

THE INTERNATIONAL YEAR OF BIODIVERSITY 2010

Adapted from a unit by Natasha Ziebell – Global Education Project, Victoria

“The latest update of the IUCN Red List of Threatened Species shows that 17,291 species out of the 47,677 assessed species are threatened with extinction. The results reveal 21 percent of all known mammals, 30 percent of all known amphibians, 12 percent of all known birds, and 28 percent of reptiles, 37 percent of freshwater fishes, 70 percent of plants, 35 percent of invertebrates assessed so far are under threat.” (IUCN)

The United Nations has declared 2010 as the International Year of Biodiversity. The key aims of the year are:

- To increase awareness of the importance of biodiversity for our well being
- To halt the loss of biodiversity, which is currently up to 100 times greater than the natural rate of extinction
- To celebrate the success stories

Biological diversity or biodiversity is defined as the variety of all living things on the planet. Biodiversity encompasses the vast range of living things, not only the endangered or the cute and cuddly. This includes plants, animals, fungi and microscopic creatures such as bacteria and viruses. Living things live in a diversity of habitats, from mountainous regions to the depths of our oceans. Nature’s diversity is rapidly declining as a result of the loss of genetic diversity, species diversity and ecosystem diversity. This affects all people as we rely on biodiversity for food, clothing and medicines amongst other things. However people living in poverty are more reliant on their environment than wealthier people.

The following unit of work focuses on defining biodiversity, looking at the richness of biodiversity on the planet, the interdependence of all living things, the threats to biodiversity and the consequences of loss of biodiversity on earth, particularly for vulnerable people.

All resources mentioned are available to borrow from the One World Centre
www.oneworldcentre.org.au

Upper Primary

Key concepts

Sustainability, interdependence, poverty, change and adaptation

KEY UNDERSTANDINGS

1. Biodiversity is the variety of all living things on earth.
2. All living things on earth are interdependent.

FOCUS QUESTIONS

1. Why is biodiversity essential for survival on earth?
2. Why are the poor so reliant on biodiversity?

<p>3. Biodiversity is affected as a result of human impact on the environment.</p> <p>4. People living in poverty are particularly vulnerable to biodiversity loss.</p>	<p>3. Why is biodiversity important in ensuring environmental sustainability?</p> <p>4. How do the choices we make impact on the earth's environment?</p>
<p>GLOBAL PERSPECTIVES</p> <p><i>Sustainable Futures:</i></p> <ul style="list-style-type: none"> - Sustainable futures is about learning to respect, value and preserve the environment and to assess, care for and restore the state of our planet. <p><i>Interdependence:</i></p> <ul style="list-style-type: none"> - Interdependence describes the relationship of mutual dependence between all elements and life forms. <p><i>Social Justice and Human Rights</i></p> <ul style="list-style-type: none"> - Social Justice and Human Rights focus on inequality and the importance of the environment in the lives of those living in poverty around the world. 	
<p>VALUES AND ATTITUDES</p> <p>Students will be encouraged to develop an attitude of respect towards biodiversity and its significance in ensuring a sustainable future. It is important for students to reflect on the responsibility that humans have to protect and preserve the variety of life on earth for current and future generations. Students identify the factors that influence our values and attitudes towards the environment.</p>	

<p>Curriculum Framework</p>	
<p>Learning Area – Society and Environment</p>	<p>Strand – Natural and Social Systems</p> <p>Students understand that systems provide order to the dynamic natural and social relationships occurring in the world.</p>
<p>K-10 Scope and Sequence</p> <p>Natural Systems - Natural cycles impact on people</p> <ul style="list-style-type: none"> - Care of the environment will affect people's well-being in the future <p>Economic Systems - Factors influence a person's access to goods and services (e.g. location, income)</p>	

Learning Area – Society and Environment	Strand – Place and Space
K-10 Scope and Sequence Features of Places – Natural and Human processes alter the environment	

Learning Area – Science	Strand – Life and Living
K-10 Scope and Sequence Interdependence of living things – Biodiversity is the variety of living things and the environments they are found in	

Learning Area – Science	Strand – Earth and Beyond
K-10 Scope and Sequence Sustainability of life and wise resource use – Human impacts on natural systems and the consequences for living things.	

Tuning In

1. *Ask students what they understand by biodiversity.*
2. *Write 'biodiversity' on the whiteboard with the following definitions:*

Bio – (prefix) Life

Diversity- (noun) A variety of many things

Discuss the definition and then take the students outside to explore the local environment to investigate biodiversity in the local environment. Ask students to identify and record all the living things they observe. Magnifying glasses may be used by students. Use a camera to take photographs of a few examples for use in the classroom.

Back in the classroom, collate all the information along with the photographs on a class chart using appropriate headings e.g. Birds, insects, plants etc. Ask students to think about other categories that may not be represented in the class chart, for example, fish. Provide reasons why they were not observed in the local environment. As a class, create your own definition of the word 'biodiversity'.

