Biodiversity, food and farming for a healthy planet

Teacher's Edition

Convention on Biological Diversity

Glossary

All **bold** words in the book are found on this page. Be sure to check back when you want to know the meaning of a word in **bold**.

Ancestor: ancient relative.
Aquaculture: fish farming.
Archeologist: scientist who studies ancient human civilisations.
Biodiversity: the variety of life on Earth, at each of the genetic, species and ecosystem levels, and the relationships between them.
Breed: a grouping of animals having a common ancestor and the same characteristics.
Carnivore: animal that eats only animals.
Cell: the basic building block of life. All organisms are made up of one or more cells.
Community: a group of organisms that share an environment.
Compost: recycle food wastes by decomposition.
Crop: plant that farmers grow.
Crop pest: insect, fungus, microorganism or animal that eats or damages crops.
Domesticated: species trained or adapted by humans. All domesticated species originated from wild ancestors.
Ecosystem: all communities living and interacting with each other within a given area.
Ecosystem service: a benefit that people obtain from ecosystems.
Ecology: the study of species in their natural environment.
Endangered species: species threatened by extinction.
Environment: the set of conditions—land, organisms and climate—in which a group of organisms live.
Epiphyte: a plant that grows on another plant and depends on it for support but not food. Epiphytes get moisture and nutrients from the air or from small pools of water that can collect on the host plant.
Fertilizer: nutrient-rich material the farmer adds to the soil.
Food chain: the sequence of who eats whom in a community.
Food web: many food chains that are related.
Fungus: organism that grows, like the roots of a plant, in the soil. The fruit of some fungi are mushrooms.
Genes: characteristics that make each individual unique.
Grain: small fruit with one seed.
Herbivore: animal that eats only plants.
Industrial farming: type of farming that needs machines and other resources that must be bought.
Livelihood: way of supporting yourself, either through a paying job or by growing, producing and/or gathering everything you need to survive.
Macroorganism: a small creature that can be seen with the naked eye.
Microorganism: a creature too small to be seen with the naked eye; you need a magnifying glass or microscope to see it.
Mixed farming system: type of farming that combines farming with another type of activity, such as herding, fishing or forestry.
Nutrient cycling: the reusing of nitrogen, carbon and other nutrients in ecosystems.
Omnivore: animal that eats plants *and* other animals.
Organic or ecological farming: type of sustainable farming where on-farm renewable resources are used as much as possible.
Organism: a living individual, such as a maize plant, a bird, a fish or a human.
Pasture: area of land, usually surrounded by a fence, where farm animals graze.
Pesticide: chemical applied to crops to kill crop pests.
Pollination: the first step in plant reproduction that produces a seed. Pollination requires water, wind or a pollinator to transfer pollen to a flower.
Pollinator: insect or animal that fertilizes a flower.
Recycle: processing of an item made of plastic, paper, rubber or metal to reuse it by making it into a new item.
Reduce: to decrease or use less. For example, buying goods with less packaging or buying fewer goods.
Renewable resource: resource that can be used more than once because it is replenished by natural processes at the rate it is used.
Resource: something that can be used to make something else. Farmers need natural resources, such as land, air, water and sunlight, to grow food.
Rethink: think about choices. Are they sustainable?

Reuse: use any item again and again until it is worn out and cannot be repaired.
Small-scale farming: farmers grow food for themselves, their family and sometimes the local market on a small piece of land with limited resources. Often, these farmers do not have the money to buy resources they need.
Species: a group of organisms that can reproduce.
Sustainability: the ability to continue an action forever because it considers the environment, people and their livelihoods.
Sustainable farming: type of farming that can continue over the long term with little or no damage to the environment.
Traditional (or local) knowledge: information and learning processes developed over many years and passed down from one generation to the next. Traditional knowledge is not static; it evolves or changes over time.
Variety: a grouping of plants having a common ancestor and the same characteristics.

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Learning for a Sustainable Future

Convention on Biological Diversity

CONTENTS

Introduction

Biodiversity is one the world's most precious **resources**. All life on Earth provides us with the food we eat, cleans the air we breathe, filters the water we drink, supplies the raw materials we use to construct our homes and businesses, is part of countless medicines and natural remedies, and many other things. It is also important to many cultural traditions and beliefs and to people's **livelihoods**, especially for families living in rural villages in developing countries.

This book explores the many different parts of nature that make **biodiversity** and agriculture possible. It is divided into six sections:

- What is biological diversity?
- What does **biodiversity** have to do with the food we eat?
- How do farmers grow food?
- Can farming affect **biodiversity**?
- What can you do?
- What is the Convention on Biological Diversity?

There are also several *special features* throughout the book:

- Words in **bold** are defined in the glossary on pages 2 and 3.
- The main text is dotted with *Did you know?* facts. They are a great way to learn all kinds of interesting and unusual things about farming and **biodiversity** in different parts of the world.
- Each section finishes with a game or puzzle to help you remember the important points.

Biodiversity, food and farming for a healthier planet is a special project of the Secretariat of the Convention on Biological Diversity. The book's theme – **Biodiversity** and agriculture – matches the 2008 theme for the International Day for Biological Diversity (IBD), celebrated worldwide on 22 May every year. The messages in this book, however, are important for every day of every year!

If you like what you read, want to share some comments or ask further questions about **biodiversity**, please visit cbd.int. Happy reading!

Sincerely,

Leah and Christine

What is biological diversity?

Biodiversity is the short way of saying biological diversity, which includes all the various forms of life on Earth. It sometimes referred to as the web of life. Although **biodiversity** is very complex, the web of life is often divided into three parts: **genes**, **species** and **ecosystems**.

Did you know that in the Amazon rain forest, a single tree can provide a home for up to 2,000 species of birds, insects, **fungi**, **epiphytes** and **microorganisms**?

Genes are special codes or instructions found in all **cells**. These codes give **organisms** different characteristics that determine the way we look and behave. **Genes** determine if you will have brown or blue eyes, or big or small or smelly feet. Genetic diversity is at the individual level and makes everyone unique.

A **species** is a group of **organisms** that can reproduce. Although we may not think of it, we see different **species** as we go about our daily life, such as humans, dogs and cats. **Species** diversity is the most obvious type of **biodiversity**. Our planet, Earth, supports millions of **species**, many of which are not yet identified! At present, there are over 375,000 known **species** of plants that produce flowers and 15,000 known **species** of mammals and birds. There are thousands of small **organisms** or **microorganisms** that scientist have yet to identify.

