

# The Land Down Under: The Effect of Environment on Settlement and Human Activity

## OVERVIEW & OBJECTIVES

This lesson provides an overview of the settlement of Australia and the adaptations made in order to develop a prosperous country. Both Aboriginal and European adaptations are investigated. Students may engage in a case study of the Murray–Darling Basin and a presentation on invasive species.

*Students will be able to...*

- Describe how the major physical features of Australia affect the location of urban areas
- Describe how people adapted to Australia’s harsh, ancient and fragile environment
- Describe the sequence of European settlement and how it reflects the environment
- Describe how physical features affect the type and location of Australia’s human activities
- Explain how Europeans changed the landscape of Australia in the past 200 years

## GRADE

8<sup>th</sup>

## TIME

3-6 days depending on number of activities and extensions selected

## REQUIRED MATERIALS

- ✓ Computer with projector
- ✓ Computer access for students
- ✓ Goode’s Atlas with maps showing Australia’s topography, climate, and resources
- ✓ Two blank maps of Australia, one with political divisions
- ✓ Blank outline map of New South Wales
- ✓ Colored pencils
- ✓ Handouts: “The Effect of Physical Features on Settlement and Human Activity,” “Aboriginal Perspectives on the Landscape,” “Selected Quotes from Kakadu Man by Bill Neidje,” “European Perspectives on the Landscape,” “Environmental Descriptors,” “Case Study of the Murray-Darling Basin,” “Invasive Species Data Sheet,” “Carousel Brainstorming”, “Attitude Towards Environment Situations”

## MINNESOTA SOCIAL STUDIES STANDARDS & BENCHMARKS

**Standard 6.** Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements.

**8.3.2.6.8** Describe how the physical and environmental features of Australia/Oceania affect human activity and settlement, including how the human populations have adapted to and changed the landscape differently over time.

*For example:* Aboriginal peoples, gold rush, opal mining, expansion of commercial agriculture, development of the Outback

## SUGGESTED PROCEDURE

### Introduction

The teacher introduces Australia with a brainstorm, “What are the characteristics of Australia”, listing them on the board. Information gathered would include the following:

*Australia, an island nation located in the southern hemisphere, is the flattest and driest inhabited continent. Because of its isolation and unique environments, many plants and animals are found only in this country. It has a variety of climates and vegetation patterns, but the interior deserts dominate the landscape with 70% of*

*Australia arid and semi-arid. Lying between the Indian and Pacific Oceans, Australia is about the size of the contiguous United States. Most people live in the urbanized southeast coastal area where the coastline is indented, the climate is mild, water is available, and resources can be found.*

The teacher explains that although Australia is an ancient land with a harsh environment, the indigenous people were able to adapt to the various environments for 50,000 years. When the Europeans settled Australia 200 years ago, they didn't know how to adapt and made significant changes to the landscape. We will explore the characteristics of Australia's environments and their effect on settlements and human activities and the changes that have occurred.

**The Effect of Physical Features on Settlement and Human Activity**

The teacher will show a video to introduce Australia's landscape and ask students to identify characteristics that support the description of Australia as an ancient and harsh land. Consider showing the first eight minutes of the video, "Australia: Life Explodes" (13.15) from PBS Nova at <http://video.pbs.org/video/2364995158/>. The video is third in the series, Australia's First Billion Years, and is an overview of Australia as an ancient and harsh land from a geological perspective. Ask students what characteristics of Australia's physical landscape support the description of Australia as an ancient and harsh land. The teacher circles or checks them from the brainstorm list on the board. Students are given the handout, "The Effect of Physical Features on Settlement and Human Activity."

The teacher distributes two blank maps of Australia—one with political boundaries. Blank outline maps of Australia are available from "Map Collection-Outline Maps" from The University of Melbourne Library <http://www.lib.unimelb.edu.au/collections/maps/digital/outline-maps/>. Students receive a blank outline map of Australia and, using the topography map of Australia in their atlas, label and color the following features on their map after drawing the Tropic of Capricorn:

Bodies of Water-Oceans	Bodies of Water-Rivers	Mountains	Deserts
Pacific Ocean	Murray River	Great Dividing Range	Great Victoria Desert
Indian Ocean	Darling River	Mt. Kosciuszko	Gibson Desert
Great Australian Bight	Great Artesian Basin	Uluru/Ayers Rock	Great Sandy Desert
Gulf of Carpentaria	Murray-Darling Basin		Simpson Desert
Great Barrier Reef			

The "Outback" refers to the remote arid regions of Australia, which is most of the country. It is found in every Australian state and territory except Tasmania and the Australian Capital Territory. There is no official boundary to indicate where the Outback is located. The teacher instructs the students that their task is to draw the boundary of the Outback after examining Australia's climate and vegetation maps in the atlas. Students compare their drawn map with the map of the outback from "Outback Australia—the Rangelands" at Australian Government, Department of the Environment <http://www.environment.gov.au/topics/land/rangelands>.

On the blank political map, students will label each state and territory and its capital as well as the national capital, Canberra. Students will use the climate map in their atlas or access the climate map from "The Key Climate Groups" at Australia Government, Bureau of Meteorology [http://www.bom.gov.au/iwk/climate\\_zones/map\\_1.shtml](http://www.bom.gov.au/iwk/climate_zones/map_1.shtml) to answer the climate questions on the handout.

On the blank outline political map of Australia, students will indicate the population size of each capital by making either a bar graph or graduated circle at the site to indicate population size. Students examine topographic, climatic, and resource maps of Australia to explain how the major cities correlate with the landscape, which is question #6 on the handout.

Capital City	Population	Capital City	Population
Sydney	4,334,000	Perth	1,554,000
Melbourne	3,805,000	Hobart	207,000
Brisbane	1,857,000	Darwin	117,000
Adelaide	1,158,000	Canberra	358,000

Australian Bureau of Statistics, 2007 Populations

The teacher shows a video of Australia to highlight its populated areas, such as “Australia—Land Down Under” <http://www.youtube.com/watch?v=tJGnHB3rtMU>, which is a 4.00 minutes non-narrative video of southeast Australia, directed towards youngsters’ understanding of the most populated area of Australia with images of animals found throughout the country. The teacher highlights that Australia’s urban areas are very metropolitan with easy access within and between major cities. Looking at their two maps and using the atlas, students will answer: How do the transportation networks reflect the environment of Australia? Students examine the highway and railroad maps in their atlas or the two online maps listed under Website Resources and answer the Transportation questions on the handout.

### Settlement

*Australia’s first settlement began in 1788 at Sydney Harbor with the arrival of 1500 people (half of them convicts) from Great Britain. Further settlements occurred along the southeast coast over the next fifty years. The pattern of settlement tended to follow the search for farmland. Rivers were settled first, providing a necessary supply of water and a transportation route. By the 1830s about 100,000 immigrants had come to Australia. With the gold rush of the 1850s, 600,000 people came to Australia. The government promoted settlement in rural areas with irrigation projects, railway networks, and re-settlement offers. The arid interior, however, was not explored until 1860 and not settled until 1890. The southeast area was settled first and today it is the most heavily populated area; in fact, New South Wales has 33% of Australia’s population and Sydney alone has 20% of Australia’s people.*

The colored population map from the 1921 census shows population density. (“Map of Australia, Population, Grouped and Graded, Census 1921” from National Library of Australia <http://nla.gov.au/nla.pic-an24189946>.) However, because of Australia’s history, it also indicates the pattern of settlement with the most populated areas the earliest settlements and the least populated areas the latest settlements. The teacher will show and explain this map. Students will compare this map with physical and climate maps and describe the patterns of settlement and how the settlement patterns relate to the physical geography of Australia by completing the “Settlement” section of the handout.

