# ENVIRONMENTAL CHANGE AND MANAGEMENT

Stage 5: Geography
GE5-2, GE5-3, GE5-4, GE5-5 , GE5-7, GE5-8

Students will develop an understanding of the causes and consequences of human-induced environmental change that challenges sustainability in Australia and Sumatra. They will explore worldviews influencing approaches to environmental use and management. Students will compare and evaluate the management responses in both countries, propose ways individuals can contribute to environmental sustainability and recognise that there are differing views on how sustainability can be achieved.

## OUTLINE

### AT SCHOOL

Begin your investigation of Australian and Sumatran environments; examine their unique features and causes of environmental change.

### AT THE ZOO

Investigate the unique flora and fauna of the Asian Rainforest Trail. Immerse yourself in the new Tiger Trek exhibit and experience first hand the Asian animal habitats . Explore the actions that you can take to help protect local and Asian species.

### ZOO WORKSHOP

Develop a deeper understanding for animals through engaging with them and learning about their reliance on rainforest environments. Discover how our need for natural resources is impacting their future survival. Discuss the major consequences of environmental change in Australia and Sumatra and the complexities of achieving sustainable land use.

### BACK AT SCHOOL

Investigate the diversity of perspectives surrounding the management of global forest habitats. Empower students to make informed decisions about the use of palm oil. Challenge your students to educate their community about the use of certified sustainable palm oil products.

TARONGA ZOO
For the Wild

# AT SCHOOL

How do environments function?

## KEY INQUIRY QUESTIONS

- How do environments function?
- How do people's worldviews affect their attitudes to and use of environments?
- What are the causes and consequences of change in environments and how can this change be managed?
- Why is an understanding of environmental processes and interconnections essential for sustainable management of environments?

# THE LUNGS OF THE EARTH

**Identify** the ecosystem functions that rainforests provide in nature (label the image below).


**Categorise** the identified functions into the table below.

| **Provisional** (benefit to people that can be extracted from nature) | **Regulating** (benefits provided by ecosystem processes that moderate natural phenomena) | **Cultural** (benefit that contributes to the development and cultural advancement of people) | **Supporting** (underlying natural processes, such as photosynthesis) |
|---|---|---|---|
| | | | |

**Highlight** – the function that would be lost if the rainforest is cleared.

**Mark** - the distribution of rainforest on a blank map of Australia and Sumatra

**Construct** – one basic food web that exists either in the Australian or Sumatra rainforest

**Analyse** how does deforestation affect biodiversity?

**Conclude** how deforestation is impacts global warming

**Build** – your own rainforest using this scaffold

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# AT SCHOOL

What are the causes and likely consequences of the environment change being investigated?

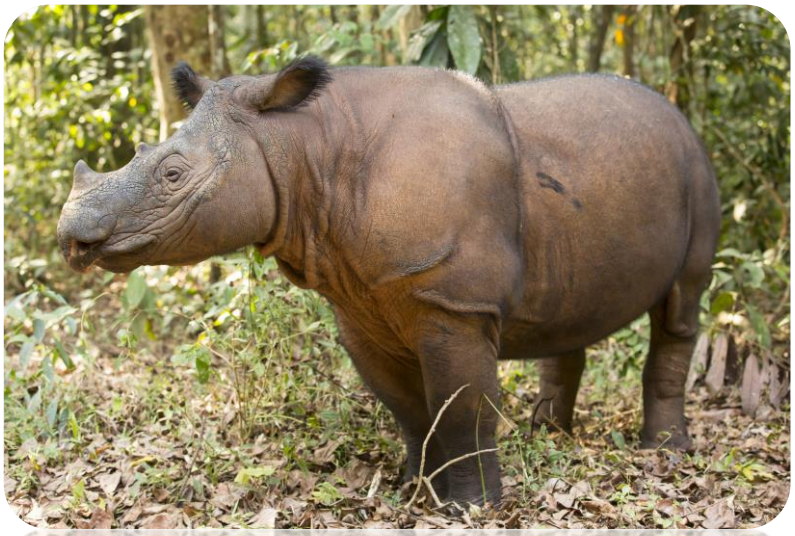
# CHANGE, CHANGE, EVERYWHERE

## FOREST LOST IN AUSTRALIA AND SUMATRA

Observe global forest loss over from 2000-2015

Analyse the data showing tree cover from 2000-2015 in Indonesia (http://www.globalforestwatch.org/country/IDN) and Australia (http://www.globalforestwatch.org/country/AUS) answer the following questions:

- Describe the trend in forest loss in both countries over the past 15 years
- Determine the cause of the change in both countries
- Calculate the average loss per year in both countries
- Compare the types of forest (primary, naturally regenerated and planted) in the two countries
- Does the forestry sector in Australian or Indonesia contribute more to the GDP?



