12 Bio-diversity

12.1 Introduction to bio-diversity

Recall the field visits you attended to study about the environment. During those field visits you would have experienced different types of environments. They can be beaches, mangrove environments, forests, monsoon forests and grasslands. A system that includes all living organisms (biotic factors) in an area as well as its physical environment (abiotic factors) interacting with one another as a unit is known as an **ecosystem**. Study the ecosystems in figure 12.1.

A forest

A mangrove environment

A grassland

A beach

Figure 12.1 - Some ecosystems

When different ecosystems are considered, the animals and plants in these systems are varied. The physical environment and climatic factors of those ecosystems are also different. The diversity among these ecosystems is known as **ecosystem diversity**.

Think about the living organisms in ecosystems. In ecosystems there are many species of animals and plants as well as many species of micro-organisms. With regard to these species, there is a great variety of characteristics in the body shape, size, nutritional patterns and reproduction. The diversity among the species is known as **species diversity**.

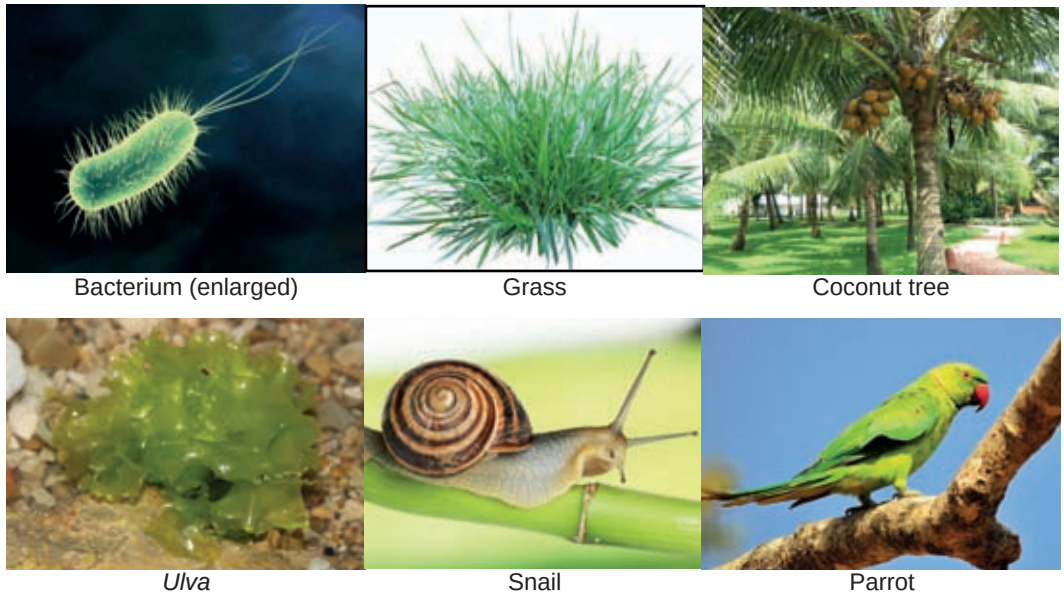


Figure 12.2 - Some species of living organisms

Let us do the assignment 12.1 to identify the diversity of plants and animals in an ecosystem.

Assignment 12.1

Select a plot of land in your area or school (thicket, grassland, pond). Study the species diversity in the selected plot of land. Using your observations fill in the table given.

Table 12.1

Plant species	Animal species	Micro-organisms

Living organisms are categorized as plants, animals and micro-organisms.

(In this field visit you should follow your teacher's advice, without harming the environment and ensure your safety.)

Are there any differences in living organisms of a same species? Let us do the activity 12.1 to find about it.

Activity 12.1

- Observe the external features (given within the table) of all your classmates and fill in the table 12.2.

Table 12.2

	Feature	Number of students
1)	a) have the ability to roll the tongue	
	b) no ability to roll the tongue	
2)	a) with free ear lobes	
	b) with attached ear lobes	
3)	a) with black eyes	
	b) with brown eyes	
4)	a) with straight hair	
	b) with curly hair	
5)	a) right handed	
	b) left handed	

Modern man belongs to the species *Homo sapiens sapiens*. Through the above activity you would have understood that even within the same species there are differences among the individuals.