Cocoa grows on tropical trees. Chocolate and cocoa products use about 1.5 million tons of ground cocoa beans each year. That's greater than the weight of 300,000 elephants!

Within a **species**, there is genetic diversity. So groups of **organisms** that share a common **ancestor** (ancient relative) and have the same characteristics are identified as a **breed** for animals and as a **variety** for plants.

Simply put, an **ecosystem** is the nature in which **species** live. **Ecology** is the study of **species** in their natural **environment**. There are many kinds of **ecosystems** on Earth. Some are

very familiar to us such as forest, mountain or marine **ecosystems**. Others are less known, but still very important in terms of **biodiversity**.

Ecosystems are made of many different kinds of **species**. In the same way that humans live in **communities**, so do animals, plants, and even **microorganisms** (creatures too small to be seen without a microscope). Where **communities** of **microorganisms**, plants and animals co-exist, they form an **ecosystem**. **Ecosystems** can be small like puddles, or large like deserts, forests, wetlands, mountains, lakes and rivers.

Not only do **ecosystems** house **microorganisms**, plants and animals, they also provide benefits called **ecosystem services**. **Ecosystem services** are all the natural **resources** and processes that maintain the conditions for life on Earth. They provide us with food, clean air and water. They regulate water levels and help to prevent flooding. They break down wastes and **recycle nutrients**, which is very important for growing food. **Pollination** is an important **ecosystem services** in farming. **Biodiversity** in **ecosystems** also protects us with "natural insurance" against future unknown conditions brought about by climate change or other events. Another important **ecosystem service** is the cultural value of natural landscapes to people's religious beliefs and leisure activities.

Biodiversity and food webs

Biodiversity is referred to as the web of life because many **microorganisms**, plants and animals interact with each other. The relationship among **species** is an important part of **biodiversity**.

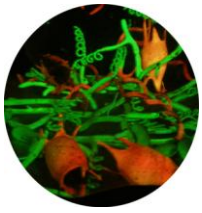
A **food chain** is a sequence of who eats whom. The usual order of a **food chain** is sunlight, plants, **herbivore**, **omnivore** and/or **carnivore**. In one type of farming **food chain**, green grass and wildflowers use sunlight to grow in a field maintained by a farmer called a **pasture**. A Billy (boy) or Granny (girl) goat grazes on these delicious plants in the **pasture**. A goat or any other plant-eating animal is called an **herbivore**. Animals that rely on the farmer for food and protection are **domesticated**. In turn, the goat provides milk, meat and wool for the farmer, his family, and others. Humans are **omnivores,** as they eat plants and animals. The goat also provides **fertilizer**. **Microorganisms** decompose the goats' poop or excrements, which provides **fertilizers** for the grass and flowers to grow. This is one example of a simple **food chain** based only on green plants, goats, **microorganisms** and humans. Millions of **food chains** exist around the world.

Food chains that are related in an **ecosystem** form a **food web**. In forest **ecosystems**, many types of **herbivores** eat the trees and other plant life. **Carnivores**, or meat-eating animals such as tigers, lions, and wolves, prey on **herbivores**. They usually prey on wild animals. Sometimes, if the habitats or homes of **carnivores** are destroyed, they may also attack goats, sheep or cows for food. For example, in India, farmers may lose their goats to tigers; in Eastern Africa, cows may provide lunch for lions and in Western Canada, wolves sometimes attack the **domesticated** sheep. **Carnivores** are an important part of **biodiversity** because they regulate **herbivore** populations so that they do not eat their favorite plant **species** to extinction.

