

Australia: An Ancient, Delicate and Unique Environment
2006 Fulbright-Hays Seminar Abroad

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***Sustainability and Stewardship:
The Future is Upon Us!***

By JoAnn Trygestad

Like many others, I have always wanted to travel to Australia. The country holds a special appeal for me and I have had a bond with the landscape.

*Therefore, the opportunity to experience Australia with a focus on its environment was a dream come true!
I would be able to travel the country, visit with Aussies, and experience the environment first-hand.
I would be able to walk around Uluru, snorkel the Great Barrier Reef, walk through rainforests and so much more!
I would learn about the Australian environment and the role it played and continues to play in creating the Australian spirit.*

I was honored to be selected and cherish the memories of the experience. It was an unbelievable gift and I will be forever grateful.

Thank you!

Australia: An Ancient, Delicate and Unique Environment

The Australian landscape is derived from millions of years of development that was modified by ancient volcanoes and plate tectonics. In the past thousands of years, forces of erosion and weathering have reduced the landscape without building it up. Thus, Australia's mountains are ancient and worn-down, similar to the Appalachian Mountains. The flat terrain and location on the Tropic of Capricorn causes the country to experience extensive desert conditions with constant erosion of the topsoil. The ocean and wind patterns of the southern hemisphere create a climate that encourages settlement primarily in the southeast. Scattered settlements are also located along the coast and interior on a few bodies of water. Thus, the physical geography of Australia dictates settlement patterns.

This ancient, isolated land of varied soils and landscapes has created a unique diversity of plants and animals that are particularly adapted to the harsh environments, but sensitive to sudden changes in habitats. The isolation of the country due to its location and distance from other countries limited its development over thousands of years. The original inhabitants successfully lived on the land in harsh environments for thousands of years and managed the environment in a way that was sustainable. Aborigines*, Latin for 'original inhabitants' and the generic name given to all the groups of indigenous people by Europeans, created the longest sustainable culture in the world, estimated to be 50,000 years old. Adaptations to changing environmental conditions and to migrations and trade (probably from Indonesia and possibly from China) were made. However, when early European explorers and settlers beginning in the eighteenth century arrived bringing guns, germs, and steel the death and destruction to Aboriginal cultures and environments was great.

There is current recognition of the fragile and unique landscape of Australia. This is evident with government policies developed at national and state levels, local management practices in urban, suburban, and rural areas, and development and institution of environmental education for K-12 students and standards addressing students' understanding of sustainable development. Non-profit organizations, higher education institutions, and cultural organizations also recognize the need for sustainable development offer stewardship practices.

The need to protect the landscape and its resources as well as develop them to promote economic development is a vital issue in Australia today. The balance of sustainable use of resources and stewardship of the land is, however, a tenuous condition.

Because Australia is an ancient land without bordering tectonic plates, it is a stable continent with limited natural disasters, meaning few earthquakes or volcanoes. However, the country does experience other natural disasters which are quite hazardous to people and the environment including cyclones, droughts, bush fires, land degradation, habitat loss and coral reef destruction. In addition, the country suffers from increased salinity, aridity, landslides and severe storms. The Australian government has been monitoring natural disasters for sixty years and provides aid to communities, disaster assistance, and raises community awareness of natural disasters.

*Aborigine will be used for generalizations of the original people of Australia

Rationale

Teaching geography in the U.S. continues to be in a precarious position as it has been for decades. Despite various efforts by national organizations including the National Council for Geographic Education, the American Association of Geographers and, in particular, the National Geographic Society, geography continues to be taught sparsely with scattered approaches and limited success. Geography is infused in the K-12 social studies curriculum with history dominating the social studies and geography taught one year, which occurs at the middle school level and, in Minnesota, is typically a world regional approach.

With little time in a one-year course to teach the entire world, Australia is often eliminated, despite the country's role as one of the most significant economic and political nations of the southern hemisphere. Students in elementary school, however, often study Australia with a focus on its unique wildlife, and young people are acquainted with popular celebrities including Steve Irwin and Paul Hogan and their movies "Crocodile Hunter" and "Crocodile Dundee", as well as Aussie slang and food because of tourist promotions.

Young people are fascinated with the country but admit little understanding of it. They would love to spend a month studying Australia, but most teachers focus on prominent economic and political regions of the northern hemisphere instead. Also, some geography teachers focus on major themes or concepts and use the various world regions as examples. Thus, this curriculum is designed to be inserted into several thematic units (including physical and cultural geography, environmental studies, natural hazards, endangered species) and to be used in comparison with other countries (particularly the U.S. and Canada). This thematic approach is valuable because it allows major global issues to be addressed while using Australia as an example. This unit provides the necessary avenue to teach about Australia in an already crowded, condensed curriculum. A proactive thematic geography curriculum would assure its position in K-12 social studies programs as an authentic, meaningful discipline for global citizenship.

Sustainability is a critical global issue and using Australia as the example is extremely appropriate. The country is a leader in developing positive attitudes and proactive behaviors toward sustainability, particularly at local and educational levels. According to the 2006 Annual Conference of the North America Association for Environmental Education, environmental issues, sustainable policies and stewardship practices are receiving widespread attention in the U.S. in the past three years, evident in the mass media, education curriculum, and local practices. "Green is good" is a new mantra for the U.S. Of course European countries are actively involved in this issue, but Australia's ancient and unique land requires a fragile approach that makes the country a primary example of the importance and immediacy of sustainability.

Students also enjoy learning about natural disasters and find the power and intensity fascinating. The study of natural disasters is an engaging conduit to the investigation of sustainability and stewardship and is currently a Minnesota state standard.

Australia as a case study—as an ancient land newly settled by Europeans—can be a model for sustainable principles and stewardship practices.

Abstract:

This unit addresses the need for sustainability and stewardship in the Australian landscape and is applicable to global landscapes. The ancient, delicate, and unique environment of Australia requires sustainable principles and stewardship practices. The independent lessons are organized according to topics of Australia's Landscape, Environment Perspectives, Sustainability, Stewardship and Natural Disasters. Several interactive activities are presented. The unit may be adapted to geography, science, area studies, and contemporary issues at the upper elementary through high school levels, although it was designed for middle school students.

Essential Questions:

- ◇ Why is Australia particularly susceptible to human changes in the environment?
- ◇ How can Australia become sustainable with its ancient, delicate and unique environment?
- ◇ Can the world's oldest culture provide examples of sustainable principles and stewardship practices for young people?
- ◇ Can people with different views of the environment live together? How might conflicts be resolved?
- ◇ Why is maintaining the planet's environment important to the quality of life of individuals?
- ◇ Why is it important for a country's economy to be based on sustainable development?
- ◇ What problems have humans caused to the environment in Australia?
- ◇ How can stewardship be promoted among young people?
- ◇ How can Australia be a model for global environmental awareness?
- ◇ How can I become more ecologically responsible?
- ◇ How can this ancient, fragile and unique land be sustained with a growing population and a desire for greater economic development?

Standards:

National Geographic Standards:

The World in Spatial Terms

The geographically informed person knows and understands:

- 1 how to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective
- 3 how to analyze the spatial organization of people, places, and environments on Earth's surface

Places and Regions:

The geographically informed person knows and understands:

- 4 the physical and human characteristics of places
- 6 how culture and experience influence people's perceptions of places and regions

Environment and Society

The geographically informed person knows and understands:

- 14 how human actions modify the physical environment
- 15 how physical systems affect human systems
- 16 the changes that occur in the meaning, use, distribution, and importance of resources

The Uses of Geography

The geographically informed person knows and understands:

- 18 how to apply geography to interpret the present and plan for the future

National Council for the Social Studies Thematic Strands:

I Culture

- a) Compare similarities and difference in the ways groups, societies, and cultures meet human needs and concerns
- b) Explain how information and experiences may be interpreted by people from diverse cultural perspectives and frames of reference
- d) Explain why individuals and groups respond differently to their physical and social environments and/or changes to them on the basis of shared assumptions, values, and beliefs

III People, Places, and Environments

- c) Use appropriate resources, data sources, and geographic tools such as aerial photographs, satellite images, geographic information systems (GIS), map projections, and cartography to generate, manipulate, and interpret information such as atlases, data bases, grid systems, charts, graphs, and maps
- h) Examine, interpret, and analyze physical and cultural patterns and their interactions, such as land use, settlement patterns, cultural transmission of customs and ideas, and ecosystem changes
- j) Observe and speculate about social and economic effects of environmental changes and crises resulting from phenomena such as floods, storms, and drought
- k) Propose, compare, and evaluate alternative uses of land and resources in communities, regions, nations, and the world

IX Global Connections

- d) Explore the causes, consequences, and possible solutions to persistent, contemporary, and emerging global issues, such as health, security, resource allocation, economic development, and environmental quality

X Civic Ideals and Practices

- c) Locate, access, analyze, organize, and apply information about selected public issues—recognizing and explaining multiple points of view

Minnesota State Standards:

Geography

C. Physical Features and Processes

Standard #1: The student will use basic terminology describing basic physical and cultural features of continents studied

Benchmark #1: Students will locate and describe major physical features and analyze how they influenced cultures/civilizations studied

Standard #5: The student will give examples of physical systems and describe their role in shaping life on Earth

Benchmark #2: Student will describe natural hazards, the physical processes behind them, the areas where they occur, and the costs and benefits of methods people use to mitigate their damage

V. Interconnections

Standard #1: The student will give examples that demonstrate how people are connected to each other and the environment

Benchmark #2: Students will analyze how the physical environment influences human activities

Standard #6: The student will demonstrate how various regional frameworks are used to analyze the variation in physical environment

Benchmark #3: Students will describe how physical processes affect different regions of the world

Benchmark #4: Students will interpret regional variation in the relationships among soil, climate, plant and animal life, and landforms

E. Essential Skills

Standard #1: The student will use maps, globes, geographic information systems and other sources of information to analyze the natures of places at a variety of scales.

Benchmark #1: Students will demonstrate their ability to obtain geographic information from a variety of print and electronic sources

Benchmark #2: Students will make inferences and draw conclusions about the character of places based on analyses and comparison of maps, aerial photos, and other images

This is a resource unit with several activities for each lesson briefly explained. Thus, teachers will find at least one strategy valuable to teach the topic with their students. Because of the multiple-use strategy of this curriculum and differentiation in the classroom, which is a strategy to meet the needs of all students by providing diverse strategies, several strategies or activities are provided for each lesson topic. Teachers may select the activity that best meets the needs of their students. Extensions are also offered to elaborate on each lesson topic.

The Lessons are organized around the several titles with numbered activities that may be selected according to various student populations. The lesson titles are the following:

- Introduction
- Australia's Landscapes: Ancient, Fragile, and Unique Environment
- Australia's Landscapes: Perspectives on the Land
- Sustainability and Stewardship: The Preservation of the Land
- Stewardship: Becoming a Global Citizen
- Natural Disasters

Introduction

Three activities are provided to introduce this unit of study, which address students' prior knowledge. All three can be used as pre- and post-assessments of students' understanding.

Activity: Pre-Test/Post-Test

Students answer brief questions using the Pre-Test/Post-Test, which is used to assess their prior knowledge. At the end of the unit, students answer the questions again to assess their increased knowledge.

Activity: Agree/Disagree

To introduce the unit, have students answer the Agree/Disagree statements on the environment individually and then discuss their responses in small groups.

Adapted from Graham Pike & David Selby In the Global Classroom: Book 1

Activity: Environmental Issues

Students need to be aware of numerous environmental concerns. Give each student "Environmental Issues" to identify the environmental concerns in Australia, the United States, and Minnesota. Students in small groups discuss student responses discuss which environmental issues were considered most significant and which environmental issues were considered least significant.

As a small group rank ten of the twenty issues using the diamond-shaped graphic organizer on poster paper to identify the most significant and least significant environmental issues for Australia, the United States or Minnesota. The topic of global impact could also be used. Discuss results as a class. Which environmental issues are global concerns? Which environmental issues should we address?

1

2 3

4 5 6

7 8

10

Pre-Test/ Post-Test

Directions: Answer each question with a brief answer.

1. Name a country that uses more resources and produces more waste than most countries in the world
2. What country has one of the world's oldest, most fragile and diverse environments?
3. What is one of the causes of land degradation?
4. What is one of the causes of endangered species?
5. What is the world's oldest continuous culture?
6. What is sustainability?
7. What does it mean to be a "good steward of the land"?
8. How can the devastation of natural hazards be reduced?
9. Name a country that is recognized for using its resources wisely.
10. What are you doing that demonstrates your awareness of the environment?

Agree-Disagree Statements

Directions: Check the column labeled Agree if you agree with the environment statement and check the column labeled Disagree if you disagree with the environment statement.

Environmental Statement	Agree	Disagree
The population explosion is the biggest problem affecting the global environment		
Concerns about the environment are based on current statistics. People are inventive and will develop solutions for the environment as they have already done for population growth		
Developed countries consume most of the world's resources so they should have limits on their consumption of resources		
Other generations only had to worry about themselves. Why should we have to worry about future generations? We will take care of ourselves and let the next generation look after itself		
We are responsible for one another now and in the future. We have to take the initiative to provide for ourselves and for future generations		
My ecological footprint or impact on the environment is acceptable. Let other people be educated and reduce their impact on the environment, too. True change occurs individually		
It is up to governments to provide incentives for businesses and citizens to reduce their impact on the environment		
The United Nations should impose restrictions on consumption in countries with the highest ecological footprint or impact on the environment		
The United Nations should impose restrictions on countries with growing populations and consumerism that may upset the global balance. Currently, these countries include China and India		
The Earth has always regenerated itself and attained a balance. Just leave nature alone and let nature take its course		
Economic incentives through a market economy will encourage businesses, organizations, and individuals to be better stewards of the environment		
We must preserve and protect the environment by establishing parks throughout the world		
Science has provided solutions to problems in the past. We should spend more money on research and development to identify solutions to environmental problems		
Schools should have environment education programs so students can learn about the environment and implement strategies to safeguard their local, national and global environments		
The U.S. has protected its environment. Let other countries be responsible for their environment, too		

Environmental Issues

What major Environmental Issues should be addressed? Identify which environmental issues are critical to Australia, the U. S. and Minnesota by checking the boxes below:

Australia	U.S.	Minnesota	Environmental Issues
			Biodiversity: maintain variety of plants and animals
			Climate Change: global warming of planet
			Coastal Management: control erosion, reduce storm damage, encourage responsible recreation
			Deforestation: cutting trees causes habitat loss & allows erosion; cutting old growth; need for reforestation
			Drought: long periods of time without sufficient water requires conserving water, finding alternative sources of water, sharing water
			Economic Development: use resources wisely while developing forests, minerals, water, wildlife
			Endangered Species: loss of species due to habitat loss & introduction of other species; preserve species
			Environmental Management: balance conserving the environment and developing the environment
			Human Rights: ability of different populations to live with the environment as they see fit
			Indigenous People: rights of native peoples to preserve native lands & follow their traditional cultural practices
			Land Degradation: changes in land that reduce its current or potential productivity through increased erosion, salinity, deforestation, desertification
			Natural Hazards: storms, cyclones/hurricanes, droughts, fires, tsunamis, floods, tornadoes, earthquakes, volcanoes
			Pollution: increased air, land, water contamination
			Population Growth: increased population, urbanization, immigration, cultural diversity
			Rural Development: balance the decline of rural areas with need for economic development
			Sustainability: meeting needs of the present without compromising the ability of future generations to meet their needs
			Tourism Impact: responsible environment use for and by tourists
			Waste: disposal of toxic and non-toxic waste
			Watershed Management: manage rivers and adjoining agricultural lands for floods, agriculture, settlement
			Urban Sprawl: extension of urban area to outlying areas, development of adequate infrastructure including transportation, communication, sewage

Australia's Landscapes: Ancient, Fragile, and Unique Environment

Australia's landscape can be described as an ancient, fragile, and unique environment. These elements are highlighted in the first power point of Australia, which summarizes the country. Show the power point, "Australia: An Ancient, Fragile, and Unique Land" to introduce Australia. An alternative is the Discovery Channel's "Australia Revealed" from its Atlas Series, developed in 2006. Select one or more of the following activities as during and after activities using the power point to understand Australia's landscapes.