You can understand the differences among the human by figure 12.3.

The reason for these differences of a certain species is **genetic diversity**. You will learn about genes in grade 10 & 11.

Figure 12.3 - Humans of *Homo sapiens sapiens* with different features

For extra knowledge

You already know that living organisms are made up of cells. Chromosomes are located in nucleus of these cells. Genes are located on these chromosomes. The features of living organisms are controlled by genes. Genetic diversity is the cause for the differences among organisms within the same species.

There is a diversity among the ecosystems that organisms live and there is a diversity among the living species. Not only that, there is a diversity among the organisms of a same species. **Bio-diversity** is a combination of ecosystem diversity, species diversity and genetic diversity.

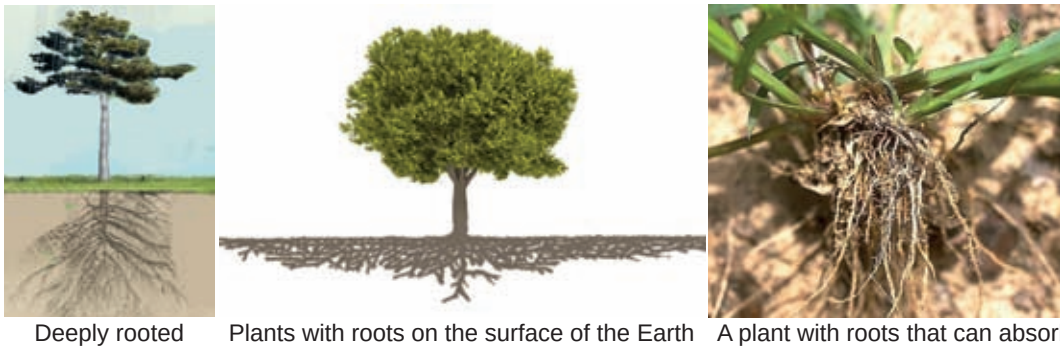
12.2 Importance of bio-diversity

Both large and small creatures in an ecosystem play a significant role in maintaining the equilibrium of the certain ecosystem. Higher bio-diversity in an ecosystem also increases the wellbeing and the stability of that ecosystem.

The beauty of the environment increases due to bio-diversity. We know that Sri Lanka is a country with a rich bio-diversity. Sri Lanka has been named as the country with the highest density of flowering plants, reptiles, amphibians, and mammals in the Asian region. Rich bio-diversity is a strong reason for tourist attraction.

Bio-diversity has reduced the competition between the species. Organisms are always in a competition for their needs. When considering the plant world, they are competing for the needs that should be used from the environment such as light, space, water and air. When considering the animal world, animals are competing for requirements such as habitat, food, security and choice of partners. Bio-diversity helps to minimize this competition among living organisms.

Let us see how bio-diversity acts, trees to minimize the competition for water. The roots of different trees are adapted to take water from different levels in the soil (figure 12.4).



Deeply rooted plants | Plants with roots on the surface of the Earth | A plant with roots that can absorb water from the atmosphere

Figure 12.4 - Roots adapted to minimize the competition for water

We know that the beaks of different bird species are of different shapes. This is important to reduce the competition for food. Various birds depend on various foods and their beaks are shaped according to their diet (figure 12.5).

Figure 12.5 - Diversity of beaks among birds

"The wild types" of most plants and animals used in agriculture are found in natural ecosystems. Genes that are resistant to pests, adverse environmental conditions and illnesses, are available in these "wild types". Because of bio-diversity it is possible to use this genetic materials in a favourable manner in agriculture.

Due to bio-diversity some species are endemic to each region. Species that can be seen only in one geographical region or country are known as **endemic species.** Humans conserve these endemic species due to this rich bio-diversity.

