biodiversity for a sustainable future P–10 overview

Big Understandings

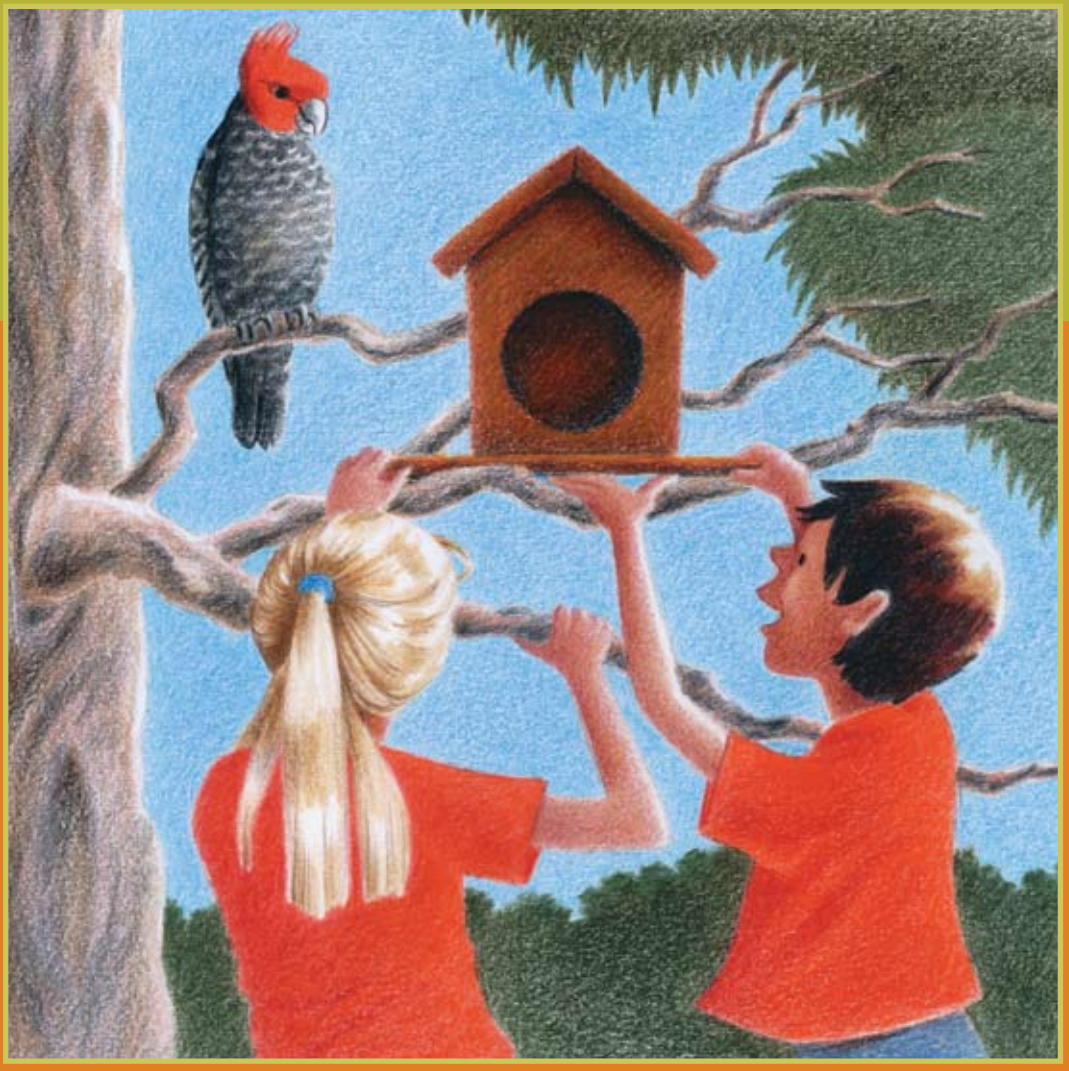
1. **Biodiversity is the variety of all living things.**
2. **The earth is always changing.**
3. **The timeframe in which life operates is beyond our personal experience.**
4. **Living things need to change and adapt to survive.**
5. **Earth and all living things are interconnected.**
6. **Australia is a unique and ancient land. ACT has a diverse ecosystem.**
7. **Human impact on the environment always affects biodiversity.**

Unit Description

Early Childhood P-2	Later Childhood 3-5	Early Adolescence 6-8	Later Adolescence 9-10
This unit of work is designed to raise awareness in Early Childhood students that biodiversity is: • the difference between living things, micro organisms, plants and animals • plants and animals change to suit where they live • we need to care for our local habitat Students will be introduced to the key components of biodiversity. The students will explore central issues of: • the whole world and its differences • where we live in the ACT is special • we need to tread lightly	This unit of work is designed to raise awareness in Later Childhood students that biodiversity: • is the variety of all living things, including micro-organisms, plants and animals • is determined by chance and adaptation • essential for a sustainable future Students will be introduced to the key components of the biodiversity. The students will explore central issues of: • The Earth and its diversity • ACT and its unique ecosystem • human impact on biodiversity	This unit of work is designed to raise awareness in Early Adolescent students that biodiversity is: • an understanding of the variety of life on earth • affected by changes in the environment • valuable Students will be introduced to the key components of biodiversity: • classification of living things • structure of a cell • types of animal and plant reproduction • food chains and food webs • structural and behavioural adaptation of species to their environments • endangered animals and extinction	This unit of work is designed to raise awareness in Later Adolescence students that: • life on this planet is diverse • changes are occurring all the time in nature and through human impact • all life is interconnected Students will learn to: • syntheses, collect, organise and present information using the inquiry process • apply scientific knowledge and use scientific theories and models • make predictions and evaluate decision and impacts

biodiversity

for a sustainable future



early childhood
years P–2

Australian Sustainable Schools Initiative - ACT

Class: Preschool to Year Two

Band of Development: Early childhood

Duration: Suggested 2-3 hours per week over 10 weeks

Teacher:

School:

The format for this unit of work is based on the **Kath Murdoch** model for integrated inquiry. The Essential Learning Achievements and Essential Content have been selected from the ACT Department of Education and Training Curriculum Framework, *Every Chance to Learn*.

Unit Description

This unit of work is designed to raise awareness in early childhood students that biodiversity is:

- the difference between living things, micro organisms, plants and animals
- plants and animals change to suit where they live
- we need to care for our local habitat.

Students will be introduced to the key components of biodiversity.

The students will explore central issues of:

- the whole world and its differences
- where we live in the ACT is special
- we need to tread lightly.

Big Understandings

1. Biodiversity is the variety of all living things.
2. The earth is always changing.
3. The timeframe in which life operates is beyond our personal experience.
4. Living things need to change and adapt to survive.
5. Earth and all living things are interconnected.
6. Australia is a unique and ancient land. ACT has a diverse ecosystem.
7. Human impact on the environment always affects biodiversity.

During this unit of work students will have the opportunity to develop the following values and attitudes:

- appreciation of the intrinsic value of the natural world and the need to preserve the diversity of ecosystems for future generations
- respecting and caring for life in all its diversity
- responsibility as consumers and citizens to conserve and manage environmental resources and cultural heritage in ways that are fair to both present and future generations
- optimism for the future through participating in informed, positive action to address local, national and global issues relating to environmental sustainability.

Schools may choose to include other worthwhile learning linked to the unit. For example:

- Birrigai - Web of Life
- Relationship between Indigenous people of the ACT and the land
- ACT Conservation Council
- Life Cycles
- Natural Resources

Threatened and Endangered Species of the ACT - see "Neighbours in Trouble!" Ian Fraser and Margaret McJannet.

Essential Learning Achievements covered in this unit of work are ELAs 2, 3, 19, 20 and 21. Essential Content has been selected from the early childhood band of development.

ELA 2 the student understands and applies the inquiry process

Essential Content

In the early childhood band of development, students have opportunities to:

- explore inquiry as a useful process for creating knowledge and understanding the world around them
- ask questions and identify possible sources of information to seek answers
- make observations about what is happening around them using their senses
- follow suggestions to collect and record data or information from a small range of sources (e.g. from simple experimentation, mathematical procedures, talking with others or from one or two text sources)
- follow suggestions to order and present data or information (e.g. grouping or sequencing, drawing, simple table, graph or timeline)

ELA 3 the student makes considered decisions

Essential Content

In the early childhood band of development, students have opportunities to:

- be aware when they have a choice
- ask for advice when making a decision
- set a small number of goals
- make decisions about how to complete a learning task and put them into effect

ELA 19 the student understands and applies scientific knowledge

Essential Content

In the early childhood band of development, students have opportunities to learn about:

- obvious features of a variety of plants and animals
- distinguishing between living and non-living things using basic criteria (e.g. characteristics and basic needs)
- some of the ways in which living things depend on their environment and each other (e.g. basic needs for survival)

ELA 20 the student acts for an environmentally sustainable future

Essential Content

In the early childhood band of development, students have opportunities to understand and learn about:

- different living things in their local environment and some observable relationships between living things and their environment
- how people cooperate to care for places in a community
- why it is important to conserve resources, protect the environment and participate in positive environmental action.

In the early childhood band of development, students have opportunities to learn to:

- share responsibility for the quality of their immediate environments and for resource conservation (e.g. dispose of litter, reuse and recycle some materials, and switch off unused lights)
- use their imagination to describe preferred future scenarios in relation to particular aspects of their local environment (e.g. suggest ways the school playground could be improved)

ELA 21 the student understands about Australia and Australians

Essential Content

In the early childhood band of development, students have opportunities to understand and learn about:

- Australia as a large land mass with a variety of environments (e.g. varied landscapes, animals and plants, places where people live)
- some places and landmarks in the local community
- recognise Australia's shape (e.g. in images and on maps) and some of its places (e.g. relevant to students experiences or classroom focus)
- create pictorial maps and timelines of their local area

ELA 23 the student understands world events and issues

Essential Content

In the early childhood band of development, students have opportunities to learn to:

- locate places on a map where significant events and Issues are occurring

Tuning In

Outcomes

What understandings will my students have at the end of the Tuning In stage?

What they know about biodiversity.

The difference between living and non-living things.

Living things grow, feed, breathe, move and reproduce.

Things change over time.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- ask questions and identify possible sources of information to seek answers
- explore inquiry as a useful process for creating knowledge and understanding the world around them

ELA 20 understands and applies scientific knowledge:

- distinguishing between living and non-living things using basic criteria (e.g. characteristics and basic needs)

Assessment

What evidence will there be that they have learnt?

Classification of living and non-living examples into the two groups.

Order changes over time, e.g. seasons, seed to plant, baby to adult.

Strategy

What is/are the most effective strategy or strategies to teach this?

Concept mapping.

Brainstorming.

Drawing and making models.

Listing questions and making statements.

Class discussions.

Simple timelines.

Activity

What is the best vehicle to deliver the learning?

View video/DVD to engage students with topic.

Use KWL to record prior knowledge and questions.

Begin whole class learning log/data chart to record/display knowledge and questions. Add information throughout the unit to demonstrate the practical and visual learning journey.

Read picture book and use open-ended questions to focus students on biodiversity. (Jeannie Baker)

Observation walk to explore local environment and find examples of living and non-living things. Highlight changes that happen including during seasons. Use camera to record findings and use as classroom examples.

Brainstorm findings from walk and add to class chart.

Explicitly teach living and non-living discussing 5 criteria and display definition. Use range of concrete examples, which demonstrate the characteristics of living things.

Use hoops or similar organiser to classify living and non-living things. Display data with pictures and labels.

Finding Out

Outcomes

What understandings will my students have at the end of the Finding Out stage?

Living things are animals, plants and micro-organisms.

All living things are interconnected.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- ask questions and identify possible sources of information to seek answers

ELA 19 understands and applies scientific knowledge:

- obvious features of a variety of plants and animals

ELA 23 understands world events and issues:

- locate places on a globe where significant events and issues are occurring

Assessment

What evidence will there be that they have learnt?

Participate in class brainstorm to generate ideas and questions.

Give a simple explanation the differences between animals and plants.

Identify; plants animals and micro-organisms are part of the environment.

Find similarities between living things. Include what they look like and where they might live.

Locate major physical habitats on the classroom map.

Strategy

What is/are the most effective strategy or strategies to teach this?

Hands on experiences to explore the school surrounds.

Making simple observations about the characteristics of living things.

Questioning.

Gathering new information.