## THE LORAX

"A thing of beauty is a joy forever," and to lose it would be a shame.

Read or View "The Lorax" (film or book). Discuss environmental/sustainability concepts evident in the film/book. Outline the different perspectives the characters hold towards the environment and how they change throughout the story.

## PALM OIL INVESTIGATION QUESTIONS

•Why is Palm oil such a popular crop?
•Who benefits from the way that palm oil is grown and sold around the world?
•Who is impacted by the way palm oil is grown and sold?
•How do Australian consumers impact Indonesian rainforests?
•What animals are directly impacted by Indonesian rainforest destruction?
•What actions are being taken to address rainforest destruction and it's consequences?

TARONGA ZOO
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# AT THE ZOO

Get up close to native Australian animals during the Zoo workshop and compare these to Asian species seen on the self-guided tour of the Rainforest Trail and Tiger Trek.

## EXPLORE

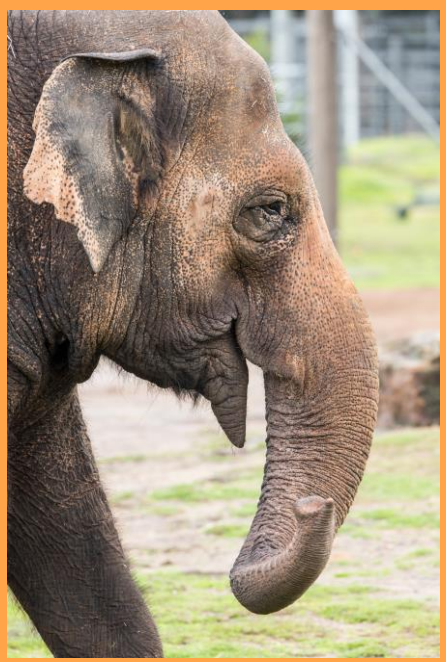
### SUGGESTED ANIMAL EXHIBITS

Find and compare one Australian animal with one Sumatran animal.

For each animal, document:
•How they influence the biophysical processes in the wild (e.g. seed dispersal)
•How current management practices influence the species (e.g. impact on population numbers).

Suggested Australian animals:
•Cassowary
•Tree Kangaroo.

Suggested Sumatran animals:
•Asian Elephant
•Sun Bear
•Sumatran Tiger.



## CONNECT

### ZOO WORKSHOP (WITH A TARONGA EDUCATOR)

•Meet native Australian animals and discuss the importance of Australian and Sumatran rainforests to both animals and people.

•Identify different strategies that are used to manage environmental change in both countries.

•Recognise that there are differing views on how sustainability can be achieved.

## DISCOVER

### TIGER TREK -SUMATRAN TIGERS (SELF GUIDED)

•Journey to Sumatra by small cargo plane and see the extent of deforestation from the plane window.

•Land in the small village of Way Kambas and see how rangers track tigers in the Way Kambas National Park.

•Finish your journey with a trip to the supermarket and learn about how your choices can save tigers.

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# BACK AT SCHOOL

Environmental, economic and social criteria can be used in evaluating management responses.

## INGREDIENTS LIST

Explore Which Everyday Products Contain Palm Oil

Many products that use palm oil aren't clearly labelled. Palm oil and its derivatives can appear under many names, including:
*Vegetable Oil, Vegetable Fat, Palm Kernel, Palm Kernel Oil, Palm Fruit Oil, Palmate, Palmitate, Palmolein, Glyceryl, Stearate, Stearic Acid, Elaeis Guineensis, Palmitic Acid, Palm Stearine, Palmitoyl Oxostearamide, Palmitoyl Tetrapeptide-3, Sodium Laureth Sulfate, Sodium Lauryl Sulfate, Sodium Kernelate, Sodium Palm Kernelate, Sodium Lauryl Lactylate/Sulphate, Hyrated Palm Glycerides, Etyl Palmitate, Octyl Palmitate, Palmityl Alcohol*

## SO WHAT IS RSPO CERTIFIED SUSTAINABLE PALM OIL?

RSPO palm oil is grown and certified against eight RSPO principles and criteria. These stringent sustainability criteria relate to social, environmental and economic good practice.