Activity 1: BINGO

Students play BINGO looking for particular words as they watch the power point.

Alternative: Students construct the BINGO card using categories such as: Animals, Aborigines, Activities, Cities, States, Physical Features, Famous People, Important Dates.

Activity 2: Viewing Guide

Students complete the "Viewing Guide" by circling the correct answers to statements and completing the chart.

Activity 3: Questions

Australia's ancient, fragile, and unique environment causes concern about its current and future development. Students provide answers for each question after viewing the power point. They discuss their responses in Think-Pair-Share before assigning the Extended Response Question.

Activity 4: Landscape Collage

Students work in a small group to make an Australian collage with landscape pictures. Each group draws a large outline map of Australia on poster paper using an overhead projector. Students cut pictures of Australia's landscape from magazines, travel brochures, or from the Internet. Each group places pictures of each landscape on the correct region of the map that the landscape is located. Have a "gallery walk" where students can react to each group's collage.

Extensions: 1) Students place captions on the poster to name and describe each region.
2) Students work in small groups with separate topics such as climates, physical features, people, animals and make a collage of that topic on their outline map of Australia.
3) Students work in small groups to make one region or one topic of Australia to place on a single, huge classroom outline map of Australia.

Activity 5: Poster of Adaptations

Divide students into groups to make a poster that explains how one of the categories of flora or fauna (Marsupials, Birds, Plants, Reptiles) uniquely adapted to the Australian environment.

Students will explain its unique adaptations (physical and social adaptations) and its habitat (climate, vegetation, food).

Aussie Bingo

Multicultural	Marsupials	Dry Landscapes	Fragile Land	Eucalyptus Tree
Harsh Environments	Stable Land	Preservation	Varied Ecosystem	Extinction
Crocodile	Erosion	Ancient Land	Isolated	Little Topsoil
Unique Land	Wollemi Pines	British	Urban	Biodiversity
Aborigines	Emu	Billabong	“No Worries!”	Habitats

Aussie Bingo

Animals	Aborigines	Activities	Cities	States
Kangaroo	Didgeridoo	Surf	Sydney	Queensland
Wallaby	Boomerang	Rugby	Melbourne	New South Wales
Koala	Dreamtime	Soccer	Canberra	South Australia
Crocodile	Bush Food	Aussie Rules Football	Brisbane	Victoria
Platypus	Indigenous	Swim	Cairn	Western Australia

Viewing Guide

Directions: Complete the Viewing Guide by circling the answer in each of the 10 statements while watching the power point presentation. Next, complete the chart by listing 5 animals endemic to Australia and 5 characteristics unique to Australia.

1. Australia is the **oldest/youngest** land mass
2. Australia has unique plants and animals because it is **isolated/in southern hemisphere**
3. The world's oldest culture is the **Aborigines/Australians**
4. Australia has one of the world's most **harsh/idyllic** environments
5. **Climate/Land** is the sacred gift from ancestors
6. Europeans first settled in Australia to establish **freedom/prisons**
7. Most people live in **cities/countryside**
8. Most people live **in the interior/near the coast**
9. Native animals couldn't be **domesticated/traded**
10. Australia's terrain is **mountainous/plains**

List 5 unique animals and 5 unique characteristics of Australia:

Australia's Unique Animals	Australia's Unique Characteristics
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Questions

Directions: List answers to each of the three questions using information from the power point.

Why is Australia an ancient land?

- 1.
- 2.
- 3.

Why is Australia a fragile land?

- 1.
- 2.
- 3.

Why is Australia a unique land?

- 1.
- 2.
- 3.

Extended Response: Why might Australia's characteristics of ancient, fragile and unique environment require bold and immediate action?

Australia's Landscapes: Perspectives on the Land

Aussies have held different perspectives towards the environment, which shaped historic and current practices. Students will investigate these perspectives to ascertain sustainable principles and stewardship practices in later lessons.

After watching Australia 2 power point, "Australia's Landscapes: Perspectives on the Land", focus on the perceptions of the environment held by traditional Aborigines and historical Europeans. Contrast these perspectives with the current attitude toward the environment. Last, contrast these perspectives with the attitude and behavior of the United States and yourself to identify similarities and differences.

Activity 1: Venn Diagram

Students make a Venn diagram to compare and contrast Aboriginal and European perspectives of the environment in small groups. In a statement, students summarize Aboriginal and European perspectives. How are these perspectives similar to or different from the U.S. perspective? How are these perspectives similar to or different from your perspective?

Activity 2: Environment Descriptors

Ask students to clarify their perspective toward the environment by selecting the descriptor that best describes their attitude towards the environment.

- Environment as Obstacle
- Environment as Partner
- Environment to be Used
- Guard/Protect Environment
- Ignore Environment
- Tend/Garden Environment

Next, ask students if their attitude is different depending on the type (rainforest, desert, woodland, ocean) or location (Brazil, U.S., Russia, India) of the environment. Why would attitudes vary depending on the type or location of the environment?

Hand out Environment Descriptors and have students develop labels for each diagram with a descriptor that illustrates the relationship of people and the environment. Ask students to draw additional images and add descriptors that would explain other relationships between people and the environment. Ask students to select the diagram that represents the Aboriginal perspective and explain why they selected that picture. Do the same for Europeans.

Extension: Aborigines were the first mapmakers. Examine some of the historical maps of landscapes available at the website: www.aiatsis.gov.au www.jaconline.com.au www.cultureandrecreation.gov.au/articles/folklore www.ga.gov.au Interpret symbols on the drawings and explain the Aboriginal perspective of the landscape.

Extension:

Jared Diamond's interviews on Australia www.abc.net.au/scinece/features/societies/default.htm

Activity 3: Aboriginal Perspectives on the Landscape

Use the summary, “Aboriginal Perspectives on the Landscape”, to explore detailed perspectives of the link between Aboriginal views of the environment and their culture. Use a literacy strategy, such as Keyword Categorization, as a before reading strategy. Keywords include: Aborigines, clans, ancestors, intangible, beliefs, corroboree, fire-stick, dreaming, story, totem, Law, spirits. After reading the article, students will construct a concept map of traditional Aboriginal perspectives of the environment with topics including land, water, animals and people. Also have students examine websites including: www.cultureandrecreation.gov.au/arti www.aiatsis.gov.au www.dreamtime.net.au/ This summary is adapted from Treading Lightly: The Hidden Wisdom of the World’s Oldest People, by Karl-Erik Sveiby and Tex Skuthorpe, 2006, Allen & Unwin, Crows Nest, New South Wales. Available at www.allenandunwin.com

Activity 4: Kakadu Man

Bill Neidje was called Kakadu Man. He was a member of the Bunitji people who leased to the Commonwealth the land called Kakadu National Park, a World Heritage Site. 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. Dreaming place...you 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; (1986; Darwin Resource Managers Pty, Ltd; 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). Students read the excerpts and brief biographies of Bill Neidje available at www.abc.net.au Students will write an imaginary interview they would have with Bill about the land and Australia’s future.

Extension: View “Kakadu Man” which explains Bill Niedjie’s perspective and shows scenes of Kakadu National Park with actors and puppets. This video is available at www.filmaust.com.au

Activity 5: European Perspective on the Landscape

Aborigines are seen as the custodians of the land and Europeans are seen as the owners of the land. To investigate whether this statement is true or not, provide summaries of the European Perspective on the Landscape Parts I and II with quotes and readings from the Australian National Library at www.nia.gov/au to gather images of historical European paintings of Australia. Were the early European paintings of Australia idyllic or realistic? The landscapes were lush, verdant, productive lands. Did they exist before the Europeans settled? We have evidence of the change in the past 100 years of clearing forests, erosion, pollution, and reduced supplies of fish, birds, and animals. We also have evidence that the European images of the landscapes were modified.

Students working in small groups will construct a concept map of historical European perspectives of the environment with topics including land, water, animals and people. Next, have a Socratic discussion on historic and contemporary land use in Australia, discussing whether Aborigines were the custodians of the land and Europeans the owners of the land.

Activity 6: Environment Situations

Consider several environmental situations and the perspectives people would have on the environment. What would Aborigines do with changes in the environment? What would Europeans do with changes in the environment? What should we do today? Identify what would be done to the environment 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 views of the environment live together on the same land? How might conflicts be resolved?

Extension: Have students complete the chart, “Attitude Towards the Environment Situations”, replacing the categories of Aborigines, Europeans, and Current with three descriptors of the environment. Review the environment situations by discussing how each descriptor would deal with an environment situation.

Extension: Make a Venn diagram to compare the Aboriginal perspective towards the environment with the Native American perspective. What similarities and differences seem to exist? How is their attitude incorporated in official government policy? How have they been part of the process of environment sustainability and stewardship?

Activity 7: Landscape Poetry Images

Understanding another country is easier when using familiar examples and analyzing them. Use the words from a popular Australian poem to understand the country’s physical and cultural landscape. Begin by using Keyword Categorization 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 explain why they made the categories. After reading the text, students revisit their categories to see how the terms are related. Students discuss images of the country’s landscape that are created in the poem.

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

“Kookaburra” by Marion Sinclair

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

Swag: rolled blanket that’s carried (also called a “matilda”)
Swagman: itinerant traveler or hobo
Billabong: waterhole

Coolabahs: endemic Australian tree
Billy: can or small kettle often used to boil water for tea
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

Coppice: traditional management method where young trees are cut to stumps for regrowth
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: not sympathetic or compassionate
Famine: starvation or scarcity
Paddocks: enclosed area for pasture
Willful: determined

Extension:

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”. Read and discuss the classic Aussie poem, “My Country”. Use 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 landscape?
- What is the author’s purpose in writing this poem?

Extension:

Could Aborigines have written this poem, “My Country”, about the land? 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”
- Flood, fire, famine
- Paddocks

Contrast this vision of the land with Aboriginal sustainable activities and current efforts to maintain and restore the landscape.

Extension:

Students can investigate the environment or people of Australia by writing their own poem that reflects the landscape or culture. Students could also learn more about the origin of the poem and the history of its author in order to understand the country better. Read about Australian culture and folklore including traditions, heroes, history, pioneer women, folk life, folklore, and Aborigines by going to <http://www.cultureandrecreation.gov.au/articles/folklore/>

Extension:

Make a list of features that you would use to describe the U.S. landscape, which may be environmental, cultural, or historical characteristics. Write a poem about those characteristics. An alternative is to write a poem about your feeling towards a particular landscape. Use any poetic form you wish but include descriptive words.

Environment Descriptors

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.

Aboriginal Perspectives on the Landscape

The Aboriginal cultures have the longest continuous cultural history in the world, dating over 50,000 years. Aborigines, actually made of hundreds of clans or groups of families with their own language, traditions, stories, and locations in Australia, are similar in their mission to maintain the land and serve their ancestors—to maintain life. They are stewards of the land in order to maintain its sustainability as well as preserve their culture, which did not radically change for thousands of years. Arrival of the first Europeans in 1788 brought guns, germs and steel that dramatically changed both Australia's physical and human landscapes.

Thus, Aboriginal society has the world's longest record for sustainability—living in harmony with their environment. No society has existed longer. They developed beliefs and practices that maintained the environment for their communities and for future generations.

The harsh, fragile environments of Australia did not permit the accumulation of belongings. There are few resources to produce, maintain, and store belongings or structures. The Aboriginal lifestyle reflects the harsh, fragile environments such that homes, artifacts, and transportation routes are sensitive to the environment using and reusing resources, making multi-use tools, and minimizing their impact on the environment.

As a result, Aboriginal culture focuses on intangible or nonmaterial characteristics, including relationships, traditions, customs and spirits. Their environment, lifestyle and beliefs value a rich culture rather than accumulation of material wealth. Despite their Stone Age characteristics of few tools and limited technology, they spend most of their time involved in cultural activities rather than hunting and gathering food, which only takes a few hours each day. Aboriginal society produces high levels of intangibles including art, education, law, and medicine.

To perpetuate harmony within and among clans, ceremonies were often held. The “corroboree” was a community gathering to reinforce and celebrate relationships among and between clan members. Corroborees occurred frequently for entertainment, education, spiritual celebrations, and to reinforce harmony.

Because their culture was based on understanding the environment and relationships, leadership was neither based on one person nor a hierarchy of people. Instead, individuals provided guidance based on their expertise and relationship with a particular landscape, animal, spirit, or person. Leadership, then, was based on group consensus and the specific situation.

Fire-stick farming is an excellent example of how they dealt with the environment in an eco-friendly 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 species, allowed grasses to grow for foraging animals, encouraged new growth with ash as fertilizer, and provided food for Aborigines and habitats for creatures. Another example of preserving the environment is they maintained live traps to keep animals and fish alive until needed. No food was wasted because only what was needed was taken.

Dreaming

The Aboriginal culture is maintained with a concept called “dreaming”—known as creation stories by Europeans. However, dreaming is much more than stories. Dreaming is their life and is intertwined with their beliefs about who they are and where they come from. Dreaming is the evidence of their beliefs, so dreams can be thought as a form of meditation or prayer. Aborigines are encouraged to dream because dreams provide guidance for life by connecting with the spirit world, but need interpretation for young people because they are inexperienced. Dreams are used to teach people how to be protected and how to behave when meeting other spirits.

Dreams are shared with others to determine the multiple layers of meaning, which must be interpreted to understand. Dreams are stories with meaning that are given by spirits to help and guide each person to understand the Laws. Stories have a basic level, which is the plot that identifies what the story is about; these are the ‘children’s stories’. The second level is the moral of the story and is found in the symbols of the story. The third level gives the meaning of the story. Particular people in the clan interpret the fourth level.

- Meaning of the story based on the plot
- Meaning of the story including the moral or lesson found in symbols which is implicit
- Meaning of the story that connects to the clan or larger community which is implicit
- Meaning of the story that requires spiritual action and psychic talents to understand (only selected people in the clan can understand this level)

In the beginning (“Burruguu” or creation time) the ancestors who are super powerful humans quarreled and created the landscape and returned to the sky (“Warrambul” or Milky Way) when they were done. The sky, then, is the intangible reflection or double of everything on earth. Thus, “Burruguu” or creation time exists in the landscape around them and in the intangible reflection in the sky (“Warrambul”).

