

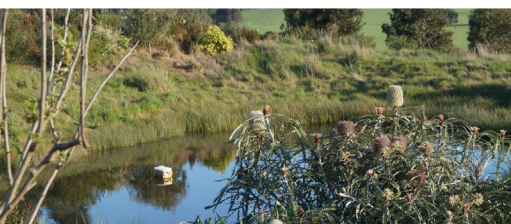
Year 7

Geography



Agriculture in Education:
an educational resource for Year 7 Geography

Sustainable Agriculture: Water Management



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AGRIFOOD
SKILLS AUSTRALIA



Sustainable Agriculture: Water Management

Year 7 Geography

Content Description

The way that flows of water connects places as it moves through the environment and the way this affects places ACHGK038

Factors that influence the decisions people make about where to live and their perceptions of the liveability of places ACHGK043

This unit also addresses the Year 7 Science content description:

Some of the Earth's resources are renewable, including water that cycles through the environment, but others are non-renewable ACSSU116

Source: Australian Curriculum v8.1

<http://www.australiancurriculum.edu.au/humanities-and-social-sciences/geography/curriculum/f-10?layout=1>

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Learning Outcomes

- At the end of the unit, students will be able to:
- Apply map interpretation skills for landform and vegetation identification;
 - Analyse and draw conclusions from online climatic data;
 - Explain the consequences of ill-informed water and land management practices;
 - Identify elements of sustainable water management in the farming landscape;
 - Describe the role of riparian vegetation in managing water flow within a local catchment area;
 - Explain the causes of dryland salinity and effective remediation strategies;
 - Assess how liveability considerations have contributed to the whole-of-farm plan; and
 - Communicate research findings in an appropriate manner.

Description

The activities in this unit focus on the water management and liveability elements of a mixed farm in southern Victoria, where regeneration of a natural watercourse, stock and pasture management changes and a long term revegetation program, have reduced soil erosion and nutrient loss, increased farm productivity and created a more aesthetic and pleasant living and working environment.

The accompanying video – *Low Impact Sustainable Agriculture – Regenerating the Family Farm* (<https://youtu.be/4b26zrkwlPU>), takes students to Yan Yan Gurt West Farm where five successive generations of the Stewart family have farmed for over 100 years. Since the 1990s, the family has fenced off and revegetated the riparian zones and in collaboration with Landcare, has developed and implemented an improved catchment management plan for the surrounding Barwon River catchment. The farm today, is a sustainable agricultural enterprise in harmony with its surrounding environment.

The video highlights the family's underlying principles of balancing economic, social and environmental sustainability within the foot print of the farm and can also be used as a point of reference within Year 7 Geography - Unit 2: Place and Liveability.

The activities are designed to provide a case study context within students' broader investigations into water and the world and place and liveability.

Activity 1: Introductory Map Study

Activity 2: What the climatic data can tell us

Activity 3: Yan Yan Gurt West farm - Water management

Activity 4: Yan Yan Gurt West farm - photo interpretation

Activity 5: Water management issues - bringing it all together

Assessment - Water Management Plan

Yan Yan Gurt West Farm - Overview

Teacher Background Information

Yan Yan Gurt West Farm is a 230 hectare mixed farm located in the northeastern foothills of the Otway Ranges in Southern Victoria. Yan Yan Gurt is derived from the Indigenous word meaning - ever flowing water. The farm supports mainly sheep (producing meat and wool), with some cattle, horses, alpacas and chickens. Perennial summer crops such as lucerne and plantain (for livestock feed) are grown along with a range of tree products (arboriculture), fruit and vegetables, bush foods and banksias.

It provides a case study in sustainable production – balancing the needs of the animals, the pasture and the environment along with the health and wellbeing of those who live and work on the farm.

History: Indigenous people lived in the area prior to European settlement. In the 1870s, European settlers moved into the area and commenced clearing the vegetation, growing crops and raising animals. The Stewart family settled there over 100 years ago and fourth and fifth generation family members now living on and earning a livelihood from the property.