Activity

What is the best vehicle to deliver the learning?

Create class glossary and add to throughout unit: Animals, plants, micro organism, biodiversity, habitat, living things, grasslands, woodlands, sub-alpine.

Display ACT map which highlights major physical features and colour coded habitats. Locate habitats where recent changes have impacted on the habitat.

Use map to build profile throughout unit, from physical features, habitats and animals.

Use pictures and words of a variety of plants, animals and micro-organisms to classify and bundle into groups. Discuss similarities and differences.

Whole class brainstorm using hoops to generate ideas about plants and animals. Breaking animal group into sub sets, e.g. feathers, furs, and scales.

Sorting Out

Outcomes

What understandings will my students have at the end of the Sorting Out stage?

All living things are interconnected.

Animals and plants live and survive in habitats.

Differences in habitats.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- make observations about what is happening around them using their senses

ELA 3 makes considered decisions:

- ask for advice when making a decision

ELA 19 understands and applies scientific knowledge:

- obvious features of a variety of plants and animals

ELA 20 acts for an environmentally sustainable future:

- different living things in their local environment and some observable relationships between living things and their environment

ELA 21 understands about Australia and Australians:

- Australia as a large land mass with a variety of environments (e.g. varied landscapes, animals and plants, places where people live)
- some places and landmarks in the local community

Assessment

What evidence will there be that they have learnt?

Participate in a class excursion to a local habitat. Make statements and drawings about what it smells like, sounds like, and looks like.

Use a concept map demonstrating simple links between animals and plants. (e.g. a kangaroo eats grass, a parrot needs a hollow log to nest).

Explain why plants and animals live in a particular habitat. Illustrate and label.

Create a 3D model to identify what makes up a habitat and describe the importance of features - trees, water animals.

Identify some of the major landforms - rivers, mountains in their local area.

Strategy

What is/are the most effective strategy or strategies to teach this?

Observing.

Drawing.

Constructing models.

Comparing and contrasting.

Group discussions.

Visiting and hands-on experiences.

Listening to experts.

Activity

What is the best vehicle to deliver the learning?

Ongoing task building of class learning chart to record learning. Include digital photographs, research, artwork and illustrations.

Pre excursion focus: predict variety of habitat and what life they can support.

Excursion to experience variety of habitats, such as Australian National Botanic Gardens.

Post excursion: Brainstorm findings and add to class chart. Use X chart.

Create 3D collages of habitats, building layers of each habitat (e.g. grassland - seed-heads, woodland - bark, sub-alpine-foam for snow).

Going Further

Outcomes

What understandings will my students have at the end of the Going Further stage?

Plants and animals found in the local area.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- follow suggestions to order and present data or information (e.g. grouping or sequencing, drawing, simple table, graph or timeline)

ELA 19 understands and applies scientific knowledge:

- obvious features of a variety of plants and animals
- some of the ways in which living things depend on their environment and each other (e.g. basic needs for survival)

Assessment

What evidence will there be that they have learnt?

Name various plants and animals of the ACT. (e.g. Eucalyptus, parrots)

Pictorial concept map of chosen animal, display characteristic and habitat. (e.g. parrot, feathers, eats seeds, lives in grassy woodland)

Strategy

What is/are the most effective strategy or strategies to teach this?

Pairs/group work.

Concept mapping.

Reflecting and revisiting.

Researching.

Recording on class chart.

Constructing models.

Making choices.

Activity

What is the best vehicle to deliver the learning?

Ongoing task: building of class learning chart to record learning. Include digital photographs, research, artwork and illustrations.

Card memory game to match habitat to plant or animal specific to the ACT.

Viewing of DVD/video relevant to ACT.

Use photographs/puppets and stories of local animals as stimulus for project (e.g. What am I? Puzzle Cards).

Project on a particular animal and its habitat. Supply list for students to make appropriate choice. Construct model/puppet of animal to place on habitat.

Making Connections

Outcomes

What understandings will my students have at the end of the Making Connections stage?

The benefits of a natural environment for plants, animals and humans.

A variety of living things live successfully in a habitat with minimal impact.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- make observations about what is happening around them using their senses

ELA 3 makes considered decisions:

- be aware when they have a choice

ELA 19 understands and applies scientific knowledge:

- some of the ways in which living things depend on their environment and each other (e.g. basic needs for survival)

ELA 20 acts for an environmentally sustainable future:

- why it is important to conserve resources, protect the environment and participate in positive environmental action

Assessment

What evidence will there be that they have learnt?

Create/draw/map/display to explain how a favourite habitat feels (touch and emotional), looks like, sounds like and smells like.

Take on the roles of different plants, animals and habitats and show the ways these are interconnected with each other. Use string, cards or labels.

Strategy

What is/are the most effective strategy or strategies to teach this?

Brainstorming.

Reflecting on early work.

Reporting.

Making decisions.

Displaying.

Illustrating.

Responding to the work of others.

Providing feedback.

Co operative groups.

Construction.

Activity

What is the best vehicle to deliver the learning?

Use Class Learning Chart to reflect on learning. Brainstorm which areas of the school could be improved, need caring for or are special. Create Diamond Display to arrange the statements with the most important at the top.

Students draw a picture within a frame. The picture reflects their feeling in relation to their local habitat. Frame to reflect the animals and habitats they have investigated.

Photo gallery of special habitats within the school. Create a 'Habitat Walk' with numbered points of interest for others to explore.

Taking Action

Outcomes

What understandings will my students have at the end of the Taking Actions stage?

We can make a positive contribution to our school habitat.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 3 makes considered decisions:

- make decisions about how to complete a learning task and put them into effect

ELA 20 acts for an environmentally sustainable future:

- how people cooperate to care for places in a community
- use their imagination to describe preferred future scenarios in relation to particular aspects of their local environment (e.g. suggest ways the school playground could be improved).

Assessment

What evidence will there be that they have learnt?

Compile a list of ideas they can share with others to care for their school habitat (e.g. To look after our soil, animals, plants, habitat I can...).

Make checklist of actions needed to maintain project.

Strategy

What is/are the most effective strategy or strategies to teach this?

Co operative groups.

Listing, recording and reporting.

Considering options.

Practical, hands-on.

Sharing ideas and informing others.

Activity

What is the best vehicle to deliver the learning?

Refer to Class Learning Chart and choose an area of the school habitat to improve or manage.

Create small posters that inform and instruct others how to care for the surrounding school habitat. (E.g.: replant, improve water sources for animals, weed garden beds or create special seat)

Present information at assembly to inform school community of school habitat management.

Sharing Discussion and Reflection

Outcomes

What understandings will my students have at the end of the Sharing, Discussion and Reflection stage?

Plants and animals in the ACT live in varying habitats.

ACT habitats are special and we must look after them otherwise they could disappear.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 3 makes considered decisions:

- set a small number of goals

ELA 20 acts for an environmentally sustainable future:

- why it is important to conserve resources, protect the environment and participate in positive environmental action
- share responsibility for the quality of their immediate environments and for resource conservation (e.g. dispose of litter, reuse and recycle some materials, and switch off unused lights)

Assessment

What evidence will there be that they have learnt?

Contribute to questions about:

What is living and non-living?

Which plants and animals belong in which habitat?

Why is the ACT special?

Contribute to the class pledge to set goals.

Strategy

What is/are the most effective strategy or strategies to teach this?

Learning Journey.

Portfolio sharing.

Learning chart.

Print work.

Picture/model/artwork displays.

Activity

What is the best vehicle to deliver the learning?

Culmination of class learning chart. Revisit and reflect on the learning process. Draw conclusions.

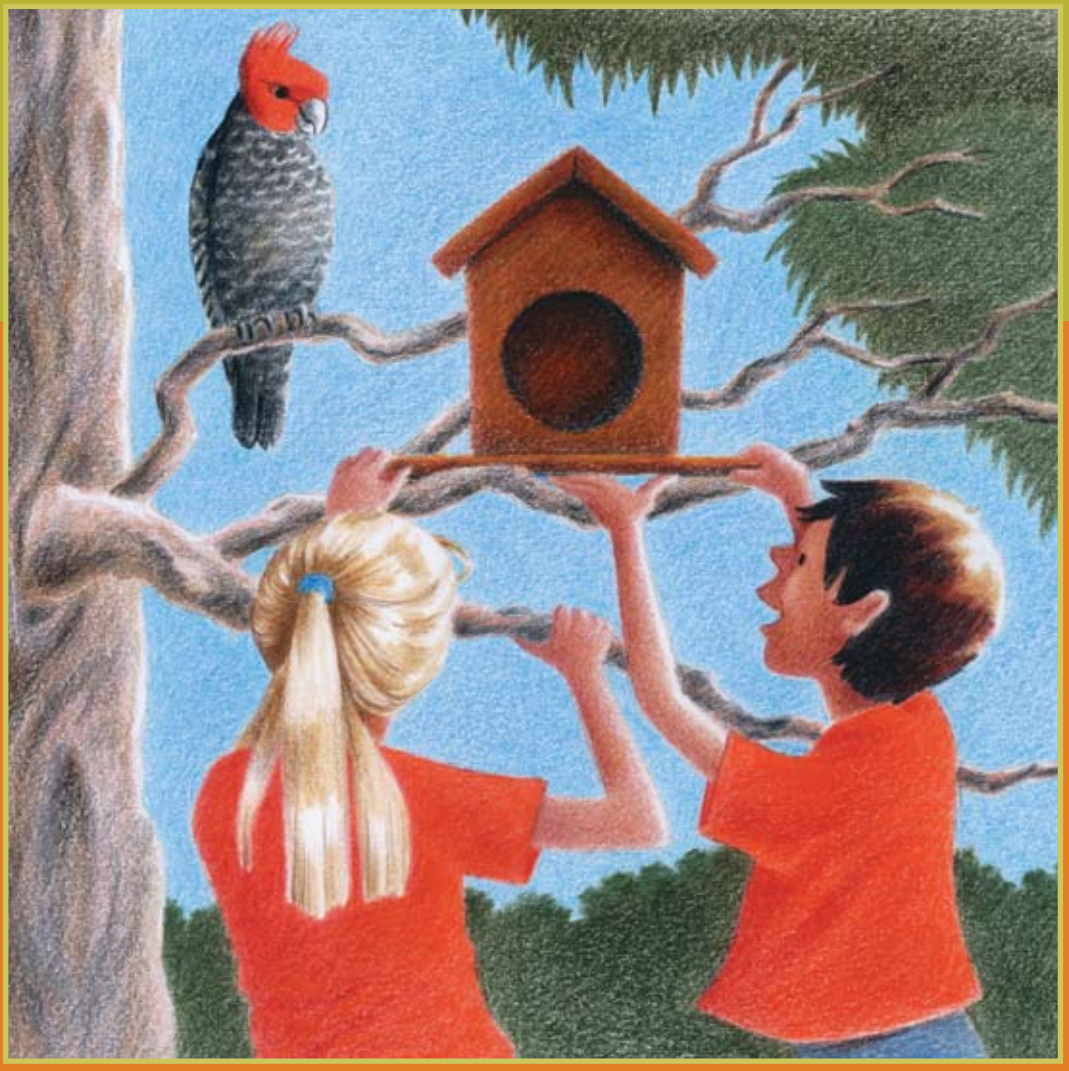
Display all work undertaken, including layered map of ACT.

Invite wider community to share in the learning journey and future goals.

Create class pledge to set goals to continue caring for our local habitats. Include specific action over time.

biodiversity

for a sustainable future



later childhood
years 3–5

Australian Sustainable Schools Initiative - ACT

Class: Year 3 – 5

Band of Development: Later childhood

Duration: Suggested 2-3 hours per week over 10 weeks

Teacher:

School:

The format for this unit of work is based on the **Kath Murdoch** model for integrated inquiry. The Essential Learning Achievements and Essential Content have been selected from the ACT Department of Education and Training Curriculum Framework, *Every Chance to Learn*.

Unit Description

This unit of work is designed to raise awareness in Later Childhood students that biodiversity:

- is the variety of all living things, including micro-organisms, plants and animals
- is determined by chance and adaptation
- essential for a sustainable future

Students will be introduced to the key components of the biodiversity.

The students will explore central issues of:

- the Earth and its diversity
- ACT and its unique ecosystem
- human impact on biodiversity.