The first human (Baayami) created the Law. Ancient ancestors who obeyed the Law were turned into people while other ancient ancestors who did not obey the Law were turned into their totem animal. The totem animal is nature’s representation of each person’s spirit—it is their “double”—and they must nurture it through ceremonies so they have an intimate understanding of its life and needs. For example, if a person’s totem animal were the kangaroo, the Aborigine would perform kangaroo ceremonies having learned the kangaroo’s lifecycle, its food, its habitat, and its enemies so the Aborigine can protect and preserve the totem.

The Law is taught through stories that are told and repeated. The Law is omnipresent and immutable, providing continuity in the culture. The Law needs no change and is not challenged. The Law must be obeyed or severe consequences occur affecting your Soul and Eternity.

There is no god or gods for the Aborigines. Instead, everything is alive with its own spirit and consciousness and holds hidden meanings. Connections can be made individually or collectively with the surrounding spirit world through proper ceremonies or visits to sacred places, which are special places in the landscape that hold stories and meaning.

The environment (as a reflection of the “Burruguu”) is to be lived in, not changed. If new discoveries or changes occur, it is because they were always there but not noticed. 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 missions must continue because the Law says it is your responsibility. If you do not fulfill your responsibilities, the spirit will die as well as all the people who have that totem. The responsibilities are immense to sustain the land, the totem, and the people.

Today, as people age and youth leave the clan, continuity of the culture is being lost and stories are disappearing. The mission cannot be fulfilled, which is causing turmoil within Aboriginal societies. Stories are their history, culture and spirituality that link them with the land. Aboriginal beliefs are reflected in the landscape because the land itself holds spirits.

Aborigines believe they existed at creation and continue to live forever as their Soul in Eternity, which is the reflection of their brief life. They have one lifetime to fulfill a mission before returning to the sky with their ancestors, which they have visited many times in their dreams.

People have four spirits that assist them while they are living. Understanding these spirits is important to understand Aboriginal culture and their relationship with the land.

- Soul: The soul is your “self” and lives forever
- Totem: The totem is the animal that is you on earth and in the ancestral world
- Shadow Spirit: The shadow spirit can be sent to influence others
- Dream Spirit: The dream spirit travels to the sky to commune with spirits and receives messages from them to share with you as you dream

The proper ceremonies at death are necessary for the Soul to return to the sky and the Shadow Spirit and Dream Spirit to rest. The Soul lives in eternity and continues to communicate through dreams and Dream Spirits if the ceremonies are conducted properly. If the ceremonies are not completed, the Soul becomes lost and wanders earth and is to be pitied.

A huge network of interconnections and interdependence exists between and among clans. Individuals in one clan have the same totem animal as another person in another clan. Clans are connected together because of the shared totems. The clans are also connected because marriage occurs between clans with women moving to their husband’s clan. The women’s role is to maintain the relationships of the clan and between clans by arranging marriages and performing ceremonies associated with birth, marriage, death, and inheritance. Also, because sacred sites are connected with the mother, they are located in the land of another clan. The necessity of healthy, positive relationships within and between clans is clear.

Men are viewed as aggressive and they perform a walkabout when they are young to channel their energy and strengthen their relationships and become mature, knowledgeable men. A Walkabout is a “learning walk” for young boys that may last as long as 15 years. In a Walkabout the youth walks throughout the landscape for years learning about the environment and reinforcing relationships among the clans. The walkabout becomes like an “outward bound” where the young boy learns how to survive in the environment and make positive connections with his relatives and “brothers”--people with the same shared totem. Thus, any time he needs help anywhere, there are kin or “brothers” to assist him. During this initiation he learns from others and uses this understanding to help his own community when he returns and marries.

There were no fortresses or barricades in Australia. There were no wars, no government, and no religious intermediary. The Aboriginal people were knowledgeable of what was needed in the land and the culture to sustain themselves for thousands of years. The Aborigines seemed to be living like stone-aged people with tools made from local resources. There was no metal, no pottery, no agriculture, and no domesticated animals. Animals could not be domesticated, agriculture would destroy the land, pottery could not be maintained, and metal would damage resources. Yet, despite the harsh and fragile Australian environment, Aborigines adapted well to it for 50,000 years. The Aborigines lived in harmony with the environment and created a sustainable culture appropriate for the vulnerable environments of Australia.

Summary of Aboriginal Perspectives:

Beliefs	Meaning of Beliefs
Mission	Keep all alive
Value: All are Connected	All are connected (ancestors, people, animals, plants, sky, earth) Time is limitless Eternal life & reward in the Warrambul (when mission on earth is accomplished) Individual spiritual relationship with Ancestors (no religion, gods, hell)
Value: Respect	Respect for knowledge itself Respect for knowledgeable individuals—learn from others; don't impose view on others; don't conquer others;
Economy: Intangibles	Production & consumption of intangibles—stories, ceremonies, dances Recycle tools & materials
Environment: Care	Ecological friendly farming, hunting, gathering methods Natural medicine
Primary Resource: Knowledge	Life-long learner Greater status from knowledge, not acquisition of material wealth
Leadership: All have Role	Context-specific leadership—all people have a leadership role Consensus decision-making Rule of Law and enforcement of sanctions
Society: Build Community	Fuzzy borders between clans Networking among clans maintains peace Custodians of land and knowledge Collaborative methods to increase productivity

Selected Quotes from Kakadu Man by Bill Neidje

<p>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</p> <p>Our story is in the land... It is written in those sacred places (p. 14)</p>	<p>We must get rain. Law says we get rain.</p> <p>Creek, plain, hill. That plain can change.... Wet season, him mud. You get lily, You get fish. But he dry up.... That's alright. Then people can get long-neck turtle. Same for animal. People look for food, Animal look for food. Lizard look, bird look, anyone look. We all same. (p. 40)</p>
<p>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> <p>When you sleep, Tree growing life other trees.... They got lots of blood. (p. 35)</p>	<p>We got to look after, can't waste anything. We always used what we got.... Old people and me. (p. 42)</p>
<p>Law never change.... Always stay the same. Maybe it hard, But proper one for all people. (p. 39)</p>	<p>Frill-neck lizard was a man who broke the law and can't change back. (p. 44)</p>

<p>Million [dollars] no good for us. We need this earth to live We'll be dead, because.... We'll become earth.</p> <p>This ground and this earth.... Like brother and mother.</p> <p>We like this earth to stay, Because he was staying for ever and ever.</p> <p>We don't want to lose him. We say 'sacred, leave him'.</p> <p>We come from earth.... Bones. We go to earth.... Ashes. (p. 46)</p>	<p>Earth.... Like you father or brother or mother Because you were born from earth. You got to come back to earth. When you dead.... You'll come back to earth. Maybe little while yet.... Then you'll come to earth. That's your bone, Your blood. It's in this earth, Same as for tree. (p. 51)</p>
<p>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> <p>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)</p>	<p>Sky.... Cloud.... Made for us. Star.... He'll stay for ever and ever. (p. 54)</p> <p>I'll become earth again. I belong to this earth. And earth should stay with us. (p. 56)</p>
<p>We walk on earth, We look after.... Like rainbow sitting on top. But something underneath, Under this ground.... We don't know.... You don't know.</p> <p>What you want to do? If you touch.... You might get cyclone, heavy rain or flood. Not just here. You might kill someone in another place. Might be kill him in another country. You cannot touch him. (p. 48)</p>	<p>Land got to stay, Always stay same.</p> <p>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)</p> <p>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> <p>Dreaming place.... You can't change it, no matter who you are. No matter you rich man, no matter you king. You can't change it. (p. 65)</p>

European Perspective on the Australian Landscape, Part I

In “Country & Landscape” by Professor Ken Taylor, Humanities Research Centre of the Australian National University as Guest Curator of the 2006 exhibit at the National Library of Australia in Canberra, he makes comments regarding the exhibit of European paintings of the Australian landscape.

According to Taylor, early 1800s Australian landscapes focused on the romantic, idyllic perspective rather than realistic, factual perspective. Thus, the making of an idyllic pastoral scene was artistic license, not actuality. In fact, paintings had additional trees drawn and green added along with seductive texts to create particular images. Even the coastal areas were incorrectly portrayed as a “park-like landscape” and a “natural Garden of Eden”.

William Westall’s “King George’s Sound: View from Peak Head” is a good example of this. Notably, this watercolour sketch is likely to be an accurate representation of what he saw, including the somewhat rough foreground. When, however, he transferred this scene into oils he embellished the foreground to improve on nature as Gilpin also entreated artists to do. The picturesque, like all landscape images, carried ideological significance.

Louisa Clifton wrote in her journal shortly after arriving in 1841: “*We then mounted the hills to the left of Mr. Eliot’s house, and were charmed with the exquisite view of the estuary, the hills beyond, dips and dells, and knolls beautifully studded with large and picturesque trees forming the nearest landscape. At length we arrived at Government House, situated on the summit of one of these high round knolls, commanding a lovely prospect.*” Taylor believes that both journals and paintings provided images of idyllic pastoral scenes that were in the creators’ minds rather than in the actual landscape. “The Australian colonial landscape narrative in paintings and descriptions was fundamentally an imaginative occupation of the country prior to its physical occupation by a settler group.”

Taylor also 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.” “The Aboriginal people were also included in rural and town scenes where they were subsidiary to the improvements brought by the settlers and were to be regarded as temporary figures on the landscape....In many of the paintings the genre is Romantic. It is a Garden of Eden—a benign wilderness setting—where Aborigines appear as leading an idyllic life or cast in the role of Adam and Eve before the fall brought about by European settlement.”

“Here is the clue to the making of the picturesque landscape: burning by Aboriginal people. It was a long held tradition of managing the landscape to maintain grassy plains and open park-like woodland and to control fire-prone flora which had evolved over millions of years prior to human settlement some 60,000 years ago. Fire evolved not just as a land-care tool, but it also

developed a deep symbolism associated with ceremony and sacred rituals linked to territory. Fire stories and fire dreamings are critical to Aboriginal relationship with country.”

Instead of portraying the harsh environments contained in Australia, Taylor says that early visitors portrayed a landscape that either suited their imagination, the imagination of the dealer, or the need to provide stunning images of a new land for native 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 waterbirds.

Examples of Early European Australian Landscapes:

J.C. Armytage “The Gwalior Plains” (1874?)

“Brisbane, from South Brisbane” (1874?)

Augustus Earle (1793-1838) “Wellington Valley, New South Wales, looking east from Government House” (1826?)

Samuel Thomas Gill (1818-1880) “Drove of cattle by a pond in the bush”; 1840s

“Government House, Hobart Town, and the River Derwent from the Domain”

“Cattlemen and natives by gum trees” (1840s)

“Aborigines and white men hunting kangaroos” (c. 1850)

“Ana-branch of the Darling” (1846)

“Drove of cattle by a pond on the bus” (1840s)

“Early Australian landscape” (1840s)

“Kangaroos and grass tree” (1840s)

“The Ranges, the residence & property of H.S. Russell esqr.” (1860s)

John Glover (1767-1849) “The Eden” (1829?)

“On the Oose River” (1834)

Robert Hoddle (1794-1881) “Ginninginderry Plains, New South Wales” (c. 1835)

“View from Limestone Hill called Campbell’s Hill, New South Wales, March 1832”

John William Lewin (1770-1819) “View of Sydney looking south (c. 1811)

Joseph Lycett (c.1775-1828) “Aborigines using fire to hunt kangaroos” (c. 1818)

“View of Lake George, New South Wales, from the north east” (1825)

“View upon the South Esk River, Van Diemens Land” (1825)

Conrad Martens (1801-1878) “Lake Illawarra, N.S.W.” 1835

“Australian view with figures” (1845)

“Craigend, Sydney” (1836)

“Landscape with farm building amongst trees” (c. 1840)

“On the road to Sydney” (c. 1840)

“River Hawkesbury, near Wiseman’s Ferry, N.S.W.” (1838)

John Skinner Prout (1805-1876)

“The city of Sydney, N.S.W., from the government paddock, Parramatta Street” (1844)

“Cario Bay from the Barrabool Hills” (1847)

“Geelong” (1847)

“Mount Macedon, Victoria” (c. 1847)

Eugene von Guerard (1811-1901) “Native encampment” (1873)

“Top of Mount Lofty near Adelaide” (1867)

William Westall (1781-1850) “King George’s Sound, view from Peak Head”; 1801

European Perspective on the Australian Landscape, Part II

Australia's edge in the ecological humanities

Australia has a real competitive edge in the ecological humanities: in the practice of philosophy, art history, eco-criticism and environmental history. It has to do with our New World mentality and predicament, our history as a modern settler society with a long, strong indigenous history, our inheritance of a confrontingly different and unique ecology, our inhabitation of an island continent that is also a nation. Australian history is like a giant experiment in ecological crisis and management, sometimes a horrifying concentration of environmental damage and cultural loss, and sometimes a heartening parable of hope and learning. Ecologists working in Australia today often feel like they are ambulance drivers arriving at the scene of an accident. They want all the help they can get. Such a roller-coaster of environmental history makes us think differently and more sharply than the rest of the world on many ecological matters. On such a continent, we can never blithely assume the dominance of culture over nature, nor can we believe in the infinite resilience of the land. We are committed by history and circumstance to an intellectually innovative environmental enquiry.

Environmental sustainability

I welcome the wording of the research priority of 'An Environmentally Sustainable Australia'. I see it wisely distancing itself from earlier formulations such as 'sustainable development', a concept which too quickly loses its sense of ecological limits. Here we are concerned with sustaining the environment – and also the Australian society that depends upon it. Our economy is to be measured by the health of the ecosystems and human communities where we live and work. What constitutes environmental sustainability is ultimately a social and political question as much as a scientific one....Moving towards an environmentally sustainable Australia will depend not only on our knowledge of ecosystems and resources but even more on our ability to initiate, advocate and absorb radical shifts in desired lifestyles, values and technology....

Locating ecological problems in the behaviour of humans

We often name ecological problems by their chief biophysical symptom—salinity, soil acidity, land degradation, forest loss—yet each problem actually has its origin in human behaviour.

Conclusion: Seasons of knowledge

I will finish with a story about the seasons of knowledge, about how the frontiers of learning are sometimes behind us. The western division of New South Wales is a region acknowledged today as being in the grip of environmental crisis, from salinity, pests, woody weeds, chemical pollution and soil degradation. In the 1860s and 1870s as squatters rapidly and successfully occupied that land, there appeared no physical limit to pastoral occupation. But the final years of the century brought rabbits, drought, overstocking, appalling wind erosion and economic depression.

A Royal commission to enquire into the crisis of the western lands was established and reported one hundred years ago. It gathered and published thousands of pages of evidence from people on the land. The Commission unearthed a widespread understanding of the destructive effects of pastoralism on the outside country. It is clear that, as early as the late nineteenth century, Australians in positions of power had a sophisticated understanding of the

environmental limits of their inland. There was rapid and early growth in knowledge of the ecology of pastoralism, and of the effects of overstocking. There was some recognition that the cessation of Aboriginal burning had changed vegetation patterns. What happened to that knowledge, and who acted upon it? Did it just vanish into the dry air, evaporate like so many waterholes? As the geographer Michael Quinn has observed, 'Knowing the West was not enough'. Scientists often argue for the need to overcome deficits of knowledge, but rarely ask why we do not act upon what we already know. Most of the constraints working against environmental change are cultural: we have to know ourselves as well as the country.