A Simple Farming Food Chain

Human/farmer

Goat

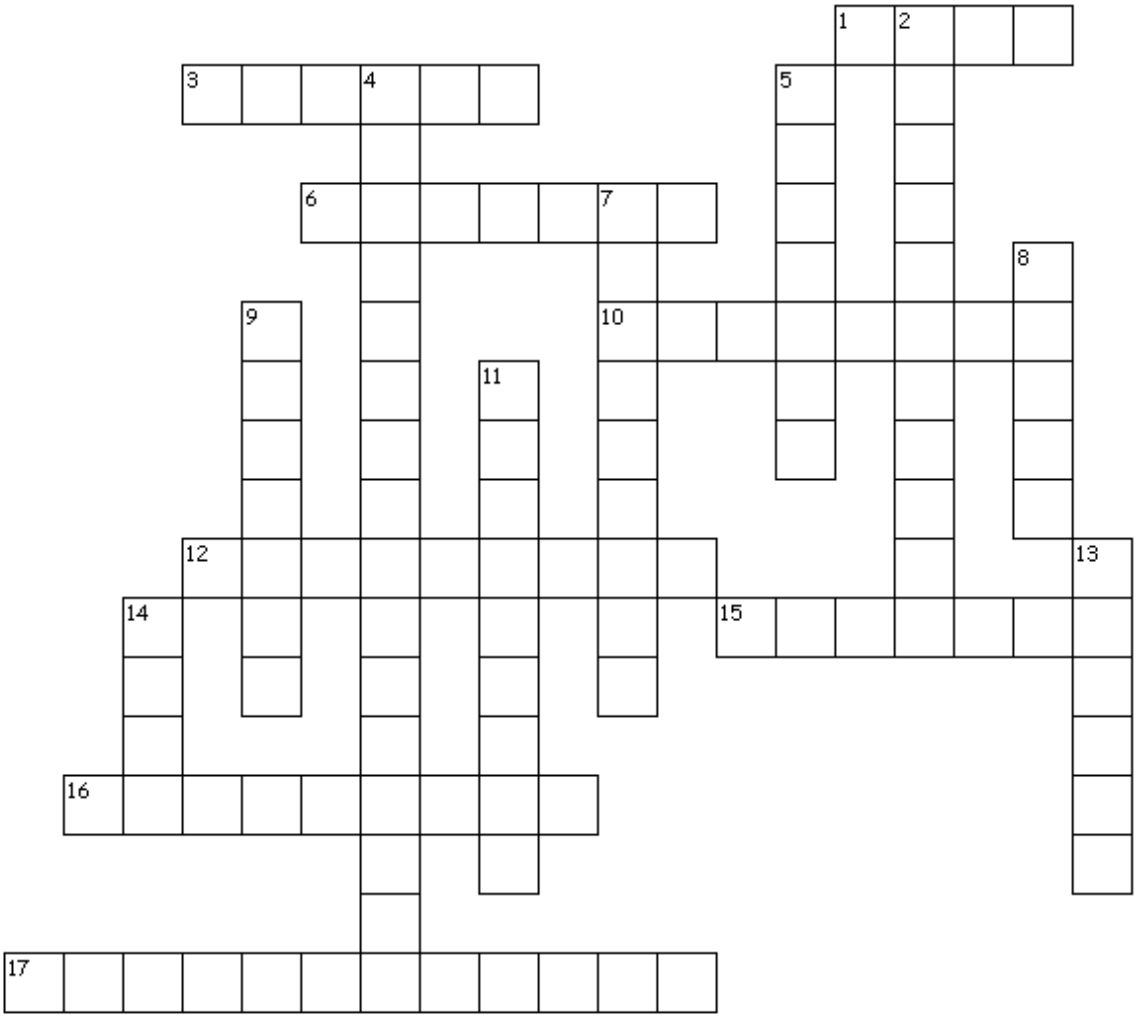


Microorganisms

Grass/flowers

The Web of life

Fill in the blanks by using the clues below.



Across

1. The basic building block of life
3. Ecosystem of trees
6. Many food chains that are related
10. Animal that eats plants *and* other animals
12. A group of organisms that share an environment
15. Area of land where farm animals graze
16. Animal that eats only plants
17. The variety of life on Earth and the relationships between organisms

Down

2. The set of conditions that a group of organisms live
4. Benefit that people obtain from ecosystems
5. A group of organisms that can reproduce
7. All communities living and interacting with each other within a given area
8. Characteristics that make each individual unique
9. The study of species in their natural environment
11. Animal that eats only animals
13. Dry ecosystem
14. Water ecosystem

What does biodiversity have to do with the food we eat?

Biodiversity provides us with a wide range of plants and animals. These **species** form a basis for nutrition, family and cultural traditions, medicines and ways to learn about and respect the life around us. Over the centuries, farmers grew over 7,000 plants and raised 30 **species** of animals for food and other uses.

We eat many different parts of plants: stalks, seeds, flowers, leaves, bark and even roots. You are probably thinking, "Yuck, I do not eat roots." It so happens that carrots, potatoes and cassava are all roots and are eaten every day all around the world! Cauliflower and broccoli are actually the flowers of the plant; maize (or corn), rice and peas are seeds; celery is the stalk; and lettuce and spinach are leaves. Fruits such as mangoes, apples and oranges grow on trees. Fruits such as cucumbers and grapes grow on vines. The bark of some trees is used for making flavoured tea or as spices like cinnamon. The sap of sugar maple trees is used for making maple syrup. Also, let us not forget gourds or melons, such as pumpkins, squash or watermelons!

Did you know that cheese was first made over 4,000 years ago in Asia?

Biodiversity is not limited only to plants; it applies to animals as well. Chickens, goats, cows, pigs, llamas and other **domesticated** animals also play a vital role in feeding the world's population. It takes a lot more energy and **resources** to raise animals than to grow plants, so it is important not to eat too much meat.

As agriculture developed around the world at different times, many peoples **domesticated** local plants and animals. Farmers grew plants and raised animals that were found locally; people ate what they grew. For example, in the Andean Mountains farmers began cultivating the potato 6,000 years ago near Lake Titicaca. A little after they started growing potatoes, around 4,000-5,000 years ago, Andean farmers **domesticated** the llama.

Did you know that in the Andes in South America, some farming communities grow as many as 178 different types of potatoes? Pass the butter!

Archeologists, scientists that study ancient human civilisations, estimate that maize (or corn) was **domesticated** about 6,000-10,000 years ago in Mexico. Even so, maize is not the oldest cultivated plant in the world. **Archeologists** think rice cultivation began over 12,000 years ago in Indochina! Six thousand years later, farmers in the region started growing citrus fruits. Today, we eat diverse citrus fruits such as oranges, lemons, and limes.

Did you know that grapes have been cultivated for more than 8,000 years?

If you lived 10,000 years ago, you would not have seen the same cows and cattle you see on farms today. Instead you would have seen their **ancestor** (ancient relative), the aurochs. Farmers in both India and the Fertile Crescent (now known as the Middle East) **domesticated** local aurochs around the same time.

Apples have a long and colourful history. Some of the first people to eat apples were travelers along the ancient silk trading routes. The road passed through the forests of Kazakhstan, which had very tall trees of the **ancestor** of apples (60 feet or 18 meters high). The travelers probably picked the small apples to carry with them on their journey. Later, ancient Greeks and Romans **domesticated** the **ancestor** of the apple for the first time. Chinese farmers invented the method of grafting (joining the branch of one tree with the trunk of another) that now produces the large juicy apples we enjoy today.

Archeologists discovered that humans enjoyed eating apples for over 6,000 years!

Today, seeds of just a few **species** are available for farmers to buy. The result is that many farmers around the world are growing similar foods. Most farmers grow rice, wheat or maize. Sometimes local foods and **species** are not grown or people do not want to eat them. Many of these vegetables are high in vitamins important for daily nutrition. When these foods are forgotten, a little part of **biodiversity** is lost.

The organization Bioversity International helps **communities** conserve their diverse diets by linking local partners. In Kenya, they helped farmers find local markets for a traditional leafy-green vegetable by encouraging store, supermarket and restaurant owners to sell and use them.

What parts of plants do you eat?

Match the type of plant part on the left with one or more examples from the right.

Plant parts	Food
	Rice
Roots	Pumpkins
	Squash
Flowers	Oranges
	Cinnamon
	Cabbage
Nuts and Seeds	Tomatoes
	Celery
Leaves	Lettuce
	Spinach
	Potatoes
Fruits	Broccoli
	Honeydew
	Carrots
Melons	Beans
	Onions
Bark and Sap	Cauliflower
	Bok choy
	Pistachio
Stalk	Maize (corn)
	Apple
	Cashew
	Maple syrup

How do farmers grow food around the world?

If you visited a farm in every country, you would notice a lot of variation. You might see a cocoa plantation in Ghana, a wine vineyard in Italy, rice patties in China, a wheat field in the United States or a cattle ranch in Brazil.

Farmers living in different areas have different climates, landscapes, **microorganisms**, plants and animals so they must adapt their growing practices to local conditions. However, all farmers rely on **ecosystem services**.