Big Understandings

1. Biodiversity is the variety of all living things.
2. The earth is always changing.
3. The timeframe in which life operates is beyond our personal experience.
4. Living things need to change and adapt to survive.
5. Earth and all living things are interconnected.
6. Australia is a unique and ancient land.
7. Human impact on the environment always affects biodiversity.

Values and attitudes

During this unit of work students will have the opportunity to develop the following values and attitudes:

- appreciation of the intrinsic value of the natural world and the need to preserve the diversity of ecosystems for future generations
- respecting and caring for life in all its diversity
- responsibility as consumers and citizens to conserve and manage environmental resources and cultural heritage in ways that are fair to both present and future generations
- optimism for the future through participating in informed, positive action to address local, national and global issues relating to environmental sustainability.

Worthwhile learning

Schools may choose to include other worthwhile learning linked to the unit.

- Birrigai Programs - Web of Life to explore interconnectedness of plants, animals and habitat. Consequences of human impact.
- Relationship between Indigenous peoples of Australia and their connection to land.
- Minerals Council - biodiversity and industry
- Threatened and Endangered Species of the ACT - see "Neighbours in Trouble" by Ian Fraser and Margaret McJannett

Essential Learning Achievements covered in this unit are ELA 2, 3, 19 20, and 21. Essential Content has been selected from the later childhood band of development.

ELA 2 the student understands and applies the inquiry process

Essential Content

In later childhood band of development, students have opportunities to:

- create questions and predictions for investigation and testing
- collect and record data, checking and repeating observations or measurements as needed
- discuss and compare results with their questions and predictions, and draw conclusions
- follow suggestions to collect and record data or information from a small range of sources
- reflect on their inquiry experience, identify what went well and difficulties encountered, and suggest improvements to the investigation

ELA 3 the student makes considered decisions

Essential Content

In later childhood band of development, students have opportunities to:

- prepare a plan containing a list of things they plan to do and a timetable for doing them
- identity possible consequences of different decisions
- make decisions about how to complete a learning task and put them into effect

ELA 19 the student understands and applies scientific knowledge

Essential Content

In later childhood band of development, students have opportunities to understand and learn about:

- structures of living things and relationships between structure and function
- sort living things into groups using observable characteristics
- life cycles and reproductive processes in living things
- some interactions between living things and between living things and their environment
- identifiable causes for some of the short and long term changes to the surface of the Earth or the atmosphere (e.g. volcanic activity, soil erosion, air pollution)

ELA 20 the student acts for an environmentally sustainable future

Essential Content

In the later childhood band of development, students have opportunities to understand and learn about:

- natural cycles and systems in the environment (e.g. water cycle, food chains)
- the concept of habitat, and the diversity of living things within a habitat
- some effects of human action on natural environments (e.g. land clearing, air and water pollution)
- some effects of human action on natural environments (e.g. land clearing, air and water pollution)
- preservation of natural environments and heritage sites and the importance of particular places to different individuals and groups, including Indigenous Australians, (e.g. Uluru, Namadgi National Park, Canberra lakes and bushland)

In the later childhood band of development, students have opportunities to learn to:

- observe and gather data about local environments and changes over time due to human or natural events (e.g. school and grounds, nearby park or creek)
- take responsibility for caring for a local environment (e.g. part of school grounds, class garden, local park)
- explore probable and preferred futures in relation to environmental issues familiar to them, and discuss actions needed to make preferred futures happen.

ELA 21 the student understands about Australia and Australians

Essential Content

In the later childhood band of development, students have opportunities to learn to:

- identify and represent key features of places in Australia on maps
- interpret and construct timelines to sequence events

Tuning In

Outcomes

What understandings will my students have at the end of the Tuning In stage?

What they know about biodiversity.

The Earth is constantly changing.

Changes in the local environment.

Biodiversity is the variety of living things.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- create questions and predictions for investigation and testing

ELA 19 understands and applies scientific knowledge:

- identifiable causes for some of the short and long term changes to the surface of the Earth or the atmosphere (e.g. volcanic activity, soil erosion, air pollution)
- sort living things into groups using observable characteristics

ELA 21 understands about Australia and Australians:

- interpret and construct timelines to sequence events

Assessment

What evidence will there be that they have learnt?

Responds to key questions about biodiversity.

What is biodiversity?

What are the differences between plants, animals and micro organisms?

How has Australia and the ACT changed over time?

How has the Earth changed over time?

Classify plants, animals and micro-organisms through visual presentation (posters and pictures).

Creation of their own timeline that shows in sequence events that demonstrate changes to the Earth.

Strategy

What is/are the most effective strategy or strategies to teach this?

Concept mapping

Brainstorming

Drawing and making diagrams

Listing questions and making statements

Small group discussions

Timelines

Activity

What is the best vehicle to deliver the learning?

View DVD/video to engage students with topic.

Whole class discussion using X chart to generate ideas about the biodiversity of the environment (e.g. see, hear, feel, think).

Use concrete materials to create timeline to demonstrate changes that have happened to the Earth (e.g. rope, paint on playground, hanging mobile).

Read environmental picture book or information text to focus students on elements of biodiversity (various plants, animals).

Use KWFL to record prior knowledge and questions.

Finding Out

Outcomes

What understandings will my students have at the end of the Finding Out stage?

The uniqueness of the ACT biodiversity.

All living things are interconnected.

The Earth is always changing.

Living things need to adapt to survive.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 19 understands and applies scientific knowledge:

- structures of living things and relationships between structure and function
- sort living things into groups using observable characteristics
- some interactions between living things and between living things and their environment

ELA 20 acts for an environmentally sustainable future:

- the concept of habitat, and the diversity of living things within a habitat
- preservation of natural environments and heritage sites and the importance of particular places to different individuals and groups, including Indigenous Australians, (e.g. Uluru, Namadgi National Park, Canberra lakes and bushland)

ELA 21 understands about Australia and Australians:

- identify and represent key features of places in Australia on maps

Assessment

What evidence will there be that they have learnt?

Begin a learning log to identify and record learning about biodiversity.

List the names and locations of rivers and mountains in the ACT.

Identify three major habitats within the ACT on a pictorial map.

Explain why plants and animals survive in particular habitats.

Explain the importance of the relationship between an animal and its habitat within the ACT.

Strategy

What is/are the most effective strategy or strategies to teach this?

Hands on experiences to explore local environment. Excursion to National Botanic Gardens to observe varying habitats.

Making observations about the characteristics of living things.

Gather new information, record and share with group.

Activity

What is the best vehicle to deliver the learning?

Compile glossary-using words such as biodiversity, habitat, woodlands, grasslands, rivers, wetlands, and dry forest, wet forests.

Display ACT map highlighting major physical features (e.g. mountains, rivers).

Observations walk to find characteristics of living things.

Use camera to record findings and use as classroom examples.

Choose an animal found in the ACT to research. Visit Environment ACT website.

Use Venn diagram to compare and contrast the characteristics and habitats of living things to determine commonalities.

Sorting Out

Outcomes

What understandings will my students have at the end of the Sorting Out stage?

Where to find the 3 main habitats found within the ACT.

A habitat is made up of rock, soil, rain, wind, sun and all the plants and animals living there.

Relationship between plants and animals in these habitats.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- follow suggestions to collect and record data or information from a small range of sources
- collect and record data, checking and repeating observations or measurements as needed

ELA 19 understands and applies scientific knowledge:

- life cycles and reproductive processes in living things
- some interactions between living things and between living things and their environment

ELA 20 acts for an environmentally sustainable future:

- the concept of habitat, and the diversity of living things within a habitat
- some effects of human action on natural environments (e.g. land clearing, air and water pollution)
- observe and gather data about local environments and changes over time due to human or natural events (e.g. school and grounds, nearby park or creek)

Assessment

What evidence will there be that they have learnt?

Identify and record information and data about an animal found in the ACT.

Locate 3 habitats on ACT map. Grasslands, Grassy Woodlands and Sub-Alpine forest.

Draw, describe and label some of the diverse life within each habitat.

Explain why plants and animals survive in a particular habitat.

Strategy

What is/are the most effective strategy or strategies to teach this?

Observing, drawing and taking photos

Listing and comparing

Discussing and sharing information

Expert groups to create models

Activity

What is the best vehicle to deliver the learning?

Explain why plants and animals survive in a particular habitat.

Add three main habitat areas to ACT map.

Research chosen animal found in the ACT. Draw and label animal to demonstrate characteristics. Display on ACT map in appropriate habitat.

Group students according to chosen animal's habitat. Construct models of habitats in which to place animal (e.g. dioramas, collages, murals).

Going Further

Outcomes

What understandings will my students have at the end of the Going Further stage?

The features of ACT habitats.

Importance of caring for protecting ACT habitats.

Habitats are vulnerable to change.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- reflect on their inquiry experience, identify what went well and difficulties encountered, and suggest improvements to the investigation

ELA 3 makes considered decisions:

- identity possible consequences of different decisions

ELA 19 understands and applies scientific knowledge:

- some interactions between living things and between living things and their environment

ELA 20 acts for an environmentally sustainable future:

- natural cycles and systems in the environment (e.g. water cycle, food chains)

Assessment

What evidence will there be that they have learnt?

State differences between ACT habitats.

Make statements about possible consequences of different decisions affecting the ACT local natural environment.

Explain the importance of maintaining the balance within any habitat.

Use Consequence Wheel to list implications of natural and human impact on habitats (e.g. drought, clearing, grazing)

Strategy

What is/are the most effective strategy or strategies to teach this?

Reflecting, interpreting and generalising information.

Researching and reporting.

Sharing of ideas and information.

Activity

What is the best vehicle to deliver the learning?

Expert groups teach each other about the habitats by sharing information.

Compare and contrast findings.

View 'The Lorax and discuss affects on habitat'.

Working in groups, students select a 'change' that will impact on their habitat. (e.g. Natural changes - fire, drought. Human changes - structures, over grazing). Role-play possible future impact on habitat (e.g. animals needing to relocate).

Making Connections

Outcomes

What understandings will my students have at the end of the Making Connections stage?

Development and changes within habitats impacts on diversity.

Sustaining biodiversity in the ACT is a collective and individual responsibility.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 3 makes considered decisions:

- identify possible consequences of different decisions:

ELA 20 acts for an environmentally sustainable future:

- explore probable and preferred futures in relation to environmental issues familiar to them, and discuss actions needed to make preferred futures happen.

Assessment

What evidence will there be that they have learnt?

Describe consequences of human impact on ACT habitats.

List human and natural impacts on habitats.

State how our actions can minimise the impact on various habitats.

Strategy

What is/are the most effective strategy or strategies to teach this?

De Bono's hats.

Reflect and consolidate.

Informing others - oral or ICT presentations.

Activity

What is the best vehicle to deliver the learning?

De Bono's six thinking hats to recap and consolidate key perspectives.

Focus on Green Hat thinking to consider solutions or alternatives to future impact on habitats.

Use expert groups to consider consequences of human impact on their habit. Share ideas using role-play, dance or ICT to present different futures.

Probable: What is likely to happen unless there is some intervention?

Preferred: What they would like to see.

Possible: What is possible if some change is made

Taking Action

Outcomes

What understandings will my students have at the end of the Taking Actions stage?

Ways to improve and protect our unique habitat.

They have a personal responsibility to care for our local habitat.

Management of our local habitats is a collective responsibility.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 3 makes considered decisions:

- prepare a plan containing a list of things they plan to do and a timetable for doing them
- make decisions about how to complete a learning task and put them into effect

ELA 20 acts for an environmentally sustainable future:

- take responsibility for caring for a local environment (e.g. part of school grounds, class garden, local park)

Assessment

What evidence will there be that they have learnt?

Create a personal pledge to consider the action they will take to care for our local habitat. Use 'Ollie's Island' DVD to complete survey, create and print pledge.

Design a poster to persuade others to care for and protect a local habitat.

Strategy

What is/are the most effective strategy or strategies to teach this?

Working independently and collaboratively.

Participating in hands-on activities.

Reflection, reporting and recording.

Taking action.

Activity

What is the best vehicle to deliver the learning?

Design self-guided walk or trail. Students map a route, which highlights features of significant habitats.

Develop an action plan for the school. What areas can be improved? (e.g. replanting, mulching)

Extend to local area with approval.

Collaborate with organizations such as Australian National Botanic Gardens, Greening Australian and nurseries to collect and plant seeds.

Advertising campaigns to encourage others to change their behaviour and take action.