3. *KWL CHART - Biodiversity*

Students fill in the 'What I know' and 'What I want to know' sections of the chart.

4. Set up a media display by pinning up current articles relating to the topic. Share new articles at the beginning of each week.

Finding Out

Species Diversity

*You may wish to read the book, *The Waterhole*, by Graham Base to begin this activity.*

*The Amazon rainforest contains approximately 2 000 bird and mammal species, 3 000 fish species, 2.5 million insects, 75 000 different types of trees. There are 40 species of toucan (*The Waterhole*). These figures vary significantly depending on the source.*

Using rice, ask students to work out how many grains of rice are in one tablespoon. Work out how many grains are in a cup of rice (approx 6 000). This activity can be used to demonstrate the biodiversity in a particular ecosystem or country. (see http://earthtrends.wri.org/pdf_library/data_tables/bio1_2005.pdf for information about species numbers in particular countries.) Each grain of rice represents one species.

Students could also:

- calculate how many cups of rice would be needed to show all of the species on Earth – estimates range from 3million up to 50 million species.
- Demonstrate number of threatened species in the world, or in countries. (See Earthtrends website or the IUCN website for details.)

Ecosystems

Ollie Saves the Planet is an interactive and engaging CD-rom that was sent to every school in 2002/2003(check your library). Once the program has been loaded, click on 'Sustainability', 'What can I do?' and then 'Biodiversity'. Students complete Activity 2 and Activity 3.

Activity 2:

- Ecosystem Diversity
- Species Diversity
- Genetic Diversity

Activity 3:

- Food webs

Create a diorama of one type of ecosystem. Refer to Ecosystem Research: Design Brief (attached)

Genetic Diversity

1. Pre-soak some broad bean seeds overnight. Individually, students carefully peel the broad bean and split it in half. Ask student to draw and label their bean: coat on the outside, embryo (first leaves, stem and root system) and cotyledon (food). Plant another broad bean seed in a glass jar filled with soil. Place the bean against the glass, but underneath the soil. Observe the seed as it develops into a plant.
2. Provide students with a wide range of vegetable seeds to classify (pumpkin, tomato, cucumber and so on. You can dry the seeds yourself or for an interesting variety of seeds, visit <http://www.diggers.com.au/>

Can students identify what plants these seeds have come from? You may find that students classify seeds depending on colour, size, texture or the type of food it produces.

- There are approximately 100,000 varieties of rice, 30,000 varieties of chickpea, and 1,000 varieties of banana in the world.
3. Narrow the focus to beans. Show students a range of bean seeds and ask them to draw and record the physical characteristics of these beans. Beans are grown almost everywhere in the world. Discuss what specific characteristics beans must have to survive in different environments. Why is it important to preserve the genetic diversity of crops?



- We are currently losing diversity of the top 22 crops produced to feed the world. We need to maintain diversity so that crops can adapt to disease, drought, floods, pests and climate change.
4. The Seed Hunter is an Indiana Jones style documentary focusing on saving the genetic diversity of crops. The website contains a range of short video clips and useful information relating to saving seeds: <http://www.seedhunter.com/>
 5. The Global Crop Diversity Trust and the Svalbard Seed Vault is an initiative that aims to preserve the diversity of crops. The vault contains approximately 420,000 samples of seeds. To learn more, visit: <http://www.croptrust.org/main/arctic.php?itemid=211>

Sorting Out

Web of Life

The web: Ask students to stand in a circle. A student holds a ball of wool and names something from the living (parrots, trees, bacteria, fungi, monkeys, lizards) or non-living category of an ecosystem. (e.g. sunlight, dark, humidity, rain, air, wind, soil, moisture, rocks, temperature). The student then throws the ball to another student who names something that has a relationship to what the first student named. Make sure that some students name people who rely on that ecosystem to survive. (e.g. someone who uses materials from the ecosystem to build their home or someone who eats plants or animals from the ecosystem)

Continue on until the centre of the circle is crisscrossed randomly with wool. Choose one, for example, water. Have the student representing water tug on the wool back and forth. Talk about the ripples and vibrations affecting the whole. Ask a student to release their section of wool. What happens to the web when one person drops their piece of wool? Ask the rest of the students to tighten their section of wool. What happens? This represents the way in which each component of an ecosystem is interrelated with each component affecting the others. Ask the student representing water to drop their piece of string. Now ask all the people that could not survive without water to drop theirs. What is left?

Going Further

Watch the following short video which revises information about food webs and links this to the impact of loss of biodiversity.

http://pbskids.org/eekoworld/index.html?load=plants_animals

Research

Students investigate an endangered animal or plant. Identify the animal's/plant's state (rare, endangered, vulnerable etc). Students may use the HIPPO acronym to determine the cause of extinction (**H**abitat Loss, **I**ntroduced **S**pecies, **P**ollution, **P**opulation growth, **O**verconsumption). More information about HIPPO is available at <http://www.oum.ox.ac.uk/thezone/animals/extinct/hippo.htm>

Students conduct a research project incorporating the following information:

Animal/plant name:

Habitat:

Features that assist the animal in survival

Feeds on:

Predators:

Why is it endangered:

The impact the loss of this species has on the ecosystem, including people?