From the 1870s, the pioneer farmers removed most of the native trees and shrubs leaving only a few patches of remnant vegetation and some isolated areas of regrowth scrub. The farming landscape began to show signs of salinity after the network of water holes along the natural low lying watercourse of the Yan Yan Gurt Creek was drained. Serious gully erosion, stream bank erosion and waterlogging developed along the artificially created drainage channel. With just 3.5% of the property under trees, there was minimal shade and shelter for the sheep and cattle.

The few fenced paddocks were too large for effective grazing management. The farm system and the catchment were not sustainable.

Today: The property has been transformed. Over the past 20 years, close on 40,000 mostly native trees and shrubs have been established, increasing tree cover from 3.5% in 1992, to over 17% today. The land and livestock are better protected, productivity has increased and the farm provides a more aesthetic and pleasant living and working environment.

The farm produces an average of 1600 prime lambs pa, raises over 82 calves, maintains 3.5 ha of remnant vegetation and 30 hectares of plantations. More than half of the area planted to trees is being managed for commercial timber production, generating a growing source of income plus considerable environmental benefits. The integration of farm forestry with Landcare generates income through on-site tours for local and international study groups.

Remediation Strategies

Much of the rehabilitation and regenerative work undertaken on Yan Yan Gurt West farm has involved planting native **woody vegetation** - trees for harvesting for timber and shrubs such as banksias - the flowers of which are harvested sold locally. Woody vegetation is generally **perennial** and deep-rooted, providing year-round habitat and protecting soil, micro-climate, groundwater and water catchments.

Water management is a critical component of the remediation work.

The **riparian zone** is the interface between land and a river or stream where aquatic systems merge with the terrestrial environment. Virtually all rainwater runoff passes through this zone before moving into adjacent aquatic/estuarine systems.

The planting and preservation of riparian vegetation is critical to the long term sustainability of water catchments and in the case of Yan Yan Gurt West farm, the surrounding Barwon River catchment.

Riparian vegetation refers to the plant habitats and communities along the river margins and banks. It plays an important role in protecting water bodies from pollutants by filtering catchment run-off, reducing erosion and maintaining stream bank stability. By providing shade, it reduces the availability of light to possible algal blooms and also provides a source of carbon to streams. It also provides in stream and bank habitats along with food for terrestrial and aquatic biota.

Stream bank erosion - occurs when riparian vegetation is degraded. The 2001 National Land and Water Resources Audit estimates that it has been common for creeks and rivers cleared since European settlement to increase fourfold in depth and twofold in width. As in the case of gully erosion, stream bank erosion adds excess sediment in waterways, causing damage to floodplain land and infrastructure. If stock have access to waterways, riparian vegetation is damaged and the risk of soil loss is increased.

Gully erosion - one of the most visible and severe forms of water erosion. Gullies are steep-sided watercourses which experience water flows during heavy or extended rainfall. Most gullies are less than two metres deep, but in deep soils, they can reach depths of up to 15 metres. Gully erosion can be triggered by cultivation and grazing which leads to a loss of vegetation cover. It also occurs when run-off is concentrated through furrows, contour banks, stock tracks, fences and roads and when drainage lines are disrupted through clearing vegetation and constructing residential areas.

Ultimately, vegetation cover is the most critical factor in the protection of soils from water and wind erosion. Any action that reduces the protective cover of vegetation increases the risk of soil loss.

Dryland Salinity

Salinity refers to the concentration of salts in soil or water. Australian soils have accumulated salt over thousands of years from prevailing winds carrying ocean salt, the evaporation of inland seas, and from weathered parent rocks.

Dryland salinity occurs when deep-rooted native plants are removed or replaced with shallow-rooted plants that use less water. As a result, more water passes through soil to groundwater, raising the water table and bringing salt to the surface where it can be left behind as the water evaporates.

High salinity levels in water and soil may cause native vegetation to become unhealthy or die, leading to a decline in biodiversity as salt-resistant species take over. Reduced groundcover makes soil more prone to erosion, polluting water with increased sediment, making it unsuitable for human and animal consumption. It also threatens high value ecosystems and the plant and animal species they support.



Setting the Scene

Explain that this case study unit supports students' investigations into water and the world, place and liveability. The activities are supported in the accompanying video *Low Impact Sustainable Agriculture – Regenerating the Family Farm* (<https://youtu.be/4b26zrkwlPU>)

Activities are based on a mixed farm in southern Victoria where the Stewart family has overcome the unsustainable water and land management practices of previous generations of the family and created a more sustainable and profitable farming operation and a more liveable environment.