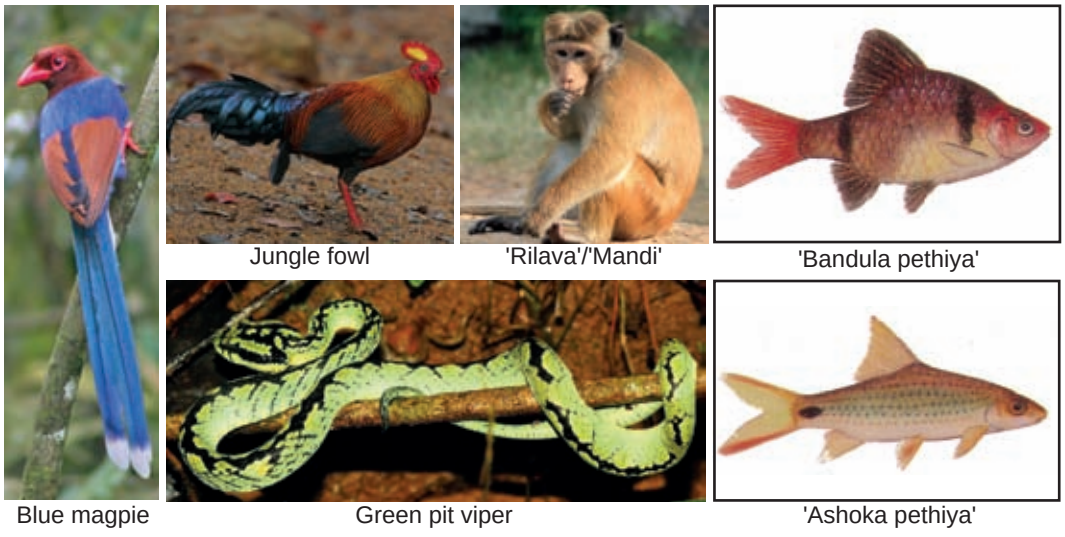


Figure 12.6 - Some species endemic to Sri Lanka

This bio-diversity helps to protect the water resources and soil to maintain favourable climatic conditions and minimize environmental pollution. Bio-diversity is very important for entertainment, various research works and educational activities.

12.3 Threats to bio-diversity

There are many threats for bio-diversity. These threats have caused deterioration in bio-diversity. The reasons for biodegradation can be discussed under two topics.

Natural reasons

Since ancient times, bio-diversity has been affected by the impact of various natural activities. Collapsing meteors, volcanic explosions, tsunami, earth slides and floods are some of these natural reasons.

e.g. It is considered that a meteor collapse caused for the extinction of dinosaurs. There is an argument that natural global warming was the reason for the extinction of mammoth.

Mammoth Dinosaurs

Figure 12.7 - Some extinct animals

Human activities

With the rapid increase in the human population, forests are destroyed extensively to meet their needs. Rapid deforestation destruct the habitats of living organisms. Also the construction of various buildings, streets and reservoirs splits the habitats of living organisms.

The increase in human population causes many environmental issues. Over use of resources and addition of pollutants to the environment are often caused by human activities. Soil, aquatic and airy ecosystems get so polluted and these ecosystems become unsuitable for survival of organisms. These reasons have a strong impact on bio-diversity.

Spreading of invasive organisms in an ecosystem too, make a strong impact on its bio-diversity (figure 12.8).

'Gandapana'/'Napunni' *Parthenium*

Tank cleaner fish

'Mannawa' fish

Figure 12.8 - Some species of invasive organisms

The introduction of genetically modified new organisms into the environment cause adverse impact on bio-diversity. Although, it is not yet possible to specify this, these organisms can be considered as a threat to bio-diversity in the future.

Climatic changes due to environmental problems such as ozone layer depletion and global warming will affect the bio-diversity.

These threats have caused bio-diversity degradation worldwide. Hence, some species of organisms are in a threat of extinction from the Earth. Therefore, bio-diversity should be conserved. The regions of higher density of living organisms are called **hotspots**. To be considered as a bio-diversity hotspot, a country or a region should be rich with high proportion of indigenous species and species with more threats. As Sri Lanka belongs to a hotspot region, it is our duty to contribute for the conservation of bio-diversity.

Assignment 12.2

Following are some threats for bio-diversity. Collect information on each topic and prepare an article for a newspaper.

- Increase of human population
- Destruction of forests
- Introduction of invasive organisms
- Environmental pollution
- Overuse of resources in the environment
- Depletion of ozone layer and climatic changes

12.4 Important features of ecosystems

Do the assignment 12.3 to get an idea about the living organisms and non-living organisms in an environment.