Look up the eight RSPO principles and criteria on the Green Palm website and create a community awareness campaign about Certified Sustainable Palm Oil.

## CONSCIOUS CONSUMERS START AT SCHOOL

Use the Palm Oil Buyers Scorecard and your own research identify products in your school canteen containing RSPO palm oil. For the products that contain non-sustainable palm oil, recommend replacement products that contain sustainable palm oil.

## DIFFERENT PERSPECTIVES INFLUENCING ENVIRONMENTAL MANAGEMENT

Different groups of people use the land for different purposes and often have differing views regarding land management and practices.

**Activity** - divide your class into groups. Allocate a different stakeholder to each group from the list below. Have students debate the issues from the perspective of their assigned stakeholder.

### Scenario One: Deforestation in Sumatra

There is a proposal to clear a section of old growth rainforest and replaced it with a palm oil plantation. People with different perspectives may include:
- Farmers
- Local residents
- Indigenous community members
- Palm oil companies
- Environment advocates
- Tourists
- Tourism operators
- Government.

### Scenario Two: Deforestation in Australia

There is a proposal to clear a section of old growth rainforest in the Daintree to build a 5 star resort.
People with different perspectives may include:
- Local residents
- Indigenous community members
- Local eco resort owner
- Business owner of the proposed resort
- Environment advocates
- Tourists
- Government.

Areas to be addressed by each group include:
- how they use the native land
- their feelings about the native forest
- what changes they have observed in Sumatra/Australia
- what have been the responses to this environmental change so far, and at a variety of scales, including worldviews
- the impact they will have on the environment
- the impact they will have on the local community
- what strategies they suggest for future sustainable interactions between the people and the rainforest.

CERTIFIED SUSTAINABLE PALM OIL™ RSPO

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# RESOURCES

## Australia

• Australian Land Use
http://www.agriculture.gov.au/abares/aclump/PublishingImages/Land-use-Aus2005-06-lrg.jpg

• Australian Climate Zones
http://www.bom.gov.au/iwk/climate_zones/images/map_01.gif.

## Sumatra

• Sumatra and Borneo - overview and threats
http://www.worldwildlife.org/places/borneo-and-sumatra

## Rainforests

• Build a Rainforest
http://www.environment.nsw.gov.au/resources/education/BuildARainforestA4.pdf

•Tropical Rainforests
http://kids.mongabay.com/

## Forest Loss

• Eyes on the forest
http://maps.eyesontheforest.or.id

•Global Forest loss
http://www.globalforestwatch.org/map/3/15.00/27.00/ALL/grayscale/loss,forestgain?tab=analysis-tab&begin=2001-01-01&end=2016-01-01&threshold=30&dont_analyze=true

•Global Forest Change
https://earthenginepartners.appspot.com/science-2013-global-forest

• Global Satellite Imaging of Deforestation
https://earthenginepartners.appspot.com/science-2013-global-forest

•Human activities are reshaping Earth's surface
http://storymaps.esri.com/stories/LandsatCompare/

•Deforestation in the Amazon rainforest
https://www.geospatialworld.net/esa-shows-30-years-deforestation-amazon-rainforest/

## Palm Oil

•From rainforest to your cupboard: the real story of palm oil - interactive
https://www.theguardian.com/sustainable-business/ng-interactive/2014/nov/10/palm-oil-rainforest-cupboard-interactive

•Deforestation on Sumatra Island Gallery
https://www.theguardian.com/environment/gallery/2009/oct/06/deforestation-sumatra-redd

•Good bad Palm Oil
http://goodbadpalmoil.org/

•Which Everyday Products Contain Palm Oil
https://www.worldwildlife.org/pages/which-everyday-products-contain-palm-oil

•Green Palm
http://greenpalm.org/about-palm-oil/sustainable-palm-oil

•Palm Oil Buyers Scorecard 2016
http://palmoilscorecard.panda.org/check-the-scores/filter/country/australia