Interesting facts:

Actions that could protect the animal/plant:

Poverty and Biodiversity

1. Read *A Country Far Away* by Nigel Gray and Philippe Dupasquier. Ask students to compare how the children in the book use parts of the environment – for food, shelter, water, transport, firewood etc. What might happen to each child if one important species or ecosystem no longer existed? (One example might be if a staple crop like wheat or rice was no longer available.)

(Alternatively you could watch the *Families of India* DVD or use a photo pack such as the Primary Topic Posters series on Food, Water or Homes as stimulus for this activity)

2. Use the activity, 'Identifying the causes and consequences of poverty' from *Look Global* by Rosalie Triolo

3. Use the activity, Biodiversity in Sweet Potatoes, on the Global Education website:
<http://www.globaleducation.edna.edu.au/globaled/go/pid/4133>

Drawing Conclusions and Reflection

1. Students create a physical continuum (the right end of the continuum being 'strongly agree' and the left being 'strongly disagree'). Students stand in the position that reflects their attitude towards the following statements. Students may be asked to justify their stance. Students may change positions depending on the arguments presented.
 - It is more important to save endangered animals than it is to save plants.
 - It is not important to save dangerous animals such as crocodiles and sharks.
 - You have to have a lot of money to protect biodiversity.
 - A koala is more important than a worm.
 - The decisions we make can affect biodiversity.
 - It is too difficult to do anything to save plants and animals from extinction.
 - People should be allowed to use the environment however they need to, in order to survive.

This activity may be the stimulus for students to write an expository piece relating to issues relating to biodiversity.

2. Ask students to review their KWL charts to determine whether all their questions have been addressed. After children have filled in the 'What I have Learned' column, ask them to complete the following statements:

I used to think...but now I know...

I used to think...but now I know...

I used to think...but now I know...

Taking Action

Identify a local biodiversity issue in your area. Your local council can provide this information. Issues that could be explored are:

- Invasive weeds or a feral animal.
- A local area.

Students create and implement an action plan (worksheet attached) to address this issue. This may be as simple as identifying and removing weeds in a natural environment to lobbying government concerning an issue related to biodiversity. A visit from a representative of a native plant nursery (e.g. APACE <http://www.argo.net.au/apace/>) may initiate an action plan to increase biodiversity in the school grounds using indigenous flora.

Students could also create a list of ways they can act to stop biodiversity loss on a global scale. They may wish to share this list with the rest of the school or community by creating a display. See <http://www.environment.gov.au/biodiversity/month.html#how>, <http://www.wms.org/biod/action/index.html> or <https://www.cbd.int/ibd/2008/youth/action/> for some ideas.

Biodiversity and Poverty websites

- <http://www.undp.org/biodiversity/biodiversitycd/biodev3.htm> Comprehensive information about biodiversity, poverty and development
- <http://www.globaleducation.edna.edu.au/globaled/go/cache/offonce/pid/4120> Information, teaching activities and case studies about biodiversity and poverty
- http://www.idrc.ca/en/ev-31631-201-1-DO_TOPIC.html Information on global agricultural diversity and specifically on staple food crops – e.g. rice, maize
- <https://www.cbd.int/doc/publications/development/poverty-alleviation-booklet-en.pdf> Booklet about biodiversity and poverty alleviation. Useful information on links between biodiversity and MDGs
- <http://www.abc-et.org/biodiversity/education/biodiversity-and-food> Lesson plan on biodiversity and food from Ethiopia's Institute of Biodiversity Conservation
- <https://www.cbd.int/ibd/2008/youth/> Youth page with information and activities about biodiversity, food and farming
- <http://www.cbd.int/doc/groups/youth/youth-bio-cc-en.pdf> Climate change and poverty PowerPoint slides with commentary
- <http://www.amnh.org/ology/index.php?channel=biodiversity#channel> – Interactive games about biodiversity with a global focus
- http://www.ecomentors.ca/pub/assets/pdfs/diversity_of_living_things.pdf Lesson plan about conserving biodiversity
- <http://www.environment.nsw.gov.au/resources/education/BiodiversityTeachersGuide1.pdf> A complete kit containing great ideas for the classroom with accompanying worksheets.
- <http://www.environment.gov.au/education/publications/biodiversity/index.html> - series of lessons on biodiversity
- <http://www.bagheera.com/index.htm> An endangered species and endangered animals website.
- <http://www.iucnredlist.org/> This comprehensive database lists endangered, threatened and extinct species. Search the status of a particular animal.