To grow crops, it helps if farmers understand local growing conditions (such as knowing when the rainy season starts, which **crops** grow well together, what nutrients the **crop** needs and are these nutrients present in the soil). After deciding what to grow, farmers often till the land by loosening the soil and mixing in **fertilizers**, which are nutrient rich. Then, they sow seeds or plant seedlings. When the **crops** are growing, farmers must water (or rely on rainfall), weed and kill **crop pests** (any **organisms** that eat or destroy **crops**)**.** Once the **crops** are mature, the farmer will harvest them.

Farmers need resources to grow food. A **resource** is something that can be used to make something else. Farmers need many different types of resources to grow food. They need natural **resources**, such as land, air, nutrients, water and sunlight. Farmers themselves need energy so they can work the land. Farmers need human-made tools to work the land. Some resources can be bought at the local market. So farmers also need money to buy **resources** that are not available on their land.

Did you know that a hive of bees flies over 55,000 miles to bring you one pound of honey? A honeybee can fly 15 miles per hour (24 kilometers per hour)?

Growing **crops** without **pollinators** is hard, if not impossible, even with natural resources, energy, tools and money. **Pollinators fertilize** flowering **crops** by transferring pollen from one

flower to another. Insects, birds, small mammals and even the wind and water can pollinate flowers. The most common **pollinator** is the honeybee; it helps coffee flowers produce coffee beans in Columbia, mango flowers produce mangoes in India, passion fruit flower produce passion fruits in Brazil, and watermelon flower produce watermelons in China. And don't forget that honeybees also produce honey!

Have you ever wondered how farmers can grow healthy **crops** on the same piece of land, year after year, without using up all the nutrients in the soil? **Nutrient cycling** is an important **ecosystem service** that allows nutrients to be used by several **organisms** and later returned to the soil to begin a new cycle. In South Africa, farmers bring their sheep to large pastures for grazing. The grasses and flowers in the pastures take up nutrients found in the soil through their roots. The different **species** of grasses and plants take up different nutrients and transform them into vitamins and minerals. When a sheep eats plants, the nutrients are transferred into its body and used for growth. Some of the nutrients will not be absorbed by the animal and will pass through its digestive system. Over time, worms, bacteria and other **microorganisms** will break down the nutrients in the sheep manure and return the nutrients to the soil. The nutrients are now available for grasses and flowers, and a new cycle can begin.

There are 914 different **breeds** of sheep in the world. Over 85 are found in Great Britain.

Different types of farming

There are many different ways of growing **crops** and raising livestock that can be grouped into three broad categories: **small-scale farming**, **industrial farming** and **sustainable farming**.

Small-scale farmers grow food for themselves, their families and sometimes for the local market, if they have extra, using the **resources** they have. They grow both local foods and common foods, such as maize. Some **small-scale farmers** raise fish! Raising fish in captivity is called **aquaculture**. Often small-scale farmers use their **local** or **traditional knowledge** to grow local foods. This knowledge is developed over generations and is tested and updated as conditions change.

Did you know that humankind's oldest social activity is eating?

The **traditional** or **local knowledge** of **small-scale farmers** enables them to grow and raise many local plants and animals and to cook these foods in diverse ways. Local plants are well adapted to the climate and growing conditions. Often many **small-scale farmers** share seeds within their communities. For example, in Kenya, many farming communities usually gather after harvest time to share knowledge and trade seeds of local **crops**, including cowpeas, millet, sorghum, and squash. Also, at these gatherings people often share recipes for cooking diverse foods.

Industrial farming is a form of modern farming that combines technical, scientific, economic and political methods to mass produce food, like a factory. **Industrial farming** needs many **resources**, such as tractors and **pesticides** that cannot be found on the farm, and must be bought. **Industrial farmers** sell their entire **crop**. Most of the meat, dairy, **grains**, fruits and vegetables bought at grocery stores around the world are produced from this type of farming.

An easy supply of mass produced food at the grocery has changed the way people are eating in many regions of the world.

Many **industrial farmers** in Western Canada and the USA grow only **grains**, such as wheat, on a large area of land. On this type of farm,

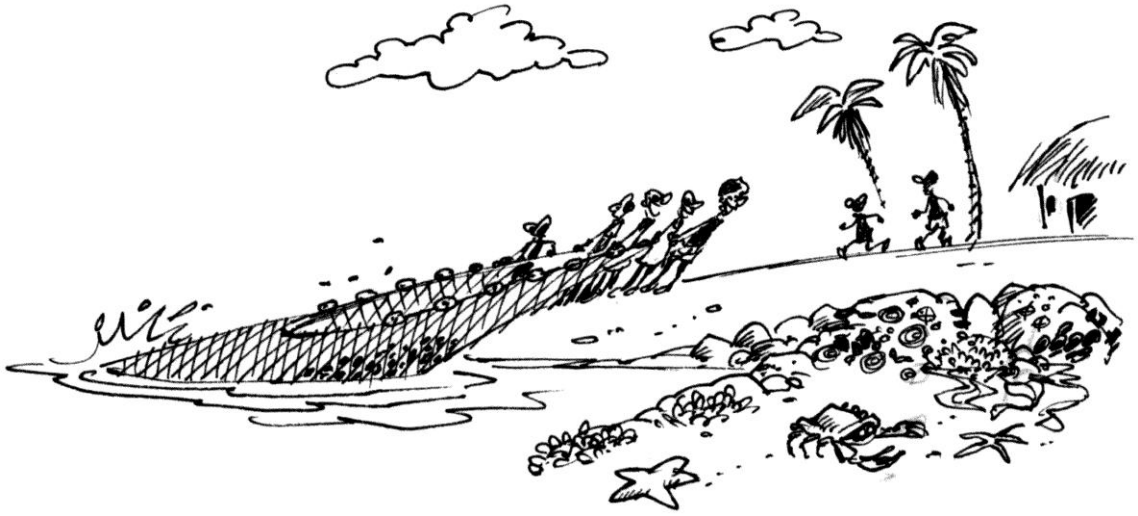
the farmer must buy **fertilizers** to put nutrients back into the soil, seeds for a specific variety of wheat, **pesticides** to kill **crop pests**, and energy, such as gasoline or diesel, to run the machines.

In **sustainable farming** food is grown in such a way that farming can continue over the long term because there is little or no damage to the **environment** or **biodiversity**. Two types of **sustainable farming** are **mixed farming** and **organic farming**.

