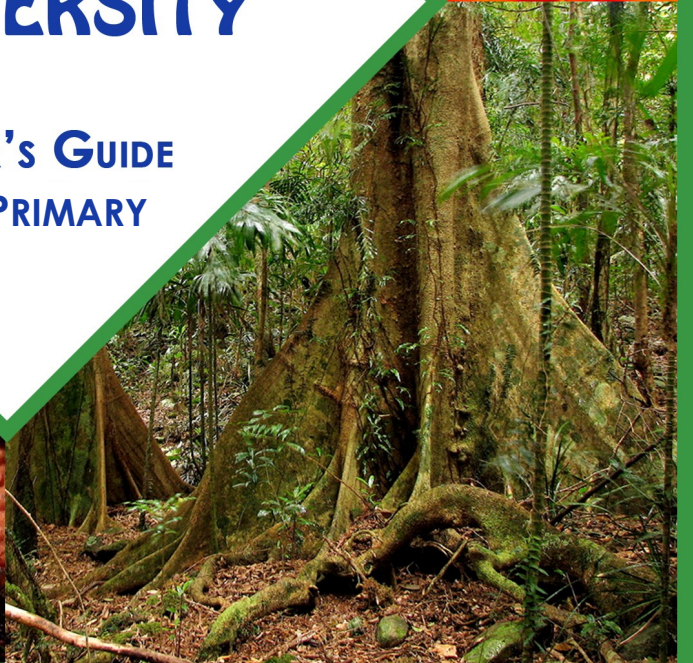




Eco-Schools  
Malawi

# BIODIVERSITY

TEACHER'S GUIDE  
UPPER PRIMARY



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Editor: Jonathan Vaughan, Lilongwe Wildlife Trust,

Writers: Nellie Chipwanyanya, Jennifer Tembo, Forgive Kanyoza (Lilongwe Wildlife Trust) & Ibrahim Mitole (Wildlife & Environment Society of Malawi).

Designer: Kate Moore, Lilongwe Wildlife Trust.

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*"In the end we will conserve only what we love. We will love only what we understand. We will understand only what we are taught." Baba Dhiom*

*"All around the world we are seeing the negative impacts of our increasingly unsustainable living practices - deforestation leads to floods, droughts and crop failure; pollution causes loss of biodiversity and sicknesses like cancer. The importance of ensuring environmental sustainability is becoming more important every day, a challenge recognized as one of the eight Millennium Development Goals (MDG). Closer to home the Malawi Growth and Development Strategies also identified the need of incorporating environmental issues in the school curriculum.*

*EcoSchools Malawi does just this and is a vital step forward in giving our children the knowledge and skills to make a difference. Congratulations to all those partners who have managed to bring this worthwhile scheme to fruition. I hope that you, as teachers, take great pride in bringing it to life in your school and inspiring your learners to put these important concepts into action. I also hope to see your name on the list of those who receive an EcoSchool Award at the end of the year.*

*We all have a part to play in protecting our natural heritage for the benefit of both people and the environment, so let's work together to make our world a better place."*

*Signed,*

*Mr Leonard Sefu, Director, Department of Parks & Wildlife*

## HOW TO USE THIS GUIDE

Each teacher's guide has been written especially to help you lead your learners on a journey, to explore environmental issues, develop skills, encourage positive attitudes and empower children to take action. These materials are not meant to be prescriptive, rather we hope that you see these as **supplementary materials** to help you develop your own interactive lesson plans, adapting to the resources available and making the themes relevant to the lives of your learners.

When developing your lesson plans, you are encouraged to use the **IVAC approach** as we have done throughout this guide. IVAC is 'action-oriented teaching' which facilitates **INVESTIGATION** of the issues developing their **VISIONS** and taking **ACTION** to facilitate **CHANGE**:

**INVESTIGATION (I):** Provide a learning platform that encourages children to investigate the topic at hand and discuss ideas together. Why is it important to us? How was it in former times? How has it changed?

**VISION (V):** What alternatives can we imagine? What is it like in other places? What do we prefer and why?

**ACTION (A):** Help children to formulate their own action plan on how to act on their knowledge. What actions bring us closer to our vision? What are the possible actions? What actions will we carry out?

**CHANGE (C):** Provide the means for learners to implement their desired action, make a positive change and monitor the benefits in their own lives as well as their schools and communities.