- Have students suggest what these unsustainable practices might have been.

Yan Yan Gurt West farm is located in the northeastern foothills of the Otway Ranges to the west of Geelong in Victoria. It can be located on the road from Winchelsea to Deans Marsh Road just opposite the T intersection with Rifle Butts Road.

- Ask whether any students are familiar with this part of Victoria. Perhaps they have been along the Great Ocean Road or visited the Otway Ranges - two iconic tourist destinations.

The first two activities involve a map study and online analysis of climatic data to help students understand the physical environment in which the farm is located. The climatic data is accessed from the Bureau of Meteorology website.

<http://www.bom.gov.au/climate/data/index.shtml>

Students need copies of all the Student Activity Sheets and the Activity 4 Information Sheet.



Student Activity 1: Introductory map study

Yan Yan Gurt West farm is located in the northeastern foothills of the Otway Ranges in Southern Victoria to the west of Geelong. You can locate the farm, using a Victorian road map, on the road from Winchelsea to Deans Marsh Road just opposite the T intersection with Rifle Butts Road. However, to investigate the region surrounding the Yan Yan Gurt farm further, you need to go online.

Working in pairs, use Google Earth or Google maps to:

1. Describe the overall appearance of the area occupied by Yan Yan Gurt West farm.
2. Identify features such as Yan Yan Gurt Creek and nearby landmarks. The creek flows into the Barwon River. Trace the course of the Barwon River from its source to its mouth.
3. Estimate the distance and direction of the farm from Melbourne, Barwon Heads and Warrnambool.
4. Locate and name some nearby landform features/national parks.
5. Make observations about the vegetation and its relation to landform types both around the farm and between the farm and the coast.

Natural disasters such as bush fires have severely affected this region of Victoria in the past. Most recently being the fire along the Great Ocean Road and in the adjacent Otway ranges, that burnt for over week, destroying 116 houses in two small settlements on Christmas Day 2015.

6. What factors can make some areas more likely to experience damaging bush fires?
 7. Suggest the precautions residents and landholders in this area need to take.
 8. What weather conditions pose the greatest threat of bushfires?
- Share what you have discovered from this introductory map study with other members of the class.

Teacher Preparation Activity 2: What climatic data can tell us

An analysis of climatic data provides students with a further understanding of the physical environment of the region in which the Yan Yan Gurt West farm is located. It provides an important underlying context for the water management issues they will investigate in Activities 3 and 4.

Explain to students that climatic data assists farmers with their everyday and longer term crop and livestock management decisions.

In this activity, students, preferably working in pairs, access and interpret temperature and rainfall data for the locality of Yan Yan Gurt West farm on the Bureau of Meteorology (BOM) website. <http://www.bom.gov.au/climate/data/index.shtml>

If students are not familiar with this website, explain that by entering names of places - cities, towns or regional locations, they can obtain data gathered from weather stations throughout Australia. In regional areas, weather stations are often located at regional airports or local post offices. Recordings are taken daily into and recorded in a central data base at the Bureau of Meteorology.

Students are directed to select the town of Winchelsea, (Vic 38.27°S, 143.83°E) with its nearby Colac (Mt Gellibrand) weather station. This town is approximately 20 km from Yan Yan Gurt West farm and this weather station is the closest to the town. The procedure is explained in the Activity 2 worksheet.

Before handing out the Activity 2 Worksheet, encourage students to familiarise themselves with this part of the BOM website, by looking at the data for weather stations in their own locality.

Students investigate temperature and rainfall data recorded at the Mt Gellibrand weather station.

Students will need to access:

Temperature - mean max monthly data, daily data by year, plus summary statistics.

Rainfall - mean monthly data, daily data by year, plus summary statistics.

Answers (*in italics*), are provided below as a guide for teachers.

