.au/news/2013-01-15/climate-change-will-force-farmers-to-adapt-csiro-says/4464506>)

Sample questions

- How do predicted warmer temperatures with higher evaporation rates affect food and fibre production?
- How do storms and cyclones affect some farmers?
- What do farmers need to know?
- What kind of changes to crops and animal stock will help farmers in a dryer environment?
- Would it help if some farmers moved or changes what they use their land for?
- How can farmers make better use of available water resources?

Useful links

ABC landline – Bom climate and weather outlook (watch first minute and half)

<http://www.abc.net.au/landline/content/2015/s4285161.htm>

(<http://www.abc.net.au/landline/content/2015/s4285161.htm>)

ABC landline – Climate change and Agriculture (8.47 min)

<http://www.abc.net.au/landline/content/2013/s3682086.htm>

(<http://www.abc.net.au/landline/content/2013/s3682086.htm>)

Adapting farming to climate change (video 2 min)

<https://www.youtube.com/watch?v=bfS8joDpUMs> (<https://www.youtube.com/watch?v=bfS8joDpUMs>)

Kick start, Enabling Farmers to Adapt to Climate Change (video 1.17 min)

<https://www.youtube.com/watch?v=sMqrSH8H6QA> (<https://www.youtube.com/watch?v=sMqrSH8H6QA>)

ABC Splash – Dealing with drought (video 1.44 min)

<http://splash.abc.net.au/home#!/media/525577/dealing-with-drought>
(<http://splash.abc.net.au/home#!/media/525577/dealing-with-drought>)

United nations, Understanding climate-smart agriculture (video 2.64 min)

<https://www.youtube.com/watch?v=IUdNMsVDIZ0> (<https://www.youtube.com/watch?v=IUdNMsVDIZ0>)

ABC Landline – Banana appeal (video watch first 4 minutes)

<http://www.abc.net.au/landline/content/2010/s3235924.htm?source=rss>
(<http://www.abc.net.au/landline/content/2010/s3235924.htm?source=rss>)

ABC News - BMP Cotton by Sarah Clarke (video 2 min)

<https://www.youtube.com/watch?v=QgXPMFR6nqY> (<https://www.youtube.com/watch?v=QgXPMFR6nqY>)

Cotton Australia – Cotton and climate change (reading fact sheet)

<http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-climate-change>
(<http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-climate-change>)

Investigation 6: The case for moving agriculture to Northern Australia

First introduction video

ABC Splash Northern food bowl: on or off the table? (video 2.31 min)

<http://splash.abc.net.au/home#!/media/526809/northern-food-bowl-on-or-off-the-table->
(<http://splash.abc.net.au/home#!/media/526809/northern-food-bowl-on-or-off-the-table->)

Sample questions

- What is needed so agriculture can be expanded in Northern Australia?
- What crops and fibre can they grow in Northern Australia?

- What are some of the problems farmers might have?
- Who will want to farm in Northern Australia?
- Do you think it will work?

Useful links

Kimberley to Cape, Sharing Stories of Success – Story 3 Agriculture across Northern Australia (reading)

<http://www.kimberleytocape.net.au/sharing-stories-of-success/>
(<http://www.kimberleytocape.net.au/sharing-stories-of-success/>)

ABC 7.30 report The mission to drought-proof Australia - led by mining boss Andrew Forrest (video 7.4 min)

<http://www.abc.net.au/7.30/content/2015/s4280595.htm>
(<http://www.abc.net.au/7.30/content/2015/s4280595.htm>)

ABC Northern food bowl dream fraught with challenges (video 2.4 min)

<http://www.abc.net.au/local/videos/2013/07/22/3808002.htm>
(<http://www.abc.net.au/local/videos/2013/07/22/3808002.htm>)

ABS Splash, Growing up in the Ord River Valley (video 2.39 min)

<http://splash.abc.net.au/home#!/media/1225208/growing-up-in-the-ord-river-valley>
(<http://splash.abc.net.au/home#!/media/1225208/growing-up-in-the-ord-river-valley>)