Art Show as a way to inform the wider community of the biodiversity of the ACT.

Record changes in the habitat over seasons.

Sharing Discussion and Reflection

Outcomes

What understandings will my students have at the end of the Sharing, Discussion and Reflection stage?

The biodiversity of the ACT is unique.

Our actions can affect the biodiversity within ACT habitats.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- discuss and compare results with their questions and predictions, and draw conclusions

ELA 3 makes considered decisions:

- make decisions about how to complete a learning task and put them into effect

Assessment

What evidence will there be that they have learnt?

Complete 'what I have learnt' section of KWFL.

School display of habitat models and posters or assembly item.

Oral explanations of journeys taken, conclusions made and understanding of biodiversity

Cross age tutoring.

Strategy

What is/are the most effective strategy or strategies to teach this?

Oral presentations.

Interacting with peers, adults and wider community.

Organisation of displays and assembly item.

Evaluation of key issues throughout the unit.

Activity

What is the best vehicle to deliver the learning?

Invite community members to tour display and attend assembly.

Learning Journey with self-assessment and community feedback.

Sharing Circle to encourage reflection.

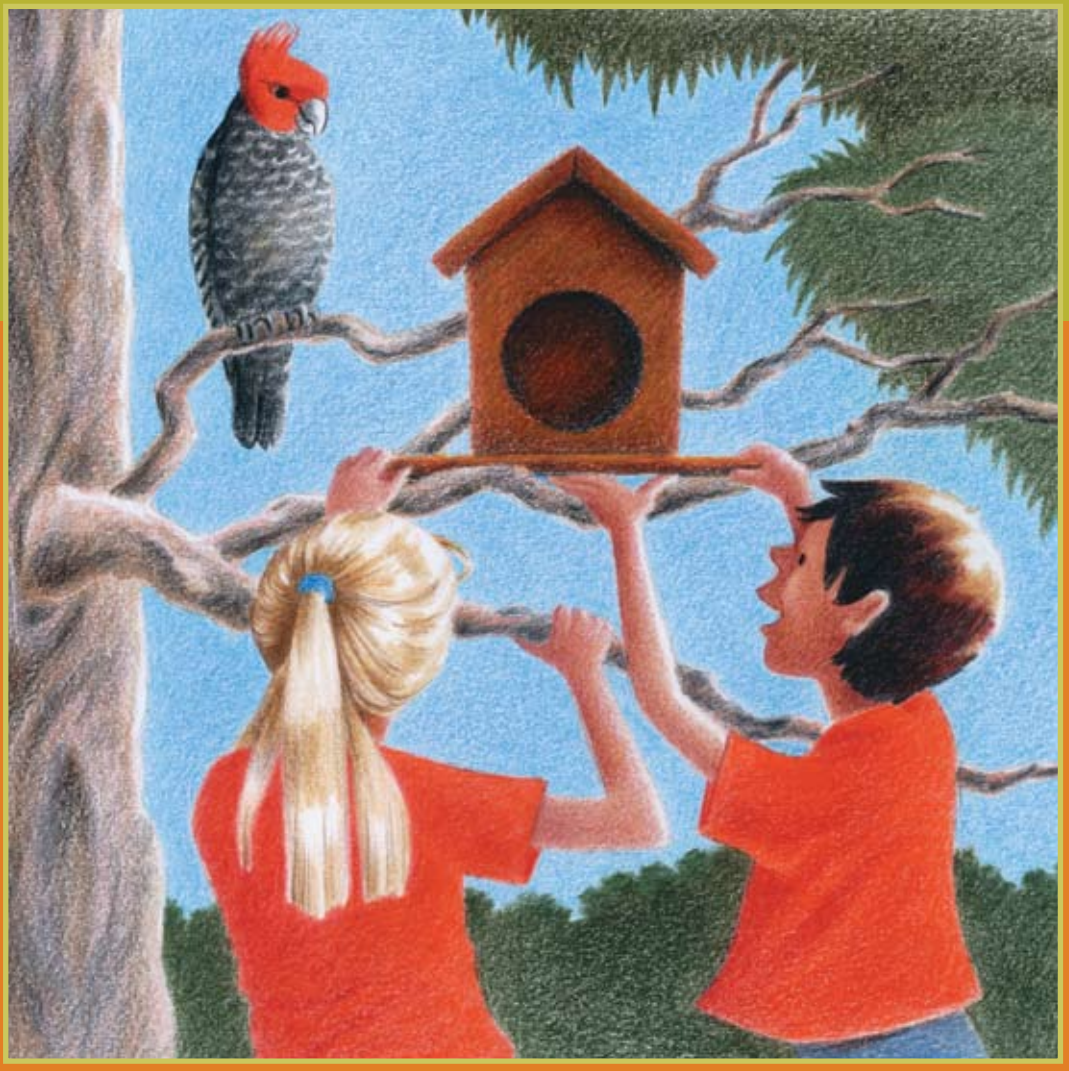
Portfolio

Further areas of investigation:

- Continued monitoring and participation of school environmental programs.
- Involvement in larger environmental issues.
- WasteWise
- Creek Watch

biodiversity

for a sustainable future



early adolescence
years 6–8

Australian Sustainable Schools Initiative - ACT

Class: Year 6 - 8

Band of Development: Early adolescence

Duration: Suggested 2-3 hours per week over 10 weeks

Teacher:

School:

The format for this unit of work is based on the **Kath Murdoch** model for integrated inquiry. The Essential Learning Achievements and Essential Content have been selected from the ACT Department of Education and Training, Curriculum Framework, *Every Chance to Learn*.

Unit Description

This unit of work is designed to raise awareness in early adolescent students that: biodiversity is:

- an understanding of the variety of life on earth
- affected by changes in the environment
- valuable.

Students will be introduced to the key components of biodiversity:

- classification of living things
- structure of a cell
- types of animal and plant reproduction
- food chains and food webs
- structural and behavioural adaptation of species to their environments
- endangered animals and extinction.

Big Understandings

1. Biodiversity is the variety of all living things.
2. The earth is always changing.
3. The timeframe in which life operates is beyond our personal experience.
4. Living things need to change and adapt to survive.
5. Earth and all living things are interconnected.
6. Australia is a unique and ancient land.
7. Human impact on the environment always affects biodiversity.

Values and attitudes

During this unit of work students will have the opportunity to develop the following values and attitudes:

- appreciation of the intrinsic value of the natural world and the need to preserve the diversity of ecosystems for future generations
- respecting and caring for life in all its diversity
- responsibility as consumers and citizens to conserve and manage environmental resources and cultural heritage in ways that are fair to both present and future generations
- optimism for the future through participating in informed, positive action to address local, national and global issues relating to environmental sustainability.

Essential Learning Achievements covered in this unit are ELA 2, 3, 19, 20, 21and 23. Essential Content has been selected from the early adolescence band of development.

ELA 2 the student understands and applies the inquiry process

Essential Content

In the early adolescence band of development, students have opportunities to:

- Formulate questions, predictions or propositions suitable for investigation and clarify the inquiry focus
- Select and use appropriate forms of the inquiry process for particular purposes
- draw reasonable conclusions based on analysis of data and information

ELA 3 the student makes considered decisions

Essential Content

In the early adolescence band of development, students have opportunities to:

- identify and evaluate the influences of media and peers in relation to a recent decision, using their skills of critical interpretation
- clarify feelings, values and beliefs in relation to particular decisions
- assess the impact and consequences of decisions they have already made to identify whether they will impact on their future choices

ELA 19 the student understands and applies scientific knowledge

Essential Content

In early adolescence, students have opportunities to understand and learn about:

- the cell as the basic unit of all living things
- biological classification systems and their applications
- why some living things are better suited to their environment than others
- food chains and webs as models of relationships within living communities

In early adolescence, students have opportunities to learn to:

- use their scientific understandings to consider and respond to appropriate ethical and social issues relevant to them (e.g. those related to health and wellbeing).

ELA 20 the student acts for an environmentally sustainable future

Essential Content

In the early adolescence band of development, students have the opportunity to understand and learn about:

- the concepts of the interdependence of living things within a habitat, an ecosystem, and how change in one part of an ecosystem impacts on other parts
- some of the processes by which human activities change natural environments in positive and negative ways ...
- population growth impacts on environmental systems (e.g. urbanisation, locust, cane toad or weed infestation)

In the early adolescence band of development, students have the opportunity to learn to:

- conduct case study investigations into local and/or national ecosystems to identify changes and predict their impacts
- participate in raising awareness about environmental issues

ELA 21 the student understands about Australia and Australians

Essential Content

In the early adolescence band of development, students have the opportunity to understand and learn about:

- range of natural environments and features in Australia, how these have shaped Australia's settlement and development and how people have shaped these environments

ELA 23 the student understands world events and issues

Essential Content

In the early adolescence band of development, students have the opportunity to understand and learn about:

- world events and how they affect people's lives in different places (e.g. natural disasters, war)

Schools may choose to include other worthwhile learning linked to the unit. For example:

While there are two excursions included in this unit, it is important for students to spend time outside gaining awareness of the biodiversity in their immediate environment. This could be through surveying the pattern of bird visitors to the school, the variety of plant life in the area, or further examining a nearby wetlands.

Tuning In

Outcomes

What understandings will my students have at the end of the Tuning In stage?

There are living and non-living things on Earth.

Living things have three characteristics and seven basic life processes.

Of the variety of living things on Earth.

Living things have changed and adapted to survive.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- formulate questions, predictions or propositions suitable for investigation and clarify the inquiry focus

ELA 19 understands and applies scientific knowledge:

- why some living things are better suited to their environment than others

ELA 20 acts for an environmentally sustainable future:

- the concepts of the interdependence of living things within a habitat, an ecosystem, and how change in one part of an ecosystem impacts on other parts

ELA 23 understands world events and issues:

- significant world events and how they affect people's lives in different places (e.g. natural disasters, war)

Assessment

What evidence will there be that they have learnt?

Define biodiversity.

List the three characteristics and seven basic life processes.

Participate in discussion.

List animal and plant species they are familiar with and the special adaptations these species have.

Write a response to David Attenborough's "State of the Planet and Planet Earth"

What impression did the State of the Planet make on you? *Can you think of other significant key environmental issues, what are they?*

Strategy

What is/are the most effective strategy or strategies to teach this?

Brainstorm/Graffiti board.

Think, pair, and share.

Concept mapping.

Reviewing.

Class and small group discussion.

Mind map.

Identifying further areas of inquiry (what don't we know?).

Pair interviews.

Activity

What is the best vehicle to deliver the learning?

Brainstorm: What comes to mind when you hear the word 'biodiversity?' Students write down their ideas. Then share their ideas. Alternatively place large sheets of paper around the room, on each sheet write one word e.g. biodiversity, living things, adaptations, habitats, endangered, extinct. Students can write or draw on any of the sheets what they know about each word.

Students record a definition of biodiversity.

Students create a mind map of living things in Australia. On the mind map need to show connections between environments, food and adaptations. Discuss with the students that living things are constantly changing and adapting to conditions on Earth, and that the species living now have not always existed or looked the way they do now.

Discuss how Australia's unique living things are a result of being a continent isolated from the rest of the world for at least 65 million years.

Use stimulus to promote thought and discussion e.g. posters, tactile objects for students to handle (plant and animal specimens). Students' pair and interview each other about what they see, know, observe. Then as a whole class share their observations.

DVD/videos: David Attenborough's State of the Planet and Planet Earth. After watching the DVD complete a topic wheel to identify questions they have about an issue.

Finding Out

Outcomes

What understandings will my students have at the end of the Finding Out stage?

The natural world is made up of diverse and complex places, filled with diverse and complex living things.

Australia has a variety of diverse habitats that make it unique.

ACT has a number of different habitats.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- formulate questions, predictions or propositions suitable for investigation and clarify the inquiry focus
- select and use appropriate forms of the inquiry process for particular purposes

ELA 20 acts for an environmentally sustainable future:

- the concepts of the interdependence of living things within a habitat, an ecosystem, and how change in one part of an ecosystem impacts on other parts
- conduct case study investigations into local and/or national ecosystems to identify changes and predict their impacts

ELA 21 understands about Australia and Australians:

- a range of natural environments and features in Australia, how these have shaped Australia's settlement and development and how people have shaped these environments

Assessment

What evidence will there be that they have learnt?

Completion of observation table.

Locate habitats on a map of Australia.