In **mixed farming systems**, one type of **sustainable farming** is combined with herding, fishing or forestry activities. In a closed **mixed farming system**, the "waste" products of each activity provide inputs to the others while producing a diverse range of nutritious food. For example, in Zhejiang province of China, naturally flowing rivers stock rice patties with a fish called carp, which is a major source of protein and income for farmers and their families.

In Asian **aquacultures**, fish from rice patties provide as much as 70% of a persons' protein each day.

Organic or ecological farming is a type of **sustainable farming** where on-farm **renewable resources** are used as much as possible. Some small-scale farmers are also organic farmers. Organic farmers often buy fewer **resources** because they use methods with on-farm **resources**. Sustainable farmers buy some chemical **pesticides** to get rid of **crop pests**, but organic farmers will use several methods without **pesticides** to get rid of the same **crop pest**. Often organic farmers sell their surplus foods at the local market.



Growing food

There are many dynamics to growing food that we learned in this section. This information can be classified into four categories. **Biodiversity and the environment** provides farmers with natural **resources they need to grow food**, but farmers also need other resources — some of which they must buy — and they use **different types of farming** in **different types of farms**, to produce food.

Place the words at the bottom in their proper category.

Biodiversity and the environment…	**…resources farmers use…**	**…different types of farming…**	**…types of farms…**
_____	_____	_____	_____
_____	_____	_____	_____
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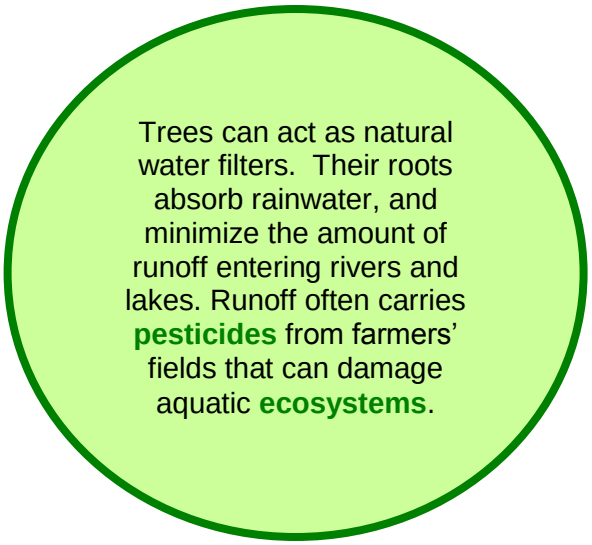
Industrial farming
Vineyard
Microorganisms
Organic farming
Knowledge
Sunlight
Wheat field
Tools
Pesticide
Seeds
Money
Chemical fertilizer
Plants (seeds)
Pasture
Pests [tricky one!]
Organic fertilizer
Animals
Fertilizer
Small-scale farming
Climate
Rain
Rice patties
Sustainable farming
Ecosystem services
Nutrients
Air
Orchard
Plantation
Mixed farming

Can farming affect biodiversity?

The way that farmers grow **crops** and raise animals can be either good or bad for **biodiversity**. Farmers can support **biodiversity** through careful farming methods. If farmers are not careful, the **environment** and **organisms** on and near the farm can be harmed.



A handful of farm dirt is rich in **biodiversity**. Soil **biodiversity** includes animals, bacteria, **fungi** and even the roots of plants growing above. Soils form complex **ecosystems** that make farming possible. There are millions of **organisms** that live in soil — **microorganisms**, such as bacteria and **fungi**, and **macroorganisms**, such as worms, mites, ants and spiders. These **organisms** can help farmers to **reduce** the negative effects of farming. When they eat and dig underground, earthworms, termites and other burrowing **organisms** mix the upper layers, redistribute nutrients and increase the amount of water absorbed by the soil. Some **macroorganisms** are critical to local farming techniques. Farmers in Burkina Faso and in other areas of West Africa encourage termites to live and burrow in their farm plots because they improve soil quality.

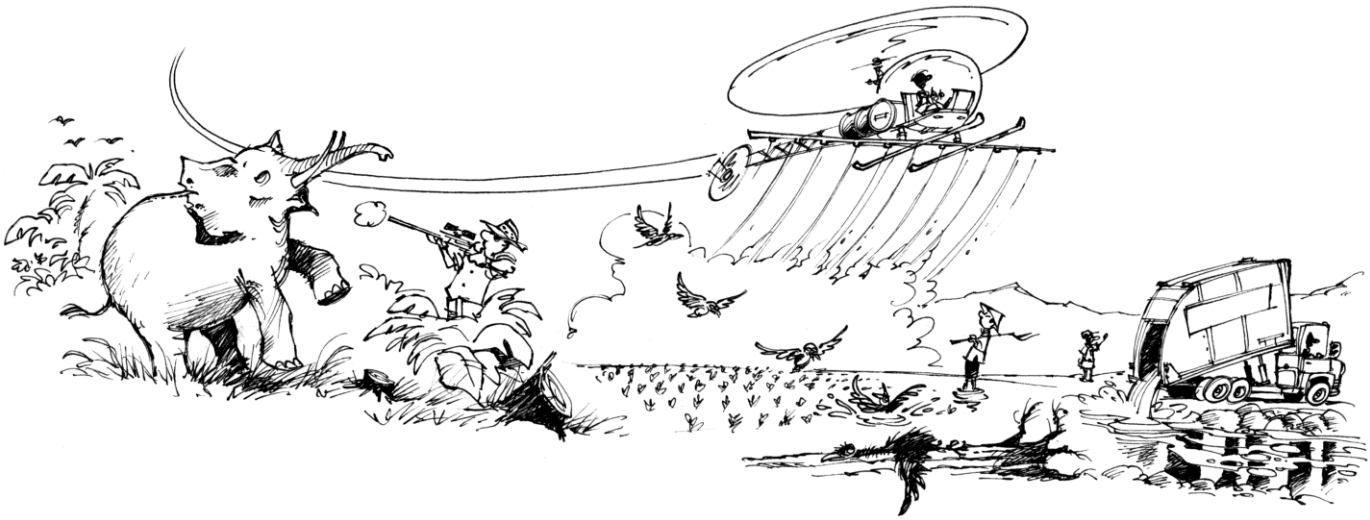
Using **pesticides** can have unexpected and unwanted effects. Often, the same chemicals that farmers apply to get rid of **crop pests** harm other **species** living around the farm. Some of these **species** may actually help to control the real **crop pests**! For example, DDT (Dichloro-Diphenyl-Trichloroethane) is a powerful **pesticide** that is poisonous to not only insects, but also animals and humans. DDT is so powerful it was banned in many countries, but some countries that face malaria problems still use it to kill mosquitoes. So if a farmer chooses to spray chemicals he or she must follow the instructions carefully to minimize the damage to other harmless **species**.