From: "The Humanities and an Environmentally Sustainable Australia"
by Dr. Tom Griffiths, Fellow of the Australian Academy of the Humanities
Address to DEST Conference on "The Contribution of the Social Sciences and Humanities to National Research Priorities", Canberra, March 28, 2003

Available at: History in the National Museum of Australia
www.humanities.org/au/Policy/NRP/expandingRppapers/GriffithsRP.pdf

Attitude Towards the Environment Situations

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

Attitude Towards the Environment Situations

Situation			
Extended Drought conditions			
Diminished population of kangaroos			
Discovery of gold			
Demand for more preserved parks			
Construction of additional housing for new immigrants			

Landscape Poetry

“Kookaburra” by Marion Sinclair

Kookaburra sits in the old gum tree
Merry, merry king of the bush is he
Laugh, Kookaburra! Laugh, Kookaburra!
Gay your life must be

Kookaburra sits in the old gum tree
Eating all the gum drops he can see
Stop, Kookaburra! Stop, Kookaburra!
Leave some there for me

Kookaburra sits in the old gum tree
Counting all the monkeys he can see
Stop, Kookaburra! Stop Kookaburra!
That’s not a monkey that’s me

Kookaburra sits on a rusty nail
Gets a boo-boo in his tail
Cry, Kookaburra! Cry, Kookaburra!
Oh how life can be

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

Once a jolly swagman camped by a billabong
Under the shade of a coolabah tree
And he sang as he watched and waited till his billy boiled
“Who’ll come a-waltzing Matilda with me?”

Down come a jumbuck to drink at the water hole
Up jumped a swagman and grabbed him in glee
And he sang as he stowed him away in his tucker bag
“You’ll come a-waltzing Matilda with me”.

Up rode the squatter a riding his thoroughbred
Up rode the trooper—one, two, three
“Where’s that jumbuck you’ve got in your tucker bag?”,
“You’ll come a-waltzing Matilda with me”.

But the swagman he up and jumped in the water hole
Drowning himself by the coolabah tree,
And his ghost may be heard as it sings in the billabong,
“Who’ll come a-waltzing Matilda with me?”

“My Country” by Dorothea McKellar

The love of field and coppice,
Of green and shaded lanes,
Of ordered woods and gardens
Is running in your veins.
Strong love of grey-blue distance,
Brown streams and soft, dim skies—
I know but cannot share it,
My love is otherwise.

I love a sunburnt country,
A land of sweeping plains,
Of rugged mountain ranges,
Of droughts and flooding rains.
I love her far horizons,
I love her jewel-sea,
Her beauty and her terror—
The wide brown land for me!

The stark white ring-barked forests,
All tragic to the moon,
The sapphire-misted mountains,
The hot gold hush of noon,
Green tangle of the brushes
Where lithe lianas coil,
And orchids deck the tree-tops,
And ferns the warm dark soil.

Core of my heart, my country!
Her pitiless blue sky,
When, sick at heart, around us
We see the cattle die—
But then the grey clouds gather,
And we can bless again
The drumming of an army,
The steady soaking rain.

Core of my heart, my country!
Land of the rainbow gold,
For flood and fire and famine
She pays us back three fold.
Over the thirsty paddocks,
Watch, after many days,
The filmy veil of greenness
That thickens as we gaze.

An opal-hearted country,
A willful, lavish land—
All you who have not loved her,
You will not understand—
Though earth holds many splendours,
Wherever I may die,
I know to what brown country
My homing thoughts will fly.

Sustainability and Stewardship: The Preservation of the Land

Sustainability is living within your resources so that future generations will also be able to do so. This challenging concept will be examined using Australia and will be applied globally and personally with stewardship providing direct application. Sustainable development often extends to equitable development to reduce the gap between rich and poor countries.

After watching Australia 3 power point, “Sustainability and Stewardship”, students will understand the concept of sustainability by completing activities and transferring understanding to global policies of sustainability.

Activity 1:

Discuss the following questions after the power point:

- What is sustainability?
- What are examples of neglecting sustainability?
- What are examples of supporting sustainability?
- What are examples of government policy or practice for sustainability?

Also use “Sustainability Quirky Facts” at: (ACTEW)

<http://www.actewagl.com.au/education/QuirkyFacts/default.aspx?section=Sustainability>

Activity 2: Natural Resources

Students will chart renewable and nonrenewable resources and answer questions individually or in small groups. Discuss: What resources can be renewed? Why must we be cautious with our use of renewable and non-renewable resources?

Alternative: Students could also interactively use a class chart labeled “Renewable Natural Resources” and “Non-Renewable Resources”. Give students slips of papers with the labels of resources to place on the chart and then answer questions and discuss use of natural resources. Possible labels include: Air, Soil, Ocean, Corn, Trees, Oil, Fish, Iron Ore, Wheat, Apples, Birds, Cow, Tiger, Eagle, Gold, Rivers, Lakes, Uranium, Grass, Dogs

Activity 3: Go Fish!

Many of our environmental resources are held in common with the larger community, although individual action can affect the quantity and quality of resources. Communities should consider sustainable use of its limited resources. Renewable resources should be used with care to support restoration and reproduction. With increasing populations, sustainable use of both renewable and non-renewable resources is vital.

Students will be in small groups of 4 seated in a circle representing a community or village. Place 15 tokens in the center of the group, such as paper squares, paper clips, poker chips, crackers or wrapped candies to represent fish. During the first round students take turns to explain how many fish they will need that year to support their families and take that number of tokens. After all four students have completed the task, the first round is over and the teacher doubles the number of tokens in the center. In many communities there will be no fish left and,

since zero cannot be doubled, the game is over. The teacher asks if they would like to play again. Return the tokens to the center and play again. Students should play 3-4 rounds. Debrief the activity using the Debriefing Questions. Have students complete the essay question:

“Explain why it is important for a country’s economy to be based on sustainable development?”

Debriefing Questions:

- What was the maximum number of tokens that each person could withdraw and still have the resource pool of fish last forever?
- How many tokens were taken each round? How did you feel about other people in your community? How many fish can you take each year and have a sustainable community?
- Did the explanations of other people seem valid to you? Were they making sustainable decisions for their families and for the community?
- How does this activity reflect perspectives of Aborigines? How does this activity reflect perspectives of European settlers? Would the two groups of people have used their resources differently?
- What might you do about situations when individual decisions affect the community? Should individual decisions be monitored or regulated? Should people be educated? How might we foster a greater sense of community?
- We used fish in our example. How might this apply to other renewable resources, such as timber, soil, water, or other animals? Do we replant, regenerate, reuse, and reproduce our renewable resources? Do we provide sufficient time for this to occur?
- Have you experienced examples of this situation in your family, school, or community? Examples might include taking a long shower so there’s less water for others; taking a larger piece of dessert so there’s less for others; taking all the supplies for an activity so there’s less for others; purchasing all the items so there’s less for other customers.

Adapted from “Sustainable Fisheries Management Inquire” in “Education for Sustainable Development Toolkit” located at <http://www.esdtoolkit.org>

Activity 4: Ecological Footprint

The Ecological Footprint Analysis (EFA) was developed in 1996 by Mathis Wackernagel and William Rees (Our Ecological Footprint: Reducing Human Impact on the Earth) as a quantitative tool to measure sustainability, which is the land needed to support resource consumption and waste production of a given population or economy. By comparing a population’s ecological footprint with the environment’s biological capacity, Ecological Footprint Analysis suggests whether a population is living within its environment and is, therefore, sustainable.

Ecological Footprint (EF) is estimation of how much of the Earth is used for food, clothing, energy, shelter, waste, and recreation with our “footprint”. The EF is a calculation for a person, family, community or country to determine how much of Earth’s renewable and nonrenewable resources we use. If the number shows that fewer resources are consumed than are available, than we are meeting our lifestyle is sustainable. If the number shows that more resources are consumed than are available, than we are surpassing our lifestyle is not sustainable.

Introduce students to the Ecological Footprint by taking the self-assessment and completing the chart at the Bobbie Bigfoot website located at: <http://www.kidsfootprint.org>. Primary questions that should be addressed include the following:

- 1) Is this lifestyle sustainable?
 - 2) Could everyone in the world live like you?
 - 3) What could you do to reduce the size of your Ecological Footprint?
- Optional: Secondary students calculate their Ecological Footprint at My Footprint, which provides more information, at: <http://www.myfootprint.org>

Create a class chart and then make a class bar graph with the number of students having an Ecological Footprint in particular increments.

	0-2	2-4	4-6	6-8	8-10	10-12	12+
Number of Students							

Discuss results and compare this with the global Ecological Footprint. If the world continues to consume at the current rate or if all countries consumed as the U.S. there would not be enough Earth to meet our needs. Review how students could reduce their EF from the lists they made.

Extension: Brainstorm a class list of how to reduce their Ecological Footprint. Reduce the list by identifying feasible solutions, solutions with greatest impact and short-term solutions to determine 1-3 goals that students could achieve. Make a goal for the class goal to achieve. Students may also make personal goals.

Extension:

Students create a campaign for sustainability by focusing on reducing their Ecological Footprint. Students make giant footprints to post around the school as information posters on sustainability awareness and to foster stewardship.

Activity 5: Global Ecological Footprints

Students will also evaluate and investigate the Ecological Footprints of other nations by graphing and mapping data by going to the Ecological Footprint at: <http://www.ecologicalfootprint.org>

- a) Students individually or with a partner graph the positive and negative Ecological Footprints scores of the world's countries by making a bar graph with the numbers of countries at each gradient of plus and minus scores by 10s to 100. What patterns can be identified?
 - b) Students cluster countries into 5 groups to color code a world map to show the distribution of Ecological Footprints. Next, students go to the Footprint of Nations Report in the Appendices (pp. 11-16) to compare their results. What generalizations can be made about the various regions of the world and their Ecological Footprints? What nations within the regions are dissimilar from the other nations? Why might this occur?
 - c) Students answer and discuss questions about Global Ecological Footprints in small groups.
- Optional: You can also use the Global Footprint Network at: <http://www.footprintnetwork.org/>

Extension:

Select two countries by their Ecological Footprint (one from the top 10 and one from the bottom 10). Research the way the two countries consume their resources.

Extension:

The race for sustainability will be won or lost in cities, where urban activity influences over 70% of people's Ecological Footprint. Examine what cities are doing at: www.wed2005.org

Compare and contrast the efforts of these cities with the city you live in or near. What can your city do to become more sustainable? Use the ICLEI website (Local Governments for Sustainability with 400 local governments participating) at www.iclei.org

Additional Teacher Resources and Lessons on Ecological Footprints (EF) and Sustainability:

a) Lessons for teachers at Bobbie Bigfoot website at <http://www.kidsfootprint.org>

b) A valuable resource on Ecological Footprint is Redefining Progress at:

<http://www.rprogress.org/education/index.shtml>

c) Canada's Fisheries and Oceans "Stream to Sea" secondary lesson plans, "Ecological Footprint: How Does the Way We Live Affect Earth" at http://www.-heb.pac.dfo-mpo.gc.ca/community/education/lessonplans/ecofootprint/ecofootprint_e.htm

d) University of Sydney website at <http://www.isa.org.usyd.edu.au/research/ef.shtml> and <http://www.isa.org.usyd.edu.au/education/ISA-Footprint-Calculator.xls>

e) Australia's World Wildlife website at www.wwf.org/au

f) Learning for a Sustainable Future, K-12 Lessons on Sustainability at www.lsf-1st.ca/en/home and www.lsf-1st.ca/en/teachers/classroom_active.php

Activity 6: Demonstrating Ecological Footprint

The average U.S. citizen has an ecological footprint of 30 acres, which means you would have an area of 30 football fields to live. In contrast a person from India would have almost the area of one football field to live. In a lifetime the U.S. citizen would have the same ecological footprint as 250 people in Sub-Saharan Africa. Demonstrate this difference dramatically using popcorn kernels and a metal bowl. Measure 2 cups of popcorn kernels into a glass-measuring bowl. For the demonstration drop 10 kernels into the metal bowl to represent the ecological footprint of a person from Sub-Saharan Africa over his/her lifetime. Slowly pour the 2 cups of popcorn kernels into the metal bowl to represent the U.S. citizen's environmental impact in a lifetime. If everyone in the world lived like the U.S. citizen, we would need 4 more planets to support a population of 6 billion people. Discuss how might the U.S. reduce its ecological footprint?

Activity 7: Case Study of the Murray River

Give students a map of Australia and have them plot the route of the Murray River and its major tributaries to outline the Murray-Darling River Basin. Explain that regions of the world have a significant river that is necessary for the culture to thrive and their country to survive. Examples include the Mississippi, Rhine, Volga, Hwang, Yangtze, Ganges, Indus, Nile and Amazon Rivers among others. The Murray is Australia's most valuable river. Read the case study and answer: Why is this river so important to Australia? What changes have occurred? Students should star the rivers on the chart that are safe to drink in 1998. Place a second star if they will continue to be safe to drink. Examine the Murray River Comparisons chart. Compare the rivers and star the ones that are safe to drink. What information does ph provide about the safety of the rivers?

Extension: Investigate the Wentworth Group of Concerned Scientists www.wentworthgroup.org & www.org.au/about/wentworthgroup to identify the organization's principles for water use and sustainability. Identify the actions that the group has taken to promote sustainability in Australia.

Extension:

The Bunyip is a mythical creature of the Murray River living in billabongs, swamps and tributaries. The nocturnal creature has a variety of descriptions including size of a calf, shiny black hair, thick tail, large flippers, walrus tusks, elephant trunk, fierce eyes in an evil head, groans and bellows at night, is mean and crafty, and eats people, particularly women and children. The bunyip may have originally been a megafauna that existed when Aborigines first arrived in Australia, such as a diprotodon (like a giant sloth). Stories of the creature may have passed through centuries of Aboriginal history. Numerous Australian media (books, television programs, video games) include the bunyip and the word means “imposter” in Aussie slang. Investigate this mythical creature and make a “What does a bunyip look like?” story or poster.

Extension:

Diversion of the Great Lakes to meet the needs of different communities and regions in the U.S. has been a serious consideration for decades. Compare water use in the U.S. by reading “The Fate of the Great Lakes: Sustaining or Draining the Sweetwater Seas” at Great Lakes Directory: www.greatlakesdirctory.org/zarticles/102802_great_lakes2.htm and answering questions:

1. Should water resources be shared?
2. Would you support the laws and regulations preserving the Great Lakes basin?
3. Do you believe the marketplace can provide solutions to environmental and social problems?
4. Should environmental regulation be voluntary or regulated?

Activity 8:

The global marketplace may provide the solution for global warming. Read the article on “Preserving Clean Air – Trading for Clean Air”. Evaluate CCX’s potential success to achieve sustainability and as a model for other environment issues by answering the following questions:

1. Are trading credits an appropriate strategy to reduce emissions?
2. Based on the brief arguments, would you support CCX and its expansion into other areas?

Activity 9: Debating the Kyoto Protocol

The Kyoto Protocol is an international agreement to reduce global warming by limiting emission of greenhouse gases such as carbon dioxide. In February 2005 it went into effect with 141 nations ratifying the agreement. Students will debate the Kyoto Protocol because countries including the U.S. and Australia have not signed the document.