Assignment 12.3

- Select a plot of land in your school garden. Now draw separately the pictures of plants, animals and non-living components in that plot of land in 3 transparent sheets.
- Keep the 3 transparent sheets overlapping

Figure 12.8 shows some pictures of a similar assignment carried out around a pond.

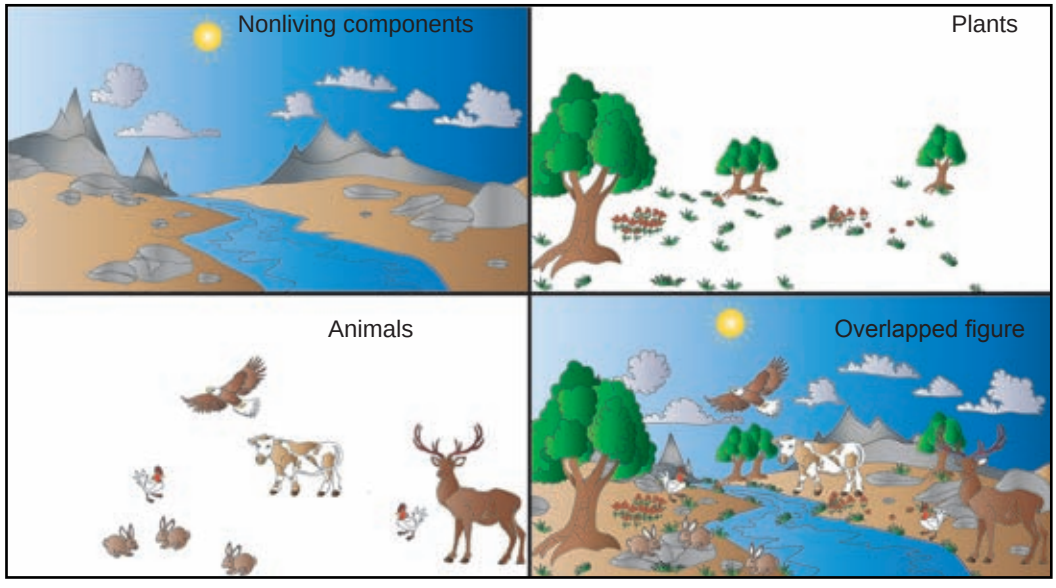


Figure 12.9

You will understand that the environment contains living organisms (animals and plants) and non-living components.

All living organisms in a community and the physical environment interacting with them considered together as an ecosystem.

e.g. :- A pond, a forest, decaying log, coral reef environment, a grassland

Features of an ecosystem

1. **Interaction occur between living components as well as between non-living components.**
   Living - living relationships, Living - non living relationships,
   Non living - non living relationships
2. **The energy flows through one way stream**
   The solar energy which is used by green plants in photosynthesis, is stored in the food produced during this process. The energy flows from lower consumer levels to the higher consumer levels through food chains or food webs.
3. **Recycling of materials**
   The materials that the organisms receive from the environment continue to be back to the environment. The continuous exchange of materials between the organisms and the environment is an important feature of an ecosystem.
4. **An independent Unit**
   Since there are constant interactions within the ecosystem it has ensured the existence in biosphere.

Let us see living - living relationships in an environment.

Living - living relationships

The interactions between the living organisms are known as living-living relationships. These interactions are to meet the following needs.

- Food
- Security
- Reproduction

Following are some such interactions.

- Animals consuming plants as food
- Some predators consuming other animals
- Certain micro-organisms depending on other living organisms
- Some animals use trees as their habitat
- Animals hiding among plants for protection
- Some plants use animals to spread their species
- Some plants fulfill their nitrogenous requirements from insects (insectivorous plants)
- Producing new creatures through reproduction for the continuous existence of life

Figure 12.10 - Living-living relationships

Living - non living relationships

The interactions between the living organisms and non-living components are known living-non living relationships. The organisms interact with their habitat to get non-living components such as water, air and light.