The teacher will review students’ short-answer responses to the “Settlement” questions on the handout. Then the teacher will go to the interactive “Atlas Explorer” of New South Wales at <http://atlas.nsw.gov.au/public/nsw/home/map/base.html> in order for students to examine European Settlement from 1788 to 1982. The site shows sequent settlement patterns for 150 years in the state of New South Wales. Next, the teacher will show the historical development of Australia by changing the State Borders under the History tab from 1787 to 1910. Students will be able to successfully describe the sequence of European settlement in Australia from coast to interior and how the settlement patterns relate to the physical geography of Australia.

### Human Activities

*Australia has abundant natural resources. The country is rich in numerous minerals including iron ore, gold, silver, uranium, lead, zinc, bauxite, and coal. But Australia’s soils are thin and poor, particularly compared to the United States, and with greater salinity. With low rainfall and poor soils, grazing cattle and sheep occurs over much of Australia. The growing of crops, including cereals and fruits and vegetables, occurs in areas with access to river valleys. The forested areas in Australia are limited with half the forests disappearing since European settlement. Mining and farming were the main economic activities in Australia for its first 150 years. Today, various services industries are dominant in urban areas.*

Students will compare the topographic and economic maps in the atlas to answer the questions on the “Human Activities” section of the handout. Online maps of land use that show economic activities are identified in the Website Resources.

Australia is rich in mineral resources. Students read the brief paragraphs explaining the discovery and importance of minerals, “The Story of Minerals in Australia” from Australian Government, GeoScience Australia at <http://www.australianminesatlas.gov.au/history/index.html#interactive>. (In addition, view the Interactive History of Australia’s mineral industry, but Google Earth needed.) Students explain why the minerals industry is one of the biggest contributors to Australia’s export trade, which is question #25 on the “Human Activities” section of the handout.

Agriculture is another important activity in Australia. Students will focus on New South Wales as an example of how specific agricultural products relate to the environment. Each student will receive a topographic map and a blank map of New South Wales. Online topographic maps of New South Wales are identified in the Website Resources and a blank map can be downloaded at Map Collection-Outline Maps” from The University of Melbourne Library <http://www.lib.unimelb.edu.au/collections/maps/digital/outline-maps/>

Students will work in groups to individually map the distribution of two Fruits and Vegetables, Oils and Grains, or Livestock on the blank New South Wales map. Students will access the maps of information by using the Economy tab at the interactive “Atlas of New South Wales” <http://atlas.nsw.gov.au/public/nsw/home/map/base.html>. Each small group will divide the agricultural products with each person having two different products so ten agricultural products will be mapped by each group of five students. Each student will map their two products and determine why the product is located at those sites. (Students could also access the Economic map in their atlas to show the locations of economic activities throughout Australia.) Students will record their answers on the Human Activities section of the handout. Last, students will share their results within their small group and complete the final question on the handout for “Human Activities”.

### **Impact on the Environment**

Students will examine Aborigine perspectives of the landscape and European perspectives of the landscape. Students will then make a Venn diagram to compare and contrast Aboriginal and European perspectives of the environment in small groups.

#### *Aboriginal Perspectives on the Landscape:*

Aborigines collectively have a perspective on the landscape that is integrated with their spiritual beliefs and clan connections. Aborigines feel that they are custodians of the environment and that their mission is to preserve the environment that has sustained them for thousands of years.

Students will read the summary, “Aboriginal Perspectives on the Landscape”, to explore detailed Aboriginal perspectives. (The summary is adapted from Treading Lightly: The Hidden Wisdom of the World’s Oldest People by Karl-Erik Sveiby and Tex Skuthorpe.) Use a literacy strategy, such as Keyword Categorization, as a before reading strategy. Keywords include: Aborigines, clans, traditions, mission, ancestors, vulnerable, beliefs, Law, sacred, rituals, continuity, and intangibles. After reading the summary, students will list Aborigine perspectives of the landscape. Students will anticipate making a Venn diagram to compare and contrast Aboriginal and European perspectives of the environment in small groups.

#### *Kakadu Man:*

Bill Neidje, called Kakadu Man, was an elder of the Bunitji people of the Northern Territory near Darwin. He leased the land called Kakadu National Park, now a World Heritage Site, to the Commonwealth of Australia. As an elder he had much to say about the land, including: “Our story is in the land...it is written in those sacred places. My children will look after those places, that’s the law. ...[Y]ou can’t change it, no matter

*who you are. No matter you rich man, no matter you King. You can't change it."* Bill's words were recorded in the book, *Australia's Kakadu Man* by Big Bill Neidje (edited by Stephan Davis and Allan Fox). The editors of the book also had comments about Aborigines. *"The most important role that an individual human could play in this system was that of custodian of the common environment"* (p. 11). *"Geography and seasonality ruled the Aboriginal lives through their effect on access and food supply...not so much controlling the shortage of food, but the maintenance of variety"* (p. 12). The teacher instructs students to write an imaginary interview they would have had with Bill Neidje about the land and Australia's future using his words in order to understand the Aborigine perspective on the land.

#### *European Perspectives on the Landscape:*

Students will examine the European perspective of the landscape by completing three tasks: read the handout, watch two videos, and analyze poetry. After the tasks have been completed students will work in small groups to construct a Venn diagram to compare and contrast Aborigine and European perspectives of the environment.

Aborigines are seen as custodians of the land and Europeans are seen as owners of the land. To investigate the truth of this statement, students read the handout, "European Perspectives on the Landscape", and discuss their responses as a class. Students will compile a list of European perspectives of the environment to use with the Venn diagram. (Historical Perspectives Quotes from "Country and Landscape" Brochure at the National Library of Australia at <http://www.nla.gov.au/exhibitions/country-and-landscape> and Contemporary Perspectives adapted from "The Humanities and an Environmentally Sustainable Australia" by Dr. Tom Griffiths; reprinted in the *Australian Humanities Review*, vol. 43 (2007) at Environmental Humanities <http://environmentalhumanities.org/history/>

Accessing water has always been a concern in Australia because it is the driest inhabited continent. Students will gain understanding of the concern with increased salinity and the necessary access to artesian water in Australia by watching the videos "Soil Salinity in Australia" (5.48) and "How the Great Artesian Basin Works" (5.36) provided by CSIRO from the British Geographer at <http://thebritishgeographer.weebly.com/freshwater-environments-and-management.html>

The Artesian Basin video reinforces that the environment of Australia is harsh and arid, but people have adapted to the environment by accessing the groundwater. The Great Artesian Basin, located north of the Murray-Darling Basin, is key to life for one-fourth of Australia's people.

Discuss the answers to the Salinity video questions with the class:

1. Explain why salt is called "white death"? It destroys farms, homes, towns; unhealthy
2. How did Europeans change the Basin with their agriculture practices? Cleared farmland of trees, planted shallow-root non-native plant species, irrigated vast lands, caused greater salinity
3. What are the 2 solutions to salinity offered in the video for rural areas? Plant deep-rooted native plants; irrigate only enough (use native vegetation productively)
4. What are the 2 solutions to salinity offered in the video for urban areas? Reduce size of lawn and plant native vegetation
5. How is the infrastructure of urban areas damaged by salt? Destroys foundations and walls, destroys roadways

#### *Landscape Poetry Images:*

Understanding another country is easier when using familiar examples and analyzing them. Students will use the words from popular Australian poems to understand the country's physical and cultural landscapes. Begin by using Keyword Categorization, often completed in pairs or trios, or another strategic reading strategy to explore the meaning of the text. In Key Word Categorization students are given key words (primary words needed to understand the reading) and told to categorize them in related groups. Students share their categories. After reading the text, students revisit their categories to see how the terms are related. As a class students highlight descriptions of the Australian environment and discuss images of the country's landscape that are created in the poems. The poem, "My Country", has specific questions to guide the class discussion.