For each unit we have provided background reading to help you direct classroom investigation and supplemented this with suggested discussion topics and activities. Finally, we have made some micro-project suggestions that will help to translate their new found knowledge into action and change. You can also read more about EcoSchools accreditation scheme on the inside back cover of this guide. **We wish you the best of luck!**

## MODULE OVERVIEW

<b>Key concepts</b>	Biodiversity, ecosystems, species, extinction.
<b>Subject areas</b>	Social and environmental studies. Science.
<b>Grades</b>	7 and 8
<b>National Curriculum link</b>	Students learn about and appreciate the importance of having a variety of life forms.
<b>IB Curriculum link</b>	students gain some understanding on the interconnection between the natural world and human societies

### ~ LEARNING OBJECTIVES ~

#### UNIT 1: DEFINING BIODIVERSITY

Understand the concepts of biodiversity, ecosystems, species and extinction, and the importance of biodiversity to humans.

#### UNIT 2: BIODIVERSITY IN MALAWI

Learn about the importance of biodiversity in Malawi and how the removal of one species can have far reaching effects.

#### UNIT 3: THREATS TO BIODIVERSITY

Learn about the human threats that are leading to a decline in biodiversity.

#### UNIT 4: PROTECTING BIODIVERSITY

Understand the role that the human population has in protecting biodiversity.

#### UNIT 5: LEARNING FROM ACTION

Feel empowered to take action to protect biodiversity.

### ~ SUCCESS CRITERIA ~

For each unit we suggest that you develop a set of quiz questions for the class to assess their understanding of the topic. You can also set your own success criteria based on the activities you choose as part of your lesson.



# UNIT 1: DEFINING BIODIVERSITY

## ~ WHAT IS BIODIVERSITY? ~

Biodiversity is a big word with a simple meaning: it means the variety of life on earth. This includes all the animals, plants, fungi and micro-organisms in the world. It also includes the habitats in which they live. The term comes from the terms 'biological' and 'diversity' contracted together.

## ~ WHAT IS A SPECIES? ~

Each separate kind of animal and plant is called a species. Animals and plants of the same species breed with each other to make more of the same type. There are more than an est. 30 million species in the world and humans are just one species. Earth is an amazing place!

## ~ WHAT IS AN ECOSYSTEM? ~

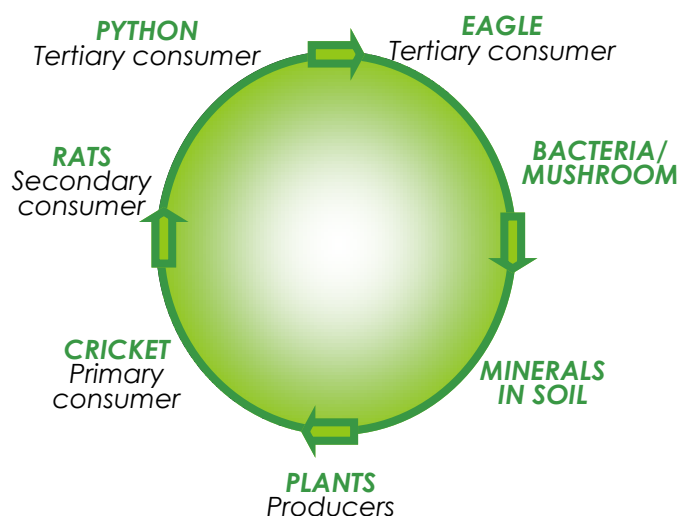
An ecosystem includes all of the living organisms in a specific area. These systems are the plants and animals interacting with their non-living environments (weather, Earth, Sun, soil, atmosphere). It is the complex set of relationships among the living resources, habitats and residents of an area. It includes plants, trees, animals, fish, birds, micro-organisms, water, soil and people. Everything that lives in an ecosystem is **dependent** on the other species and elements.

As far as the boundaries of an ecosystem, it depends upon how you use the term. An ecosystem can be as small as a puddle or as large as Lake Malawi. That ecosystem includes every living and non-living thing in the area. It is several small communities interacting with each other. When an ecosystem is healthy, scientists say it is **sustainable**. This means all the elements are in balance and can reproduce themselves.