e.g. The plants use solar energy for photosynthesis

Plants absorb water from soil

Plants and animals use atmospheric oxygen for respiration

Plants use atmospheric carbon dioxide for photosynthesis

Plants release oxygen to the atmosphere as a result of photosynthesis

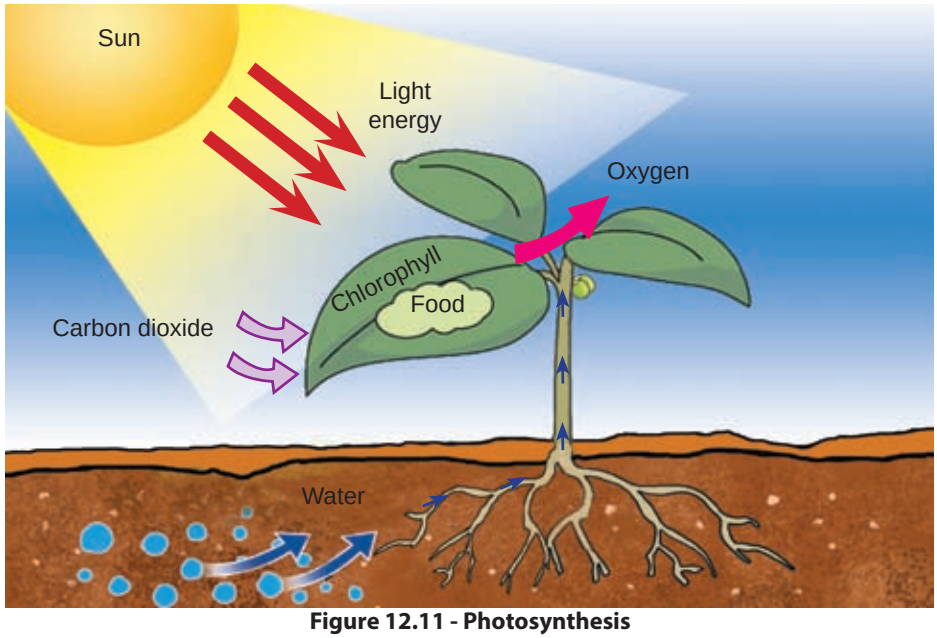


Figure 12.11 - Photosynthesis

The living creatures are also adjusted to match the specific environmental conditions of their habitats. This is known as adaptation.

e.g. Adaptations of plants to minimize transpiration in dry environment

Non living - non living relationships

The interactions between non living components are known as non living - non living relationships.

e.g.

- Soil erosion by water
- Rock weathering due to water and solar heat

Figure 12.12 - An environment subjected to soil erosion

Activity 12.2

- Name the plants, animals and non-living components that can be seen in the given plot of land.
- Write sentences about the interactions that exist between the living organisms and living-non living and non living materials.

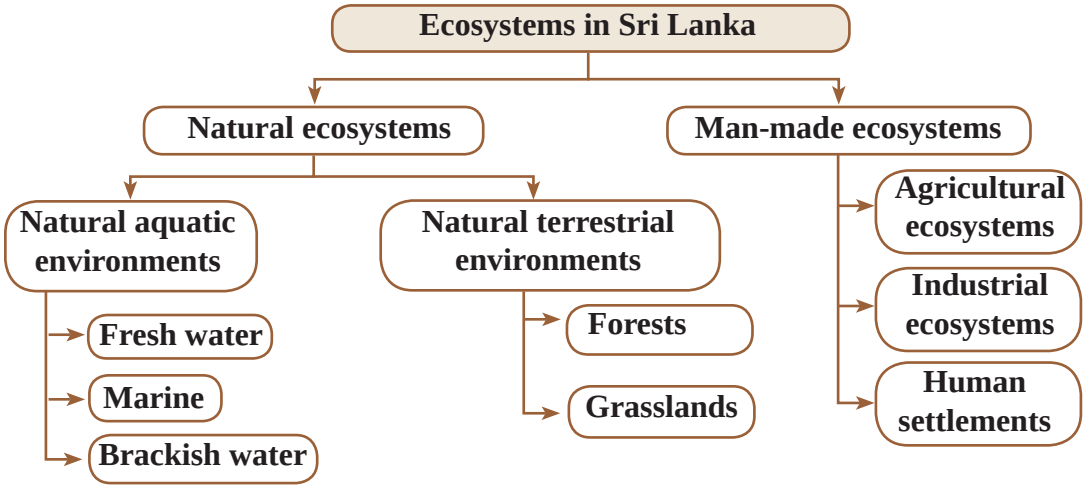
  e.g. Plants absorb solar energy for photosynthesis

Figure 12.13

12.5 Natural ecosystems and built environment

Sri Lanka is a country with a rich bio-diversity. Various ecosystems are found due to the location of Sri Lanka as an island and the location of the central hill country. The location of different ecosystems is a major cause for a higher bio-diversity.