Investigation 1: Monthly Mean Maximum Temperature data

1. Hottest December day in 2015? (42.6°C on 19th December)
2. Maximum temperatures on 24th and 25th December 2015? (35.3°C and 36°C)
3. What day recorded the lowest max temp in 2015? (7°C on 14th July)

Viewing summary statistics for all monthly data back to 2001:

4. Month with highest average maximum temperatures? (Jan - mean max 25.7 °C)
5. Noticeable trends in mean annual temperature since 2001? (minor fluctuations)

Investigation 2: Monthly Rainfall

1. Annual rainfall total for Colac (Mt Gellibrand) in 2015? (434.2mm)
2. Wettest and driest months in 2015? (January and October)
3. Comparison of Dec 2015 total with average Dec total (2015 -19.6mm, mean 36.9mm)
4. Describe the rainfall distribution in 2015 (529.5mm pa - winter maximum)
5. Observing trends in annual rainfall back to 2001 (less than average annual totals for 2012- 2015. Previous dry years 2006 and 2008)

Teacher Preparation Activity 2: What climatic data can tell us (cont)

Explain that students are focusing on 2015 in view of the devastating Christmas Day 2015 bushfires in this part of Victoria, that destroyed 116 houses at Wye River and Separation Creek on the Great Ocean Road, just 40km from Yan Yan Gurt Farm. Heavily timbered forest within the Otway Ranges exists between these settlements and the farm.

Encourage students to draw further conclusions from this data, such as:

- Climate can vary considerably year to year (characterises Australia's climate in general);
- Variation in average annual temperatures since 2001;
- An unseasonably hot December in 2015 with no rain;
- How declining rainfall would affect local farmers' and landholders' water management planning and practices;
- Seasonal impacts on land and livestock management eg - lambing in cold moist conditions, and the effect of hot dry conditions in summer on pastures and feed for livestock.

Students should be also encouraged to suggest instances where additional weather and climate information would be required to draw some land and livestock management conclusions such as:

- Information on wind speed and direction to determine an imminent bushfire threat;
- Chance of thunderstorm in hot dry conditions. The Otway fires are believed to have started on 19 December 2015 as a result of a lightning strike;
- Location of livestock during the colder and wetter months; and
- Protection livestock and new born lambs in adverse weather situations.



Student Activity 2: What climatic data can tell us

Understanding the physical features of an area is an important part of a geographical investigation. Analysing local climatic data provides you with background understanding of a region. The Bureau of Meteorology website provides detailed climatic statistics on locations right across Australia.

Your task is to analyse and draw conclusions on annual average rainfall and maximum temperatures for this area in southern Victoria, where the Yan Yan Gurt West farm is located.

Access the Bureau of Meteorology (BOM) website - <http://www.bom.gov.au/climate/data/index.shtml>

This takes you to the climate data online section.

Follow the procedure below for searching temperature and rainfall data:

In *Select using Text* option

1. *Selected - Data about* - Select either *Temperature* or *Rainfall*, from the drop down menu and *Type of Data - Observations monthly*.
2. *Select a weather station in the area of interest*.
 - a. Type Winchelsea and select Find
 - b. *Matching towns* - select Winchelsea Vic 38.27°S, 143.83°E.
 - c. *Nearest Bureau station* – select 090035 Colac (Mt Gellibrand) Vic.(5.2km away)
3. *Get the data*. Use this station number - 090035 as a short cut for further searches

Investigation 1: Temperature: Colac (Mt Gellibrand)

Examine the maximum temperatures (including the summary statistics for all years). Record your answers.

1. What was the hottest day in December 2015? What did the temperature reach?
2. What was the maximum temperature on 24th and 25th December 2015?
3. What day recorded the lowest maximum in 2015? What did the temperature reach that day?
4. From 2001-2015, which month recorded the highest average maximum temperatures?
5. Comment on the overall trend in mean annual temperatures since 2001 -2015.

Investigation 2: Rainfall: Colac (Mt Gellibrand)

Examine the daily rainfall data (including summary statistics for all years). Record your answers.

1. What was the annual rainfall recorded for Colac (Mt Gellibrand) in 2015?
2. Which month in 2015 was the wettest? Which was the driest?
3. Compare the December 2015 total with the average December rainfall total 2001-2015.
4. Describe the rainfall distribution in 2015.
5. Comment on the trends in annual rainfall back to 2001.

As a class, discuss the conclusions that can be drawn from this analysis.