Participate in discussion on findings of observation activity.

Make conclusions about the diversity of living things in our world.

List at least three habitats that make Australia a unique place. Describe the features of the habitats and where they can be found in Australia.

Identify the three different habitats that make the ACT biologically special. Describe each of the areas, what grows and lives in the area. *Woodlands and Grasslands, Moist coastal range and the sub alpine meadows and woodlands of the Brindabellas*

Strategy

What is/are the most effective strategy or strategies to teach this?

Excursion.

Film viewing.

Class and small group discussion.

Working co-operatively.

Activity

What is the best vehicle to deliver the learning?

Visit either a local habitat (woodland, wetland) or the Australian National Botanic Gardens. Students conduct an investigation into the diversity of life in the area. Mark out an area (e.g. using a rope, quadrat, hoop or chalk). Students observe and identify the living things within the area, and record them in a table according to whether they are plant or animal. Include a written description and an illustration of each item. Students attempt to identify each species.

Look at a map of Australia. Identify the diversity of habitats found in Australia. Describe the types of life in each of the habitats. Use the photos in the Natures Treasures Kit to identify some of the possible environments and where we might find them.

Look at a map of the ACT and identify the three areas that make the ACT biologically special. List some of the plant and animal life in each of the areas. Make note of any plants or animals that are close to extinction or endangered. Use the mural in the Natures Treasures Kit to identify environments in the ACT. Create a class mural identifying different habitats and the life in the habitats in the ACT.

Sorting Out

Outcomes

What understandings will my students have at the end of the Sorting Out stage?

Living things are classified to help us understand them.

All living things are interconnected.

A cell is the basic unit of all living things.

Living things reproduce in different ways.

Living things have unique functions and structures.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- draw reasonable conclusions based on analysis of data and information

ELA 19 understands and applies scientific knowledge:

- biological classification systems and their applications
- the cell as the basic unit of all living things
- food chains and webs as models of relationships within living communities

Assessment

What evidence will there be that they have learnt?

Classify information by asking questions and identify why different species are linked.

Ability to place living things into the five kingdoms classification system to the phylum level.

Identify the cell as the basic unit of life and describe the basic function.

Draw and label plant and animal cells.

Know that living things reproduce in different ways. Define sexual and asexual reproduction.

Describe the relationships within the food web.

Identify basic plant structure.

Describe the process of photosynthesis. Give reasons for the importance of photosynthesis in food webs.

Strategy

What is/are the most effective strategy or strategies to teach this?

Brainstorm.

Concept mapping.

Class and small group discussion.

Note-taking.

Scientific drawing.

Interpreting information.

Working co-operatively.

Recording.

Reviewing.

Researching.

Locating.

Summarising.

Scientific investigation.

Activity

What is the best vehicle to deliver the learning?

Brainstorm: What do we classify in our lives? Ask students to classify a subject e.g. sport, cars, clothing, food, or movies. Discuss the process they used to classify their subject, and list the advantages of using a classification system. Discuss ways living things could be classified, and introduce the Five Kingdoms system used by scientists to classify all living things. Ask students to classify a selection of living things from each kingdom to their phylum level.

Introduce concept of the cell as the basic and original unit of all life. Discuss that there are single-celled and multi-celled organisms. Students draw and label animal and plant cell structures and record the function of each part.

Students record definitions and examples of sexual and asexual reproduction.

Review: What is energy? Why do humans need energy? Where do they get their energy? Conclude that like all livings things we get our energy from energy stored in other living things.

Brainstorm: What eats what? Students provide an example of an animal. From this discuss and describe the food chain that the animal is a part of and identify the other members of the chain.

Locate information on food webs from textbooks, library books or the internet. Students to write a paragraph describing the relationships within the food webs. Students to find and record examples of food webs in two systems (e.g. oceans, woodlands, grasslands).

Revise basic plant structure and further develop knowledge of each part and its function.

Introduce the concept of photosynthesis. Complete practical experiment to investigate this process.

Review: Food webs start with plants because they capture and store energy from the Sun through the process of photosynthesis.

Going Further

Outcomes

What understandings will my students have at the end of the Going Further stage?

Living things need to change and adapt to survive.

Living things that fail to change and adapt are vulnerable to extinction.

In Australia, human activity has impacted on the survival of living things.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 19 understands and applies scientific knowledge:

- why some living things are better suited to their environment than others

ELA 20 acts for an environmentally sustainable future:

- some of the processes by which human activities change natural environments in positive and negative ways ...
- population growth impacts on environmental systems (e.g. urbanisation, locust, cane toad or weed infestation)

Assessment

What evidence will there be that they have learnt?

Explain why living things need to change and adapt to survive.

Presentation of research findings into how living things have or haven't adapted to Australia's unique conditions.

Strategy

What is/are the most effective strategy or strategies to teach this?

Class discussion.

Questioning.

Reviewing.

Researching.

Reporting.

Graphing.

Activity

What is the best vehicle to deliver the learning?

Introduce the concept of adaptation and provide examples. Local examples that could be used include the highland copperhead or the local population of shingle backs. Question: Why is adaptation essential for survival?

Review: It has been 65 million years since Australia separated from the rest of the world and our living things have adapted to the different habitats found in Australia.

Research assignment:

1. How have living things adapted to Australia's different habitats? Choose an Australian mammal or plant and investigate how it has adapted to its habitat.
2. Choose an endangered Australian species: What factors are leading to its possible extinction?
3. Choose an extinct Australian species: What factors led to its extinction?

Graph the rate of species extinction and endangerment pre-1788 and post-1788.

Taking Action

Outcomes

What understandings will my students have at the end of the Taking Actions stage?

In the ACT humans are having an impact on the biodiversity of living things.

We need to act to preserve biodiversity in the ACT for future generations.

The ACT community needs to work together to preserve biodiversity.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 19 understands and applies scientific knowledge:

- why some living things are better suited to their environment than others

ELA 20 acts for an environmentally sustainable future:

- some of the processes by which human activities change natural environments in positive and negative ways ...
- participate in raising awareness about environmental issues

Assessment

What evidence will there be that they have learnt?

Identify how people living in the ACT have an impact on biodiversity in the local area.

Ability to communicate and raise awareness of issues.

Participation in class discussion about biodiversity in the ACT and how we can act together to conserve and protect the environment.

Strategy

What is/are the most effective strategy or strategies to teach this?

Listening.

Designing and creating.

Visual representation.

Class discussion.

Excursion.

Personal reflection.

Activity

What is the best vehicle to deliver the learning?

Invite a guest speaker from Environment ACT or local conservation groups to discuss endangered species in the ACT.

Make a poster raising awareness of how humans and their lifestyle affect biodiversity in the ACT. Display posters in local shopping centres or libraries.

As a class visit a local habitat (eg wetland or grassland) and consider the impact your lifestyle has on biodiversity in this habitat. Discuss the changes we can make to reduce our impact. Collect resources from Environment ACT or local conservation groups about issues in your area.

Making Connections

Outcomes

What understandings will my students have at the end of the Making Connections?

Living things need to change and adapt to survive.

Earth and all living things are interconnected.

Human actions have an impact on biodiversity.

Australia has a diversity of living things.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- draw reasonable conclusions based on analysis of data and information

ELA 3 makes considered decisions:

- clarify feelings, values and beliefs in relation to particular decisions

ELA 19 understands and applies scientific knowledge:

- use their scientific understandings to consider and respond to appropriate ethical and social issues relevant to them (e.g. those related to health and well-being)

ELA 20 acts for an environmentally sustainable future:

- some of the processes by which human activities change natural environments in positive and negative ways ...
- participate in raising awareness about environmental issues

Assessment

What evidence will there be that they have learnt?

Participation in debate and draw conclusions based on reasonable arguments.

Journal reflection identifying thoughts, feelings, ideas, questions and comments they have on human impact on biodiversity.

Identify living things found in Australia and their diverse habitats.

Strategy

What is/are the most effective strategy or strategies to teach this?

Synthesising.

Interpreting.

Revising.

Restating.

Elaborating.

Activity

What is the best vehicle to deliver the learning?

Class debate and journal response: Humans are responsible for the end of biodiversity.

Students either participate in a class debate on this topic or prepare a written response to the statement reflecting on the positives and negatives of arguments delivered.

Prepare a written journal response, identifying their own beliefs and values about their impact on biodiversity, raise questions and comments.

Wall chart: Students choose and illustrate a living thing found in Australia, and place it on a map of Australia displayed in the classroom.

Sharing Discussion and Reflection

Outcomes

What understandings will my students have at the end of the Sharing, Discussion and Reflection stage?

Biodiversity is the variety of all living things.

Biodiversity is vulnerable due to human activity.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- draw reasonable conclusions based on analysis of data and information

ELA 3 makes considered decisions:

- assess the impact and consequences of decisions they have already made to identify whether they will impact on their future choices
- identify and evaluate the influences of media and peers in relation to a recent decision, using their skills of critical interpretation

ELA 20 acts for an environmentally sustainable future:

- some of the processes by which human activities change natural environments in positive and negative ways ...
- participate in raising awareness about environmental issues

Assessment

What evidence will there be that they have learnt?

Participation in class discussion and evaluation using SWOT analysis.

Identify in their visual diary two examples of how human activity in the ACT is impacting on local diversity. Evaluate how decisions made are inclusive of the biodiversity in the region.

Identify how they see the future and some options for creating a positive future.

Strategy

What is/are the most effective strategy or strategies to teach this?

Class discussion.

Designing and creating.

Visual representation.

Activity

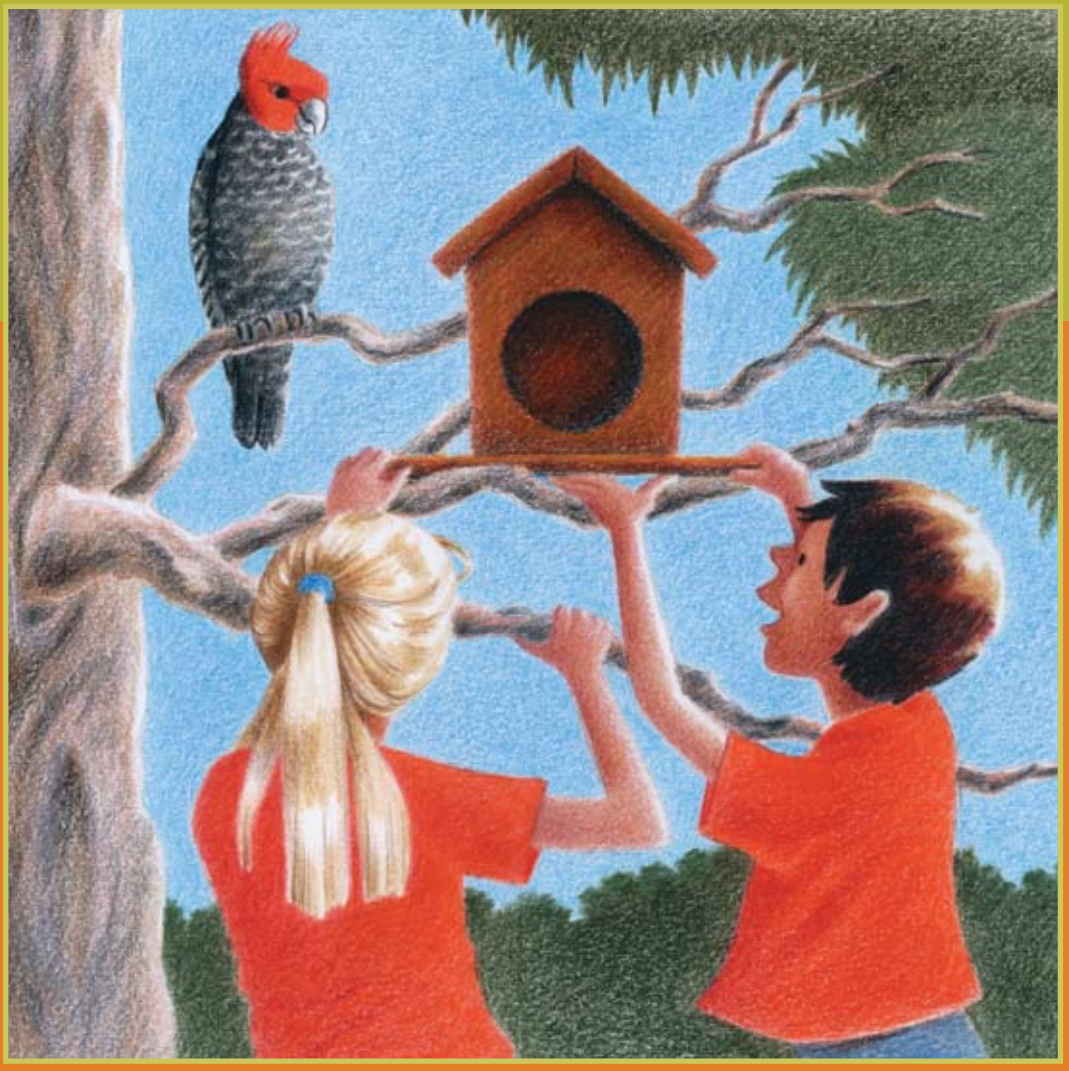
What is the best vehicle to deliver the learning?