# CURRICULUM LINKS

## Stage 5: Geography - Environmental Change and Management

OUTCOMES

A student:

- GE5-2 explains processes and influences that form and transform places and environments
- GE5-3 analyses the effect of interactions and connections between people, places and environments
- GE5-4 accounts for perspectives of people and organisations on a range of geographical issues
- GE5-5 assesses management strategies for places and environments for their sustainability
- GE5-7 acquires and processes geographical information by selecting and using appropriate and relevant geographical tools for inquiry
- GE5-8 communicates geographical information to a range of audiences using a variety of strategies

**Investigative study**

Select ONE type of environment in Australia as the context for a comparative study with at least ONE other country.

Students:

- investigate the biophysical processes essential to the functioning of the selected environment:
  - explanation of how the biophysical processes operating in the environment maintain its functioning.
- investigate the causes, extent and consequences of the environmental change:
  - examination of the causes and extent of change to the environment in each country
  - analysis of the short and long-term consequences of the environmental change in each country.
- investigate the management of the environmental change, for example:
  - discussion of the factors influencing the management responses in each country e.g. worldviews, competing demands, technology, climate change
  - comparison and evaluation of the effectiveness of the management responses in achieving environmental sustainability
  - proposal of how individuals could contribute to achieving environmental sustainability for the environment in each country.

| Geographical concepts | Geographical skills | Geographical tools |
|---|---|---|
| The following **geographical concepts** have been integrated into the lesson sequence:<br>**Place:** the significance of places and what they are like<br>**Space:** the significance of location and spatial distribution, and ways people organise and manage spaces that we live in<br>**Environment:** the significance of the environment in human life, and the important interrelationships between humans and the environment<br>**Interconnection:** no object of geographical study can be viewed in isolation<br>**Scale:** the way that geographical phenomena and problems can be examined at different spatial levels<br>**Sustainability:** the capacity of the environment to continue to support our lives and the lives of other living creatures into the future<br>**Change:** explaining geographical phenomena by investigating how they have developed over time | The following **geographical skills** have been integrated into the lesson sequence:<br>**Acquiring geographical information**<br>• identify an issue or problem<br>• develop geographical questions to investigate the issue or problem<br>• collect primary geographical data<br>• gather geographical information from secondary sources<br>• record information<br><br>**Processing geographical information**<br>• evaluate data and information for reliability and bias<br>• represent data and information in appropriate forms<br>• interpret data and information gathered<br>• analyse findings and results<br>• draw conclusions<br><br>**Communicating geographical information**<br>• communicate the results using a variety of strategies appropriate to the subject matter, purpose and audience<br>• reflect on the findings of the investigation; what has been learned; the process and effectiveness of the inquiry<br>• propose actions and predict outcomes<br>• where appropriate, take action. | The following **geographical tools** have been integrated into the lesson sequence:<br>**Maps – M**<br>Examples include, but are not limited to, pictorial maps, large-scale and small-scale maps, relief maps, choropleth maps, flowline maps, cadastral maps, isoline maps, land use maps, physical maps, political maps, précis maps, road maps, thematic maps, topographic maps and special-purpose maps. Maps are used to locate, visualise, represent, display and record spatial data.<br><br>**Fieldwork – F**<br>Fieldwork involves observing, measuring, collecting and recording information outside the classroom.<br><br>**Graphs and statistics – GS**<br>Graphs, also called charts, include, but are not limited to, tally charts, pictographs, column graphs, line graphs, pie graphs, weather charts, climate graphs and population profiles. Statistics - will begin with basic data tables and progress to complex representations of statistics on common themes. Graphs and statistics are used to collate, organise, illustrate, summarise and compare patterns, relationships and trends.<br><br>**Spatial technologies – ST**<br>Spatial technologies include any software or hardware that interacts with real world locations. Examples include, but are not limited to, virtual maps, satellite images, global positioning systems (GPS), geographic information systems (GIS), remote sensing and augmented reality. Spatial technologies are used to visualise, manipulate, analyse, display and record spatial data.<br><br>**Visual representations – VR**<br>Examples include, but are not limited to, diagrams, images, photographs, paintings, illustrations, symbols, models, posters, collages, cartoons, multimedia, infographics and mind maps. Visual representations are used to display, visualise, analyse and communicate geographical data and information. |