Activity 3: Yan Yan Gurt West farm – Water management

Preparation

Print and distribute copies of Student Activity 3: *Yan Yan Gurt West Farm - Water Management*.

It is suggested that copies of Student Activity 4: *Yan Yan Gurt West farm – Photo interpretation* a) and b) be handed out after students have discussed and researched the issues and concepts raised in Student Activity 3.

Setting the Scene

Introduce these next two activities by reminding students they need to note the role that water management plays in the farming operation that is portrayed in the video below. Farm owners - Andrew and Jill, make reference to previous unsustainable land and water management practices.

The video highlights current farm management practices - vastly different to those of previous generations of the family who commenced farming here over 100 years ago. The farm is now a sustainable agricultural enterprise in harmony with its surrounding environment. Family members have created a liveable place, in keeping with their underlying principles of balancing economic, social and environmental sustainability within the foot print of the farm.

Show the video - *Low Impact Sustainable Agriculture – Regenerating the Family Farm* (<https://youtu.be/4b26zrkwlPU>)

After viewing, encourage students to recall what they observed and heard in the video in relation to the previous widening and straightening of the Yan Yan Gurt Creek. In particular:

- The consequences of this action and why it might have been done;
- Time taken for the current generation of family members to rectify the damage;
- The various steps involved in doing so; and
- The location of tree corridors.

Introduce students to the following terms that are referenced in the video.

Hydrology - the scientific study of the movement, distribution, and quality of water on Earth

Agroforestry - a method and system of land management involving the simultaneous cultivation of farm crops and trees; agriculture incorporating the growing of trees.

Arboriculture - the cultivation of tree and shrubs

Students need to record these terms.

Introduce the concepts - **Perennial vegetation, riparian zones, riparian vegetation, stream bank erosion, gully erosion and dryland salinity**. Students should also define these terms and verify their source as they record them.

The following activities investigate, discuss and analyse aspects of water management on Yan Yan Gurt West farm. Encourage students to demonstrate their ability to list and categorise relevant information at the local case study level and subsequently to apply this understanding within the broader context of water management within the hypothetical farm they choose for their final research and presentation task.



task

Student Activity 3: Yan Yan Gurt West farm - Water management

The video below takes you to the Yan Yan Gurt West Farm where current land and water management practices are now very different to those of previous generations of the family who commenced farming there over 100 years ago.

The video highlights the decisions made by family members to create a more sustainable and liveable place, in keeping with their underlying principles of balancing economic, social and environmental sustainability within the farm footprint.

The farm is now a sustainable agricultural enterprise in harmony with its surrounding environment.

Watch the video – *Low Impact Sustainable Agriculture – Regenerating the Family Farm* (<https://youtu.be/4b26zrkwlPU>)

1. After viewing the video, think about and discuss the following:
 - a. What is the meaning of Yan Yan Gurt? Why might the family have adopted the name? Is it an appropriate name for the farm? Give your reasons.
 - b. What are your initial reactions to the farm? Would you like to live there? What type of work could you be involved in if you did?
 - c. Andrew mentions that the hydrology of the landscape was changed by previous farming practices. What does he mean by this?
 - d. 40,000 trees have been planted on this predominantly sheep grazing property since the early 1990s. Suggest where the trees have been planted and why the family has planted so many.
 - e. What evidence is there of associated commercial activities being undertaken within the tree corridors? With the help of your teacher, suggest how the trees are also impacting on the main income earning purpose of the farm – raising sheep and cattle.
 - f. Andrew and Jill are members of the East Otway Landcare Group. What is Landcare? What is its purpose. Access the link below to find out the environmental concerns and work of this group. <http://deansmarsh.org.au/community/east-otway-landcare-group/>
2. Find and record your answers to the following.
 - a. Define the term hydrology. List the changes made to the creek by previous generations of the family. What were the consequences of those actions?
 - b. Some of the vegetation planted on the property can be described as riparian. Define the terms riparian zone and riparian vegetation and verify your sources.
 - c. Where are the riparian areas on the farm? How are they now being managed?
 - d. What is arboriculture? How it now integrated into the property?
 - e. Many of the low lying areas on the farm were previously susceptible to waterlogging. What consequences would this have had on managing the livestock?