The Australian – Food bowl dream was centuries in the rough (2 min)

<http://www.theaustralian.com.au/news/inquirer/food-bowl-dream-was-centuries-in-the-rough/story-e6frg6z6-1226489500826> (<http://www.theaustralian.com.au/news/inquirer/food-bowl-dream-was-centuries-in-the-rough/story-e6frg6z6-1226489500826>)

Bloomberg, Chinese Eye Australia's Outback in \$43 Billion Foreign Farming Frenzy (reading)

<http://www.bloomberg.com/news/articles/2015-08-03/shanghai-cop-grows-superfood-in-aussie-outback-for-china> (<http://www.bloomberg.com/news/articles/2015-08-03/shanghai-cop-grows-superfood-in-aussie-outback-for-china>)

[back to top](#)

Lesson 5: My water career

Summary:

Students will investigate the wide range of people who work together to manage water resources. They identify some of their scientific skills and how these skills are applied.

Equipment:

Computer or tablets with access to the internet, writing materials and digital technology to show a video to the class, a board or butchers paper to write a list.

Assessment:

Write a job advertisement for a position that is involved in water management.

Activity 1. Brainstorm water jobs

From what students have already learned what kind of jobs can they recall? Start writing a list on a board.

Activity 2. Discuss Bureau of Meteorology video

Show the Bureau of Meteorology video – A day at the Geraldton weather station (3.22 min)

<http://splash.abc.net.au/home#!/media/527997/> (<http://splash.abc.net.au/home#!/media/527997/>)

As a class discuss the tasks that Gemma and Patrick do each day. What is unusual about their job? Do you think Gemma and Patrick like their jobs?

Activity 3. Explore employment pages on water resources websites

As a class identify which water authority supplies water to the students' city, town or region.

In small groups students visit their website and find their employment section and find out what kinds of jobs are being advertised.

Then in small groups go to the Bureau of Meteorology website and look at their employment opportunities

<https://bom.nga.net.au/cp/index.cfm> (<https://bom.nga.net.au/cp/index.cfm>) and

<http://www.bom.gov.au/careers/antarctica.shtml> (<http://www.bom.gov.au/careers/antarctica.shtml>)

Bring students together to share what they found out. What was the range of positions being advertised? Which involved science and technology? Which jobs seemed most mysterious?

Add some more jobs to the list.

Activity 4. Search an employment database

In small groups students use the Seek website <http://www.seek.com.au/> (<http://www.seek.com.au/>)

Place these words in the fields and then students can try their own searches.

Keywords	Classification	Where
Irrigation	Any classification	All Australia
Water	Science and technology	All Australia

Students choose a couple of Jobs of interest and read what information is provided.

Continue to search on seek or use Career Harvest <http://www.careerharvest.com.au/> (<http://www.careerharvest.com.au/>) for more water related careers. Use water to do a search of the career database.

Add additional jobs to the list. Discuss what kind of science skills the different jobs require.

Activity 5. Clarify what information is provided in job advertisements

As a class list the main areas of information provided in a job advertisement. In what order is the information provided?

Activity 6. Write a job advertisement

Individual students write a job advertisement for a person needed for the water resources area?

- Choose or invent an organisation that is involved in water resources.
- Decide what kind of job will be advertised.
- Don't forget to mention something about qualifications and past experience.
- Keep the advertisement to 100 words or less.

[back to top](#)

Lesson 6: Poster presentation and reflection

Summary:

Teachers will provide groups of students a maximum time eg 3 minutes to present their poster to the class. Groups may be rotated to complete a PMI assessment on their peers' presentation. A reflection sheet is available to be used as is or modified by the teacher.

Equipment and materials:

Clock eg mobile phone, students' completed posters, worksheets 6.1 (one per group) and 6.2 (one per student)

Assessment:

The poster presentation will be main assessment for the unit of work.

Presentation

Groups of students have up to three minutes or the time decided by the teacher to present their poster to the class. To make sure that all students get to present their posters, impose a strict time limit.