Each list identifies keywords and their meanings for some well-known Australian poems.

*“Kookaburra”* by Marion Sinclair (1934)

Kookaburra: endemic Australian bird  
Gum tree: another word for eucalyptus tree  
Bush: the Australian outback  
Laugh: sound of the kookaburra  
Gum drops: resin from the gum tree  
Monkeys: there are no monkeys in Australia  
Merry: happy

*“Waltzing Matilda”* by A.B. (Banjo) Paterson (1895)

Swag: rolled blanket that’s carried (also called a “matilda”)  
Swagman: itinerant traveler or hobo  
Billabong: waterhole  
Coolabahs: a type of eucalyptus tree  
Billy: can or small kettle used for cooking over a fire  
Jumbuck: a sheep  
Tucker: food found in the bush  
Tucker Bag: container for storing bush food  
Squatter: person who takes possession of land and becomes owner after time  
Trooper: soldier—soldiers were the policemen in Australia’s early days

*“My Country”* by Dorothea McKellar (1908)

Coppice: the stump of a tree left for re-growth  
Liahhas: woody vines that wrap around tropical trees  
Ordered: organized linearly  
Sunburnt: burned by the sun to a red color  
Terror: intense fear  
Tragic: disastrous event  
Tangle: twisted mass  
Lithe: agile or graceful  
Pitiless: unforgiving or merciless  
Famine: starvation or scarcity  
Paddocks: enclosed area for pasture  
Willful: determined

Aussies are resilient who laugh in the face of adversity and deliberately go against the power of authority. They withstand harsh environments and do it all with good cheer and “no worries”. Students will read and discuss the classic Aussie poem, “My Country”, using the discussion questions to analyze the poem and consider European perspectives of the Australian landscape.

*Discussion Questions:*

- Why is this poem titled, “My Country”? What impression is the author trying to create?
- What does the author mean by a “sunburnt country”? What characteristics is the author highlighting?
- What images are used to describe Australia? Categorize the images into environmental characteristics and human characteristics. What images do not seem to be included that you would have included?
- Is the author writing about an actual or an ideal landscape? Why is exaggeration needed?
- What does the author mean when she says, “I love her far horizons, I love her jewel-sea, Her beauty and her terror—The wide brown land for me!”
- Should this landscape be preserved? Do people have an obligation to protect the environment?
- What is the author’s purpose in writing this poem?

*Ask students:* Could Aborigines have written the poem, “My Country”, about the Australian landscape? Why or why not? The landscape represented by the poem reflects changes in the environment made by European settlement. These changes are indicated in the following words: ordered, brown streams, cattle, army, and paddocks. Contrast this vision of the land with Aboriginal sustainable activities and current efforts to maintain and restore the landscape.

### *Environment Descriptors*

Students will clarify their perspective toward the environment by selecting the descriptor that best describes their attitude towards the environment from the list below. Students will discuss their perspectives as a class.

- Environment is Dangerous and unpredictable so it needs to be Controlled—1st diagram
- Environment is Fragile so it should be Protected—2<sup>nd</sup> diagram
- Environment has abundant Resources so it should be Used—3<sup>rd</sup> diagram
- Environment is an Obstacle to progress so it should be Conquered—4<sup>th</sup> diagram
- Environment has abundant Resources and it will Provide—5<sup>th</sup> diagram
- Environment is in Control and we are a small Partner—6<sup>th</sup> diagram

The teacher hands out “Environment Descriptors” and students label each diagram with the terms that illustrate the relationship of people and the environment from the list above. Next, the teacher asks students to select the diagram that represents the Aboriginal perspective and explain why they selected that diagram. Students share their answers with the class. Do the same for Europeans. Discuss how perspectives toward the environment affect the actions that are taken.

### *Venn Diagram*

Students have examined Aborigine perspectives of the landscape and European perspectives of the landscape. Students will make a Venn diagram to compare and contrast Aboriginal and European perspectives of the environment in small groups.

### **Case Study of the Murray-Darling Basin**

*The teacher explains that regions of the world have a significant river basin that is necessary for the culture to thrive and the country to survive; examples include the Mississippi, Indus, and Nile River Basins among others. The Murray-Darling Basin is Australia’s most valuable basin that provides resources for Aborigines, early settlers, and contemporary populations. Students will investigate the Murray-Darling Basin to understand the uses and changes that have occurred as people adapted to the landscape.*

The teacher will ask students to refer to their physical characteristics map of Australia to trace the route of the Murray River and its major tributaries in order to outline the Murray-Darling River Basin. Next, students will watch the video, “Murray Darling Basin: A System in Crisis” (3.51) at <http://www.youtube.com/watch?v=zcVfWOYeZ7Y> and answer the following questions as a class:

1. How many people are affected by the Murray-Darling Basin? *2 million*
2. How much of Australia’s agriculture depend on the Basin? *40%*
3. What city relies on the Basin for its drinking water? *Adelaide*
4. Why is the Murray-Darling Basin unique? *It’s the flattest area on earth and is dry with intense summer heat*

Students will complete the case study activity, “Case Study of the Murray-Darling Basin”, and later reconvene as a class to discuss the future proposals for the Murray-Darling Basin. The teacher begins by dividing students into heterogeneous small groups representing one of the following groups of the Murray-Darling Basin region:

### *Aborigines*

- From the clan Barindji, New South Wales, living near Sydney
- From the clan Latie Latje, Victoria, living in Melbourne
- From the clan Tirari, South Australia, living near Sydney
- From the clan Bangerang, Victoria, living near Adelaide
- From the clan Bangerang, Victoria, living in Adelaide

### *Farmers*

- Cattle rancher from Anna Creek, located in South Australia
- Sheep rancher from Arkaba Station, located in the Murray-Darling Basin
- Farmer who grows rice on irrigated land in the Murray-Darling Basin
- Farmer who grows cotton on irrigated land in the Murray-Darling Basin
- Farmer who grows grapes on irrigated land in the Murray-Darling Basin

### *Government Officials*

- Minister for Infrastructure and Regional Development: focuses on transportation networks
- Minister for Agriculture: focuses on agricultural and rural development policies
- Minister for Finance: responsible for the budget
- Minister for the Environment: focuses on sustainable practices for clean air, water, & land
- Minister for Indigenous Affairs: responsible for indigenous policies, programs & services

### *Urban Residents*

- Adelaide resident
- Adelaide resident
- Albury resident
- Sydney resident
- Miner from Coober Pedy

### *Special Interest Group*

- Environmentalist
- Engineer
- Urban planner
- Biologist
- Water quality specialist

Student groups present their proposals about what course of action should be taken in the Murray-Darling Basin to protect the environment and provide for the wellbeing of its population. The class discusses the proposals and answers the Discussion Questions:

1. The Murray Darling Basin has a variety of environments. Why would this affect the potential for agriculture?
2. Explain why the Murray-Darling Basin is an important source of irrigated lands.
3. Identify five environmental problems of the Murray-Darling Basin that have occurred since European settlement.
4. Identify solutions to the five environmental problems.
5. Explain what Australian city may suffer the greatest with the degradation of the Murray River.