Student Activity 4: Yan Yan Gurt West farm - Photo interpretation a)

Examine and discuss the following three images. Ensure you have both pages a) and b).

1994: Artificially created drainage channel on Yan Yan Gurt West Farm



1999: Same View after five years





Student Activity 4: Yan Yan Gurt West farm - Photo interpretation b)

2013: Same view after a further 14 years



As a class, share and record your observations.

Answer the following:

1. What evidence is there that all three photos were taken from the same place?
2. What can you see in the 1994 photo? What measures would have been taken since then to stop livestock walking into the watercourse? How would this area have looked after a lot of rain?
3. Look closely at the 1999 photo? Describe the variety of vegetation. Would livestock have been able to access this area? Provide evidence to support your answer.
4. What comparisons can you make between the 1994 and 2013 photos? If you were a native animal, which habitat would you prefer? Why?
5. What is a micro-climate? Identify a possible example from the 2013 photo.
6. This area of the farm can be described as a riparian zone and today is playing a key role in the sustainability of the farming operation. What benefits might these areas provide to the sheep?
7. How would the flow of water through this area have changed over this period?
8. Suggest possible situations when paddocks surrounded by tree corridors could be a factor in livestock management decisions.

Activity 5: Water management issues

Preparation

Print and when appropriate, distribute copies of:

- Student Activity 5: Water management issues – Information sheet.
- Student Activity 5: Water management issues – bringing it all together
- Assessment task

Setting the Scene

Ensure students have a copy of the *Water management issues information sheet*. It provides a summary of the consequences of previous water and land management practices and the remedial actions that have subsequently been implemented.

Students use the *Water management issues information sheet* as a base for the additional research required in Activity 6 and for the subsequent assessment task.

They will also need a copy of Student Activity 6 - *Water management issues - bringing it all together* and the Assessment task.

Guidance for the Assessment Task

Before they start their planning, advise students to consider a suitable location and type of environment for their hypothetical farm. Their choice must enable them to apply their learning from the Yan Yan Gurt Farm West case study. Teachers may need to help students with their choice.

They will need to decide on the overall physical characteristics of their farm - flat, hilly, type of climate, natural vegetation, the location of water courses etc. They add to this major landuses and the layout of their paddocks. Students need to think about what they could place on the other side of a boundary fence with a neighbour. Perhaps there could be some native forest that a wildlife corridor could link to. Advise students to select a location with reasonable rainfall.

Their map will be a useful tool enabling them to demonstrate the spatial characteristics of their farm and to explain reasons for the water management actions and strategies they decide to put in place.



Student Activity 5: Water management issues – Information sheet

Background

A summary of Issues relating to land and water management on Yan Yan Gurt West Farm, is contained below. These supplement what you would have discovered from the Yan Yan Gurt West Farm video and conclusions from your analysis of the photos in Activity 4.

To a large extent, these issues can be attributed to interference with the movement of water through the farm landscape. Read the following information carefully. It provides some background information for your research in Activity 5. It will also help you develop your Water Management Plan for the assessment task.

Situation in 1992:

- Much of the native vegetation on the farm had been removed and habitat removed.
- The banks of the creek were eroded and the creek had cut a deep channel to bedrock.
- Low lying areas were often waterlogged and salt had risen to the surface.
- There was very little shade and shelter for livestock.
- Paddocks were too big for effective grazing management.
- The land and farm system were inappropriately managed.

The East Otway Landcare Group developed a plan to manage the surrounding Yan Yan Gurt Creek catchment area. This encouraged landowners in the area to implement a variety of landcare, water quality, landscape, habitat and animal productivity initiatives.

The whole-of-farm plan for Yan Yan Gurt West farm involved:

- Improving the quality and quantity of water moving through the property.
- Addressing the salinity issues.
- Planting native trees and shrubs, restoring habitat and increasing biodiversity.
- improving livestock and pasture management.