Explain groups will be penalised if they go over their time limit, but not if their presentation is much shorter.

You may wish to have some peer assessment. Each group could be given one other group to assess using a PMI plus/minus/interesting thinking tool. Use the worksheet 6.1.

- Plus – students explain why parts of the presentation was communicated well.
- Minus – students explain how the presentation could have been improved.
- Interesting – students highlight what they found most interesting.

After the presentations, display the posters in a classroom for a couple of weeks.

What did we learn about reducing water waste?

Present the list of ideas students brainstormed about reducing the waste of water in lesson 1. Ask students to add to the list.

Ask students for their opinion about the most effective ways of sharing water resources.

Reflection

Provide students with the Reflection worksheet 6.2

Go through the questions on the worksheet:

- If there was one thing you could change about how water resources are used in Australia what would it be?
- What will you do to reduce the waste of water?
- What was the most surprising thing you learned about water?
- Which job was of greatest interest to you?

Give students about five minutes to complete the reflection sheet.

Worksheet 6.1

[Download Worksheet 6.1 \(PDF\) \(pdf/worksheet6-1.pdf\)](#)

Worksheet 6.2

[Download Worksheet 6.2 \(PDF\) \(pdf/worksheet6-2.pdf\)](#)

Reflection

If there was one thing you could change about how water resources are used in Australia what would it be?

What will you do to reduce the waste of water?

What was the most surprising thing you learned about water?

Which job was of greatest interest to you?

[back to top](#)

Web links

Lesson 1

Embedded water

Wikipedia – Virtual water – scroll down to the chart

https://en.wikipedia.org/wiki/Virtual_water (https://en.wikipedia.org/wiki/Virtual_water)

BBC in UK – Embedded water

http://news.bbc.co.uk/nol/shared/spl/hi/sci_nat/09/embedded_water/swf/embedded_water.swf
(http://news.bbc.co.uk/nol/shared/spl/hi/sci_nat/09/embedded_water/swf/embedded_water.swf)

National Geographic – Embedded water

<http://environment.nationalgeographic.com.au/environment/freshwater/embedded-water/>
(<http://environment.nationalgeographic.com.au/environment/freshwater/embedded-water/>)

Cotton Australia – Water, an example of changing water use (reading fact sheet)

<http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-water>
(<http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-water>)

Additional resource if time:

ABC splash – 13 minute video Water footprint in food – watch first two minutes

<http://splash.abc.net.au/home#!/media/107290/-water-footprints-in-food-manufacturing>
(<http://splash.abc.net.au/home#!/media/107290/-water-footprints-in-food-manufacturing>)

Sharing water resources

Australia's food bowl the Murrumbidgee Irrigation Area (9 min)

<https://www.youtube.com/watch?v=SZENTER1fE8c> (<https://www.youtube.com/watch?v=SZENTER1fE8c>)

lesson 2

What's today's weather?

Bureau of Meteorology www.bom.gov.au (<http://www.bom.gov.au>)

Climate maps

Bureau of Meteorology <http://www.bom.gov.au/climate/averages/maps.shtm>
(<http://www.bom.gov.au/climate/averages/maps.shtm>)

http://www.bom.gov.au/jsp/ncc/climate_averages/rainfall/index.jsp
(http://www.bom.gov.au/jsp/ncc/climate_averages/rainfall/index.jsp)

Drought and El Nino

ABC Splash Patterns of El Nino and La Nina (video 3min)

<http://splash.abc.net.au/home#!/media/1542363/> (<http://splash.abc.net.au/home#!/media/1542363/>)

Bureau of Meteorology <http://www.bom.gov.au/climate/change/?ref=ftr#tabs=Tracker&tracker=trend-maps>
(<http://www.bom.gov.au/climate/change/?ref=ftr#tabs=Tracker&tracker=trend-maps>)

Bureau of Meteorology tools

Bureau of Meteorology

<https://www.youtube.com/watch?v=d-GFADBBfcA> (<https://www.youtube.com/watch?v=d-GFADBBfcA>)