Students will be in small groups representing the U.S., Australia, the European Union or China. Other countries may be added. Students will research their country’s position and prepare an opening statement to defend their positions. Proposals to deal with emissions may also be presented. The moderator will address each group asking for clarification of their opinions by questioning them about the Kyoto Protocol, air pollution, and their countries’ efforts to reduce emissions. The class discussion will address the following questions:

- 1) Should developing nations be excluded from emissions standards of the Kyoto Protocol?
- 2) Can the marketplace reduce emissions without the need for government regulation?
- 3) Do all nations have to agree to reduce greenhouse gases for global sustainability to occur?

Adapted from Globalization101.org

Extension:

Consider Canada as another country who is a leader in global warming and supports the Kyoto Protocol. In addition, this country has 20 million people with the majority living on the coast or bordering the Great Lakes, which is similar to Australia. www.climatechange.gc.ca/

Lesson 10: What is the UN Doing about Sustainability? Is the World Supporting Sustainability? The United Nations is an international organization of 191 countries that develops programs to meet the needs of the world. Students read the document, “What is the United Nations Doing about Sustainability? Is the World Supporting Sustainability?” Next, discuss the following question as a class: The UN through its 191 member states has made environmental sustainability one of its goals. What evidence suggests that by 2014 the global environment will be more sustainable? What problems exist in achieving the goal? What can be done to support the UN’s efforts to promote global sustainability?

Essay: Explain why maintaining the planet’s environment is important to the quality of life of individuals. Explain why sustainability is important for a country to maintain its environment.

Activity 11: Problem Solving

The unique relationship of the United States and Australia has brought cooperation in military, political, and economic matters. This problem solving activity focuses on an imaginary environmental issue. Present the environmental issue to the class. Next, students will work in small groups to develop an impact matrix to determine possible solutions to nuclear waste disposal in Australia. Last, students will present their proposals to the class and, from the class discussion write a position paper on the issue.

Activity 12: Land Degradation

Students will use Harlan Cleveland’s quote, “think globally, act locally” to investigate sustainability. Students will work in small groups to investigate specific land degradation issues in their community. Students will select among several issues and determine the causes and effects of the current situation and propose solutions to develop a sustainable community.

Extension:

Students will compare countries’ official policy of sustainability by researching and comparing Australia, U.S. and Canada. Investigate the official policy by examining national government policies and practices. Australia at: www.nla.gov.au/oz/gov/ U.S. at: www.usa.gov/ Canada at: www.canada.gc.ca/

Extension:

Write a proposal for the county commission to address the issue you researched. Include data in the form of a chart or diagram to support the proposal.

Extension:

Planting trees is the most viable strategy to reduce wind and water erosion and to create a healthier environment. Explain how trees can reduce wind and water erosion and be helpful to

the environment. Evaluate the Holbrook Land Care program or a community land care program and determine the effectiveness of the program.

Activity 13: How Green is Your School?

Examine how sustainable your school is by surveying the school and investigating sustainable topics within your school. Begin the survey by having the class answer the questions:

- 1) Do you think our school is friendly to the environment?
- 2) What does our school do to help the environment?
- 3) What does our school do that hurts the environment?
- 4) What could our school do to support the environment?

Next, students will survey three peers and one adult about the school's sustainability. Compile the results as a class and discuss: What results surprised you? What suggestions may be helpful for our school to adopt?

Students will investigate sustainable topics by dividing into seven small groups, each with a different topic, using the chart for recording data. Students will examine the school and school district websites, interview appropriate school and school district staff, and interview city officials. Students will report to the class and discuss the results. They will summarize the results and write a report for the school administration. Students will develop and implement an action plan to enhance their school's sustainability and promote the school as a "green school".

Several Green Schools websites are available for further research including:

a) Eco`tude: Changing your School's Ecological Attitude:

<http://powerhousemuseum.com.au/ecotude/>

b) Green Schools: <http://www.greenschools.ca>

c) Northern Territory Department of Planning and Infrastructure

<http://www.ipe.nt.gov.au/whatwedo/ems/schools/index.html>

d) Sustainability Victoria

<http://www.sustainability.vic.gov.au/www/html/1861-waste-wise-schools.asp?intSiteID=4>

Extension:

Develop a campaign to help your school become a "Green School".

- Make a bumper sticker or poster that gives a slogan to raise awareness of sustainability
- Make a pamphlet, poster, or flyer that identifies ways students at your school could reduce their Ecological Footprint
- Make stickers for the school that say "turn off lights when not in use".
- Begin a recycling program in your school
- Examine historical photographs and maps of your school community and identify changes to the environment

Extension:

Students will take photographs of sustainable and non-sustainable practices in their home, school, or community. Use these photos as part of a sustainability campaign. The photos could also be placed on the school's webpage or the "hometown" webpage to encourage sustainability.

Extension:

Compare the activity of our school's policy of sustainability by researching and comparing Australia, U.S. and Canada. Examine what schools are doing in several countries. Look for examples of "green" schools, recycling program, and education curriculum.

Activity 14: 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 2-4 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 responses. Next, each group categorizes the responses in order to summarize them to the entire group. 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 reactions to the question or topic

Student will follow the carousel brainstorming activity above with the following questions:

- What does a larger "Ecological Footprint" mean for the environment?
- What could you do to reduce the size of your Ecological Footprint?
- Which daily choices do you make that have the greatest effect on the amount of resources you use?
- What is happening in some countries that causes them to have a larger Ecological Footprint?
- What is happening in some countries that causes them to have a smaller Ecological Footprint?
- How can we sustain a world if all countries consumed as many resources and produced as much waste as the U.S.?
- What could occur in our school to reduce its Ecological Footprint?

Natural Resources

Natural resources are gifts from nature that people use to make their life better or easier. Natural resources may be renewable or non-renewable. Examples of renewable resources that can be reproduced or restored include air and fish. A non-renewable resource is limited and cannot be reproduced or restored. An example of a non-renewable resource is iron ore.

Directions: List natural resources in the columns “Renewable Natural Resources” or “Non-Renewable Natural Resources”. Answer the questions below the chart using your information.

Renewable Natural Resources	Non-Renewable Natural Resources

Questions:

1. What is a natural resource? _____

2. What is the difference between a renewable resource and a non-renewable resource?

3. The basic types of natural resources are land, air, water, vegetation, wildlife and minerals. Are these types primarily renewable or non-renewable resources? _____

4. What natural resources are being used faster than the resource can be renewed or reproduced?

5. What natural resources are being contaminated so their use is limited if contamination continues? _____

Losing our natural resources either because they are non-renewable or people do not give them the opportunity to renew or restore themselves is a serious concern for people today and for future generations. It is important as a community to identify and maintain natural resources.

Go Fish!

Directions: Your group of four is a village and each person represents a family. In the center will be your supply of fish from the local lake. The number of fish in the center is the number in the lake, which will double or multiply after each “round” which represents a year. However, the lake has a carrying capacity of 15 so there will never be more than 15 fish in the lake. Your goal is to have a sustainable family and a sustainable community.

One person will begin and you will take turns fishing. Before you take the fish that you and your family need for a year, you will explain to the other families in the community how many fish you need and why you need them. Then, you will take that many fish.

Round	Family 1	Family 2	Family 3	Family 4	Village Total	Remaining Fish
Round #1						
Round #2						
Round #3						
Round #4						

Explain why it is important for a country’s economy to be based on sustainable development.

Ecological Footprint

The Ecological Footprint (EF) is a measure of the amount of nature it takes to sustain a given population over the course of a year. It reflects a population's sustainable use of its environment. The ecological footprint helps us consider if we are using resources faster than they can be restored. If we are sustainable, the resource amount and our use will balance. If a population's ecological footprint is greater than the environment's capacity, the population is said to be unsustainable for its environment. Go to 'Bobby Bigfoot' at <http://www.kidsfootprint.org> and follow directions to complete the chart

Ecological Footprint

Category	Acres
Food	
Mobility	
Shelter	
Goods/Services	

Total Footprint: _____

Number of Planets Needed? _____

Select "What can you do to reduce your Ecological Footprint?" and list one thing you might be able to do for each category to reduce your Ecological Footprint.

Category	My Action
Food	
Energy/electricity	
Transportation	
Creating Less Waste	
Water	
School:	
Community	

Global Ecological Footprints

Name the countries that have larger Ecological Footprints than the U.S.

How many countries have smaller Ecological Footprints than the U.S.?

What is the world average Ecological Footprint?

How many countries are below the average and do not negatively impact the earth?

What hypotheses can be made why those countries are below the global average?

What does a larger “Ecological Footprint” mean for the environment?

What are the advantages and disadvantages of using “Ecological Footprints” as a measuring tool of a population’s impact on the environment?

Advantages	Disadvantages

Can we sustain a world if all countries consumed as many resources and produced as much waste as the U.S.?

Should people in the U.S. change their lifestyle in order to assist other countries?

The Murray-Darling River Basin: A Case Study

The Murray-Darling Basin is the most important fresh water resource in Australia. It is the nation's breadbasket and covers 14% of Australia's land mass or 1/7 of the continent. It is a highway, a border, a lifeline, and an icon. The Murray 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 and the heartland of the country.

The Murray River starts as a mountain stream in the Snowy Mountains and meanders westward for 1500 miles through plains, forests, and deserts before reaching the sea near Adelaide. Only the Nile, Amazon, and Mississippi have more navigable waterways, but the Murray-Darling is the slowest moving with the least water. In fact, the Amazon carries more water in one day than the Murray-Darling does in a year. Today, 80% of the water from the Murray is removed--70% for irrigation and 10% for town and city water supplies--with only 20% reaching the sea. Two-thirds of the basin provides no water because the arid lands absorb the water.

Fast Facts	Fast Facts	Fast Facts
<ul style="list-style-type: none"> - Murray is 2500 km long & 300 meters wide at its widest point - Major tributaries are Darling & Murrumbidgee Rivers providing ¼ of Murray's flow 	<ul style="list-style-type: none"> - Half of agriculture profit comes from .5% of land that's irrigated - Irrigation has increased over 50% between 1983-1996 - Most irrigated crops are dairy, grain & pasture - Most profitable crops are grapes & vegetables 	<p>Hume & Howell discovered the Murray River in 1824 & Captain Charles Sturt, sent to explore the river, discovered it in 1830 and named it after Sir George Murray, Secretary of State for the Australian Colonies.</p>

Aboriginal Use:

Originally, the Murray River had 300 Aboriginal clans along it with 10 more along the Darling River. Aborigines managed water extensively so they had abundant food supplies including fish, crayfish, birds (ducks, emus, pelicans, swans) and animals (especially kangaroos). Aborigines built live fish traps to contain fish before they were eaten and created fish habitat with tree limbs for spawning and protection. Evidence suggests the Murray had a greater number and diversity of fish, amphibians, birds and plants than it does today. Europeans blasted fish traps and barriers to make rivers more navigable for boats and barges and built dams for irrigation and storage. The changes are evident in Lake Mungo, which is now dry but once was a 15,000 square acres, 30 feet deep freshwater lake surrounded by lush grasslands.

European Use:

The Murray River has changed as a result of settlement patterns. The Murray had large numbers of yellow perch, catfish, and cod that were caught by the Murray Fishing Company and other small companies in the 1800s. However, Europeans modified the landscape by planting willow trees to stabilize the riverbanks. Unfortunately, the deciduous trees lost their leaves at the end of summer, which increased nutrients in the river when water levels were low, which killed fish and encouraged algae growth. Also, trees and branches were removed from the river to make it easier to navigate eliminating spawning and protected areas and reducing the fish population. Today, seven of 15 fish species native to the Murray are endangered, including the Murray cod.

Transportation of some goods along the river caused pollution. Wool was the major product and the shearing season coincided with high water levels making transportation easier. Wood was the second most important product and usually redgum trees were cut. These hardwood trees resist water and would sink so they could not be floated down the river. Instead, mills were located along the river to cut planks for shipping, which increased water pollution. Minerals including lead and copper, the third major product, were shipped on barges.

River traffic declined with increased rail traffic, but locks and dams along the river remained. However, water flow was changed because water, held by dams during the rainy season when annual floods occurred and released during dry season, reversed the natural cycle and affected the reproduction of fish, birds, plants, and the quality of the water.

Agricultural settlements grew along the rivers and land was cleared for farming. Introduced plants with shallow roots replaced native trees with deep roots causing the ground water to rise and bringing salts to the surface. Also, extra water on the surface raised the water level and dissolved salts causing more salinization and killing plants. Problems of increased salinization, plant disease, and droughts challenged the farmers.

Large areas of farmland were purchased from the government and extensive irrigation channels were dug to produce irrigated crops of grapes, citrus fruits, cotton and rice. The government encouraged settlement by providing materials, money, and an agricultural expert. In the early 1900s the government drained wetlands along the lower Murray for additional farmland. They also provided land to returning World War I veterans. None of these attempts by the government to develop the interior by the government were successful. In fact, disputes between bordering cities and farms of New South Wales and Victoria over customs, laws, and money encouraged Confederation as a solution to their disputes.

The Snowy Mountains Scheme:

The Murray River Basin became managed with the drought of 1914-1915 because local areas built dams to provide their communities with water while, as a result, denying water to other communities downstream. The Hume Dam and Reservoir near Albury was completed in 1936 storing three times the capacity of the Sydney Harbor and increasing settlement and demand for even more dams. Water was viewed as a resource that needed to be used and not wasted by letting it flow into the ocean. Thus, an extensive dam-building scheme occurred to provide water.

The Snowy Mountains Scheme, built between 1949-1975, was designed to increase water supply to the dry inland (leeward) side of the mountains from the wet coastal (windward) side of the mountains. Engineers felt they could dam the Snowy River, drill tunnels through the mountains, and bring water to the Murray River on the west side of the mountains. They would also build power stations for electricity. The complex system of roads, tunnels, aqueducts, dams, power stations, and pumping facilities was built after World War II using immigrant workers. The completed system brings water to the Hume Reservoir contributing 5% of Murray's annual flow and 30% in drought years.

Contemporary

The Murray-Darling Basin provides valuable water and, as a result, has experienced significant changes. The Basin has extensive farmland that supports half Australia's farms. The Murray also provides drinking water to 2 million people. Competition for water from various groups and states has been intense. Moreover, the constant need for water has changed the environment. 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 habitats for fish, birds, and forests.

Increased salinization has occurred in semiarid regions because salts remain near the surface as rising groundwater brings salts to the surface. Salinization is increasing with three million tons of salt flowing down the Murray annually

Salinity Levels* in Murray River and Tributaries:

River Valley	1998	2020	2050
Murray River at Morgan	570	670	790
Murray River at Renmark	400	480	550
Murray River at Swan Hill	270	270	310
Murrumbidgee River	250	320	350
Avoca	970	980	1480
Loddon River	870	880	900
Goulburn-Broken	130	180	260
Lachlan River	530	780	1150
Macquarie River	620	1290	1730
Namoi	680	1050	1280
Condamine-Balonne	210	1040	1040

*Salinity is measured in EC units or electrical conductivity units. A salinity level of 800 is the upper limit for drinking water and 1500 is the threshold for irrigation and environment use.