Class discussion: Reflect on learning about biodiversity, the interconnectedness of life, and the impact human activity is having on these relationships.

Create a visual diary of biodiversity in your local area. Take photographs or video footage, or draw living things around your school, and create a class display. Include newspaper clippings that directly relate to how human activity is affecting biodiversity.

biodiversity

for a sustainable future



later adolescence
years 9–10

Australian Sustainable Schools Initiative - ACT

Class: Year 9 - 10

Band of Development: Later adolescence

Duration: Suggested 2-3 hours per week over 10 weeks

Teacher:

School:

The format for this unit of work is based on the **Kath Murdoch** model for integrated inquiry. The Essential Learning Achievements and Essential Content have been selected from the ACT Department of Education and Training Curriculum Framework, *Every Chance to Learn*.

Unit Description

This unit of work is designed to raise awareness in Later Adolescence students that:

- life on this planet is diverse
- changes are occurring all the time in nature and through human impact
- all life is interconnected.

Students will learn to:

- syntheses, collect, organise and present information using the inquiry process
- apply scientific knowledge and use scientific theories and models
- make predictions and evaluate decision and impacts.

Big Understandings

1. Biodiversity is the variety of all living things.
2. The earth is always changing.
3. The timeframe in which life operates is beyond our personal experience.
4. Living things need to change and adapt to survive.
5. Earth and all living things are interconnected.
6. Australia is a unique and ancient land.
7. Human impact on the environment always affects biodiversity.

Values and attitudes

During this unit of work students will have the opportunity to develop the following values and attitudes:

- appreciation of the intrinsic value of the natural world and the need to preserve the diversity of ecosystems for future generations
- respecting and caring for life in all its diversity
- responsibility as consumers and citizens to conserve and manage environmental resources and cultural heritage in ways that are fair to both present and future generations
- optimism for the future through participating in informed, positive action to address local, national and global issues relating to environmental sustainability.

Worthwhile learning

Schools may choose to include other worthwhile learning linked to the unit.

- Exhibitions: The activity in “Going Further: where students are asked to consider what would happen to food webs if humans were

removed could be adapted for Exhibitions. Groups could be allocated a particular Australian habitat, and present their findings at the Exhibitions Fair.

- The arrival of humans 60 000 years ago: Look at the impact the arrival of the first humans had on biodiversity. Consider the tools they used to shape their environment (eg fire) and the impact this had on the land and living things.
- When studying plate tectonics, the impact of natural disasters on environments could also be considered. Eg the impact of the 2004 tsunami; agriculture on volcanic land (See ELA 19).
- Visit the AustralianNational Botanic Gardens to view plant life in different Australian habitats.
- Consider issues in the Asia-Pacific region - poaching, butterfly ranching, traditional Chinese medicine.
- Research the importance of international cooperation.

ELA 2 the student understands and applies the inquiry process

Essential Content

In the later adolescence band of development, students have opportunities to:

- Formulate questions, hypotheses propositions and conjecture suitable for testing or investigation in relevant disciplines and frame these to clarify the purpose and scope of the inquiry
- Identify sources and collect data and information in systematic ways to improve reliability
- Manage and organise data and information in ways that assist in its interpretation, analysis and synthesis
- draw conclusions that are consistent with the data or information and provide evidence or supporting details
- Present and discuss their investigation using appropriate representations, conventions and terminology specific to the discipline

ELA 3 the student makes considered decisions

Essential Content

In the later adolescence band of development, students have opportunities to:

- make plans and decisions and put them into effect as part of topics, themes or activities across the school's curriculum
- generate multiple viewpoints in relation to options and criteria for judging the quality of a decision
- evaluate the role of intuition, feelings, values, beliefs in decision-making and strengthen their capacity for moral and ethical decisions

ELA 19 the student understands and applies scientific knowledge

Essential Content

In later adolescence, students have opportunities to understand and learn about:

- how contemporary scientists often draw on concepts and processes across scientific disciplines in multi-disciplinary teams and how science can provide rewarding careers
- the theory of evolution by natural selection to explain the diversity of living things and how inherited characteristics are passed from parent to offspring
- scientific concepts and models to explain the interdependence of populations of organisms and the environment, and predict the consequences of changes to an ecosystem

- the theory of plate tectonics to explain global patterns of geological activity (e.g. earthquake and volcanic zones)

In later adolescence, students have opportunities to learn to:

analyse and synthesise information and use scientific models and terms to explain properties and interrelationships and to predict change in phenomena and systems

ELA 20 the student acts for an environmentally sustainable future

Essential Content

In the later adolescence band of development, students have opportunities to understand and learn about:

- key concepts used in contemporary information and debates about environmental sustainability (e.g. biodiversity, carrying capacity, ecological footprint, preservation, conservation, wilderness, heritage, sustainability, sustainable development)
- events that have significant effects on regional or global ecosystems and describe related environmental, social or economic consequences (e.g. drought, cyclones, bushfires, earthquakes, El Nino, climate change)
- how environmental decision-making often involves dealing with conflicting values and interests of different individuals or groups (e.g. preservation of wilderness, development of non-renewable and renewable resources)
- how peoples' views on the environment influence government policy and non government organisations, and the ways in which governments attempt to address issues of development and sustainability.

In the later adolescence band of development, students have opportunities to learn to:

- apply relevant scientific understandings to form personal views and make responsible and informed decisions about issues concerning sustainability (e.g. salinity, nuclear energy production, land degradation)
- consider and explain their own decisions about lifestyle choices and participation in social actions for environmental sustainability
- examine examples of individual and global actions to create sustainable futures, assess their strengths and limitations, and propose further appropriate actions.

ELA 21 the student understands about Australia and Australians

Essential Content

In the later adolescence band of development, students have opportunities to understand and learn about:

- natural and human processes that form and transform Australian environments over time (e.g. explanations of the origins of Australia, factors changing communities, geographical issues affecting Australian environments)
- how government policies have affected indigenous peoples and their pursuit of citizenship rights

ELA 23 the student understands world events and issues

Essential Content

In the later adolescence band of development, students have opportunities to understand and learn about:

- analyse and explain different perspectives on a significant world issue or event

Tuning In

Outcomes

What understandings will my students have at the end of the Tuning In stage?

Variation and variety can take several forms - biological, cultural, social and economic.

An appreciation of how diverse life on the planet is.

That biodiversity is important and valuable without it we loose quality of human life.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- formulate questions, hypotheses propositions and conjecture suitable for testing or investigation in relevant disciplines and frame these to clarify the purpose and scope of the inquiry
- manage and organise data and information in ways that assist in its interpretation, analysis and synthesis

ELA 3 makes considered decisions:

- make plans and decisions and put them into effect as part of topics, themes or activities across the school's curriculum

Assessment

What evidence will there be that they have learnt?

Identify different levels of diversity and give a short explanation of each. (Genetic, species and ecosystem.)

Collate what they know about diversity on the planet and how diversity is important to them in their every day lives.

Complete the K part on the KWL chart.

Generate questions to formulate investigations into biodiversity in the W part of the KWL

Organise initial information systematically.

Strategy

What is/are the most effective strategy or strategies to teach this?

Brainstorm.

Metacognitive reflection.

Concept map.

Graphing.

Activity

What is the best vehicle to deliver the learning?

Class discussion and brainstorm what is biodiversity? Discuss the levels of biodiversity, genetic diversity, species diversity and ecosystem diversity. Give examples of living things and living things that are now extinct.

Draw attention to how the quality of human life interconnects to that of the biodiversity in which they live. (See notes in resource list).

Students to commence KWL chart (what do you know, what do you want to know, what have you Learnt). At this stage the K and W can be completed.

Visit local ACT habitats to identify what makes each place unique. Record, evidence/sightings of different animals -bugs to mammals, native and domestic, record the types of plants and landforms within a given location. Evidence of earlier life e.g. - Wee Jasper fossil lungfish. Encourage students to take photos, draw and collect small samples. Collect evidence of humans in the area.

Finding Out

Outcomes

What understandings will my students have at the end of the Finding Out stage?

The timeframe in which life operates is beyond our personal experience.

Changes on the planet happen due to natural movement of the planet, climate change, natural disasters and human intervention.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- identify sources and collect data and information in systematic ways to improve reliability
- present and discuss their investigation using appropriate representations, conventions and terminology specific to the discipline

ELA 19 understands and applies scientific knowledge:

- analyse and synthesise information and use scientific models and terms to explain properties and interrelationships and to predict change in phenomena and systems
- how contemporary scientists often draw on concepts and processes across scientific disciplines in multi-disciplinary teams and how science can provide rewarding careers

ELA 20 acts for an environmentally sustainable future:

- events that have significant effects on regional or global ecosystems and describe related environmental, social or economic consequences

Assessment

What evidence will there be that they have learnt?

Compare and contrast their life on a timeline with that of life on the planet.

Respond to this statement - *Change has always occurred on the planet, animals and plants have adapted or died out. During the relative short time on the planet humans have created changes that have increased the rates of extinction.*

Use graphing techniques to understand how human impact is affecting rates of change and extinction.

Strategy

What is/are the most effective strategy or strategies to teach this?

Observing.

Listening.

Viewing.

Questioning.

Evaluating.

Graphing.

Activity

What is the best vehicle to deliver the learning?

DVD/Video: view a presentation about the formation of Earth and the occurrence of life.

Timeline activity: illustrate the age of the Earth by preparing a timeline (using rope, marked out on oval or on the classroom wall): Showing creation of the Earth, occurrence of single cell life, movement of life onto land, arrival and extinction of dinosaurs, breakup of Gondwana, first evidence of human life on Earth.

Students prepare a personal timeline marking five important events in their life. Students then adapt the scale to represent 4.6 billion years ago to the present and record the above significant Earth events.

Discuss the causes of change and the rates of change. Graph the changing rates of extinction and decline in biodiversity due to human activity. What could the reasons for the changing rates of extinction be?

Use the internet to access the IUCN Red List of endangered species.

http://www.redlist.org

Keep a media file of newspaper cuttings and radio and television references concerned with the conservation of endangered species. Before students begin, write down what you expect to find - for example what species are newsworthy, where the articles originate, whether the stories are 'positive' or 'negative', whether there is any follow-up in letters to the editor. After two weeks, compare your actual findings with what you expected to find. Can you suggest reasons for any differences? How highly do you think the media rate the problem of endangered species?

Sorting Out

Outcomes

What understandings will my students have at the end of the Sorting Out stage?

Plate tectonics is a scientific theory that explains why the Earth is always changing.

Evolution is a theory of development of diversity amongst living things.

Scientific theories of evolution have developed over time.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- formulate questions, hypotheses propositions and conjecture suitable for testing or investigation in relevant disciplines and frame these to clarify the purpose and scope of the inquiry

ELA 19 understands and applies scientific knowledge:

- the theory of plate tectonics to explain global patterns of geological activity (e.g. earthquake and volcanic zones)
- the theory of evolution by natural selection to explain the diversity of living things and how inherited characteristics are passed from parent to offspring

Assessment

What evidence will there be that they have learnt?

Discuss the theory of evolution, and the different ideas of scientists who developed the theory (Buffon, Lamarck, Darwin, Wallace).

Using the example of one species explain the process of natural selection.

Identify how the theory of evolution is making an impact on science today.

Present their understandings of plate tectonics and show how plate tectonics are related to change in the animal and plant life on the planet.

Describe and illustrate the structure of the Earth.

Strategy

What is/are the most effective strategy or strategies to teach this?

Guided learning.

Modeling.

Reporting.