Students individually write a paragraph explaining: *What course of action should be taken in the Murray-Darling Basin to protect the environment and provide for the wellbeing of its population?*

### **Invasive Species**

*Note: This activity may be coordinated with science to meet standard 8.3.4.1.2.*

*Australia is an ancient land with unique plants and animals that adapted to specific microenvironments. Australia has more than one million species, many found only in Australia. About 85% of flowering plants,*



*84% of mammals, 45% of birds and 89% of fish are endemic. The intentional introduction of other species has challenged the survival of endemic species.*

Students in small groups will investigate one of the invasive species that have been introduced to Australia to determine the effect of species introduction. Students will select an invasive species such as European rabbit, European carp, cane toads or they may select another animal or category to investigate. (Other Australian animals, birds, and plants to consider include: water buffalo, fox, camel; house sparrow, common starling, blackbird; alligator weed, asparagus fern, prickly pear.) Each group will present their findings as a simulated talk or news show. One student will become the moderator and prepare insightful questions. The other students will take different roles as “guests”, such as Government Official, Farmer, or Environmentalist. Students will be prepared to answer questions from the moderator and the audience. Students will be able to describe the interaction of people with the environment and recognize that national issues must be addressed through local action. Students will also raise public awareness of the invasive species through a media campaign such as a public service announcement, poster, or bumper sticker. Students will write a reflective paragraph explaining what they learned about invasive species and justification for their media campaign.

The teacher introduces the topic of invasive species by showing the video, “Cane Toads”, found with the article, “Invasive Species”, from National Geographic Education, Encyclopedia Entry [http://education.nationalgeographic.com/education/encyclopedia/invasive-species/?ar\\_a=1](http://education.nationalgeographic.com/education/encyclopedia/invasive-species/?ar_a=1). As a class, discuss reasons why people introduced plants and animals into the Australian environment:

- Acclimatization organizations & individuals—make it feel like “home” (rabbits, foxes, sparrows, starlings, blackbirds)
- More attractive than native species (wheat, sugar cane, willow trees, mimosa tree)
- Solve a problem (cane toads to solve cane beetle infestation but are poisonous and kill native species; water buffalo to increase food and production but damage wetlands)

Next, students read the article “Invasive Species” at the same website answering the questions on the handout, “Invasive Species Data Sheet”. What is an invasive species? What is an introduced species? Why are invasive species harmful? What can be done about invasive species? Students will be placed in groups to investigate the impact people have had on Australia by researching one type of invasive species and its relationship to the environment using the handout, “Invasive Species Data Sheet”. Students will present their talk show to the class and showcase their media campaign for public awareness of the invasive species. The ten-minutes talk show must involve each group member and all questions must be answered with supporting data. Students will be evaluated on their research, the talk show presentation, the public awareness campaign, and their reflective paragraph using a rubric. (An alternative is to write a letter to the editor or a more extended opinion piece addressing invasive species.)

#### *Resources to Consider*

Students will find information about their invasive species as well as government actions toward them at “Biodiversity” from Australia Government, Department of the Environment at

<http://www.environment.gov.au/topics/biodiversity>

Students can find brief summaries of Australian animals at Australian Fauna at

<http://www.australianfauna.com/>

CSIRO (Commonwealth Scientific and Industrial Research Organisation) is Australia’s national science organization and provides research-based academic documents and programs to assist researchers and organizations. The following two sites provide information about invasive species and policies to deal with them.

“Invasive Species Threaten Australia’s Biodiversity” from CSIRO

<http://www.csiro.au/Outcomes/Food-and-Agriculture/Pest-Management-Overview.aspx>

“Biosecurity and Invasive Species” from CSIRO

<http://www.csiro.au/Outcomes/Safeguarding-Australia/Biosecurity-Invasive-Species.aspx>

Students can acquire further information at “Biodiversity Theme Report” from the Australian Government, Department of Environment  
<http://www.environment.gov.au/node/21595>

### **Closing**

Place students in heterogeneous small groups to perform a carousel brainstorm (see Carousel Brainstorming handout for directions to this Best Practice activity). Questions to consider include:

- Why are most Australian cities located along the coast?
- How did the settlement of Australia correspond to its physical geography?
- How do Australia’s physical features affect the country’s economic activities?
- Give 2 examples of how Aborigines adapted to the environment.
- What is the Aboriginal perspective of the landscape?
- What is the historical European perspective of the landscape?
- What is the contemporary Australian perspective of the landscape?
- Give 2 examples of how the Australian landscape has changed.
- Give 2 examples of how people have adapted to Australia’s harsh environment.
- Why is the Murray-Darling Basin important to Australia?
- Why are invasive species harmful?
- Explain why settlement after 1788 had a great impact on Australia’s environment.

A student representative from each group reads their question and summary as a report to the class. The class discusses the summary statement, which embodies the comments of all the groups.

### **Extensions**

#### 1. Aboriginal Lands and Protected Areas

Aborigines were found throughout Australia when Europeans came in 1788 and are still found throughout Australia today. However, only parts of Australia have been labeled Aboriginal Lands with 60 Indigenous Protected Areas including 36 reserves. The teacher accesses “Indigenous Protected Areas August 2013” from Australian Government, Department of the Environment at

<http://www.environment.gov.au/indigenous/ipa/map.html>. Students examine the map identifying Aboriginal Lands and Protected Areas and answer the questions:

In what states and territories are most Aboriginal Lands and Protected Areas located? In what climate zones are the lands and protected areas found? Compare this map with the roads and railways map. Do Aborigines have easy access to travel from one area to another? Where do most Aborigines live? Are they living in concentrated areas? Are they living in the Aboriginal Lands and Protected Areas? Use the interactive map from “Atlas Explorer” from New South Wales, Property Information

<http://atlas.nsw.gov.au/public/nsw/home/map/european-settlement.html> to compare the total population distribution and the indigenous population. Use the tab, Census 2006, and the zoom feature to show the entire country by state and territory.

#### 2. Comparing Australia and U.S. Settlement

Compare settlement of Australia with that of the U.S. using a Venn diagram. Students will identify the original settlers, later settlers, actions toward indigenous populations, immigrant populations, the gold rush, and the development of commercial farming. The teacher will pose the question: Why are so many factors of settlement similar? Students will realize that geography and history influenced the settlement of both countries.

*Similarities include:* colonized by Great Britain, coastal settlement, treatment of natives (reduced populations through disease and warfare, placed in reservations, assimilated through missions and schools), settlement along river valleys, delayed settlement of dry interior, gold rush in 1850s, Chinese immigrants worked mines and built railroads, diverse population

*Differences include:* penal colony, slavery, and population size

### 3. Coober Pedy: Opal Capital of the World

Coober Pedy is the world's major source of opals, a semi-precious gem. The town is unique because, located in the desert region of Australia, people live and work underground. Students learn more about the adaptations people have made to live and work in the desert environment. Students list specific adaptations that people made to live in Coober Pedy and reasons for those specific adaptations. Students then identify two adaptations that could have been selected and explain why those would be viable alternatives. Students go to "Coober Pedy" at <http://www.cooberpedy.sa.gov.au/page.aspx?u=191> and "Welcome to Coober Pedy" at <http://www.cooberpedy.net/>.

### 4. Environment Situations

Students will consider several environmental situations and determine the perspectives of Aborigines and Europeans toward each situation. Students will also identify possible action that could be taken in particular situations according to each perspective. Students will complete the chart, "Attitude Towards the Environment Situations", and discuss similarities and differences in attitude towards environmental change.

Extended Response Question: Can people with different perspectives of the environment live together? How might conflicts be resolved?