## ~ WHY IS BIODIVERSITY IMPORTANT TO ECOSYSTEMS? ~

All plants, animals, birds and even fungi and insects are inter linked and all are vital for the survival of others. A good example is the **food chain in the forest...**

The **minerals in the soil** allow the **producers** to grow. The **producers** then feed the **primary consumer**, which in turn feeds the **secondary consumer** which feeds the **tertiary consumer**. The **tertiary consumer** dies, its carcass is broken down by the **decomposers** producing minerals in the soil. So, **biodiversity is vital for a healthy forest.**



**NONE OF THESE SPECIES WOULD SURVIVE ALONE WHICH IS WHY BIODIVERSITY IS SO IMPORTANT.**

### ...ACTIVITY TIME...

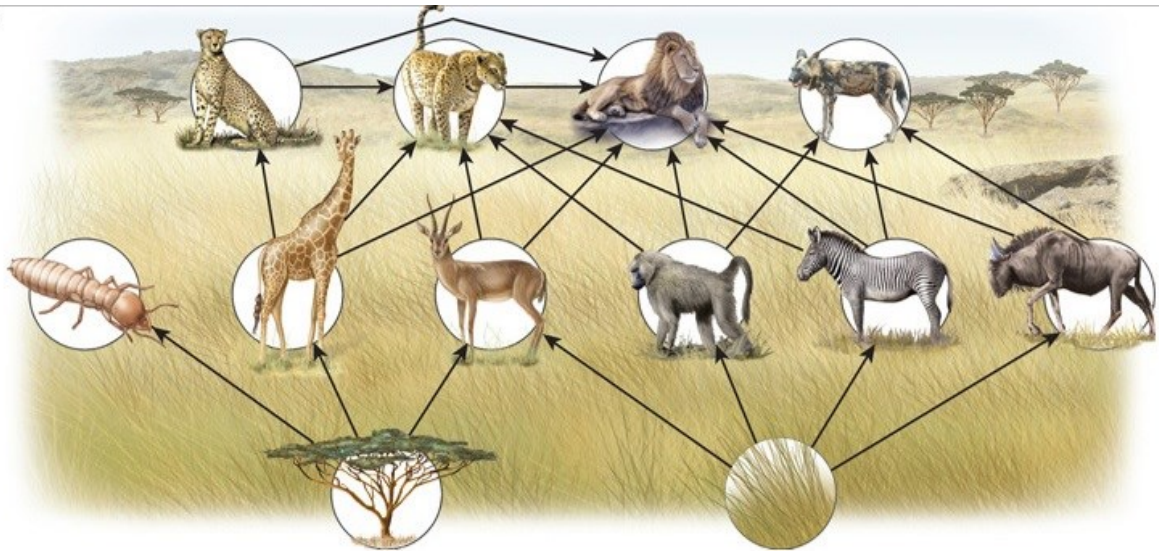
This encourages learners to think about just how many different species there are. Ask the class to split into two groups at each end of the room with a piece of paper and a pen. One person is designated the writer and the group must think of as many species as they can, plants and animals. Time them for 3 minutes. A spokesperson must then come and read out the list. One species is one point. Mention the same species twice and lose a point. The team with the most species is the winner.

**Trophic level**

Secondary consumers

Primary consumers

Primary producers



Each species within a habitat has a special way of living. Removing a species from an ecosystem can cause an imbalance. For example a lion is a predator, eating other species. Removing the lion from its natural habitat will cause its prey species to increase in numbers. Grazing and browsing animals may then reproduce too much and eat too much grass and vegetation and eventually destroy the ecosystem on which they depend. Similarly if there are not enough trees and grass because they have been destroyed then the primary consumers like the antelope would die, and in turn the secondary consumers wouldn't have enough to eat and would also die.

**...ACTIVITY TIME...**

The Leopard and Duiker game is a fun way to show how leopards hunt. One child volunteers to be the duiker and the rest are leopards. The duiker stands about 15 metres away from where the leopards are and faces away from the leopards. The leopards have to observe the duiker, and move only when the leopard is not facing them. When he faces them they freeze. They move slowly until they catch the duiker when he's facing away from them.

**~ WHY IS BIODIVERSITY IMPORTANT TO HUMANS? ~**

Biodiversity is the basis of human existence, our life support system. Humans depend on plants and animals. For example, we rely on healthy ecosystems for our basic survival (food and water) and for generating an income (e.g. wood for buildings, cotton for clothes). Ecosystems also regulate climatic processes, breakdown wastes and recycle nutrients, filter and purify water and maintain soil fertility. Many people also value biodiversity for spiritual and ethical reasons - that diversity on Earth has intrinsic value and is worth protecting for its own sake.