Source: The Salinity Audit of the Murray-Darling Basin, 1999 as reported in Sustainability

During droughts and dry seasons, the Murray becomes a series of small ponds. The water is cloudy causing algae growth; sand and silt build up; fish cannot spawn; calm waters of reservoirs provide habitat for introduced fish species rather than for native species that prefer flowing rivers; wetlands are not sustained; erosion increased. Several conclusions about the conditions of the Murray River Basin can be made including:

- Reduced invertebrate populations
- Loss of redgum trees on floodplain
- Threatened fish species (Murray Cod)
- Decline of native fish species with commensurate increase in carp
- Increased algae
- Increased water pollution
- Mouth of Murray River closed with silt

The increased irrigation of marginal lands, increased use of fertilizer, increased salinity, and loss of biodiversity are serious concerns. However, the Murray River is now being better sustained:

- Some communities are treating sewage and watering crops with recycled water
- Planting the riverbanks with native trees
- Re-establishing wetlands

In addition to the decline of water quality and the health of rivers, there is demand for more water. Not only do agriculture and industry require water, but increasing populations in urban areas demand more water. The Wentworth Group of Concerned Scientists was recently formed to oppose massive engineering projects that contain water during drought years and to offer alternatives because of the greater number and intensity of drought conditions.

Water use has been reduced because of public education, dual-flush toilets, user-pay pricing, and an increase in apartment living. Water use may be further reduced by using recycled water to flush toilets and to water gardens—the two primary uses of water in residential areas—and improving the efficiency of water use such as using water catchment tanks to gather and store rainwater runoff from homes and other buildings.

Water is a community issue and must extend beyond the local community to consider the health of the entire water basin.

Adapted from The Mighty Murray written and illustrated by John Nicholson, 2005, Allen & Unwin, Crows Nest, New South Wales. Teaching Notes available at www.allenandunwin.com

Murray River Comparisons

Water Bodies	Relative Locations	Absolute Locations	Ph Levels
Murray	Albury, Australia at Hume Park	36, 0 S 147, 0 E	5.8
Yarra	Melbourne, Australia at Eel Trap Indigenous Sculpture	37, 52 S 145, 08 E	7*
Southern Ocean	Warrnambool, Australia at Pickering Point	38, 20 S 142, 28 E	7*
Pacific Ocean	Great Barrier Reef, Australia at Michaelmas Cay	17, 02 S 145, 49 E	7*
Mississippi	Minnesota, U.S. at Winnibigoshish Dam	47, 30 N 93, 45 W	7*
Mississippi	Minnesota, U.S. at Minnehaha Creek	44, 58 N 93, 15 W	7*

***All the numbers were greater than level 7 ph**

Preserving Clean Air – Trading for Clean Air

<p>Economist Richard Sandor, trained at the University of Minnesota, found the solution to reducing global warming in the marketplace. Sandor established and is the CEO of the Chicago Climate Exchange (CCX) that allows companies to purchase pollution credits from other companies in order to reduce sulfur dioxide emissions. He is credited with reducing U.S. emissions by half and reducing the effect of acid rain in the U.S.</p> <p>In 1990 the U.S. Congress passed the Clean Air Act that restricts emissions and allows companies to purchase credits from other companies so emissions standards can be met. Both companies would meet their allowances while one company also earned a profit. Thus, the industry has reduced its emissions although individual companies may not have reduced their emissions.</p> <p>CCX has 200 members including utilities, companies (Dupont, Ford, IBM), population centers (cities of Boulder and Chicago, King County, Washington, state of New Mexico), educational institutions (University of Minnesota) and organizations in other countries (Brazil and China).</p>	<p>By the end of 2006 CCX members must achieve a 4% reduction in emissions (from a 1998-2001 baseline average) or buy credits from other members and, by 2010, it must reach a 6% reduction.</p> <p>Companies and organizations are interested in participating in this exchange for a variety of reasons including insurance discounts, lawsuit protection, establish reputations as ‘green’ organizations, and anticipate future emissions standards.</p> <p>Sandor believes that the marketplace can provide solutions to both environmental and social problems. Other assets may be preserved besides clean air, such as clean water, health care, and endangered species as they become valuable commodities that can be traded.</p> <p>Supporters appreciate the efforts of CCX to reduce pollution and encourage voluntary self-regulation by companies and organizations. Opponents feel that the modest goals of CCX interfere with national efforts to significantly reduce pollution. Also, because CCX is private, maintains anonymity about trades, and its accounting information is not public, opponents are skeptical of the company and its innovative solution to environmental issues.</p>
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Adapted from "Hot Commodity" by Jack El-Hai in Minnesota, September-October 2006; pages 27-29; University of Minnesota Alumni Association; Minneapolis

Debating the Kyoto Protocol

Directions: Each group of students will represent a country or groups of countries named below. Use the statements and websites as a beginning point to investigate your country's position on the Kyoto Protocol and the issue of global warming. Be prepared to debate the issue by presenting an opening statement and supporting reasons for your country's position. You may also provide a proposal for reducing greenhouse gas emissions. General information on the Kyoto Protocol is at: www.environment.about.com/od/KyotoProtocol/i/KyotoProtocol_2.htm Also investigate the Asia-Pacific Partnership on Clean Development and Climate at: www.whitehouse.gov/news/releases/2006/01/20060111-8

The U.S. opposes the Kyoto Protocol because:

- It does not include major polluters such as China and India, which are developing nations
- It would greatly restrict economic development in the U.S. including jobs, market growth, and corporate share of the global economy
- Further scientific research is necessary
- U.S. is a leader in developing and implementing new technologies to reduce emissions

www.state.gov/g/oes/rls/rm/6633.htm and

<http://www.ncseonline.org/NLE?CRSreports/BriefingBooks/Climate/ebgcc6.cfm>

Australia opposes the Kyoto Protocol because:

- It does not include major polluters such as China and India, which are developing nations
- It would greatly restrict economic development in Australia including jobs, market growth, and corporate share of the global economy
- Australia believes state governments, local communities, and environment organizations are providing solutions. Regulation is not needed; you should 'think globally, act locally'
- Along with U.S. it is developing and implementing new technologies to reduce emissions

<http://www.dfat.gov.au/environment/climate/ap6/> and www.dfat.gov.au/environment/climate

The European Union supports the Kyoto Protocol and is the architect of the document because:

- Regulation is necessary to immediately reduce emissions and make countries responsible
- The long-term sustainable future is more important than short-term economic gains
- Developed countries are responsible for being leaders in global environmental awareness

http://europa.eu/int.comm/environment/climnat/home_en.htm and

www.ec.europa.eu/environment/climat/docs.html

China is exempt from the Kyoto Protocol and its position on emissions includes:

- As a developing country it is necessary to place economic development before environment awareness just as the U.S. and Europe did in their early stages of economic development
- Supports global environmental efforts and has strategies in place to reduce emissions and develop alternative energy solutions through decentralized pollution and waste management laws and regulations
- Global reduction of emissions will balance their emissions in a global marketplace until they are able to reduce emissions domestically

<http://www.english.gov.cn/about/environment.htm> and www.cchina.gov.cn/english

What is the United Nations Doing about Sustainability? Is the World Supporting Sustainability?

“A turning point has been reached. For the first time it has been realized that we must enter into a new relationship with our planet—a kind of environmental compact whereby we, who get our life sustenance from our planet, will agree to work together to protect it.”

- Javier Perez de Cuellar, 1989, Former Secretary-General of the United Nations

The United Nations declared 2005-2014 the Decade for Education for Sustainable Development recognizing the need to not only involve the world's countries and leaders in sustainability, but to include the world's people through an active program of education. Sustainable Development involves three areas:

- Environment (Environmental Stewardship)
- Society (Equity among all People)
- Economy (Poverty Reduction).

The Earth Summit

The UN Conference on Environment and Development was held in Rio de Janeiro in 1992, which was also called the “Earth Summit” and led to a landmark conference on sustainability. The summit's emphasis was to find economic solutions to environmental problems so leaders from government, business and environment organizations would focus on problems of global warming, rainforest destruction, and biodiversity loss. The UN Commission on Sustainable Development (UNCSD) was established to monitor implementation of Conference agreements. The UNCSD assists governments, professionals, and local citizens to share information, technology, and education to promote global sustainability.

Agenda 21 is an action plan developed at the Earth Summit with over 100 programs to eliminate poverty and protect the environment. This agreement was one of the major documents from the Earth Summit. The Goals of Agenda 21 include:

- Recognize the link between environment and development issues
- Use energy more efficiently and develop renewable energy sources-wind and solar power
- Give farmers environmental education
- Plant new forests and replant damaged ones
- Eliminate poverty by helping the poor earn a living that doesn't damage the environment
- Prepare national plans for waste management
- Require that industry adopt safer and cleaner production methods
- Change wasteful consumption patterns

What has the United Nations done about sustainable development through its various organizations? According to a recent list, the UN through its multiple organizations has:

- Battled poverty and promoted sustainable development in over 170 countries

- Strengthened industrial development in the developing countries
- Helped focus economic policy on human need
- Helped remove trade barriers
- Helped expand exports and improve imports
- Promoted international trade and technology
- Linked community groups with aid projects
- Acted as an early warning system on the state of the Earth's atmosphere
- Led the international effort to preserve and protect the environment
- Combated drug abuse and trafficking through international conventions and helped farmers find alternative sources of income
- Enabled reductions in population growth, infant mortality and fertility rates
- Improved women's literacy in the developing world from 36% in 1970 to 55% in 1990
- Improved food production for the poorest people in over 100 countries
- Coordinated disaster relief and rehabilitation
- Improved agricultural techniques
- Limited deforestation and promoted sustainable forestry
- Monitored world fisheries

All 191 United Nations member states have pledged to meet the UN Millennium Development Goals by 2015. These goals include:

- Eradicate extreme poverty and hunger
- Achieve universal primary education
- Promote gender equality and empower women
- Reduce child mortality
- Improve maternal health
- Combat HIV/AIDS, malaria and other diseases
- Ensure environmental sustainability
- Develop a global partnership for development

From Intermediate School Kit on the United Nations, 1995; UN Publications: New York, NY

Problem Solving an Environmental Issue

The United States is the best ally of Australia, defending her militarily during World War II and supporting her economically for sixty years. The United States has a major environmental concern and feels that Australia may be able to help. The U.S. produces large quantities of nuclear waste from its power plants and has a desperate need to store the radioactive waste. The controversy of burying nuclear waste at Yucca Mountain in Nevada continues to grow, despite numerous safeguards. In addition, people throughout the U.S. do not want radioactive waste transported through their state via railways fearing radioactive contamination.

The United States government has approached the Australian government with the proposal of burying its radioactive nuclear waste in central Australia. The United States proposal suggests that Australia is an appropriate location because:

- No plate boundaries
- Arid conditions
- Small population
- Little industry, agriculture, mining

Australia benefits:

- Monetary remuneration
- Enhanced trade policies
- Goodwill with United States
- Global citizenship

The Australian government will probably agree to the proposal because of the benefits. However, the solution is unclear. Where should the nuclear waste be buried? How should it be transported? How should nuclear contamination be safe-guarded? These and other questions need to be addressed.

Directions: In your small group develop an impact matrix to determine a possible solution to the effects of nuclear waste disposal in Australia. Decide in a group what you think the Australian government should do. You will be presenting your small group proposal to the class.

Possible Solutions:

- 1.
- 2.
- 3.
- 4.

Impact Matrix

	Solution #1	Solution #2	Solution #3	Solution #4
Solution #1	X			
Solution #2		X		
Solution #3			X	
Solution #4				X

Land Degradation

While land can be irrigated, fertilized, drained and terraced, about 11% of the Earth is suitable for agriculture. Soil erosion is a major problem of land degradation with most erosion caused by wind and water. In arid areas, the wind can remove enough soil that would cover a football field in one hour. The soil would be blown and cover roads, buildings, and machinery. In steep areas, water can wash soil into streams and rivers causing unnavigable waterways, spoil drinking water, kill plant and animal life, and make flooding more likely. Each year about 25,000 tons of soil is washed away.

Land Degradation is a serious concern in Australia and throughout the world. Its causes include:

- Soil erosion by wind, water, ice
- Build-up of salts where land is irrigated in arid climates because water evaporates and leaves salts behind
- Urbanization as cities sprawl into the countryside
- Mining and machinery that digs up the land
- Compacted soils caused by machinery
- Chemical poisoning

The consequences of land degradation include:

- Deforestation
- Landslides
- Reduced fishing in shallow waters
- Increased silt deposits
- Reduces arable land through erosion
- Reduced navigability of waterways
- Increased flooding

Possible solutions include:

- Reforest and replant lands to control erosion
- Dams & levees to control flooding and reduce erosion
- Terrace slopes and hillsides
- Contour plowing and cultivation

It is estimated that the Earth loses 5-7 ha per year of soil through land degradation, which is also about the amount of arable land needed for the increasing population of the world.

You are on an adventure to “think globally and act locally”. Your group will select a topic to investigate and consider solutions for your community. Begin by selecting a topic, investigating why it’s a problem by examining its causes and effects, consider possible solutions, and then propose a solution that would apply to your community. Topics include specific land degradation issues including soil erosion, pesticides/herbicides, urban sprawl as well as community issues including waste disposal and clean water.

How Green is Our School?

Topic	Questions	Answers
Energy	What energy sources are used? Do the sources support sustainability? Are alternative energy sources feasible? Are students individually reducing energy use in the school?	
Water	Where does our water come from? How is water transported to our school? How is water purity maintained? Is water used to support sustainability?	
Food Production	Where does most of the food supply come from? How is food transported to our school? Are resources used to support sustainability? Is the food wrapped unnecessarily? Are food containers recycled?	
Waste Management	What waste services are provided? Where is the school's waste disposed? What methods are used to dispose of waste? Does waste management support sustainability?	
Pollution Reduction	What methods are used to reduce pollution? Are the methods effective? Do methods at our school reduce pollution and support sustainability?	
Public Transportation	What transportation services are available to come to school? Do most students use buses regularly? Do methods of transportation support sustainability? Do students minimize transportation costs by car pooling, walking, biking?	
Shelter	Is the school building sustainable? Is it heated and cooled properly? What are the plans for continued development and change in the school building? Does the school support sustainability?	

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Stewardship: Becoming a Global Citizen

Stewardship means taking care of your environment in order to make the world a better place. Students will be encouraged to make thoughtful decisions that will also be good for others and for the environment. Several activities will help students think about what it means to be a good steward.

Activity 1: BINGO

The class plays BINGO to reinforce sustainable principles and stewardship practices. Begin by handing out a BINGO card to each student. Explain to students that the purpose is to gather information from their classmates to complete it. Each student's name and their response should be printed in the appropriate matching square. However, a classmate's name can be used only once to complete the task. Give students time to complete the BINGO card. Debrief the activity by discussing responses in general and surprise responses in particular. Analyze the responses by identifying patterns and asking questions. Examples might include: How aware is this class of strategies to manage human impact on the environment? How aware is this class of global efforts to support stewardship practices?

Activity 2: Blowing Up Your World

This activity demonstrates the concept of carrying capacity and the use of resources as you discuss principles of stewardship. Select a student to put on safety glasses and to blow a balloon (or a balloon with the globe on it) to its ordinary full size and hold the end. Tell the class that the balloon represents the world as it is today. The Earth is resilient and will not "blow up", but our decisions will dramatically impact people and plant and animal species throughout the world making living as we do today difficult. We will see what the world may look like in the future based on our decisions today. Use a series of questions and a class tally to determine whether air will be blown into the balloon or some air let out based on the majority of students' responses to questions such as:

1. How many of you turn off the light when you leave your room?
2. How many of you came to school by bus, bike or walked?
3. How many of you recycle your beverage can or bottle?