### 5. Historic Landscape Paintings

Students will view historic European paintings and images of Australia from the Australian National Library. Students access the archived exhibit, "Country and Landscape", from the National Library of Australia at <http://www.nla.gov.au/exhibitions/country-and-landscape>, and click "visit the archived exhibition". Students read the opening statement to this archived exhibit that highlights the different perspectives of Aborigines and Europeans towards the Australian landscape. Students then click Brochure at the bottom for an explanation of the exhibit, individual paintings, and European perspectives on the landscape. For a more detailed examination of each of the paintings, click one of the eight painters. Students will respond to the opening statement: "Whose place is being shown in the image—Aborigine or European?" The Australian landscapes were shown as lush, verdant, productive lands. Ask students the questions: Were the early European paintings of Australia idyllic or realistic? Did these images exist before European settlement?

### 6. Contemporary Interactions

Students explore contemporary interactions between Aborigines and other Australians in their endeavors to sustain the environment by watching two videos. Students watch "On Country: Aboriginal Custodians Work to Maintain Local Environments" (1.38) from ABC News at <http://www.abc.net.au/environment/?topic=land-management&type=video>. The video highlights current efforts to mimic Aborigine custodial practices in order to preserve Australia's landscape through management techniques that conserve waterways, protect native habitats, and control hazard reduction burns. Students watch "Aboriginal Wetland Burning in Kakadu" (7.36) from The British Geographer at <http://thebritishgeographer.weebly.com/freshwater-environments-and-management.html>. The video demonstrates the Aboriginal process of burning to preserve the environment in Kakadu National Park. Both Aborigines and a park ranger explain the purpose of burning. Students should note that Aborigines are said to be custodians of the environment while Australians are said to be stewards of the environment. The class discusses: Is there a difference in terminology? Does the language imply particular perspectives? Can people work effectively together to sustain the environment?

### 7. National Anthem

Discuss images of Australia using two documents: "Song of Australia", a poem written in 1859 by Mrs. C. J. Carleton and a choice for the national anthem, and the lyrics to the national anthem "Advance Australia Fair", written as a song in 1878. Students will consider the following questions: What images of the Australia's environments do they portray? Do the songs effectively represent Australia? What groups of

people or regions of Australia are not included? How does the national anthem compare with the national anthem of the U.S.?

#### 8. Aborigines in the Murray-Darling Basin

Students take the Aborigine perspective to investigate the Murray-Darling Basin to determine the changes that have occurred and how, as custodians of the land, they can revive the Basin. Students use the following websites to understand Aboriginal history and current use of the Basin.

“Student and Teacher Murray River Project Information” from “The Murray-Darling Basin”

<http://www.murrayriver.com.au/about-the-murray/murray-darling-basin/>

“People of the Murray River—Aboriginal Communities” from “The Murray-Darling Basin”

<http://www.murrayriver.com.au/about-the-murray/murray-river-aboriginals/>

#### Assessments

- Handout “The Effect of Physical Features on Settlement and Human Activity”
- Bill Neidje Imaginary Interview
- Salinity and Artesian Basin Videos Class Discussions
- Landscape Poetry Images Class Discussion
- Environment Descriptors
- Venn Diagram of Aborigine and European Perspectives of the Environment
- Case Study of the Murray-Darling Basin Paragraph
- Invasive Species Group Presentation and Reflective Paragraph

#### Invasive Species Rubric

	<b>Excellent! (10)</b>	<b>Adequate (8)</b>	<b>Marginal (6)</b>
Research	Group showed evidence of thorough research that answered all the questions	Group research was adequate with some missing information	Research was not clearly evident with little effort to obtain information
Questions Answered	Answered each question in depth using data to support each response & provided examples	Answered each question using data to support each response & provided examples	Answered each question using data
Talk Show	An impressive presentation with a believable moderator asking challenging questions; “guests” made the issue come alive with their responses	Group discussed the issue, but the moderator asked questions the “guests” could not answer or asked very basic questions	The moderator & “guests” were not prepared for the presentation; the “guests” did not seem involved
Public Awareness Campaign	A valuable, creative product was designed to impact the audience to take an active role in becoming part of the solution	A product was created but without the audience in mind; product might raise awareness but not inspire action	A product was created but public awareness not raised significantly & audience not inspired to act
Reflection	Reflection clearly showed understanding of the information & the issue with a thoughtful proposal for action	Reflection clearly showed understanding with a proposal for action	Reflection showed some understanding with an incomplete proposal for action

## Website Resources

“Australia: Life Explodes” from PBS Nova “Australia’s First Billion Years”

<http://video.pbs.org/video/2364995158/>

Blank outline maps of Australia from “Map Collection-Outline Maps” The University of Melbourne Library

<http://www.lib.unimelb.edu.au/collections/maps/digital/outline-maps/>

“Outback Australia—the Rangelands” from Australian Government, Department of the Environment

<http://www.environment.gov.au/topics/land/rangelands>

“The Key Climate Groups” from Australia Government, Bureau of Meteorology

[http://www.bom.gov.au/iwk/climate\\_zones/map\\_1.shtml](http://www.bom.gov.au/iwk/climate_zones/map_1.shtml)

“Australia—Land Down Under” from YouTube

<http://www.youtube.com/watch?v=tjGnHB3rtMU>,

“Map of Australian Highways and Holiday Destinations”, from Australia Travel & Tourism Network

<http://www.atn.com.au/mapofaustralia.html>

“Australian Rail” from Australian Rail Maps

<http://www.railpage.org.au/railmaps/austrail.htm>

“Map of Australia, Population, Grouped and Graded, Census 1921” from National Library of Australia

<http://nla.gov.au/nla.pic-an24189946>

“Atlas Explorer” from New South Wales Land & Property Information

<http://atlas.nsw.gov.au/public/nsw/home/map/base.html>

“Land Use in Australia at a Glance” from “Land Use Mapping” Australian Government, Department of Agriculture

<http://www.daff.gov.au/abares/aclump/land-use/land-use-mapping>

“Summary of Land Use Patterns in Australia” from Australian Government, Department of the Environment

<http://www.environment.gov.au/node/22164>

“The Story of Minerals in Australia” from Australian Government, GeoScience Australia

<http://www.australianminesatlas.gov.au/history/index.html#interactive>

Blank outline map of New South Wales from “Map Collection-Outline Maps” The University of Melbourne Library

<http://www.lib.unimelb.edu.au/collections/maps/digital/outline-maps/>

“New South Wales: Physical Features of New South Wales” from Britannica Kids

<http://kids.britannica.com/elementary/art-146118/Physical-features-of-New-South-Wales>

“Physical Map of New South Wales” from Freeworldmaps.net at

<http://www.freeworldmaps.net/australia/newsouthwales/map.html>

“Map of New South Wales” from Welt-atlas.de

[http://www.welt-atlas.de/map\\_of\\_new\\_south\\_wales\\_3-900](http://www.welt-atlas.de/map_of_new_south_wales_3-900)

“Soil Salinity in Australia” and “How the Great Artesian Basin Works” from the British Geographer

<http://thebritishgeographer.weebly.com/freshwater-environments-and-management.html>

“Country and Landscape”, from the National Library of Australia

<http://www.nla.gov.au/exhibitions/country-and-landscape>

“Murray Darling Basin: A System in Crisis” from YouTube

<http://www.youtube.com/watch?v=zcVfWOYeZ7Y>

“Cane Toads” & “Invasive Species” from National Geographic Education, Encyclopedia Entry

[http://education.nationalgeographic.com/education/encyclopedia/invasive-species/?ar\\_a=1](http://education.nationalgeographic.com/education/encyclopedia/invasive-species/?ar_a=1)

“Biodiversity” from Australia Government, Department of the Environment

<http://www.environment.gov.au/topics/biodiversity>

Australian Animals from Australian Fauna

<http://www.australianfauna.com/>

“Invasive Species Threaten Australia’s Biodiversity” from CSIRO

<http://www.csiro.au/Outcomes/Food-and-Agriculture/Pest-Management-Overview.aspx>