**SUPPORT**

- Nutrient cycling
- Soil formation
- Primary production
- Photosynthesis

**PROVISIONS**

- Food
- Freshwater
- Fuelwood
- Fibre
- Biochemicals



**REGULATION**

- Climate regulation
- Disease regulation
- Water regulation
- Water purification

**CULTURAL**

- Spiritual/religious
- Recreation & ecotourism
- Aesthetic & inspirational
- Education
- Cultural heritage

## ~ WHAT DOES SPECIES EXTINCTION MEAN TO BIODIVERSITY? ~

We discussed extinction in the wildlife welfare and conservation module. Extinction is where all the animals of a species die out. An animal can become extinct in an area (e.g. rhinos are now extinct in the wild in Malawi) or extinct all around the world (e.g. dodos are a famous bird that became extinct through over-hunting 300 hundred years ago). Many species of plants and animals become extinct naturally which is not a problem as ecosystems can adjust.

However, loss of species is estimated to be currently 1,000 times faster than the natural extinction rate should be. We will learn more about this in unit 3.

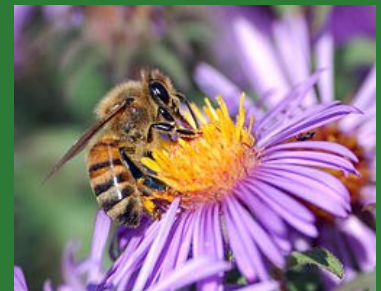
### ~ CASE STUDY: BUSY BEES ~

Biodiversity boosts ecosystem productivity. Each species, no matter how small, all have an important part to play. Bees are a good example. Some people are scared of bees because they sting. Others like them because they eat the honey that they produce in beehives which are farmed by beekeepers. Interestingly, beekeeping is viewed as the oldest form of agriculture - people have been farming honey for 3000 years. What many do not know is that if bees went extinct today humans would die in 5 years. Here's why...

One third of all our food—fruits and vegetables—would not exist without bees. If bees went extinct today humans would die in 5 years because we would run out of food.

#### Why is this?

Bees are very important to plants. This is because bees are pollinators. Pollinators are animals that help plants reproduce, or make more plants, by spreading pollen from one plant to another. The bright colors and scent of flowers are what attract bees. Once a bee lands on a flower, it crawls inside to drink the nectar. Then, the pollen grains that are on the flower's anthers, stick to the bee's body. They then "comb" the pollen from their body and deposit it onto their back legs.



There are 130,000 plants for which bees are essential to pollination. Important examples here include onion, tomato, pumpkin, avocado and cotton. So bees are important to the survival of species of plants that we don't eat, and many that we rely on here in Malawi.

#### The world's bee population is in decline...

It is estimated that the population of bees around the world has declined by 45% in the last ten years and this poses a major threat to global agriculture. This is thought to be for many reasons, but in the main it is due to human activity, including use of pesticides and fertilisers (which kills the bees and also has led to an increase in a disease that affects bees) and loss of habitats which destroys eco systems and therefore there are less native plants from which the bees can collect nectar.

### LET'S INVESTIGATE

You can help guide the children to think about why bees might be important as an example of the importance of biodiversity. Ask them what they know about bees and why they think bees are important to humans. You can then go on to explain some of the points above and ask them what they think might be causing the decline.

## UNIT 2: BIODIVERSITY IN MALAWI

### ~ WHY IS BIODIVERSITY SO IMPORTANT IN MALAWI? ~

Malawi's biodiversity is quite astounding. Think of all the animals like elephant and lion down to the cichlid fish, 95% of which can't be found anywhere else in the world. In 2011, new species of butterfly and orchid were found on Mount Mulanje. These species are important to the biodiversity of both Malawi and that off the whole planet.

We Malawians are more dependent on our country's biodiversity than more developed countries. This is because so many of us rely heavily on natural resources such as wood for fuel, and also on agriculture which requires good biodiversity.

So we need to protect our biodiversity and live in harmony with the environment for the future of our country.



### ~ GLOBAL PERSPECTIVE: A WORLD WITHOUT MOSQUITOS ~



Malaria once infected nine out of ten people on Borneo, an island in the Pacific Ocean that is about 4 times larger than Malawi.

In 1955, the World Health Organization (WHO) began spraying a pesticide called dieldrin to kill malaria-carrying mosquitoes. The program was so successful that malaria was almost eliminated from the island. However, unexpected things happened. The dieldrin killed other insects, including flies and cockroaches living in people's houses.