Interpreting information.

Working cooperatively.

Presenting ideas to others.

Explaining.

Organising.

Classifying.

Researching.

Use of ICT.

Activity

What is the best vehicle to deliver the learning?

Brainstorm: What makes up the Earth?. Review students' knowledge of the physical structure of the Earth.

Use textbook, library and internet resources describe and illustrate the structure of the Earth, including the inner and outer core, mantle Asthenosphere and Lithosphere.

Explain the lithosphere is formed of two types of crust, continental and oceanic. Continental crust is made up of plates, which float on the mantle. Discuss how plates move apart, collide together and slide past each other.

Take a hard-boiled egg and crack its shell. Does the egg remind you of anything? The Earth, perhaps? The egg could be seen as a tiny model of the Earth. The thin shell represents the Earth's crust, divided into plates; within the shell is the firm but slippery mantle. Move the pieces of shell around. Notice how the shell buckles in some places and exposes "mantle" in other places. The same thing happens on Earth, but on Earth, this activity results in the formation of mountains, earthquakes, and new ocean floor.

Using ICT

1. Locate an interactive model of plate tectonics and record their observations of the plate boundaries onto a map.
2. Research and record the movements of the plates.
3. Summarise in two paragraphs the history of the theory of plate tectonics.
4. In what ways would the plates moving cause change in animal and plant life?

The Theory of Natural Selection.
Using an example (e.g. finch, giraffe, platypus) introduce the idea of species evolving from a common ancestor through adaptation and natural selection. Discuss species extinction as part of the process of evolution.

In small groups research the theory of evolution and a scientist who provided key findings on the theory. Include in the findings a section on - how does evolution impact on my life? Give examples and supporting evidence.

Going Further

Outcomes

What understandings will my students have at the end of the Going Further stage?

The theories of plate tectonics and of evolution explain why there is so much diversity on Earth.

Earth and all living things are interconnected.

Living things continue to evolve and adapt irrespective of human impact.

In Australia humans have an impact on habitats and the biodiversity found in them.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 19 understands and applies scientific knowledge:

- scientific concepts and models to explain the interdependence of populations of organisms and the environment, and predict the consequences of changes to an ecosystem

ELA 20 acts for an environmentally sustainable future:

- key concepts used in contemporary information and debates about environmental sustainability
- apply relevant scientific understandings to form personal views and make responsible and informed decisions about issues concerning sustainability
- examine examples of individual and global actions to create sustainable futures, assess their strengths and limitations, and propose further appropriate actions

Assessment

What evidence will there be that they have learnt?

Explain why Australia, South America and Africa have living things that share a common ancestor.

Discuss the food web of an Australian habitat.

Analyse the impact on a habitat if humans were removed from it.

Plan, prepare and report the findings of an investigation.

Strategy

What is/are the most effective strategy or strategies to teach this?

Guided learning.

Listening.

Metacognitive reflection.

Reviewing.

Questioning.

Hypothesising.

Researching.

Reporting.

Investigating.

Presenting.

Collaboration.

Discussing.

Activity

What is the best vehicle to deliver the learning?

Make links between the theories of plate tectonics and evolution.

Review formation of Gondwana, and that this eventually became Australia, Africa, and South America. What living things do we have in common? Examples include ratites and protoceae: The Ratites are emus, ostriches and rheas. These birds prove to us that the three continents were once joined and that these three birds evolved from a common ancestor.

With a focus on Australian examples, review food chains and webs, and the habitats that support them.

Select an Australian environment to study. Consider the impact of humans on that environment and what would happen if humans were removed from Earth? Include in the discussion impact on the food web and habitats. Students may report their findings by a method of their choosing e.g. essay, oral presentation, etc.

(The preference is for students to consider an Australian habitat, but they could negotiate alternatives with the teacher.)

Making Connections

Outcomes

What understandings will my students have at the end of the Making Connections stage?

The impact of people on environments and how the environment shapes human activities.

The ways different cultures view the importance of sacredness in the environment.

The importance of respecting and conserving indigenous knowledge and cultural heritage

We need to exercise caution in all our interactions with the environment.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 3 makes considered decisions:

- make plans and decisions and put them into effect as part of topics, themes or activities across the school's curriculum
- generate multiple viewpoints in relation to options and criteria for judging the quality of a decision
- evaluate the role of intuition, feelings, values, beliefs in decision-making and strengthen their capacity for moral and ethical decisions

ELA 20 acts for an environmentally sustainable future:

- how people's views on the environment influence government policy and non government organisations, and the ways in which governments attempt to address issues of development and sustainability

ELA 21 understands about Australia and Australians:

- natural and human processes that form and transform Australian environments over time (e.g. explanations of the origins of Australia, factors changing communities, geographical issues affecting Australian environments)
- how government policies have affected indigenous peoples and their pursuit of citizenship rights

ELA 23 understands world events and issues:

- analyse and explain different perspectives on a significant world issue or event

Assessment

What evidence will there be that they have learnt?

Formulate opinions and options by participating in-group discussion/forum.

Identify and assess environmental issues.

Critical and creative thinking about environmental challenges and opportunities.

Consideration and prediction of the consequences (social, cultural, economic and ecological) of possible courses of action.

Strategy

What is/are the most effective strategy or strategies to teach this?

Discuss.

Argue.

Reflect.

Observe.

Evaluate.

Predict.

Activity

What is the best vehicle to deliver the learning?

Hold a series of class forums to explore, discuss and respond to the following statements: (Students need to research and prepare their arguments and discussion points prior to the forums.)

- The impact humans have on Australian biodiversity. Debate topic: humans are nature's greatest enemy.
- The importance to protect whole ecosystems rather than a particular species.
- Australians act for a sustainable future.
- Australians value biodiversity.
- "Our story is in the land...It is written in those sacred places." (Statement by the late Bill Neidjie, Senior Traditional Owner, Kakadu National Park) Consider how indigenous knowledge and cultural heritage help focus on respecting the diversity of life and preserving natural environments for future generations.
- Sustainable development is all about economic, social and environmental costs and benefits.
- A sustainable future is largely about good practice policy making.

Taking Action

Outcomes

What understandings will my students have at the end of the Taking Actions stage?

Our actions do have an impact on biodiversity that will affect future generations.

Australians can influence decision makers.

By working together Australians can create sustainable futures.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 20 acts for an environmentally sustainable future:

- the need to make decisions and choices about the development of natural ecosystems that will preserve them for future generations
- how peoples' views on the environment influence government policy and non-government organisations
- the roles individuals and groups can play as active and informed members of society, to create environments in the future that are positive and sustainable

Assessment

What evidence will there be that they have learnt?

Articulating a commitment to protect biodiversity.

Write a persuasive letter that communicates their position on an issue of importance to them.

Participation in a class or school event promoting biodiversity.

Oral, written and graphic communication of environmental issues and solutions to others.

Cooperation and negotiation to resolve conflicts that arise over environmental issues.

Individual and collective action to support desirable outcomes.

Strategy

What is/are the most effective strategy or strategies to teach this?

Reflecting.

Questioning.

Investigating.

Communicating ideas.

Justifying.

Organising.

Activity

What is the best vehicle to deliver the learning?

Complete a personal journal reflection on the following:

- As individuals how do we feel about the natural environment and its future?
- How will the choices we make now affect the well-being and lifestyle of future generations?

Make a commitment to an action that will help protect biodiversity in the local area.

Investigate Australia's endangered species. Write to a conservationist group and find out whether there is a public campaign you could become involved in.

In a 'kids for tigers' campaign one million Indian children signed a petition to protect the tiger. Brainstorm in a group to draw up a list of practical activities you could do to support endangered species in Australia. Choose some items from your list and put them into practice.

Write to your local member and the federal government about an issue affecting biodiversity in Australia.

Organise a fair at school or in the local community publicising issues about biodiversity in Australia. Invite conservation groups to display information about their work.

Design a poster to display near the cage or enclosure of an endangered animal explaining what we can do to help its survival.

Sharing Discussion and Reflection

Outcomes

What understandings will my students have at the end of the Sharing, Discussion and Reflection stage?

The intrinsic value of the natural world and the need to preserve the diversity of ecosystems for future generations.

The responsibility as consumers and citizens to conserve and manage environmental resources and cultural heritage in ways that are fair to both present and future generations.

Essential Content

What do I want them to have opportunities to learn? (Taken from identified Essential Learning Achievements)

ELA 2 understands and applies the inquiry process:

- draw conclusions that are consistent with the data or information and provide evidence or supporting details

ELA 20 acts for an environmentally sustainable future:

- consider and explain their own decisions about lifestyle choices and participation in social actions for environmental sustainability

Assessment

What evidence will there be that they have learnt?

Complete a flow chart.

End of unit test.

Reflects on their ideas about protecting biodiversity.

Strategy

What is/are the most effective strategy or strategies to teach this?

Reflection.

Constructing concept maps.

Revising.

Summarising.

Role Play.

Activity

What is the best vehicle to deliver the learning?

Review major content of the unit including the theory of plate tectonics, theory of evolution, and the interconnectedness of all living things.

Complete KWL chart commenced in 'Tuning in'. Students complete a journal entry that makes a personal response to each of the big understandings described at the beginning of the unit.

As a class develop a flow chart or concept map of their learning's during the unit.

Imagine you are a small group of conservationists keen to get public support to help preserve an endangered Australian species. Make a presentation to explain the importance of your task and gain the support of the public.

Resources and References

Biodiversity: Books and Articles

Barnham, K 2006, *Protect Nature,* Hodder Wayland, Great Britain

Base, G 2006, *Uno's Garden,* Penguin Australia

Boehm-Jerome, K 2003, *Protecting the Planet,* Rigby, Port Melbourne

Environmental Issues: Facing the Challenges: ages 10+, 2005, RIC Publications Pty Ltd, Balcutta, WA

Harvey, R & Howes, J 2002, *Islands in my Garden,* Puffin Australia

Jakab, C 2007, *Biodiversity, Global Issues,* MacMillan Education Australia Pty Ltd, South Yarra, Victoria

Jakab, C 2007, *Clean Air and Water, Global Issues,* MacMillan Education Australia Pty Ltd, South Yarra, Victoria

Jakab, C 2007, *Natural Resources, Global Issues,* MacMillan Education Australia Pty Ltd, South Yarra, Victoria

Jarman, M 2006, *The Impact of Big Business,* Franklin Watts Australia, Sydney

Lang, J 2007, *How to Succeed with Education for Sustainability,* Curriculum Corporation, Carlton, Victoria

Morgan, S 2001, *Worms, Looking at Minibeasts,* Chrysalis Children's Books, London

Nicholson, J 2002, *State of the Planet,* Allen & Unwin, Crows Nest NSW

Our Environment, Topics to Go, 2007, Rigby, Port Melbourne

Parry, A 2006, *Conservation, Civic Issues,* MacMillan Education Australia Pty Ltd, South Yarra, Victoria

Poultney, T 2003, *Access Asia, Environments Asia Pacific for Middle Years,* Curriculum Corporation, Carlton, Victoria

Ruscoe, A and Budden, N 2003,*The Environment: Promoting Sustainability: ages 11+,* RIC Publications Pty Ltd, Balcutta, WA

Rushby, P 2007, *The Mangrove Grannies,* Rigby, Port Melbourne

Rushton, S 2006, *Pet or Pest?* Curriculum Corporation, Carlton, Victoria

Stewart, S 2004, *Save our Earth,* Pearson Education Australia

Winters, B 2002, *Weedbusters: Activities, Information and Curriculum Links,* Gould League, Victoria

Websites

ACT Sustainable Schools website http://www.sustainableschools.act.gov.au/biodiversity

A Science Odyssey website http://www.pbs.org/wgbh/aso/tryit/tectonics/#

A Shared Vision for Tourism in Kakadu National Park website
http://www.environment.gov.au/parks/publications/kakadu/tourism-vision/pubs/brochure.pdf

Australia's Biodiversity Australian Museum online website http://www.amonline.net.au/biodiversity/index.htm

Australian Conservation Foundation website http://www.acfonline.org.au

Australian Government Dept of the Environment and Water website www.environment.gov.au/biodiversity/threatened/

Conserving Biodiversity in the ACT website
http://www.environmentcommissioner.act.gov.au/SoE/SoE2000/ACT/Issues/Conservingbiodiversity.htm