“Biosecurity and Invasive Species” from CSIRO

<http://www.csiro.au/Outcomes/Safeguarding-Australia/Biosecurity-Invasive-Species.aspx>

“Biodiversity Theme Report” from the Australian Government, Department of Environment

<http://www.environment.gov.au/node/21595>

### **Extension Website Resources**

“Indigenous Protected Areas August 2013” from Australian Government, Department of the Environment <http://www.environment.gov.au/indigenous/ipa/map.html>

“Atlas Explorer” from New South Wales, Property Information <http://atlas.nsw.gov.au/public/nsw/home/map/european-settlement.html>

“Coober Pedy” from South Australia, Government of Australia

<http://www.cooberpedy.sa.gov.au/page.aspx?u=191>

“Welcome to Coober Pedy”

<http://www.cooberpedy.net/>

“Country and Landscape”, from the National Library of Australia

<http://www.nla.gov.au/exhibitions/country-and-landscape>

“On Country: Aboriginal Custodians Work to Maintain Local Environments” from ABC News

<http://www.abc.net.au/environment/?topic=land-management&type=video>

“Aboriginal Wetland Burning in Kakadu” from The British Geographer

<http://thebritishgeographer.weebly.com/freshwater-environments-and-management.html>

“Student and Teacher Murray River Project Information” from The Murray-Darling Basin

<http://www.murrayriver.com.au/about-the-murray/murray-darling-basin/>

“People of the Murray River—Aboriginal Communities” from The Murray-Darling Basin

<http://www.murrayriver.com.au/about-the-murray/murray-river-aboriginals/>

### **Additional Website Resources**

“Discovery Atlas: Australia Revealed” from Discovery Channel

<http://dsc.discovery.com/tv-shows/other-shows/videos/other-shows-discovery-atlas-videos.htm>

<http://geography.howstuffworks.com/discovery-atlas-australia-revealed-videos-playlist.htm>

“History of Australia” from Hometown Australia

<http://www.hometownaustralia.com/index.php/41-general/11-history-of-australia>

“Australian History Timeline” from National Film and Sound Archive

<http://www.aushistorytimeline.com/>

## The Effect of Physical Features on Settlement and Human Activity

### *Physical Features:*

1. List the characteristics of Australia's physical landscape that support the description of Australia as an ancient and harsh land:

### *Climate:*

2. What states and territories do not have a desert climate? \_\_\_\_\_

3. What states and territories have an equatorial climate? \_\_\_\_\_

4. Most of the interior of Australia has what climate? \_\_\_\_\_

5. In what climate zone would you find the following cities?

Sydney: \_\_\_\_\_

Melbourne: \_\_\_\_\_

Canberra: \_\_\_\_\_

Adelaide: \_\_\_\_\_

Perth: \_\_\_\_\_

Darwin: \_\_\_\_\_

Alice Springs: \_\_\_\_\_

6. Why are most cities located along the coast, especially the southeast coast? (Compare the populations of cities with maps of climate, topography and resources)

### *Transportation:*

7. Where are most of the transportation networks located? \_\_\_\_\_

8. Why are there few highways and railroads in the interior? \_\_\_\_\_

9. Why are much of the highways and railroads straight? \_\_\_\_\_

*Settlement:*

<b>Capital City</b>	<b>Date of Founding</b>	<b>Capital City</b>	<b>Date of Founding</b>
Sydney	1788	Canberra	1863
Hobart	1804	Darwin	1872
Brisbane	1824	Broken Hill	1883
Perth	1829	Cairns	1885
Melbourne	1835	Alice Springs	1890
Adelaide	1836	Cooper Pedy	1915

10. What area of Australia was settled by 1800? \_\_\_\_\_

11. What area of Australia was settled by 1850? \_\_\_\_\_

12. What area of Australia was settled by 1900? \_\_\_\_\_

13. Why were the first 50 years of Australian settlement along the coasts? \_\_\_\_\_

\_\_\_\_\_

14. How did the desert regions limit settlement? \_\_\_\_\_

\_\_\_\_\_

15. Australia is the size of the contiguous United States. How did the great distances of Australia limit settlement? \_\_\_\_\_

16. Describe the sequence of European settlement in Australia from coast to interior. Then describe how the settlement patterns relate to the physical geography of Australia.



*Human Activities:*

17. Where does most livestock ranching (cattle and sheep) occur in Australia? \_\_\_\_\_

18. Why does it occur there? \_\_\_\_\_

19. Where does most farming (commercial, plantation, and specialized) occur in Australia?  
\_\_\_\_\_

20. Why does it occur there? \_\_\_\_\_

21. What economic activities tend to occur in the Australian Outback? \_\_\_\_\_

22. Why do they occur there? \_\_\_\_\_

23. Australia is considered rich in natural resources. In what resources is Australia rich?  
\_\_\_\_\_

24. In what resources is Australia poor? \_\_\_\_\_

25. Explain why the minerals industry is one of the biggest contributors to Australia's export trade.  
\_\_\_\_\_

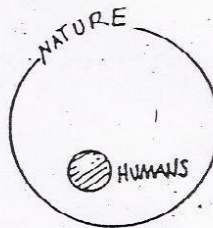
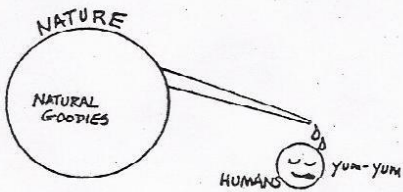
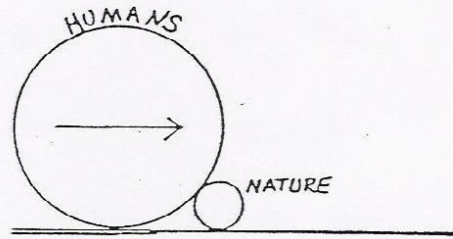
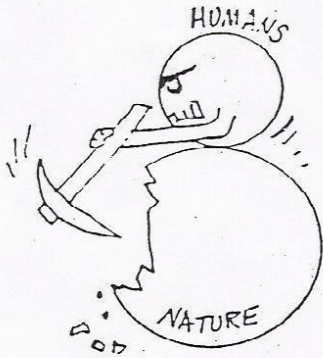
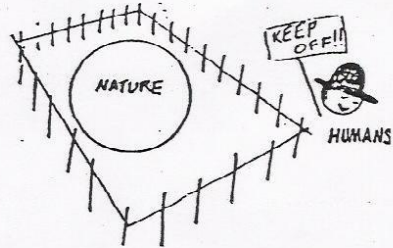
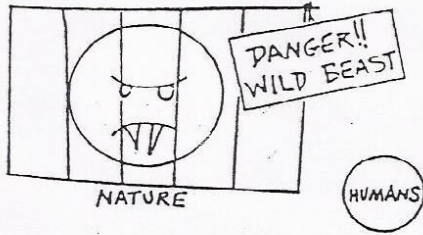
26. What agriculture products did you map? \_\_\_\_\_

27. Where was each product located? \_\_\_\_\_

28. Why was each product located in that area? \_\_\_\_\_  
\_\_\_\_\_

29. Describe how physical features affected Australia's major economic activities and their locations.

# Environmental Descriptors



## *Aboriginal Perspectives on the Landscape*

Aborigines have the longest continuous cultural history in the world, dating over 50,000 years. Aborigines, actually hundreds of clans or groups of interrelated families with their own languages, traditions, stories, and locations in Australia, are similar in their mission to maintain the land and serve their ancestors. Aborigines lived in harmony with their environment, minimizing their impact. They developed beliefs and practices that maintained the environment for their communities and for future generations.