If farmers are not careful in their use of **natural resources**, they can decrease the amount of **resources** available to them to grow food. When

there are not enough nutrients in the soil, farmers often buy chemical **fertilizers**. Using **fertilizers** can help grow more food, but using too much can pollute the water. Polluted water affects **organisms** that drink the water or that live in it. For example, too many pollutants can kill fish. Water pollutants also affect our health, as it decreases the amount of clean water to drink, wash and grow **crops**.

Some **industrial farms** mass-produce a few select **breeds** in their quest to produce more meat, milk or eggs. This practice, however, leads to a decline in livestock diversity. The same principle applies to **crops**. As the number of **varieties** decreases, existing **crops** become increasingly at risk to destruction by disease and pests. If **crops** are all identical, it is much easier for a new disease or pest to wipe out an entire harvest. The less diversity farmers maintain, the greater the risk of diseases and pests. This increase in risk means farmers apply more **pesticides** to the **crop** fields or administer antibiotics to the animals.

If farmers are careful and manage resources sustainably, they can help preserve **biodiversity** and the **environment**. Many farmers around the world use **sustainable farming** and **organic or ecological farming** methods. One method is to grow two or more **crops** in the same field. This helps the farmer reduce **crop pests** while using fewer **pesticides**. Another method is to avoid applying **pesticides** on rainy or windy days so less **pesticide** will enter waterways causing pollution or get blown away.



Changing landscapes

Farming usually changes the landscape, the water, the air and **biodiversity**. For example, construction workers build roads so that trucks can pick up farm produce and take it to markets. When farmers cut trees to create space for growing **crops** or raising livestock, they also reduce natural water filtration (cleaning) and available habitats for many **species**. Tractors and other farm machinery emit air pollutants.

In some areas, farming brings enormous changes to the landscape. In parts of the Amazon, large tracts of forests have been cut down and replaced by monoculture (one **crop**) farming or **pastures** for cattle grazing. These changes reduce the number and variety of habitats available for **species**. Without suitable habitats, hundreds of **species**, including trees, vines, plants, birds, snakes, frogs and mammals, can no longer live in the area. The end result is a loss of **biodiversity**.

In other areas, the land does not change much. Some farmers use the landscape as it is. For example, grasslands are natural **pastures** for many farm animals or wild **herbivores**. Many farmers do not fence in these natural **pastures** so that wild **herbivores** can use them too. Leaving the **pastures** open can be risky – **carnivores** may prey on farm animals.

Other farmers design their farms to minimize changes to the natural landscape. They might even try to enhance **biodiversity** on and around the farm. They can promote **biodiversity** by using **sustainable farming** methods such as including both plants and trees, using little or no **pesticides** and planting a variety of **crops**.

Farming and pollution

On the illustration below, place each word from the bottom of the page — represents either the potential pollutant or affected part of the environment — in the appropriate blank.

Air	Herbivore	Ecosystems	Pesticides
Carnivore	Microorganism	Fertilizers	Machines
Omnivore	Soil	DDT	Water
Biodiversity	Macroorganism		

What can you do?

There are many things you can do to help protect **biodiversity**.

Learn

Learn about **biodiversity** and food issues – visit **biodiversity** websites, ask your teachers about farming and **biodiversity**, explore natural and farming areas, use your five senses – sight, touch, hearing, taste and smell – to experience **biodiversity** and how it is integral to your life. Learn about where your food comes from and about how food is grown and raised around the world. Understanding **biodiversity** is important to understand how humans should live while respecting the Earth's finite **resources**.

Act

You can use your ability to buy things to help **biodiversity**. Individual choices on what you eat and buy are important. Whenever possible, choose healthy, local and **sustainably** – produced foods with little packaging that was not transported long distances. When you shop, buy products from companies that value the **environment** and people. Remember, companies will sell what people want to buy – so tell companies that you want products that do not harm **biodiversity**!

Involve others

Once you have a better understanding of local **biodiversity** issues, it is time to take action. With your class, talk with your local government officials, local farmers and **community** members about **biodiversity**. Find out about local priorities for **biodiversity** and how your class can help. Together, you can decide if it is best to start a **community biodiversity** garden, clean up a local wetland, teach **community** members about **biodiversity** and farming, or something else.

Share

Share your experiences with your family, friends and **community** members. Encourage them to work with you in helping protect **biodiversity**.

Rethink, reduce, reuse and recycle!

Thinking about the four "R's" is an easy way to remember how you can protect **biodiversity**.

Start by **rethinking**. How much waste do you produce? What **resources** and **biodiversity** went into the products and packaging that you throw out? Where does that waste go? What **species** and **ecosystems** do the wastes affect? What can you do to minimize your impact?

Growing cotton for one t-shirt takes about 150 grams of chemicals (**pesticides** and **fertilizers**).

The next step is to **reduce** your consumption and waste. You could buy only the amount you actually need and buy products with little packaging. You might eat more fresh foods and **compost** the waste into your garden.

After **rethinking** and **reducing**, it is time to start **reusing** products. **Reusing** is a great way to decrease wastes (and save money!) Think twice before throwing something into the garbage. Can it be repaired? Can someone else use it? Can you invent a new creative use for it? Remember, whenever you **reuse** something, you are saving **resources** and **biodiversity**.

If, after **rethinking**, **reducing** and **reusing**, you still are left with wastes, then try **recycling**. **Recycling** transforms wastes into products that companies can use to make new products. It can help preserve **biodiversity** by limiting the amount of **resources** needed to make new products, but it is not perfect. Lots of energy is used in collecting, transporting and processing **recycled** material.

Checklist

So don't forget to learn, act, involve others and share experiences!

Here are some ideas to get you started:

- ☐ Plant a local tree **species**. (Don't forget to care for it!)
- ☐ Keep nearby forests and woodlots clean.
- ☐ Use, **reuse** and repair things until they are completely worn out.
- ☐ Do not use, eat or buy **endangered species**. Ask your parents to avoid using **endangered species**.
- ☐ Avoid using **pesticides** in your family or **community** garden.
- ☐ Start **composting** at home. Use the **compost** in your garden or in a **community** garden.
- ☐ Find out where and how your food is grown. Encourage your parents to support local or **sustainable farming**.