The islanders applauded. But then small lizards that also lived in the houses died after gorging themselves on dead insects. Then cats began dying after feeding on the dead lizards. Without cats, rats flourished and began overrunning the villages. Now people were threatened by sylvatic plague carried by the fleas on the rats. On top of everything else, roofs began to fall in. The dieldrin had killed wasps and other insects that fed on a type of caterpillar that either avoided or was not affected by the insecticide. With most of its predators eliminated, the caterpillar population exploded. The larvae munched their way through one of their favourite foods, the leaves used in thatching roofs.

The situation was brought under control when WHO parachuted healthy cats onto parts of the island. In the end, the Borneo episode turned out all right; both malaria and the unexpected effects of the spraying program were brought under control. Nonetheless, it shows the unpredictable results of interfering in an ecosystem. Even mosquitoes have their place.

### LET'S INVESTIGATE

Tell the story once. Then ask a volunteer to come up to the board. The volunteer can, with the help of the class, rough draw all the animals affected from memory, then link them up with arrows. Another volunteer can then come up and explain how the pesticide affected the whole ecosystem.



## ~ ACTIVITY TIME: CREATING AN ECOSYSTEM ~

### GETTING READY

Choose a local ecosystem, perhaps a forest, or the lake and lakeshore, or a national park, and with your students create a list of the various living and non-living things in that ecosystem\*. Remember to not only think of common animals, but also to include insects, fungi, fish, plants, microorganisms, and other living things. Assign each student the name of a plant, animal, microorganism, or non-living thing in the ecosystem. If you have time, students can write the name of their ecosystem member and draw it on a piece of paper and tape it to the front of their shirts. Having these signs on their shirts will help the students remember who's who throughout the activity. You will also need a big ball of string or twine.

### 1. Create an ecosystem.

Ask students to stand in a circle and explain that together they represent an ecosystem and each student represents a part of the ecosystem. Have students look around the circle and think about how plants, animals, microorganisms, and nonliving things in their ecosystem are connected.

### 2. Weave the web.

Ask one student to hold onto the end of the string and toss the rest of the ball of string to another student, explaining his or her ecological connection to that other student. For example, the tree student might say that she is connected to the bird student because she provides shelter for the bird. The bird then might say that he is connected to the snake because snakes eat birds. As each student makes a connection, help wrap the rope around the back of each student's waist, forming a big complicated star-shaped web among the students. It works best if students are connected to others across the circle from themselves, rather than next to each other.

### 3. Talk about the connections.

When all the students are connected to the web, explain that harming any part of the web can hurt the entire web, sometimes in ways that we don't foresee, because everyone is connected to everyone else in the ecosystem. Have the students imagine what would happen, for example, if the trees were cut down (the tree student can start to shake or tug on the rope), or if the birds went extinct (have the bird student fall to the ground). Ask the other students if they can feel the changes through their string.

### FINISHING UP

After students have played for a while, have them stop and discuss which members of the ecosystem have the most connections to others and why this might be the case (trees provide food and shelter for many species, for example). What might happen if one of the big animals that eats other animals disappears? With fewer key predators, the animals the predators eat become more numerous, which can affect many other interactions in the system. Animals such as large predators that are important to the way the whole ecosystem works are examples of keystone species. What might be a keystone species in your local ecosystem? Discuss the status of ecosystems in your area—are they healthy or has there been some sort of disturbance to the system (pollution, deforestation, over-hunting)?

*\*Sample Forest Ecosystem Members: sun, water, soil, trees, wild pig, frog, snake, monkey, bee eater, bird, butterfly, lizard, insect, bee, parrot, tortoise, bird of prey, small plant, large cat (e.g. leopard), mushroom, flowering plant, snail, alligator. Be sure to include a human in the web!*

## UNIT 3: THREATS TO BIODIVERSITY

Over the past 50 years the human population has doubled. In that time, we have lost a quarter of our land species and nearly a third of living organisms in the sea and freshwater. This is at least 1000 times faster than the natural extinction rate and it is humans are responsible for this acceleration in loss of biodiversity. Given the interrelationship between people, biodiversity and ecosystems, this loss will contribute to the decline in human well-being. Here are the main threats to biodiversity:

### ~ HABITAT LOSS ~

Habitat loss is considered to be one of the biggest threats to biodiversity. Land is transformed from its natural state by activities such as cultivation, grazing, urban developments and mining. This can affect any habitat but tropical forests are especially important because they harbor at least 50% of the world's biodiversity. Draining wetlands and flooding valleys to form reservoirs also destroys these habitats and all the organisms in them. This destruction can cause remaining habitats to become fragmented, or broken up, and so too small for some organisms to persist, or fragments may be too far apart for other organisms to move between.