Situation today:

- Fences along creeks and drainage lines keep the stock out of the wet and boggy areas. This has improved water quality and also reduced the risk of disease in the livestock.
- Native vegetation planted along the sides of watercourses, has created wildlife corridors into and across adjacent properties.
- Commercial timber species have been planted in the low lying areas where there is greater moisture and nutrients in the soil and seedlings are better protected.
- Arboriculture is an increasingly valuable income earning and employment opportunity.
- Waterlogging has been reduced making it easier and safer to muster livestock and for people and vehicles to move about the property.
- A badly salt-scalded area has been revegetated and salt levels reduced. The area is now a safe and sheltered place for newly shorn sheep and a haven for birds.
- Tree corridors protect the soil and vegetation from hot north westerly winds in summer. This has enabled deep rooted perennial summer fodder crops to be established. These provide a valuable source of feed for livestock during the hot dry months.
- Higher quality pastures guarantee the farm's prime lamb production targets are met.



Student Activity 5: Water management issues - bringing it all together

Make sure you have a copy of the assessment task – Water management plan.

Discuss the assessment task with your teacher, so you are clear about what is expected. It is a good idea to check with your teacher that you have chosen a suitable location for your hypothetical farm.

Undertake some further research to prepare you for this final task. In summary, the issues explored in this case study of Yan Yan Gurt West farm relate to:

- Creating a profitable farming operation, balancing economic, environmental and social sustainability considerations;
- Overcoming the legacy of unsustainable land and water management practices;
- Addressing soil loss and declining pasture quality;
- Increasing biodiversity and plant and animal habitat;
- Reducing stream erosion, resulting from interference with the flow of a natural watercourse;
- Devising more efficient strategies for managing the health and wellbeing of the livestock;
- Remediating the salinity outbreaks in the lower parts of the farm landscape; and
- Creating a pleasant living and working environment.

Your task now is to focus your attention on finding out more about:

- The management and rehabilitation of riparian zones.
- Dryland salinity and how to manage it.
- Improving the soil quality and preventing soil loss.

The references below provide a useful source. They can be supplemented with further research.

Removal and Degradation of Riparian Vegetation NSW Dept of Primary Industries.

<http://www.dpi.nsw.gov.au/fisheries/habitat/threats/removal-and-degradation-of-riparian-vegetation>

Habitat Scale Influences – Riparian Vegetation Australian Government - Department of the Environment. <http://www.environment.gov.au/node/22502>

Salinity and water quality fact sheet Australian Government Department of Sustainability, Environment, Water, Population and Communities.

<http://www.environment.gov.au/water/quality/publications/factsheet-salinity-and-water-quality>

Soils for Life - Case Studies

<http://www.soilsforlife.org.au/about.html>

Soil erosion in Australia - images

<https://www.google.com.au/search?q=soil+erosion+in+australia&client=safari&rls=en&tbn=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwiS383zuPfNAhULnpQKHdr1BzgQ7AkIWg&biw=1104&bih=660 - imgsrc=egfUYarjuJq9HM%3A>



assess

Water management plan

Scenario:

Assume you own and manage a small scale farming operation somewhere in Australia. You have owned the farm for the past five years. When you bought it, the land was severely degraded with many bare patches, there were few trees, the banks of the creek were severely eroded and the previous farmer complained he had sold his remaining livestock as he could no longer produce enough feed for them.

You recently received a Landcare award in recognition of the improvements you have made over the past five years on your farm. As part of your award, you have been invited to address the local Landcare group and share your success strategies.

You have decided to use an annotated map of your property within its surrounding landscape to help you demonstrate and explain the strategies you have implemented. Make sure you include:

- the main physical features of your farm - location of watercourses, main landform features;
- the remediation strategies you are implementing and where these are located;
- why you are implementing them.

Your presentation should highlight the steps you are taking to generate and maintain a profitable and sustainable farming operation in harmony with its surrounding environment.

- Prepare the map of your farm. Make sure it includes all the requirements of a map.
- Locate and label your key remediation strategies, mindful of the landscape features on adjacent areas of your neighbours' farms on the other side of your boundary fence.
- Prepare a list of talking points to explain and justify your strategies.

Delivery:

With the aid of the annotated map of your farm, present your *Water Management Plan*.



web

Online Teacher Support Resources

1. *Low Impact Sustainable Agriculture – Regenerating the Family Farm*
2. Climatic data - Bureau of Meteorology website
<http://www.bom.gov.au/climate/data/index.shtml>
3. East Otway Landcare Group
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