<http://www.bom.gov.au/australia/satellite/?ref=ftr> (<http://www.bom.gov.au/australia/satellite/?ref=ftr>)

<http://www.bom.gov.au/australia/satellite/himawari.shtml>
(<http://www.bom.gov.au/australia/satellite/himawari.shtml>)

Sky News BOM supercomputer to give faster warnings

<http://www.skynews.com.au/business/tech/2015/07/21/bom-supercomputer-to-give-faster-warnings.html>
(<http://www.skynews.com.au/business/tech/2015/07/21/bom-supercomputer-to-give-faster-warnings.html>)

Itnews - Cray to build Australia's biggest supercomputer

<http://www.itnews.com.au/news/cray-to-build-australias-biggest-supercomputer-406827>

(<http://www.itnews.com.au/news/cray-to-build-australias-biggest-supercomputer-406827>)

Weather stations

Bureau of Meteorology

<http://www.bom.gov.au/climate/cdo/about/sites.shtml>

(<http://www.bom.gov.au/climate/cdo/about/sites.shtml>)

Australian Weather News – Clickable map of all weather stations around Australia

<http://www.australianweathernews.com/sitepages/data/StationMapAustralia.shtml>

(<http://www.australianweathernews.com/sitepages/data/StationMapAustralia.shtml>)

Bom – WOW

<http://www.bom.gov.au/wow-support/> (<http://www.bom.gov.au/wow-support/>)

Lesson 3 and 4

Investigation 1: Application of GPS on farms

Introduction

Reasons for irrigation water waste (video 2.47 min)

<https://www.youtube.com/watch?v=R0P30b-woOA> (<https://www.youtube.com/watch?v=R0P30b-woOA>)

Useful links

Splash – How GPS works (video 4 min)

<http://splash.abc.net.au/home#!/media/85602/> (<http://splash.abc.net.au/home#!/media/85602/>)

Splash – Hi Tech Farming (video 2.33 min)

<http://splash.abc.net.au/home#!/media/1423209/high-tech-farming>

(<http://splash.abc.net.au/home#!/media/1423209/high-tech-farming>)

Farmers of the future will utilize drones, robots and GPS (reading)

<http://theconversation.com/farmers-of-the-future-will-utilize-drones-robots-and-gps-37739>

(<http://theconversation.com/farmers-of-the-future-will-utilize-drones-robots-and-gps-37739>)

How to use the GPS Mod - Farming Simulator 2015 game (video 11 min)

<https://www.youtube.com/watch?v=UGd2Jt9RGJc> (<https://www.youtube.com/watch?v=UGd2Jt9RGJc>)

GPS guidance of a tractor (video 1 min)

<http://www.precisionagriculture.com.au/gps-guidance-and-network-rtk.php>
(<http://www.precisionagriculture.com.au/gps-guidance-and-network-rtk.php>)

Digging trenches (reading)

<http://www.cisirrigate.com.au/about-us/115> (<http://www.cisirrigate.com.au/about-us/115>)

Agriculture (Victoria), Using satellite technology to improve irrigation management on Victorian farms (reading)

<http://agriculture.vic.gov.au/agriculture/horticulture/horticulture-research/using-satellite-technology-to-improve-irrigation-management-on-victorian-farms2>
(<http://agriculture.vic.gov.au/agriculture/horticulture/horticulture-research/using-satellite-technology-to-improve-irrigation-management-on-victorian-farms2>)

Investigation 2: Sustaining wetlands in the Murray Darling Basin

Introduction

ABC Splash Murray-Darling - a big balancing act (4 min)

<http://splash.abc.net.au/home#!/media/107334/murray-darling-a-big-balancing-act>
(<http://splash.abc.net.au/home#!/media/107334/murray-darling-a-big-balancing-act>)

Useful links

ABC Splash How might water shortages in the Basin affect you? (video 3 min)

<http://splash.abc.net.au/home#!/media/860145/how-might-water-shortages-in-the-basin-affect-you->
(<http://splash.abc.net.au/home#!/media/860145/how-might-water-shortages-in-the-basin-affect-you->)