Adapted from: "Blowing Up Your World" from Teaching Green: The Middle Years

Activity 3: Natural Resource Units

Now that students have completed their ecological footprint and determined it is probably too high, ask them to consider changes in their lifestyle. Students will consider their impact on the environment and strategies to reduce their impact by completing the two charts on Natural Resource Units. Debrief the activity.

Debriefing Questions:

1. Which activities were more popular? Which activities were less popular?
2. What trade-offs were made to stay within the 20 NRUs limit?
3. What is your reaction to a legal rationing system that would limit use of NRUs in Minnesota?

4. Explain whether you think you are becoming more environmentally aware and creating a more sustainable future by the choices you have made.
 5. What other activities would you add? Approximately what NRU value would you attach to each activity? Would this new list help you become more aware of your environmental use? Ask students to make a list that identifies strategies they could take to reduce their Ecological Footprint in order of greatest to least impact. Ask them to set goals to reduce their impact.
- Adapted from People and the Planet: Lessons for a Sustainable Future, Zero Population Growth

Activity 4: Scavenger Hunt

Hand out the Scavenger Hunt to each student. Explain to students that the purpose is to complete the chart using responses from their classmates. Place classmates' names in the column on the right; however, a classmate's name can be used only once. Debrief the activity. Discuss which statements were easier to answer and which were more difficult. What would be the results if these events continued into the future? Ask students to make their own list of 12 items that they would continue to do in the future. Let students make a goal of a week or two weeks to achieve their list. Discuss the stewardship actions of the students in two weeks.

Adapted from In the Global Classroom 1 by Graham Pike & David Selby

Activity 5: Agree/Disagree

Place 4 signs around the room that say: Strongly Agree, Agree, Disagree, and Strongly Disagree. Have students individually record their opinion to controversial environmental statements. Next, present each controversial environmental statement one at a time to the class and have students stand by the sign with which they agree. Discuss these statements in small groups or as a class. Let students select the environmental statement with which they feel strongly and write an opinion piece about their belief.

- Students should be penalized for throwing away their lunch food
- Jobs are more important than the environment
- Science and technology can develop solutions to meet the needs of a growing population and to protect the environment
- A law should be made that households must separate garbage from recyclables
- Habitats of endangered species should be preserved
- There should be greater promotion and more advertising for public transportation
- Students should take the bus, walk, or bike to school

Activity 6: Environment Scavenger Hunt

Students work individually or with a partner on this environment scavenger hunt in their classroom or school. An option is to complete the community version of the scavenger hunt. School Environment Scavenger Hunt Items:

- Find an article about the environment in a newspaper or on the Internet
- Find a sign in the school that encourages recycling
- Pick up paper off the floor
- Reuse a piece of paper
- Recycle an item

Community Environment Scavenger Hunt Items:

- Plant a tree
- Clean your neighborhood
- Take a shorter shower
- Use ph paper to test water in or near the school
- Find a picture of a habitat dissimilar from your own

Activity 7:

Plan a campaign for stewardship in your local community. As a class develop a button, bumper sticker, poster, or song to promote your goals. Distribute the items to local businesses and community organizations to foster stewardship.

Activity 8:

On paper draw your profile and your partner's profile. Draw quote bubbles to show what you think about the environment or what you think should be done about the environment. Use a flashlight and butcher paper to do make the profile. The dialogue boxes can be between the partners or attached to each person.

BINGO

Find someone who:

<p>Can name a country with an Ecological Footprint of 10 or less</p> <p>Name: _____</p> <p>Country: _____</p>	<p>Can name a country with an Ecological Footprint of 40 or more</p> <p>Name: _____</p> <p>Country: _____</p>	<p>Can name a country that is proactive in preserving the environment</p> <p>Name: _____</p> <p>Country: _____</p>	<p>Can name a country that reduced its CO2 emissions</p> <p>Name: _____</p> <p>Country: _____</p>
<p>Knows a strategy to reduce water use</p> <p>Name: _____</p> <p>Strategy: _____</p>	<p>Knows a strategy to reduce energy use</p> <p>Name: _____</p> <p>Strategy: _____</p>	<p>Knows a company that makes hybrid or electric cars</p> <p>Name: _____</p> <p>Company: _____</p>	<p>Knows what the UN is doing to promote sustainability</p> <p>Name: _____</p> <p>Program: _____</p>
<p>Knows a non-profit organization that promotes sustainable practices</p> <p>Name: _____</p> <p>Organization: _____</p>	<p>Knows one method to reduce use of paper</p> <p>Name: _____</p> <p>Method: _____</p>	<p>Knows how to reuse a paper bag</p> <p>Name: _____</p> <p>Method: _____</p>	<p>Knows one strategy the school could use to help the environment</p> <p>Name: _____</p> <p>Strategy: _____</p>
<p>Can give an example of land degradation</p> <p>Name: _____</p> <p>Example: _____</p>	<p>Can explain sustainability</p> <p>Name: _____</p> <p>Explanation: _____</p>	<p>Can explain what a country's ecological footprint means</p> <p>Name: _____</p> <p>Explanation: _____</p>	<p>Can name one thing that could be recycled</p> <p>Name: _____</p> <p>Item: _____</p>

Natural Resource Units

You completed your ecological footprint and determined it is too high. To consider changes in your lifestyle, you decide to perform the following exercise to reduce your environmental impact

Directions: You have 20 natural resource units (NRU) to “spend” during the next year. NRUs represent the impact of an activity on the environment. The items with higher NRUs have greater impact on the environment and require more energy, water, or other resources. The items with lower NRUs have lower impact on the environment and require less energy, water, or other resources. Determine which items you will utilize and, by elimination, the ones you will not use.

Activity	NRUs	NRUs Used
Watch your favorite movies using a VCR or DVD player	2	
Play video games using a console	2	
Use the computer	2	
Watch TV on your color television	3	
Have air conditioning in your bedroom	8	
Take a car to/from school	13	
Take a bus to/from school	6	
Walk, bike, or skate to/from school	0	
Use a hair blower or curling iron	1	
Open the refrigerator to see what’s inside	1	
Get food at a fast-food restaurant drive-through	1	
Take a shower more than once a day	1	

Some people think change to sustainability will occur as people transition from environmental abuse to environmental awareness. The “exchange of NRUs” is a strategy to reduce human impact on the environment. Which of the following activities will you do in the next year to gain natural resource units (NRUs)?

Activity	NRUs	NRUs Used
Recycle at your home	1	
Reuse paper	1	
Reduce waste	1	
Turn off lights when not in use	1	
Take 3 minute showers	2	
Turn off water when brushing your teeth	1	
Make one trip to several stores rather than multiple trips	1	
Walk or bike to a friend’s house instead of riding a car	2	
Open the windows rather than turn on air conditioning	3	
Use a hand-turn rather than an electric clock	3	
Recharge batteries	2	
Read a book, ride a bike, go to the park, visit with friends—instead of watching TV or playing on computer	3	

Scavenger Hunt

Find someone who:

Stewardship Practices	Name
Regularly turns off the lights when leaving a room	
Uses recycled paper	
Has given clothes to charity	
Can explain where the local sewage treatment plant is located	
Knows where the closest recycling bin is located to the classroom	
Turns off the faucet when brushing teeth	
Wears extra clothes rather than turning up the heat at home	
Uses reusable lunch bags	
Can tell you the day that recycling is picked up in the neighborhood	
Has disposed of something responsibly this week	
Has encouraged or informed someone about an environmental issue	
Recharges batteries rather than using new ones	

Natural Hazards

Natural Hazards occur annually causing death, injury and damage to property, people and the environment. Over the past 20 years four million lives have been lost with over a billion people uprooted from their homes. Since 1950 there have been at least 17 catastrophes that have each caused the deaths of 10,000 people or more.

Natural hazards occur everywhere in the world and, even though predicting natural hazards may not be possible, people can be prepared to minimize the effects. However, the global effect of natural hazards is great because there are more people in the world and many governments cannot afford to protect or prepare their people. Coordination among all people, organizations, governments, and the United Nations will be necessary.

Ten Hard Facts About Australia's Natural Hazards: www.AusSurvivalist.com

Bushfires: Southeast Australia includes areas, which are prone to the most severe and frequent wildfires in the world

Floods: The Great Floods of 1990 in southern Queensland, northern New South Wales and southeast Victoria covered a total area larger than Germany

Heatwaves: During the 20th century, heatwaves caused more deaths in Australia than any other natural hazard (except disease). The worst recorded heatwave killed over 400 people.

Severe Storms: On average, severe storms (including hail and tornadoes) occur more frequently and cause more insured damage per year than any other natural hazard in Australia

Drought: On average, approximately three out of every 10 years bring drought, which costs Australia more than any other natural hazard

Cyclones: Tropical cyclones cross the northern, northeastern and northwestern Australian coastline 16 times per year on average.

Earthquakes: On average an earthquake of 5.5 on the Richter scale occurs every 15 months in Australia

Tsunamis: Numerous small tsunamis (seismic sea waves) have been recorded along Australia's coastline and evidence suggests larger ones occurred before European settlement

Landslides: In Australia, landslides have been responsible for approximately five times as many deaths as earthquakes but have caused only 5% as much economic damage

Volcanoes: Although volcanoes in Australia are extinct, scientists believe further minor volcanic activity is possible from long-dormant ones in South Australia and Victoria.

Activity 1: Natural Hazards, Frequency and Severity

Students will begin an investigation of natural hazards by considering the potential impact they have by identifying the frequency and severity of different types of natural hazards.

Alternative: Students may complete the same task for the U.S. and/or for the entire world.

Activity 2: Natural Hazards

Students will work in small groups to investigate the history of one of Australia's natural hazards by completing a chart and answering questions. Each group will share their chart with the class. The class will discuss the following questions:

Discussion Questions:

1. What is a natural hazard and how is it different from a natural disaster?
2. Explain how natural hazards can occur as a result of human-environment interaction.
3. Explain why the impact of natural hazards in Australia has been minimal compared to other countries, such as China, India, and the U.S.
4. Which natural hazards have the greatest impact? Why does the impact of natural hazards vary?

Activity 3: Webquest

Students in small groups will investigate a natural disaster by collecting data, answering questions and presenting their information and conclusions. The ten-minutes group presentation must include a visual that uses data to answer the major questions.

Teacher Resources:

- a) Lessons online at National Museum of Australia, Canberra at www.schools@nma.gov.au
"Extremes: Survival in the Great Deserts of the Southern Hemisphere"
"Can We 'Drought-Proof Australia?'"
- b) Lesson also online at: <http://science.uniserve.edu.au/school/resource/natdish.html>
- c) Examine importance of wetlands to reduce intensity of hurricanes www.novasciencenow.org
- d) National Oceanic and Atmospheric Administration's Geostationary Satellite with satellite imagery of coastal areas and sea surface temperatures: www.goes.noaa.gov/
- d) National Weather Service's Climate Prediction Center explains role of climate systems and extreme weather conditions: www.cpc.ncep.noaa.gov/products/outreach/education.shtml
- e) Educational National Oceanic and Atmospheric Administration focuses on protecting and preserving coastal wetlands: www.nmfs.noaa.gov/habitat/habitatprotection/wetlands.htm
- f) Teaching Resources: www.science.uniserve.edu/au/school/resource/natdis.html
- g) Additional resources can be found at:
 - Emergency Management Australia
 - Hazard Net
 - Barrie McElroy
 - The Natural Disaster Reference Base
 - ReliDisaster Center
 - Hazards and Risks Virtual Library: Charles Sturt University

Principles for Managing Disaster Recovery:

1. Recognize and integrate the coping mechanisms of disaster survivors and local agencies
2. Avoid arbitrary relief assistance
3. Beware commercial exploitation
4. Avoid relief dependency
5. Decentralize decision-making when possible
6. Recognize disasters as political events
7. Recognize pre-disaster constraints

8. Balance reform and conservation
 9. Avoid rebuilding injustice
 10. Accountability—the key issue
 11. Relocation is the worst option
 12. Maximize the transition from relief to development
- From: At Risk by Piers Blaikie, et al

Activity 4: Natural Disaster Preparedness

Students will consider the items necessary to survive in case of a natural disaster. Imagine a sudden natural disaster has occurred in your community leaving no telephones, no water, no electricity, ruined buildings and roads, and people injured. Some help might reach you immediately, but you will need to endure for a few weeks because of the extensive damage. What things will you need to survive for two weeks? Make a list of all the equipment and necessary goods that you will need.

Design a family survival kit for your family in order to be prepared for the next disaster. Identify the items and explain why each item might be helpful. Also, identify the size of the kit and where it will be located. The United Nations survival kits include these items: soap, disinfectant, iron wire, kitchen utensils, rope, combined shovel/hatchet/saw, stove, 3 multipurpose knife tools, matches, 2 five-liter cans, water purification tablets, a petroleum lamp.

Alternative: Design a family survival kit for another family that does not speak your language

Extension:

Evaluate the disaster preparedness of your local community. Write a letter to city hall about your conclusions.

Extension:

Prepare a presentation about a natural disaster and the impact it had on a community. You may construct a model, develop a power point, or make a poster.

Activity 5: Global Natural Hazards

Natural hazards occur throughout the world. Students will investigate the question: Why are the effects of natural hazards greater in developing regions than in developed regions? Students will compare global maps of natural hazards to world population to answer the questions:

1. Do the natural hazards occur more frequently in particular areas?
2. How do poor people in poor countries deal with natural hazards?

“Global climate change has contributed to an increase in natural disasters over the last three decades of the 20th century. One billion or so people suffered from them, mainly in poorer countries (McGuire 2002). Developing countries are particularly susceptible to disasters such as mudslides, cyclones and flooding because rapid population growth has meant that people increasingly utilize high risk terrains such as steep hillsides, flood-plains and coastal zones for habitation and farming. Many developing countries are also in the tropics and these areas experience higher rates of natural disasters than temperate countries.” From Sustainability p. 155

Activity 6: Natural Hazards Game

Students will design and make a game about natural disasters in small groups using questions that they have written about natural disasters. Let students play the games and evaluate them when completed. This assessment may be evaluated using small group scores or an additional 20 points may be added to evaluate each person's questions and answers.

Activity 7: Invasive Species

Australia, an ancient, delicate, and unique environment has micro-environments that caused specific adaptations by plants and animals. Australia has more than one million species, many endemic or 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 challenged the survival of endemic species. Students will investigate one of the invasive species of Australia to determine the effect of species introduction in small groups as a case study.

Students will select one of the following invasive species: European rabbit, European carp, cane toads, fox or they may select another animal or category to investigate such as mammals, birds, amphibians, fish and invertebrates or plants. Each group will present their findings as a simulated talk show. One student will become the host and should prepare insightful questions. The other students will take different roles such as Government Leader, Farmer and Environmentalist. Students should be prepared to answer questions from the moderator and from the audience. Students will also raise public awareness through some type of media campaign or product such as a public service announcement, poster, or bumper sticker. Students will be able to identify the interaction of people with the environment and recognize that national issues must also be addressed through local action. Students will vote on the most effective presentation. Students will write a reflective paragraph regarding what they learned about invasive species and one way they will become involved in the issue.