I would like to learn about:

- ☐ _____
- ☐ _____
- ☐ _____

I can do the following activities:

- ☐ _____
- ☐ _____
- ☐ _____

I can ask the following people to help me:

- ☐ _____
- ☐ _____
- ☐ _____

I will share my experiences by:

- ☐ _____
- ☐ _____
- ☐ _____

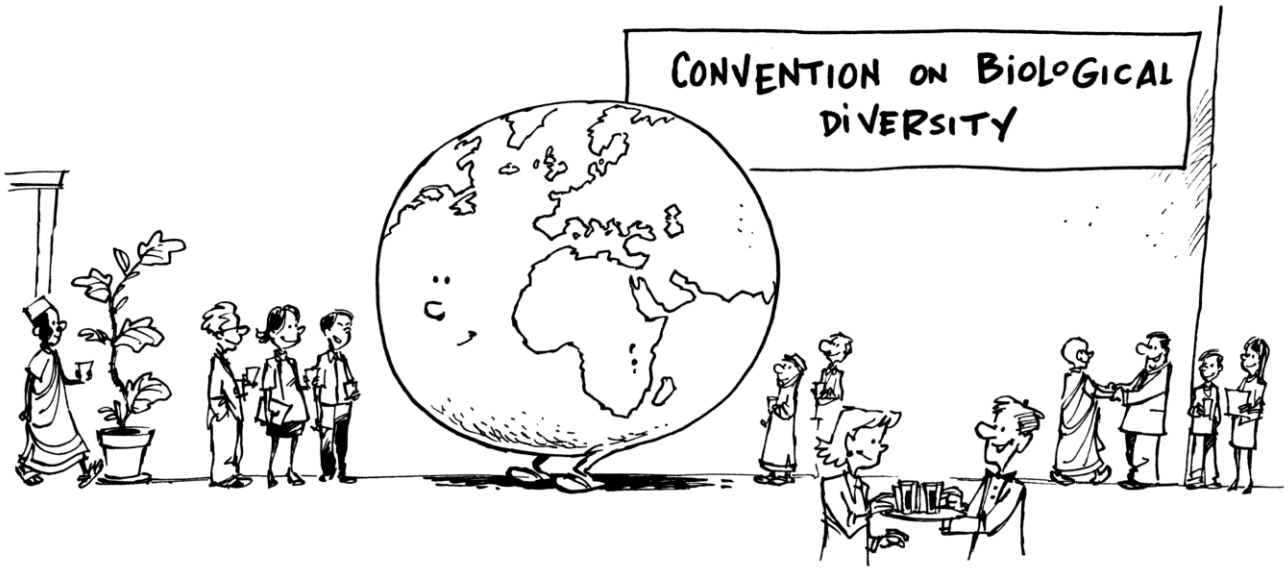
What is the Convention on Biological Diversity?

In 1992, governments, indigenous groups and non-governmental organizations (NGOs) from around the world gathered in Rio de Janeiro, Brazil to talk about the **environment**. The Rio Earth Summit was the largest international **environmental** meeting ever. At the meeting, world leaders agreed that it was important to protect the **environment** for all people, including future generations (That's you). The leaders decided to adopt three conventions to achieve this goal.

Three conventions emerged from the Rio Earth Summit:

- The Convention on Biological Diversity (CBD)
- The United Nations Framework Convention on Climate Change (UNFCCC)
- The United Nations Convention to Combat Desertification (UNCCD)

A convention is an agreement or contract. The Convention on Biological Diversity (CBD) is an agreement between countries based on preserving natural and biological resources. The CBD has three main goals: to protect **biodiversity**; to use **biodiversity** without destroying it; and, to share any benefits from genetic diversity equally.



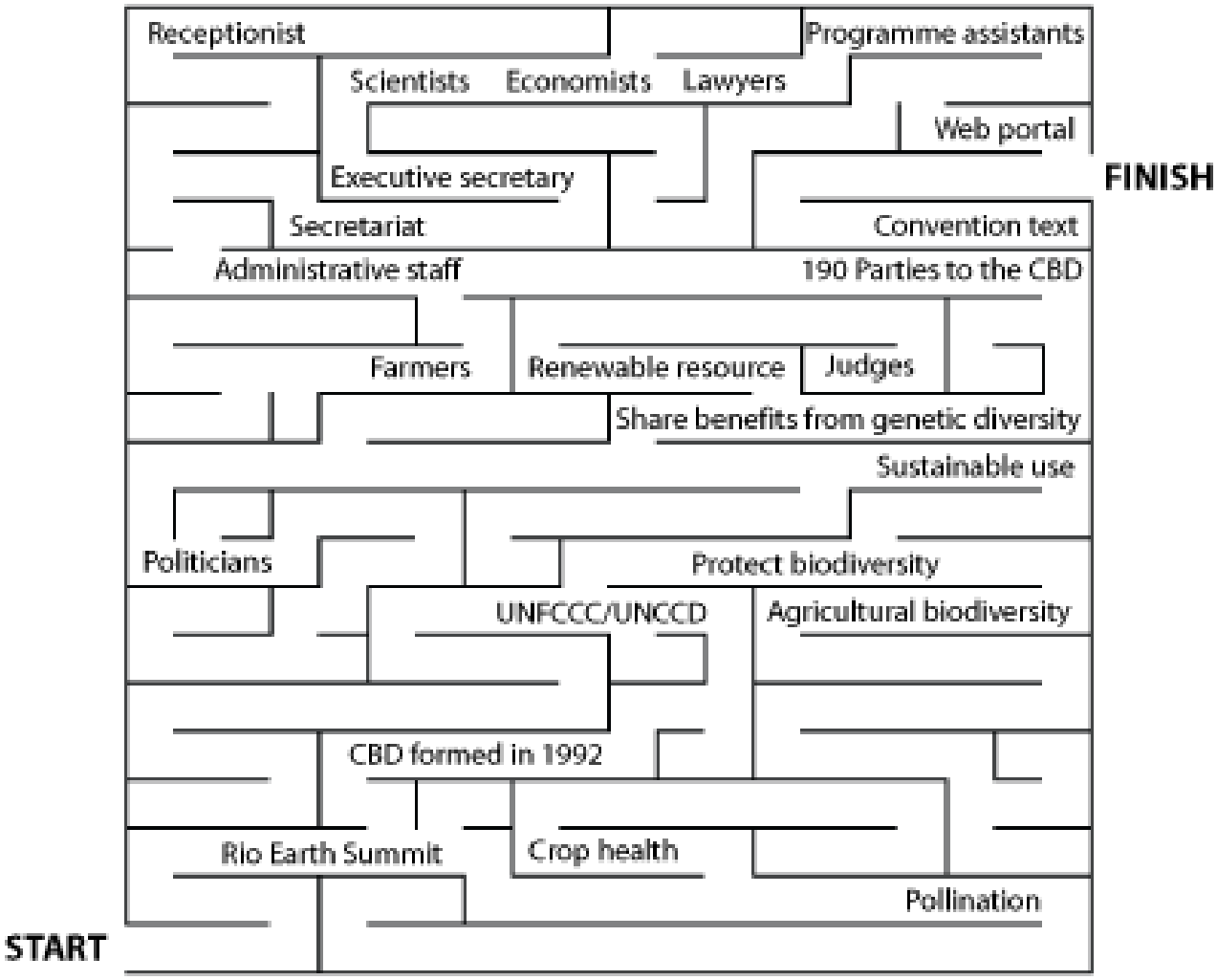
How does the CBD work?