ABC Splash Murray-Darling - a big balancing act (video 4 min)

<http://splash.abc.net.au/home#!/media/107334/murray-darling-a-big-balancing-act>
(<http://splash.abc.net.au/home#!/media/107334/murray-darling-a-big-balancing-act>)

La Trobe research – Be the protector of my species (video 2.41 min)

<http://www.latrobe.edu.au/be-the-difference/species> (<http://www.latrobe.edu.au/be-the-difference/species>)

Australian Science Chanel – The science behind the headlines: The Murray Darling Basin Plan (video 1 first six min)

<http://riaus.org.au/events/science-behind-the-headlines-march-2012/>

(<http://riaus.org.au/events/science-behind-the-headlines-march-2012/>)

ABC Mildura Swan Hill - Scientists trial new methods for saving wetlands at Bottle Bend near Mildura
(2.16 min)

<http://www.abc.net.au/local/videos/2009/08/24/2664889.htm>

(<http://www.abc.net.au/local/videos/2009/08/24/2664889.htm>)

Investigation 3: Recycled water

Introduction

Altona treatment plant – processing waste water (video 3 min)

<https://www.youtube.com/watch?v=7dGcOntEkTY> (<https://www.youtube.com/watch?v=7dGcOntEkTY>)

Useful links

ABC splash – How a desalination plant work

<http://splash.abc.net.au/home#!/media/524895/how-does-desalination-work->

(<http://splash.abc.net.au/home#!/media/524895/how-does-desalination-work->)

ABC splash – Using recycled waste water for trees

<http://splash.abc.net.au/home#!/media/30879/water-recycling-wastewater-to-wealth>

(<http://splash.abc.net.au/home#!/media/30879/water-recycling-wastewater-to-wealth>)

Melbourne Water – Recycled water (reading)

<http://www.melbournewater.com.au/whatwedo/recyclewater/pages/producing-recycled-water.aspx>

(<http://www.melbournewater.com.au/whatwedo/recyclewater/pages/producing-recycled-water.aspx>)

<http://www.melbournewater.com.au/whatwedo/recyclewater/Pages/Using-recycled-water.aspx>

(<http://www.melbournewater.com.au/whatwedo/recyclewater/Pages/Using-recycled-water.aspx>)

<http://www.melbournewater.com.au/whatwedo/recyclewater/Pages/Recycled-water-research.aspx>

(<http://www.melbournewater.com.au/whatwedo/recyclewater/Pages/Recycled-water-research.aspx>)

Target 100 – Using recycled water in Abattoirs

<http://www.target100.com.au/100-Initiatives/All-industry-initiatives/Reusing-water-in-abattoirs>

(<http://www.target100.com.au/100-Initiatives/All-industry-initiatives/Reusing-water-in-abattoirs>)

Investigation 4: New and future water saving technologies

Introduction

Splash – Hi Tech Farming (video 2.33min)

<http://splash.abc.net.au/home#!/media/1423209/high-tech-farming>

(<http://splash.abc.net.au/home#!/media/1423209/high-tech-farming>)

Useful links

Target 100 – Water use in the feedlot (reading)

[http://www.target100.com.au/Environment/Water/Water-use-in-the-feedlot?](http://www.target100.com.au/Environment/Water/Water-use-in-the-feedlot?gclid=CMiQtLTjzcgCFYKavAodrsUCFw)

[gclid=CMiQtLTjzcgCFYKavAodrsUCFw \(http://www.target100.com.au/Environment/Water/Water-use-in-the-feedlot?gclid=CMiQtLTjzcgCFYKavAodrsUCFw\)](http://www.target100.com.au/Environment/Water/Water-use-in-the-feedlot?gclid=CMiQtLTjzcgCFYKavAodrsUCFw)

Target 100 – Water use in the paddock (reading)

<http://www.target100.com.au/Environment/Water/Water-use-in-the-paddock>

(<http://www.target100.com.au/Environment/Water/Water-use-in-the-paddock>)