Habitat loss in Malawi is mainly as a result of deforestation from agricultural expansion and use of wood for fuel, which continues to be the main source of energy for most Malawians. We will learn more about this in the 'Forests and Deforestation' module.

### ~ OVER-EXPLOITATION ~

Over-hunting has been a significant cause of the extinction of hundreds of species and the endangerment of many more, such as whales and many African large mammals like elephant and rhino. Most extinctions over past several hundred years are mainly due to over-harvesting for food, fashion, and profit.



Recently government have tried to control the over-exploitation of biological resources in their countries such as the introduction of quotas for fish and marine resources. This is very difficult because so many people have come to rely on these resources for their livelihoods but if something is not done soon there will be no resources left.

Various social pressures impact on biodiversity. The world's increasing population means more people need to use the natural resources like food and water to survive. Poverty also creates a heavy reliance on biological resources for sustaining livelihoods. For example, poorer people in Malawi do not have electricity and need to use wood for cooking.

Our societies tend to see economic growth as the most important thing, and individuals and companies will often put making money now ahead of taking care of our natural resources for the future. This is ironic given the loss of biodiversity will cost us much more in the long term.



Population growth, habitat destruction and wildlife hunting have all contributed to the exploitation of our environment at a rate which is not sustainable. We now require the equivalent of 1.4 planets to support our lifestyles and the situation is getting worse.

## ~ POLLUTION ~

Waste products that are emitted into the atmosphere and dumped in rivers, wetlands and oceans places great pressures on these ecosystems, with an associated loss in biodiversity and decline in ecosystem services.

Pesticides and fertilisers also harm biodiversity because they are designed specifically to either kill insects or help crops to become stronger than they would naturally be, often at the expense of other plants. This upsets the natural balance and, as we learnt from the case study of the mosquito in Borneo, killing off one 'pest' can impact a whole ecosystem.



## ~ INVASIVE SPECIES ~

Invasive alien species (IAS) are biological organisms that are introduced into an ecosystem from outside. They usually cause harm because they are stronger predators, they compete for food or they bring in diseases that kill the native species. Here are some examples:

- ◆ The African Great Lakes - Victoria, Malawi, and Tanganyika - are all famous for their great biodiversity, especially cichlid fish. In Lake Victoria a species called the Nile Perch was introduced for food and also sports fishing. But this one fish has eaten almost all the native cichlids and now many species are extinct.
- ◆ Of the 31 identified invasive alien species in Malawi, water hyacinth is the most harmful. It was discovered in Lake Malawi in the 1960's and has spread across the Lower Shire River and has led to the decline of many aquatic plants that other animals like snakes, birds and fish rely on. It has also changed the and has reduced the speed of the river flow, and thus also the hydro-electric power that can be generated.
- ◆ Gmelina (pronounced Molina) trees were brought to Malawi because it was fast growing and good for timber and firewood. However it deposits berries that poison the soil around it and very few plants or trees can grow near it. Walk through a Gmelina forest and you won't hear birds or monkeys because they cannot eat the fruit or leaves.



## ~ CLIMATE CHANGE ~

The changing climate of the Earth is resulting in droughts, floods, extreme weather and rising sea temperatures. Climate change is caused by unsustainable human practices like deforestation.

Some plants and animals would adapt to the change or move, but many species would be killed off. They cannot adapt fast enough to this and numbers are decreasing as a result. Since ecosystems are connected, changes in climate could cause a chain reaction, killing off species that depend on each other. You will learn more about this in the 'Climate Change' module.



## UNIT 4: PROTECTING BIODIVERSITY

### ~ WHY PROTECT BIODIVERSITY? ~

Just because natural resources and the services they provide appear to be free, we should not take them for granted. Biodiversity is a fundamental part of the Earth's life support system. It supports many basic natural services for humans, such as fresh water, fertile soil and clean air. Biodiversity helps pollinate our flowers and crops, clean up our waste and put food on the table. Without it we would not be able to survive.

### LET'S INVESTIGATE

Ask the children who they think has the responsibility to help conserve the biodiversity? Considering the threats to biodiversity, what can we do to protect it?

The term biodiversity should also remind us that no one organism lives in isolation. The many different ways that the millions of organisms on the Earth interact with each other contribute to the balance of the global ecosystem and the survival of the planet. Biodiversity plays a role in regulating natural processes such as the growth cycles of plants, the mating seasons of animals, and even weather systems. We all have a role to play in protecting biodiversity.