The harsh environments of Australia do not permit the accumulation of belongings because there is few resources to produce, maintain, and store belongings or structures. Thus, there were no fortresses or barricades in early Australia. There were no wars, no government, and no religious structures. Aborigines seemed to live like stone-aged people with tools made from local resources. There was no metal, no pottery, no domesticated animals and no agriculture. Agriculture would destroy the land, animals could not be domesticated, pottery could not be maintained, and metal would damage resources.

Fire-stick farming is an excellent example of how Aborigines dealt with the environment in an eco-friendly, sustainable manner. Fire-stick farming was the intentional burning of small plots of land

that increased the number and diversity of plants and animals. The controlled, limited burning encouraged fire-resistant plants, allowed grasses to grow for foraging animals, encouraged new growth with ash as fertilizer, and provided food for Aborigines and habitats for creatures.

Despite their Stone Age characteristics of few tools and limited technology, Aborigines spent only a few hours each day hunting and gathering food. Instead, they spent most of their time involved in cultural activities producing multifaceted works of art, education, law, and medicine.

In the Aboriginal belief system, everything is alive with its own spirit and holds hidden meanings. Thus, individual and group connections involve proper ceremonies and visits to sacred places, which are special places in the landscape that hold stories and meaning.

According to Aborigines, the environment is to be lived in, not changed. Everything is and always will be the same because that is the Law. For example, when seasons change, it is because certain things occur and will always occur. However, individual and clan ceremonies and visits to sacred places must continue because it is the Law and it is your responsibility to follow it.

Beliefs	Meaning of Beliefs
Value: All are Connected	Ancestors, people, animals, plants, sky, earth are linked Time is limitless Greater status from knowledge, not acquisition of material wealth
Economy: Intangibles	Production & consumption of intangibles—stories, ceremonies, dances Recycle tools & materials
Environment: Custodians	Ecological friendly farming, hunting, gathering methods Natural medicine
Society: Build Community	Fuzzy borders between clans Networking among clans maintains peace Collaborative methods increase productivity

**Selected Quotes from Kakadu Man by Bill Neidje**

<p><i>Rock stays Earth stays I die and put my bones in cave or earth Soon my bones become earth... All the same My spirit has gone back to my country... My mother</i></p> <p><i>Our story is in the land... It is written in those sacred places (p. 14)</i></p>	<p><i>Million [dollars] no good for us. We need this earth to live We'll be dead, because.... We'll become earth.</i></p> <p><i>This ground and this earth.... Like brother and mother.</i></p> <p><i>We like this earth to stay, Because he was staying forever and ever.</i></p> <p><i>We don't want to lose him. We say 'sacred, leave him'.</i></p> <p><i>We come from earth.... Bones. We go to earth.... Ashes. (p. 46)</i></p>
<p><i>This earth.... I never damage, I look after. Fire is nothing, Just clean up. When you burn, New grass coming up. That mean good animal soon.... Might be goose, long-neck turtle, goanna, possum. Burn him off.... New grass coming up, New life old over. (p. 35)</i></p>	<p><i>Our story is in the land.... It is written in those sacred places. My children will look after those places, That's the law.</i></p> <p><i>No-one can walk close to those sacred places No difference for Aborigine or European. That's the law. We can't break the law. (p. 47)</i></p>
<p><i>We got to look after, can't waste anything. We always used what we got.... Old people and me. (p. 42)</i></p>	<p><i>Land got to stay, Always stay same.</i></p> <p><i>Well, you feel it in your body, You say "That tree same as me." This piece of ground he grow you. This story. (p. 61)</i></p> <p><i>Our story is in the land.... It is written in those sacred places. My children will look after those places, That's the law. (p. 65)</i></p>

## European Perspectives on the Landscape

### Historical Perspective:

According to Professor Ken Taylor, guest curator of the “Country and Landscape” exhibit at the National Library of Australia, early 1800s Australian landscapes focused on a romantic, idyllic perspective rather than a realistic, factual perspective. In fact, paintings had additional trees drawn and green color added along with persuasive narratives. For example, the coastal areas were incorrectly portrayed as a “park-like landscape” and a “natural Garden of Eden”.

Taylor commented on the European view of Aborigines in their landscape paintings. *“The inclusion of Aboriginal people in early colonial art and their association with landscape is a notable aspect of this period. They are often shown not in contrast to the composition, but rather adorning it*

*as part of the harmonious whole. Indigenous people were presumably seen as part of the exotic otherness and scientific wonder of the new colony, very much part of the landscape; they were ‘Nature’s children’ who would disappear with the civilizing influence of European domination.”*

Instead of portraying Australia’s harsh environments, Taylor says that early visitors portrayed a landscape that suited their imagination, the desire of the merchant, or the need to provide stunning images of a new land for the British. *“Rather, the landscapes are seen as a bountiful kaleidoscope of rolling forested hills with open grassy plains abundantly stocked with kangaroos and other game, and rivers or coastal areas teeming with fish and water birds.”*

### Contemporary Perspective:

Ecologists in Australia tend to react to environmental crises when they occur rather than prepare for the environmental problems before they become a crisis. Because Australia is an ancient, harsh, and fragile land, Australians cannot assume they can dominate nature without causing destruction or that nature is resilient and will overcome problems that people place on it.

Thus, ecologists need to be concerned with sustainability—the balance of healthy environments and prosperous communities.

Australian history has been a series of environmental crises as well as a series of contributions. When Australia was settled over a hundred years ago, settlers confidently produced

food for the country and for export. However, changes to the environment, which included introducing rabbits and overgrazing cattle and sheep, created problems. With drought and wind erosion, the land deteriorated and aggravated economic decline.

A hundred years ago the Australian government originally encouraged the settlement of the interior lands—the clearing and use of the land. Yet at the same time a government commission found that extensive grazing was destructive and that the cessation of Aborigine burning had changed necessary vegetation patterns. But nothing happened with the knowledge and no action was taken. What will be done today?

## Case Study of the Murray-Darling Basin River

**Directions #1:** Your group represents Aborigines, farmers, government officials, urban residents, or special interest group. Read each statement below as a representative of your designated group and determine whether each statement is “good news” if it gives you positive information or “bad news” if it gives you negative information. Label the “good news” and “bad news” statements with a code of your choosing.

### “Good News” – “Bad News” Statements

1. The Murray-Darling Basin is Australia’s most important fresh water resource and most important agricultural region.
2. The Murray-Darling Basin is the nation’s breadbasket and provides one-third of the country’s food.
3. The Murray-Darling Basin contains one-quarter of the cattle, half the sheep, and three-fourths of Australia’s irrigated lands.
4. The Murray River begins as a stream in the Snowy Mountains and meanders west for 1500 miles through forests, plains, and deserts until it reaches the coast near Adelaide.
5. The major tributary of the Murray is the Darling River and, along with other rivers, makes the Murray-Darling Basin 14% of the land mass or 1/7 of the country.
6. Today, 80% of the water from the Murray is removed—70% for irrigation and 10% for industry and domestic water supplies—with only 20% reaching the sea.
7. The Murray River is slow moving; in fact, the Amazon River carries more water in one day than the Murray does in a year. In 1981 and 2002 the mouth of the Murray closed because of no water.
8. The Murray River is a trade and transportation route, a border between states, a source of water for agriculture, industry and fishing, and a part of Australian history.
9. Historically, 300 Aborigine clans lived along the Murray River with another ten clans along the Darling River.
10. Aborigines managed the rivers so they had abundant food including fish, crayfish, birds (ducks, emus, pelicans, swans) and animals (especially kangaroos).
11. Aborigines built fish traps to hold live fish and made fish habitat for spawning and protection.
12. European settlers destroyed fish traps and barriers to make the rivers navigable for boats and barges and they built dams for irrigation and storage.
13. The Murray had large numbers of yellow perch, catfish, and cod that were caught by fishing companies in the 1800s. Today, fish are depleted and seven of 15 fish species are endangered.