Seametrics – 5 Effective Water Conservation Tools for Farmers

<http://www.seametrics.com/blog/farming-water-conservation-tools/>

(<http://www.seametrics.com/blog/farming-water-conservation-tools/>)

Various methods of using irrigation water efficiently (reading)

<http://wateruseitwisely.com/100-ways-to-serve/landscape-care/principles-of-xeriscape-design/efficient-irrigation/> (<http://wateruseitwisely.com/100-ways-to-serve/landscape-care/principles-of-xeriscape-design/efficient-irrigation/>)

Bloomberg, Farm, Innovation: Cheap solar irrigation (reading)

<http://www.bloomberg.com/bw/articles/2013-10-10/innovation-sunwaters-cheap-solar-powered-irrigation> (<http://www.bloomberg.com/bw/articles/2013-10-10/innovation-sunwaters-cheap-solar-powered-irrigation>)

Bloomberg, Farm Bots and Two-Month-Old Bread: Innovations in Food and Agriculture (reading)

<http://www.bloomberg.com/bw/articles/2013-01-10/farm-bots-and-two-month-old-bread-innovations-in-food-and-agriculture> (<http://www.bloomberg.com/bw/articles/2013-01-10/farm-bots-and-two-month-old-bread-innovations-in-food-and-agriculture>)

ABC news website – Agricultural machinery news (reading and video)

<http://www.abc.net.au/news/topic/agricultural-machinery>

(<http://www.abc.net.au/news/topic/agricultural-machinery>)

ABC news website – Water management news (reading and video)

<http://www.abc.net.au/news/topic/water-management> (<http://www.abc.net.au/news/topic/water-management>)

ABC The new inventors – Water purifier (reading)

<http://www.abc.net.au/tv/newinventors/txt/s1649590.htm>

(<http://www.abc.net.au/tv/newinventors/txt/s1649590.htm>)

Sustainability matters, Providing clean tank water to rural homes without using chemicals (reading)

<http://www.sustainabilitymatters.net.au/content/water/article/providing-clean-tank-water-to-rural-homes-without-using-chemicals-1228669156>

(<http://www.sustainabilitymatters.net.au/content/water/article/providing-clean-tank-water-to-rural-homes-without-using-chemicals-1228669156>)

Investigation 5: Adapting to Climate Change

Introduction

ABC news, Climate change will force farmers to adapt: CSIRO (audio 3.23 min)

<http://www.abc.net.au/news/2013-01-15/climate-change-will-force-farmers-to-adapt-csiro-says/4464506>

(<http://www.abc.net.au/news/2013-01-15/climate-change-will-force-farmers-to-adapt-csiro-says/4464506>)

Useful links

ABC landline – Bom climate and weather outlook (watch first minute and half)

<http://www.abc.net.au/landline/content/2015/s4285161.htm>

(<http://www.abc.net.au/landline/content/2015/s4285161.htm>)

ABC landline – Climate change and Agriculture (8.47 min)

<http://www.abc.net.au/landline/content/2013/s3682086.htm>

(<http://www.abc.net.au/landline/content/2013/s3682086.htm>)

Adapting farming to climate change (video 2 min)

<https://www.youtube.com/watch?v=bfS8joDpUMs> (<https://www.youtube.com/watch?v=bfS8joDpUMs>)

Kick start, Enabling Farmers to Adapt to Climate Change (video 1.17 min)

<https://www.youtube.com/watch?v=sMqrSH8H6QA> (<https://www.youtube.com/watch?v=sMqrSH8H6QA>)

ABC Splash – Dealing with drought (video 1.44 min)

<http://splash.abc.net.au/home#!/media/525577/dealing-with-drought>

(<http://splash.abc.net.au/home#!/media/525577/dealing-with-drought>)

United nations, Understanding climate-smart agriculture (video 2.64 min)

<https://www.youtube.com/watch?v=IUdNMsVDIZ0> (<https://www.youtube.com/watch?v=IUdNMsVDIZ0>)

ABC Landline – Banana appeal (video watch first 4 minutes)