In 1992, Malawi became a signatory on The Convention of Biodiversity. The Convention notes that while key priorities for developing countries are economic and social development and poverty eradication, the conservation and sustainable use of biodiversity is critical for meeting the food, health and other needs of these countries' growing populations.

### ~ WHAT CAN WE DO? ~

There are many sustainable practices in our own lives that we can take pride in and know that we are doing our bit for biodiversity.

**PROTECT HABITATS & ENCOURAGE BIODIVERSITY TO FLOURISH** Plant more trees and cut fewer trees down. Clear as little as possible for agriculture. Let nature breathe, don't sweep everything up outside your house. Plant native plants and trees in your garden and at your school. Don't introduce alien species like gmelina or eucalyptus trees.

**RESPECT WILDLIFE** You might not like snakes, bees or bugs, but every living thing has a place in this world. Respect wildlife and learn to share your environment with it.

**DON'T POLLUTE, DON'T DROP LITTER** Get rid of your waste responsibly. Sewage that ends up in the river or lake will kill fish. Litter will kill animals and poison the soil.

**MINIMISE YOUR USE OF FERTILISERS & PESTICIDES** These make soil less fertile over time, so whilst fertilisers might help you get good crops this year, you will struggle in future years. There are many natural ways that you can increase the fertility of your land and learn to use water more efficiently. You can find out more about permaculture methods in later modules.

**REDUCE YOUR USE OF RESOURCES** from firewood, electricity and water. Use fire briquettes made out of recycled materials instead of fuelwood and use eco stoves that need less fuel. Turn off dripping taps and re-use waste water for watering plants. Don't hunt wild animals or overfish lakes and rivers. Consumer products which are all made out of precious resources so think before you buy or throw away. Live more sustainably and you will reduce your impact on the environment.

**SPREAD THE WORD** Tell people about the importance of biodiversity and how they can help protect it for the benefit of people and wildlife.

## UNIT 5: LEARNING FROM ACTION

As part of your work towards Eco Schools accreditation, you are recommended to undertake a micro-project that helps children to learn through action and see the impact of the change they have implemented.

Living more sustainably and in harmony with the environment is a step that we can all take towards protecting biodiversity. These suggested projects also link in with other modules in the programme.

### ~ BEE KEEPING ~

Bee keeping is a great opportunity for children to learn about biodiversity, ecosystems, food production, social hierarchies, the value of the natural world and the importance of sustainable living. Your school will also be contributing to conserving local biodiversity and agriculture because bees will help to pollinate local crops and support local ecosystems.

It is certainly an art that requires care and attention in the beginning but once set up you can let nature take its course and wait for honey harvesting time, which happens around November in Malawi.

Setup instructions including health and safety guidelines are available upon request from the EcoSchools partners, as are the contact details of local experts who can help you with establishment of your project and harvesting.

If beekeeping is impractical for your school there are also demonstration sites planned for 2014 at Lilongwe Wildlife Centre and Kuti Wildlife Reserve which both cater for visits from school groups. Make sure you call ahead to book.



### ~ GREEN & CLEAN ~

The 'Green & Clean' micro-project tackles a number of issues brought up in both this and other modules.

Elements include:

- ◆ **Afforestation:** learners plant 1-2000 trees in a woodlot which they manage
- ◆ **Fuel briquettes:** learners work with the local fuel briquette co-operative to learn how to make and use briquettes.
- ◆ **Use of eco stoves:** these stoves help to reduce fuel-wood usage and were also used with fuel briquettes
- ◆ **Community clean up:** learners take responsibility for picking up litter and set a good example to other community members.

You can find out more about how to run a similar project in your school in the micro-project supplement which is supplied as part of this series. If you would like advice please email [education@llwc.org](mailto:education@llwc.org), call 0211 951819 or write to Lilongwe Wildlife Trust, PO Box 2140, LLW.



## EXTRA RESOURCES

### ~ PERMACULTURE ~

Permaculture is the development of agricultural ecosystems intended to be sustainable and self-sufficient. It is about working with rather than against nature. Here are some examples of practices:

- ◆ Harvesting rainwater and other available water sources effectively
- ◆ Using compost and organic waste for fertilizer instead of chemicals that deplete the soil over time
- ◆ Planting crops that are suitable for the area e.g. peas put nitrogen back into the soil, lettuce benefits from more shady areas whereas carrots need 5+ hours of sun a day.