14. Europeans planted willow trees to stabilize the riverbanks. But the deciduous trees lost their leaves in the fall, which increased nutrients in the rivers especially when the water level was low and, as a result, killed fish and encouraged algae growth.
15. Rivers were polluted when lumber mills were built along the river and when barges shipped minerals, including lead and copper, which increased minerals in the water.
16. As agriculture developed along the rivers, land was cleared for farming causing erosion and chemical fertilizers were added causing pollution.
17. New plants with shallow roots were introduced to replace native plants with deep roots causing the ground water to rise and bringing salts to the surface. The dissolved salts increased the salinity of the soil and water, killing plants and making some water unsafe.
18. The additional water on the surface from irrigation raises the ground water level and dissolves the salts causing greater salinity.
19. The government encouraged settlement for a hundred years by providing materials, money, and an agricultural expert for farmers.
20. In the early 1900s the government drained wetlands for additional farmland.
21. The government provided land for settlement to returning World War I veterans.
22. The Snowy Mountains System, built between 1949-1975, was designed by the government to increase the amount of water into the dry inland (leeward) side of the mountains from the wet coastal (windward) side of the mountains.
23. Engineers built dams, drilled tunnels through mountains, and brought water to the Murray-Darling Basin.
24. Engineers built power stations for electricity.
25. Engineers built roads, railroads, tunnels, aqueducts, dams, and pumping facilities with immigrant workers.
26. Today, the completed Snowy Mountains System contributes 5% of the Murray River's annual flow and 30% in drought years. It also provides 10% of the electricity for the state of New South Wales, Australia's most populous state.
27. Today, half of Australia's farms are located in the Murray-Darling Basin.
28. The Murray-Darling Basin provides drinking water to two million people.
29. Competition for the Murray-Darling Basin water from surrounding states and groups has been intense.
30. Dams changed the natural flow of water by eliminating dry and flooded seasons; pipelines removed water reducing water levels; habitat changed reducing the number and diversity of native fish; algae growth increased and poisoned rivers causing fish and birds to decline; limited water on floodplains changed plant life and habitats for fish, birds, and animals.

31. The Murray-Darling Basin is located in five states—New South Wales, Victoria, Queensland, South Australia, and the Australian Capital Territory.
32. Most of the land in the Murray-Darling Basin is used for grazing.
33. Most of the water in the Murray-Darling Basin is used for irrigated agriculture and urban needs.
34. The Murray-Darling Basin's major crops are cereal crops including wheat, oats, barley and rye.
35. Almost the entire rice crop of Australia is grown in the Murray-Darling Basin.
36. Drought is a significant problem in the entire country, but especially in the Murray-Darling Basin because of its agricultural land, water resources, and proximity to urban areas.
37. Fruits and vegetables grown in the Murray-Darling Basin use the least amount of irrigated water for the greatest profit.
38. Aborigines continue to live in the Murray-Darling Basin; many make a living running a cooperative farm and harvesting fruits and vegetables,

**Directions #2:** Review the statements you marked and use them as a basis to discuss the Murray-Darling Basin issue and determine your position on it.

*Severe drought, called the "Big Dry", gripped the Murray-Darling Basin from 2001 to 2012. Several Australian states initiated "drought-proof" policies including better irrigation systems, recycle "grey" water from washing and bathing, subsidize rainwater storage tanks for residents, and build giant desalination plants. Despite spending over two billion dollars, many farmers lost their farms. Although the "Big Dry" is one of three severe droughts in Australian history since 1788, at least one region suffers a severe drought every twenty years. Meteorologists have warned that Australia will have more frequent and severe droughts in the future.*

In your group decide what course of action should be taken in the Murray-Darling Basin to protect the environment and provide for the wellbeing of its population?



## Invasive Species Data Sheet

What is an invasive species?

What is an introduced species?

Why are invasive species harmful?

- 1.
- 2.
- 3.

What can be done about invasive species?

## Research Questions to Address

<p>What is this species? What is its habitat? In what regions or states in Australia does it live?</p>	<p>Why was this species originally introduced to Australia?</p> <ul style="list-style-type: none"><li>- Acclimatization—make it feel like “home”</li><li>- More attractive than native species</li><li>- Solve a problem</li></ul> <p>Answer:</p>
--	---

<p>Why is this an invasive species?</p>	<p>Why is this invasive species harmful?</p>
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<p>What can be done about this invasive species? (Actions by the government, organizations, communities, individuals)</p>
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## Carousel Brainstorming

Carousel Brainstorming is a Best Practice strategy to enhance student learning. Students are placed in small groups, each group with a different colored marker, then they go to any posted newsprint, read the question, and record responses as they brainstorm answers. After 3 minutes rotate clockwise to the next posted question and, after reading previous responses, brainstorm additional answers. Continue rotating clockwise until they have been at each posted question. When they return to the original question, categorize the responses and write a summary at the bottom to answer the question. Each group must be prepared to present the summary to the class. The following summary of Carousel Brainstorming provides further details of this valuable activity.

### *Carousel Brainstorming*

Carousel brainstorming is a strategy to actively engage students in addressing major concepts or questions in groups by identifying their prior knowledge or reviewing and/or evaluating their learning. There are several steps for this activity.

1. Post newsprint paper (3-8 sheets depending on the task and size of the class) around the room, each with a different question related to the topic.
2. Students are placed in groups of 3-5 persons with each group having a different colored marker to record their responses.
3. Roles may be assigned including recorder, timekeeper, facilitator, and encourager
4. Each group goes to a posted paper and brainstorms responses to the question or topic and records their responses using their colored marker.
5. After two to five minutes a signal is given and each group rotates to the next posted newsprint to brainstorm responses to the question or topic using their original colored marker. The colored marker shows the group's progress and assists accountability.
6. As each group rotates, they read previous responses and add their own responses. (They may also "star" previous statements with which they agree.) Each group continues to rotate until it has responded to each posted question.
7. When the groups return to their original question or topic, they should review the posted responses. Next, each group categorizes the responses in order to write a summary that incorporates other groups' responses to the question on the poster paper. Each group reports their summary to the entire class. Alternatively, the original group may be asked to:
  - Write a summary in exactly 5 words
  - Write a one-sentence summary
  - Identify the potential impact of the responses to the question or topic
  - Identify resources that may be helpful to investigate the question or topic further
  - Share personal experiences or reaction to the question or topic

## Attitude Towards Environment Situations

Situation	Aborigine Perspective & Action	European Perspective & Action
Extended drought conditions		
Increased kangaroo population		
Discovery of gold		
Demand for preservation of parks		
Additional housing for new immigrants needed		

## Attitude Towards Environment Situations

Situation	Aborigine Perspective & Action	European Perspective & Action
<i>Extended drought conditions</i>	Accept condition, but know that greater responsibility to earth needed Visit sacred places	Find condition dreadful Increase irrigation & build dams
<i>Increased kangaroo population</i>	Accept condition & know that kangaroo is a gift Visit sacred places	Find condition challenging with grazing land for cattle & sheep & with transportation Shoot more kangaroos
<i>Discovery of gold</i>	Accept condition	Gratified with new resource & increased income Build mines, transportation networks & settlements
<i>Demand for preservation of parks</i>	Grateful for official government preservation Visit sacred places	Find proposal challenging because it limits production & use of resources & activities Protest laws
<i>Additional housing for new immigrants needed</i>	Accept condition	Appreciate new construction jobs, but fear loss of jobs with competition from immigrant workers Accept condition