One hundred and eighty-nine (189) countries and the European **Community**, making 190 Parties (the governments of the countries), have joined the CBD. That means 190 Parties across the planet have promised to achieve the goals of the Convention. The Convention is like a textbook that explains how parties should turn those goals into action. It suggests ways for Parties to help each other by sharing **resources** and technology so that all **biodiversity** benefits. Individually and collectively we can all make a difference by helping to preserve and protect the natural and biological **resources** of our precious planet.

The Convention on Biological Diversity's office is known as the Secretariat. It is located in Montreal, Canada. The head of the Secretariat is called the Executive Secretary. The Executive Secretary is an Assistant Secretary-General in the United Nations system – a very high position. The Executive Secretary, along with a staff of scientists, economists, lawyers, programme assistants and administrative staff, assist countries in carrying out their **biodiversity** work. The Secretariat also runs a web portal. To learn more about biological diversity around the world, visit the children and youth portal at cbd.int/youth and our main web portal at cbd.int.

The CBD from formation to today

In the maze below, trace the correct path or the timeline of events that follows CBD from its formation to today.



Answer key

Web of life

Across: 1. Cell, 3. Forest, 6. Foodweb, 10. Omnivore, 12. Community, 15. Pasture, 16. Herbivore and 17. Biodiversity.
Down: 2. Environment, 4. Ecosystem service, 5. Species, 7. Ecosystem, 8. Genes, 9. Ecology, 11. Carnivore, 13. Desert and 14. Lake.

What plant parts do you eat?

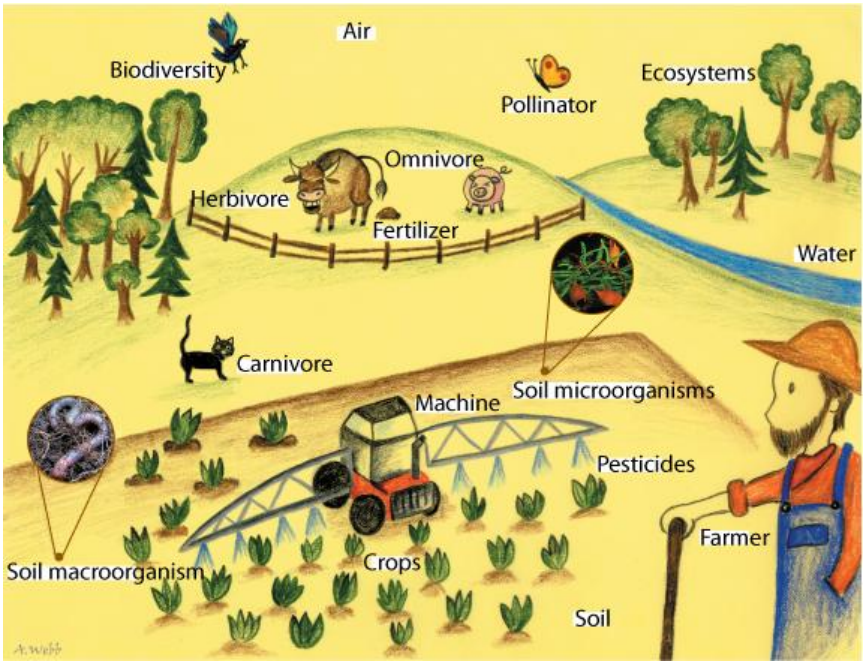
Roots: Carrots, Potatoes and Onions.
Flowers: Broccoli, Cauliflower Cabbage.
Nuts and Seeds: Maize (corn), Beans, Rice, Pistachios and Cashews.
Leaves: Lettuce, Spinach and Bok choy.
Fruits: Oranges, Apples and Tomatoes.
Melons: Pumpkins, Squash and Honeydew.
Bark and Sap: Cinnamon and Maple Syrup.
Stalk: Celery.

Growing food

Biodiversity and the environment: sunlight, plants, animals, ecosystem services, climate, rain, air, nutrients, pests, organic fertilizers and microorganisms
resources farmers use: knowledge, money, tools, chemical and organic fertilizers, pesticides and seeds
types of farming: small-scale farming, industrial farming, sustainable farming, organic or ecological farming and mixed farming systems
types of farms: vineyard, rice patties, wheat field, pasture, plantation and orchard.

Farming and pollution

See diagram to the right.
Pollutants: Fertilizers, pesticides, machines and DDT;
Affected parts of the environment: biodiversity, carnivore, herbivore, omnivores, microorganisms, macroorganisms, water, air, soil and ecosystems.



The CBD from formation to today

World Leaders attended the Rio Earth Summit at Rio de Janeiro, in 1992, where the CBD, UNFCCC and the UNFCCD were formed. The goals of the CBD are to protect biodiversity, to use biodiversity without destroying it and to share any benefits from genetic diversity equally. The 189 Countries/ 190 Parties are aided by the Secretariat (SCBD)—Executive secretary, scientist, economists, lawyers, administrative staff and programme assistants. For more information, please visit the Web portal.

Web pages to visit:
cbd.int/youth and cbd.int
unep.org/tunza
cyberschoolbus.un.org
ecoliteracy.org

Convention on Biological Diversity