Setting up permaculture gardens at your school can be a very rewarding micro-project for the learners, because they grow food that they will ultimately eat and they can even generate income for the school through sales of the produce. Guidelines for how to set up a permaculture garden are available from your EcoSchool partners.

### ~ CASE STUDY: PERMACULTURE IN MZIMBA ~

Teachers and learners at Kapita Primary School, Mzimba, underwent a 5 day intensive permaculture training course. One year on, here are the results as reported by a visitor.

"10 months on, on the back of their education in permaculture, the school formed a permaculture committee comprising of students, teachers and parents. The committee has developed an annual action plan for the following year and has planted over 300 fruits and vegetables around the school. Further to this mulching, composting, a seedling nursery and the construction of eco-sanitation toilets is managed by young pupils of the school.

During our first school visit we could see the remains of a recently harvested maize garden, well tended and a good harvest. Unfortunately that was the only edible crop the school was demonstrating. Today the school boasts 11 fruit tree species, 4 nitrogen fixing agro-forestry species and 5 other staples alongside the 1.5 acres of maize – an incredible increase in seasonal, nutritional and climatic strength and availability of food. We are so inspired by their work and more importantly, so are neighbouring communities.

Permaculture plots and practices are now evident across villages in the region, most notably Zatuba Village. Bearing witness to the rapid, empowering results of permaculture has driven villagers to start experimenting with their own farming plots and embrace organic agriculture. A critical move towards reducing reliance on chemical based fertilizers to improve soil health and eliminate leeching into water sources.



## MORE ON ECO SCHOOLS MALAWI

### HISTORY

Eco-Schools is an international award programme introduced by the Foundation for Environmental Education that operates in more than 46 countries around the world including South Africa and the UK. Set up in 1994, the purpose was to involve young people in finding solutions to environmental and sustainable development challenges at the local level. The programme encourages whole-school improvement through positive environmental change and curriculum-based learning. Teachers, learners, community members and various partner organisations can work together and are given the opportunity to improve the environment of the school and also that of the community.

### ECO-SCHOOLS MALAWI

The Eco-Schools programme was adapted for Malawi and launched here in 2012. Through this programme learners will increase their awareness and understanding of key environmental issues and will be encouraged to develop a passion for and ownership of their country's natural heritage. This is achieved through participation in classes and workshops on key environmental themes as well as practical micro-projects that help students to learn through action. Schools are encouraged to explore the following themes, for which these teacher's guides provide a framework:

- ◆ Wildlife welfare & conservation
- ◆ Nature & biodiversity
- ◆ Forests & deforestation
- ◆ Water
- ◆ Soil & sustainable agriculture
- ◆ Waste management
- ◆ Climate change
- ◆ The environment & human health

These topics are linked closely to those of both the IB & National Curriculums, so enhancing overall learning for those pupils involved.

### BENEFITS OF JOINING ECO-SCHOOLS MALAWI

- ◆ Enhances the curriculum: Eco-Schools provides great ways of introducing environmental topics linking in with the National Curriculum and, in doing so, it helps to develop a creative learning environment for all pupils involved.
- ◆ Links to the community: The Eco-Schools programme is designed to involve as many people as possible, both inside and outside school, to raise their awareness of environmental issues and to improve the community spirit of an area, helping everyone to become involved in the decision-making of their local area.
- ◆ Improves school environment: Students are encouraged to take responsibility for their environment around them, and you are likely to see the results in many ways, from less litter through to tree planting and vegetable gardens as part of the micro-projects.
- ◆ Recognition & publicity: Schools are assessed on a number of criteria each year and they can work towards bronze, silver and gold accreditation. Gaining this accreditation is an important achievement which will undoubtedly attract attention within the school and in the wider community.

### WHO CAN JOIN?

The scheme is initially being introduced in a select number of schools in Lilongwe and Salima who will work closely with the key Eco-School partner organisations, WESM & Lilongwe Wildlife Trust, with a view to roll out the programme nationwide in 2014/15. However any school can apply to join the scheme. The programme will be run by a select eco-committee within the school which we recommend should include around 30 learners, a teacher and at least one other community member representative. There are also opportunities for whole school involvement through activities like assembly presentations.

### HOW TO FIND OUT MORE

This series of teacher's guides are supplemented with a handbook which provides more details how the scheme works. You can also contact [education@llwc.org](mailto:education@llwc.org) for more information.



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