<http://www.abc.net.au/landline/content/2010/s3235924.htm?source=rss>
(<http://www.abc.net.au/landline/content/2010/s3235924.htm?source=rss>)

ABC News - BMP Cotton by Sarah Clarke (video 2 min)

<https://www.youtube.com/watch?v=QgXPMFR6nqY> (<https://www.youtube.com/watch?v=QgXPMFR6nqY>)

Cotton Australia – Cotton and climate change (reading fact sheet)

<http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-climate-change>
(<http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-climate-change>)

Investigation 6: The case for moving agriculture to Northern Australia

Introduction

ABC Splash Northern food bowl: on or off the table? (video 2.31 min)

<http://splash.abc.net.au/home#!/media/526809/northern-food-bowl-on-or-off-the-table->
(<http://splash.abc.net.au/home#!/media/526809/northern-food-bowl-on-or-off-the-table->)

Useful links

Kimberley to Cape, Sharing Stories of Success – Story 3 Agriculture across Northern Australia
(reading)

<http://www.kimberleytocape.net.au/sharing-stories-of-success/>
(<http://www.kimberleytocape.net.au/sharing-stories-of-success/>)

ABC 7.30 report The mission to drought-proof Australia - led by mining boss Andrew Forrest (video 7.4 min)

<http://www.abc.net.au/7.30/content/2015/s4280595.htm>
(<http://www.abc.net.au/7.30/content/2015/s4280595.htm>)

ABC Northern food bowl dream fraught with challenges (video 2.4 min)

<http://www.abc.net.au/local/videos/2013/07/22/3808002.htm>

(<http://www.abc.net.au/local/videos/2013/07/22/3808002.htm>)

ABS Splash, Growing up in the Ord River Valley (video 2.39 min)

<http://splash.abc.net.au/home#!/media/1225208/growing-up-in-the-ord-river-valley>

(<http://splash.abc.net.au/home#!/media/1225208/growing-up-in-the-ord-river-valley>)

The Australian – Food bowl dream was centuries in the rough (2 min)

[http://www.theaustralian.com.au/news/inquirer/food-bowl-dream-was-centuries-in-the-rough/story-](http://www.theaustralian.com.au/news/inquirer/food-bowl-dream-was-centuries-in-the-rough/story-e6frg6z6-1226489500826)

[e6frg6z6-1226489500826](http://www.theaustralian.com.au/news/inquirer/food-bowl-dream-was-centuries-in-the-rough/story-e6frg6z6-1226489500826) (<http://www.theaustralian.com.au/news/inquirer/food-bowl-dream-was-centuries-in-the-rough/story-e6frg6z6-1226489500826>)

Bloomberg, Chinese Eye Australia's Outback in \$43 Billion Foreign Farming Frenzy (reading)

[http://www.bloomberg.com/news/articles/2015-08-03/shanghai-cop-grows-superfood-in-aussie-](http://www.bloomberg.com/news/articles/2015-08-03/shanghai-cop-grows-superfood-in-aussie-outback-for-china)

[outback-for-china](http://www.bloomberg.com/news/articles/2015-08-03/shanghai-cop-grows-superfood-in-aussie-outback-for-china) (<http://www.bloomberg.com/news/articles/2015-08-03/shanghai-cop-grows-superfood-in-aussie-outback-for-china>)

Lesson 5

My Water career

ABC Splash, A day at the Geraldton weather station (3.22 min)

<http://splash.abc.net.au/home#!/media/527997/> (<http://splash.abc.net.au/home#!/media/527997/>)

Bureau of Meteorology, employment

<https://bom.nga.net.au/cp/index.cfm?> (<https://bom.nga.net.au/cp/index.cfm?>)

<http://www.bom.gov.au/careers/antarctica.shtml> (<http://www.bom.gov.au/careers/antarctica.shtml>)

Seek website

<http://www.seek.com.au/> (<http://www.seek.com.au/>)

Career Harvest website

<http://www.careerharvest.com.au/> (<http://www.careerharvest.com.au/>)