Begin by introducing the topic of invasive species using the article "Invasive Species in Australia" located at www.deh.gov.au. Discuss: What is an invasive species? Why are invasive species harmful? What can we do about invasive species? Students will be placed in groups to complete their research about one type of invasive species and its relationship to the environment. Students present their talk show to the class and demonstrate the product. Students will be evaluated on their research, the talk show discussion, the public awareness product, and their reflective paragraph.

Alternative: Students will write a letter to the editor or a more extended opinion piece addressing invasive species.

Discuss reasons why people introduced plants and animals into the Australian environment:

- To make a new region like "home" (sparrows, starlings, blackbirds)
- Acclimatization societies (silkworms, elands, foxes)
- More attractive than native species (plants)
- 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 damaged wetlands)

An introduced species may meet some or all of the following criteria:

- Not found in the fossil record of the country
- Brought to the country or region by people

- Migrated to the region from another region
- Escaped from human control

Resources:

CSIRO “Managing Plant and Animal Pests” at:

<http://www.csiro.au/csiro/content/standard/pps8e,..html>

CSIRO “Cane Toads” at:

http://www.ento.csiro.au/research/projects/cane_toads/ctresearch.html

Australian Government, Department of the Environment and Heritage at:

<http://www.deh.gov.au/biodiversity/invasive/index.html>

“Fact Sheets on Individual Invasive Species”

<http://www.deh.gov.au/biodiversity/invasive/ferals/index.html>

“Feral animals in Australia”

<http://www.deh.gov.au/biodiversity/threatened/ktp/index.html>

“Key Threatening Processes”

<http://www.deh.gov.au/biodiversity/threatened/tap/index.html>

Australian Animals: <http://www.australianfaunacom/>

Taronga Zoo, Sydney: <http://www.zoo.nsw.gov.au/content/view.asp?id+1050>

Great Barrier Reef: <http://www.cultureandrecreation.gov.au/articles/greatbarrierreef/>

Australian Animals: <http://www.australianfaunacom/>

Rubric

	Excellent! (10)	Adequate (8)	Marginal (6)
Research	Group showed evidence of thorough research	Group research was adequate with some missing information	Research was not clearly evident with little effort to obtain information
Talk Show	Wow! An impressive presentation with a believable host asking challenging questions & guests made the issue come alive with their responses	Group discussed the issue, but the host asked questions the guests could not answer & they did not seem involved	Group was not prepared for presentation so some information was inaccurate or incomplete
Public Awareness Product	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 to act	Product was created but public awareness not raised significantly & not inspired to act
Reflection	Reflection clearly demonstrated information & understanding with a thoughtful proposal for action	Reflection clearly showed information & understanding	Reflections showed some information & understanding

Natural Hazards: Frequency & Severity

Directions: Natural hazards impact the environment and people of the world. Identify the potential impact of natural hazards by completing the chart below for Australia by circling the number that corresponds with the Frequency and Severity for each natural hazard

Natural Hazard	Frequency 1 is low; 5 is high	Severity 1 is low; 5 is high	Explanation: Why I Ranked Natural Hazards	Rank
Bushfires	1 2 3 4 5	1 2 3 4 5		
Cyclones/Hurricanes	1 2 3 4 5	1 2 3 4 5		
Droughts	1 2 3 4 5	1 2 3 4 5		
Earthquakes	1 2 3 4 5	1 2 3 4 5		
Floods	1 2 3 4 5	1 2 3 4 5		
Heatwaves	1 2 3 4 5	1 2 3 4 5		
Landslides	1 2 3 4 5	1 2 3 4 5		
Storms	1 2 3 4 5	1 2 3 4 5		
Tsunamis	1 2 3 4 5	1 2 3 4 5		
Volcanic Eruptions	1 2 3 4 5	1 2 3 4 5		

Rank the natural hazards from the worst to the not worst for Australia with 10 being the worst and one being the not worst.

Natural Hazards

Directions: In your small group you will investigate the history of one of Australia's natural disasters. Complete the chart and answer the questions. Be prepared to present the chart and the answers to the questions to the class

Natural Hazards	Location	Date & Time	Deaths	Injuries	Costs

Questions:

1. What is a natural hazard and how is it different from a natural disaster?
2. Explain how natural hazards can occur as a result of human-environment interaction.
3. Explain why the impact of natural hazards in Australia has been minimal compared to other countries, such as China, India, and the U.S.
4. Which natural hazards have the greatest impact? Why does the impact of natural hazards vary?

Natural Hazards Webquest

Directions: You will work in small groups to investigate a natural hazard. The natural hazard may be bushfires, cyclones, droughts, floods, heatwaves, landslides, or storms. The research will focus on answering several questions about the natural hazard in general and one specific occurrence. You will need to make a visual aid and present the natural hazard to the class in a ten-minutes presentation.

Questions:

1. What patterns are shown about when and where the natural hazard tends to occur?
2. What are the physical and human geographic causes of the natural hazard?
3. What are the economic, social, and environmental impacts of the natural hazard?
4. What are the responses of governments, organizations and communities to the natural hazard?
5. How can the natural hazard impact be reduced? What can governments, organizations, communities, and we do about the natural hazard?

Several valuable websites are listed to help you with your research, but you will also want to explore other sites as well in order to complete the data sheet.

Websites:

National Oceanic and Atmospheric Administration's Defense Meteorological Satellite Program with satellite photos of wind patterns: www.nodc.noaa.gov/dmsp/dmsp.html

National Museum of Australia: <http://www.schools.nma.gov.au>

Web-Based Environmental Resources: <http://www.environment.gov.au/>

Aussie Facts: <http://www.www.dfat.gov.au/facts/intro.html>

Australian Information: http://www.australianexplorer.com/australian_nature.htm

Australian Climate Averages: <http://www.bom.gov.au/climate/averages/>

Geoscience Australia: <http://www.ga.gov.au/education/facts/>

Government Environmental Education: <http://www.deh.gov.au/education/aries/index.html>

Complete the Data Sheet, which will help you to understand the answers to the questions.

Select one instance of the natural hazard and explain the answers to the same questions as listed above and recorded on the Data Sheet. In addition, explain the unique characteristics of the natural hazard, how the natural hazard was presented in the media, and what was the historical memory of the event?

Presentation:

The ten-minutes presentation must involve each group member and all questions must be answered with supporting data. Visual aids must be used which could be a model, poster, power point, photographic collage, diagrams, charts.

Data Sheet

In what regions does the natural hazard occur?	What season of the year and time of day does the natural hazard tend to occur?
--	--

Thus:

What patterns are shown about when and where the natural hazard tends to occur?

Causes	Natural	Human

Thus:

What are the physical and human geographic causes of the natural hazard?
--

Effects	Economic	Social	Environment

Thus:

<p>What are the economic, social, and environmental impacts of the natural hazard?</p>
--

Responses	Government	Organizations	Communities

Thus:

<p>What are the responses of governments, organizations and communities to the natural hazard?</p>
--

Reducing Impact	Governments	Organizations	Communities

Thus:

How can the natural hazard impact be reduced? What can governments, organizations, communities, and we do about the natural hazard?

Presentation Rubric:

The ten-minutes presentation must involve each group member and all questions must be answered with supporting data. Visual aids must be used which could be a model, poster, power point, photographic collage, diagrams, charts.

Topics	Possible Points	Points Earned	Comments
Explained each question in depth	50		
Used data to support each question	20		
Presented an instance of the natural hazard	20		
Provided appropriate and valuable visuals	20		
Presentation was well planned with evidence of rehearsal	10		
Thoroughly answered class questions	10		
Presentation was 10 minutes	10		
Effective communication skills with eye contact, posture, clear voice and all members presenting	10		
Total Points	150		

Natural Hazards Game

Natural hazards are found almost everywhere in the world. What natural hazards occur? What are their causes? What are their effects? What should people do about natural hazards? You will construct a game about natural hazards that include answers to these questions. You may construct any type of game that can be played by a small group of people. You will need to include clear directions for the game and all materials to play the game. Write several levels of questions, from easy to challenging, with each person writing 4 questions at each level. You will evaluate your game and two other groups will evaluate it, too, after they play it. Be creative!

Names: _____

Name of Game: _____

Type of Game: _____

Evaluation

Criteria	Self-Evaluation	Peer-Evaluation	Peer-Evaluation
Creative/Original Design (3 points) 1. Game choice was appropriate 2. Game board creative & appropriate 3. Questions & game pieces original & appropriate			
Ease of Play (2 points) 1. Directions are clear 2. Game is easy to play			
Levels of Questions (5 points) 1. Easy questions included 2. Average questions included 3. Challenging questions included 4. Answers provided & easy to identify 5. Questions are a good review of natural disasters			
Points Possible	/10	/10	/10

Final Assessment

Students will construct a large, poster-sized world map of sustainable principles and stewardship practices. Students will follow the contest rules of the Barbara Petchenik Children's World Map Competition at www.icaci.org/en/competition.html to make a world map that can be shared with other students, their school, and their community.

Suggested References

Suggested Websites:

National Museum of Australia: <http://www.schools.nma.gov.au>

Web-Based Environmental Resources: <http://www.environment.gov.au/>

Aussie Facts: <http://www.www.dfat.gov.au/facts/intro.html>

Australian Animals: <http://www.australianfaunacom/>

Australian Information: http://www.australianexplorer.com/australian_nature.htm

Australian Climate Averages: <http://www.bom.gov.au/climate/averages/>

Geoscience Australia: <http://www.ga.gov.au/education/facts/>

Taronga Zoo, Sydney: <http://www.zoo.nsw.gov.au/content/view.asp?id+1050>

Great Barrier Reef: <http://www.cultureandrecreation.gov.au/articles/greatbarrierreef/>

*Government Environmental Education: <http://www.deh.gov.au/education/aries/index.html>

ESRI of Australia: <http://www.esriaustralia.com.au/>

National Library of Australia: <http://www.nla.gov.au/>

*Department of Sustainability and Environment: <http://www.dse.vic.gov.au/dse/index.htm>

North American Association for Environmental Education: <http://www.naaee.org/npeee>

National Environmental Satellite, Data & Information Service: <http://www.nesdis.noaa.gov>

Environment: <http://www.environment.gov.au/>

Australian Association for Environmental Education: <http://www.aaceorg.au>

NASA Maps: <http://www.earthobservatory.nasa.gov>

ARM: <http://www.education.arm.gov>

Risk Frontiers: <http://www.riskfrontiers.com>

Oxfam Canada: <http://www.oxnet.org/index.php/Educators>

ActewAGL: <http://www.actewagl.com.au/education/edfault.aspx>

Charles Sturt University: <http://www.csu.edu.au/australia/nation.html>

CSIRO: <http://www.csiro.au/>

CERES: <http://ceres.org/au>

ENSO: <http://enso.unl.edu/ndmc/enigma/def2.htm>

World Wildlife Fund: <http://www.wwf.org/au>

Australian Maps: <http://www.earthsystems.com.au/map/>

El Nino Cycle: <http://www.abc.net.au/science/slab/elnino/story.htm>

Australia Survivalist: <http://www.AusSurvivalist.com/naturalhazards.htm>

Australian Bureau of Statistics: <http://www.abs.gov.au/>

The Disaster Center: <http://www.disastercenter.com/>

Population Reference Bureau: <http://www.prf.org>

Teacher Curriculum Resources:

*Education for Sustainable Development Toolkit: <http://www.esdtoolkit.org>

Minnesota Seek: <http://mnseek.net>

Minnesota Next Step Toward a Sustainable Future: <http://www.nextstep.state.mn.us>

“Big Foot”, Center for Global Environmental Education: <http://www.cge.hamline.org>

*Green Teacher: <http://www.greenteacher.com>

Australian Teacher Resource Materials: <http://www.jaconline.com.au>

Jared Diamond’s interviews on Australia’s unique landscape and history at:
www.abc.net.au/scinece/features/societies/default.htm

*GeoActive 1 and 2 by John Paine and Susan Bliss (2005); Jacaranda/John Wiley & Sons:
Milton, Queensland

*Australia: Environments & Communities by Colin Sale & Graeme Wilson (2000); Longman: Sydney

People and the Planet: Lessons for a Sustainable Future (1996); Zero Population Growth: Washington, DC

Earth Matters: Studies for Our Global Future (1991); Zero Population Growth; Washington, DC

Global Issues & Sustainable Solutions: Population, Poverty, Consumption, Conflict, and the Environment (2004); Facing the Future: Seattle, Washington (www.facingthefuture.org)

Facing the Future: People and the Planet Curriculum Guide (2002); Facing the Future: Seattle, Washington

In the Global Classroom 1 and 2 by Graham Pike and David Selby (1999); Pippin Publishing: Toronto, Canada

Primary, Intermediate, Secondary School Kit on the United Nations (1995); UN Publications: New York

Suggested Books:

*In Search of Sustainability Edited by Jenny Goldie, Bob Douglas, Bryan Furnass (2005); CSIRO Publishing: Collingwood VIC

*Treading Lightly by Karl-Erik Sveiby and Tex Skuthorpe (2006); Allen & Unwin: Crows Nest, New South Wales

*In a Sunburned Country by Bill Bryson (2000); Random House: New York

Blue Latitudes: Boldly Going Where Captain Cook Has Gone Before by Tony Horwitz (2002); Henry Holt and Company: New York

Amazing Facts about Australian Landforms by Allan Fox; Steve Parish Publishing: Archerfield BC, Queensland

The Mighty Murray written and illustrated by John Nicholson (2005); Allen and Unwin: Crows Nest, New South Wales

*Papunya School Book of Country and History (2001) Papunya School; Allen and Unwin: Crows Nest, New South Wales

*Guns, Germs, and Steel: The Fates of Human Societies by Jared Diamond (1999) WW Norton: New York

*Collapse: How Societies Choose to Fail or Succeed by Jared Diamond (2005); Penguin Books: London

Suggested Media:

Bullfrog Films: <http://www.bullfrogfilms.com>

Videos available at National Film and Sound Archive at: <http://www.screensound.gov.au>

Film Board of Australia at <http://www.fba.org>

“Rabbit Proof Fence”

“Ten Canoes”

“Kakadu Man”

“The Castle”

“The Man From Snowy River”

“Walkabout”

“The Trapper”

“Crocodile Hunter”

“Crocodile Dundee”

*Discovery Channel’s “Australia Revealed” from Atlas Series, 2006

***Highly Recommended References**

Additional Natural Hazards Websites:

Bushfires:

Bushfire Factsheets: www.nccnsw.org.au/bushfire/projects/masterindex.html

Bushfire Safety: www.castlemaine.net.au/~jwebster/

Droughts and Heatwaves:

Living with Drought: www.bom.gov.au/climate/drought/livedrought.shtml

National Drought Mitigation Center: www.drought.unl.edu/index.htm

Cyclones and Storms:

Australian Weather and Storm Chasing: www.ozthunder.com/

Cyclone Tracy: www.ntlib.nt.gov.au/tracy/basic/Cyc_Tracy.html

Floods and Landslides:

Flash Floods: www.weathereye.kgan.com/cadet/flood/about.html

Famous Floods: www.pbs.org/wgbh/nova/flood/textindex.html