CSIRO page linked to TV series SCOPE website www.csiro.au/scope

Deakin University, Faculty of Education, Resources - Science and Environmental Education website
www.deakin.edu.au/education/resources/sci-enviro-ed/early_years/plants.php

Ecotude Sydney Powerhouse Museum website http://www.powerhousemuseum.com/ecotude/

Environment ACT website http://www.environment.act.gov.au/

Environment Australia website http://ea.gov.au

GEOLOGY 107 Our Dynamic Planet Fall 2005 website http://www.earth.northwestern.edu/people/seth/107/

Greenpeace Australia Pacific website http://www.greenpeace.org.au

National Biological Information Infrastructure website http://www.nbii.gov/education/biodiversity.html

National Parks Association of the ACT website www.npaact.org.au/splash.php

Resources and References

One Ocean's Ocean Ambassadors Program website http://www.oneocean.org/ambassadors/track_a_turtle

Passport to Knowledge, Geosystem, Ecosystem website http://passporttoknowledge.com/rainforest/main.html

Salinity Australia's Silent Food website http://www.abc.net.au/learn/silentflood/default.htm

The 5Tigers website hosted by Minnesota Zoo website http://www.5tigers.org

The Global Network of the WWF website http://www.panda.org/

The Wilderness Society website http://www.wilderness.org.au

Trinity College, Cells website www.trinity.wa.edu.au/plduffyrc/subjects/science/biology/cells.htm

Understanding Evolution website http://evolution.berkeley.edu/

Zebra Online, Lincoln Park Zoo website www.lpzoo.com/education/zebra/student/formfunction/c.html

CD-ROMs, DVDs, Videos, Kits, and Posters

State of the Planet 2000, DVD, three-part environmental documentary series, British Broadcasting Corporation, London. Presented and narrated by David Attenborough

The three programmes cover the scientific understanding of the crisis, the extent to which humans are implicated in the wave of extinctions currently sweeping across our planet, and the ways in which we might slow or halt the current precipitous decline in Earth's biodiversity.

Marvellous Micro-organisms, Primary Connections: Linking Science with Literacy, Stage 3, Life and Living 2006, CD-ROM, Australian Academy of Science, Canberra

Ollie Saves the World Series

Ollie saves the Planet 2002, CD-ROM, Sustain Ability International Pty Ltd, Camberwell, Victoria

Ollie's Island 2007, CD-ROM, Sustain Ability International Pty Ltd, Camberwell, Victoria

Conservation Council Natural Treasures Education Kit - held at the CTL (Library)

The ACT Conservation Council has been working in collaboration with the Department of Education and TAMS (Sustainable Schools) to develop an education kit about protecting the natural treasures around the ACT. Included in the kit are the following teacher's resources that are aligned to the ACT Curriculum.

Contents of the Natures Treasures Kit include:

Food Web Mural - Food Web Mural - Map (2 laminated sheets)

Some Woodland Birds in Canberra (1 DVD/1Video - same content)

Grassy Woodlands Education Kit - Teacher Resource Book/Student Workbook

Environment ACT, Grassy Woodlands: Natural Habitats of the ACT (Poster

6 Environment Types (laminated pictures)

32 Plants and animals (Flash cards - pictures and writing)

6 Extra species cards for Food Web Mural Activity

Maps, brochures, leaflets

Canberra Nature Park - Bush on your Doorstep (map)

Murrumbidgee River Corridor (brochure)

Tidbinbilla Nature Reserve (brochure)

Jerrabomberra Wetlands (brochure)

Frost Hollow to Forest Walk - Aranda Bushland (brochure)

Are your Garden Plants Going Bush? (leaflet)

Logs have Life Inside (information and activity sheet)

Green Kids Guide to Threatened Species (leaflet)

Park Care - Dig the Environment? (brochure)

Protecting our Wildlife: Responsible pet ownership (pamphlet)

Invasive Species (pamphlet)

The Birds of Canberra - Pocket guide (pamphlet)

Caring for Woodland Birds (pamphlet)

Waterwatch - Upper Murrumbidgee (pamphlet)

Living with Magpies (pamphlet)

Frogs Materials

Frog Species of the ACT and Region Fact Sheet (6 laminated sheets)

Frog Calls of the ACT and South-East NSW (1CD)

ASX Frog Focus (1CD)

Articles and Books

Australian Geographic 2006, My Australia - (10 laminated sheets)

Bennett, R 1998, Field Guide to Reptiles and Frogs of the ACT, National Parks Association of the ACT, Canberra

Celebrating Our Shared Discoveries of the Land, Department of Education, Community and Cultural Development, Hobart

Crane, M, Lindenmayer, D, and Michael, D 2005, Woodlands - a Disappearing Landscape, CSIROPublishing

Field Guide to Trees of the ACT, National Parks Association of the ACT, Canberra

Fraser, I and McJannett, M 1996, Neighbours in Trouble!, Conservation

Council of the South-East Region and Canberra

McComas, T and Day, N 1993, Field Guide to Birds of the ACT, National Parks Association of the ACT, Canberra

Rope Timeline

Rope 1. 10m represents age of earth. 2.2m = 1st life; 8.7m = first multi-celled life + formation of Gondwana; 8.9m = 1st move ashore; 9.5m = rise of dinosaurs; 9.9m = end of dinosaurs and isolation of Aust; very oldest human ancestors appear ~5mm from end.

Rope 2. represents isolated Aust (50m yrs); last 10cm = human occupation.

Rope 3. represents human occupation (50,000 yrs); last 40mm = European settlement

Glossary

adaptations Adaptations enable living organisms to cope with environmental stresses and pressures. Physical adaptations can help an organism to survive in its natural habitat (e.g. skin color, shape, body covering). Behavioral adaptations are special ways a particular organism behaves to survive structural or behavioral changes. Structural adaptations are special body parts. Physiological adaptations are systems present in an organism that allow it to perform certain biochemical reactions (e.g., making venom, secreting slime, being able to keep a constant body temperature).

animals Animals are a major group of multicellular organisms, of the kingdom Animalia or Metazoa. Their body plan becomes fixed as they develop, usually early on in their development as embryos, although some undergo a process of metamorphosis later on in their life. Most animals are mobile - can move spontaneously and independently.

asexual reproduction Is a form of reproduction which does not involve meiosis, ploidy reduction, or fertilization. Asexual reproduction only takes one parent. A more stringent definition is agamogenesis which refers to reproduction without the fusion of gametes.

bark The outer layer of tree-trunks and branches.

biodiversity 'bio'-life; 'diversity' - variety
Biodiversity is defined as "the variety of life forms: the different plants, animals and micro-organisms, the genes they contain, and the ecosystems they form. It is usually considered to have three levels: genetic diversity, species diversity and ecosystem diversity.

Genetic refers to the variety of genetic characteristics found within a particular species and among different species. Plants and animals may have thousands of genes, providing huge varieties within one species. Humans differ by many physical aspects including hair, eye and skin colour and in the way they live. A visit to a supermarket shows many different varieties of the same fruit or vegetable.

Species refers to the variety of living species. Some estimates suggest that there are between 1.5 and 1.7 million names species on Earth, including insects, plants, fish, reptiles and amphibians, birds, mammals, molluscs, worms, spiders, fungi, algae and micro-organisms. There may be millions more which have not been identified.

Ecosystem includes the many different habitats, biological communities and natural systems in which plants and animals live. It includes ecosystems such as savannas, rainforests, oceans, marshes, deserts, and any other environment in which a species may live.

conservation The act of preserving, guarding, or protecting; the keeping (of a thing) in a safe or entire state; preservation.

deforestation Removal or clearing of forest cover.

ecosystems Communities of living things and their physical environments.

endangered A species in danger of extinction.

environment The word 'environment' means 'home'. Earth is our home planet and provides all the necessary requirements for life.

exotic species A species that is not native to an area.

extinct A species with no living examples left.

feather Any of the structures that grow from a bird's skin and cover its body, consisting of central shaft with a fringe of fine strands on each side.

five kingdoms classification system to the phylum level Living organisms are subdivided into 5 major kingdoms, including the Monera, the Protista (Protoctista), the Fungi, the Plantae, and the Animalia. Each kingdom is further subdivided into separate phyla or divisions. Generally "animals" are subdivided into phyla, while "plants" are subdivided into divisions.

food Food is any substance, usually composed primarily of carbohydrates, fats, water and/or proteins, that can be eaten or drunk by an animal or human being for nutrition or pleasure. Items considered food may be sourced from plants, animals or other categories such as fungus or fermented products like alcohol. Although many human cultures sought food items through hunting and gathering, today most cultures use farming, ranching, and fishing, with hunting, foraging and other methods of a local nature included but playing a minor role.

food chain Food chains, food webs and/or food networks describe the feeding relationships between species in an ecological community. They graphically represent the transfer of material and energy from one species to another within an ecosystem.

fur The term fur refers to the body hair of non-human mammals also known as the pelage (like the term plumage in birds). Fur comes from the coats of animals; the animal's coat may consist of short ground hair, long guard hair, and, in some cases, medium awn hair. Not all mammals have fur; animals without fur may be referred to as 'naked', as in 'The Naked Ape', naked mole rat, and naked dogs.

Glossary

grasslands Grasslands are areas where the vegetation is dominated by grasses (Poaceae) and other herbaceous (non-woody) plants (forbs). Grasslands occur naturally on all continents except Antarctica, and in many other areas they have replaced the natural vegetation due to human influence.

habitat The area in which an organism lives that contains all the resources it needs to survive including food, water, space, light shelter. Different animals and plants are found in different habitats. Habitats can be big - a forest - or small - a leaf.

highland copperhead A Copperhead snake found in the high country and only on the mainland.

investigate To make a careful study of a thing or subject in order to discover the facts about it.

living Being alive.

living things All living things have a circle of life. Birth, growth, reproduction, and death are natural parts of the natural world.

mammal A member of the class of animal that suckle their young.

micro-organism Microorganism (also spelled as microrganism) or microbe is an organism that is microscopic (too small to be seen by the human eye). The study of microorganisms is called microbiology.

multi-celled organisms Multicellular organisms are organisms of more than one cell, and having differentiated cells that perform specialized functions. Most life that can be seen with the naked eye is multicellular, as are all members of the kingdoms Plantae and Animalia (except for specialized organisms such as Myxozoans in the case of the latter).

non-living Sand, wood and glass are all non-living things. Non-living things can be divided into two groups. First, come those which were never part of a living thing, such as stone and gold. The second group are those which were once part of living things. Coal is a good example. It was formed when trees died and sank into the soft ground.

photosynthesis Photosynthesis is the process by which plants, some bacteria, and some protistans use the energy from sunlight to produce sugar, which cellular respiration converts into ATP, the "fuel" used by all living things. The conversion of unusable sunlight energy into usable chemical energy is associated with the actions of the green pigment chlorophyll. Most of the time, the photosynthetic process uses water and releases the oxygen that we absolutely must have to stay alive.

plants Plants are a major group of life forms and include familiar organisms such as trees, herbs, bushes, grasses, vines, ferns, mosses, and green algae. About 350,000 species of plants, defined as seed plants, bryophytes, ferns and fern allies, are estimated to exist currently.

scales Thin overlapping plates of membrane or hard substance that protect the skin of many fish and reptiles. There are four main kinds of scales 1. Placoid, 2. Cosmoid, 3. Ganoid and 4. Cycloid and Ctenoid.

seed-heads Seeds found in the heads of flowers.

Shingle Backs The Shingle Back is a large lizard with four short stumpy legs. It has a tail that looks like a platypus tail. Shingle back lizards are very fat and sleepy. They are related to the skink family.

single-celled One only. Cell division involves a single cell (called a mother cell) dividing into two daughter cells. This leads to growth in multicellular organisms (the growth of tissue) and to procreation (vegetative reproduction) in unicellular organisms.

sub-alpine The term subalpine refers to the biotic zone immediately below tree line around the world. Species that occur in this zone depend on the location of the zone on the Earth. Trees in subalpine zone often become krummholtz (stunted and twisted).

sub-alpine meadow A sub-alpine meadow is a high-altitude grassland located below the treeline of a mountain. Sub-alpine meadows, along with alpine meadows, are part of the Montane grasslands and shrublands biome as defined by the World Wildlife Fund.

threatened Species under threat of extinction.

woodlands Woodlands are places where the trees are spaced apart with heath and grassland in between. They often have open grassy spaces as well as clumps of trees, rocks and bushes.