A sketch of the ecosystem classification in Sri Lanka is given below.



Natural aquatic environments

Natural aquatic environments can be categorized into three groups as fresh water, marine ecosystems and brackish water environments. A vast number of living organisms live in these environments. Information about some aquatic ecosystems are given below.

Rivers

Figure 12.14 - A river

- They are fresh water aquatic ecosystems.
- Most rivers start from the catchment areas of the central highlands and flow to the sea.
- The water level of rivers fluctuate with the rainfall in the regions.
- Some rivers confine to a small stream during the dry season.
- Different species of plants and animals are living from the head wall ('Ismaththa') up to the estuary.

  e.g. 'Mahaweli' river, 'Kelani' river

Importance

- Fulfill the water needs for agriculture
- Generating hydro power
- For transportation

Estuary

Figure 12.15 - A river mouth

- A place where a river falls to the sea is known as an estuary.
- As marine water and fresh water are mixed at estuary, water becomes brackish.
- Various organisms live in brackish water.
- The deposition of mud and sand in river water cause triangular islands known as a Delta.

  e.g. Estuary of 'Mahaweli' – opens to 'Koddiyar' Bay and 'Thambalagam' Bay

Importance

- Prevents the mixing of marine water and fresh water
- Abundance of fish species with economic importance
- Rich in bio-diversity

Lagoon

- A lagoon is a shallow body of brackish water permanently separated from the sea by barriers of sand or reefs, but connected with the sea at one time during the year.

e.g. Negombo lagoon, Batticaloa lagoon, Puttalam lagoon

Figure 12.16 - Lagoon

Importance

- Used for fishing purposes because prawns, crabs, oysters are available in these places
- The mangrove plants common on lagoons prevent sea erosion.
- A place of tourist attraction

Riverine environment

- The environment on either sides of the river from starting point of the river to the point where it flows to the sea is known as the riverine environment.
- Flood plains, sandy lands, marshy lands belong to this environment.
- 'Villu' is a wet land in riverine environment.
- Due to over flow of a river during the rainy season flood plains are created.

Figure 12.17 - River side environment

e.g. 'Mahaweli' flood plain at East

Importance

- Used for inland fishing industry
- The soil is very fertile in flood plains as silt flowing along the river is deposited in these areas. So, this soil is used for agriculture as well as for tile and brick industry.

Inland water reservoirs

- Naturally formed lakes and ponds belong to inland water reservoirs. Man-made tanks are also considered inland water reservoirs. They can be seen in both wet zone and dry zone and are fresh water environments.

Figure 12.18 - Inland water reservoirs

- Plants such as Lotus, Lilly, 'Kekatiya'/'Kotti' and animals such as fish, frogs, snakes, otters and aquatic birds can be seen in this environment

e.g. 'Parakrama samudraya', 'Kala wewa'

Importance

- Used for inland fishery industry
- Provides water for agriculture

Ocean

- Marine areas that covers most of the Earth's surface is known as ocean.
- A large living community such as algae, polyps, oysters and fish live in the oceans.
  e.g.- Indian ocean, Atlantic ocean

Figure 12.19 - Ocean

Importance

- Rich bio-diversity
- Ocean water is used to produce salt
- For fishing industry
- Generates electricity by ocean waves
- A place of tourist attraction

Wet lands

- Marshy lands that are covered with water during a long period of time in the year are known as wet lands.
- There are fresh water wet lands, marine wet lands and man-made wet lands.
  e.g.- Anawilundawa, Muthurajawela

Figure 12.20 - A wet land

Importance

- Wet lands are important to control flood, maintain the stability of reservoirs, minimize climatic changes, make ground water nutritious and maintain the bio-diversity.
- Used for different industries and tourism industry

Assignment 12.4

- Arrange a field trip to visit a natural water resource in Sri Lanka.
- Study the bio-diversity in the particular environment.
- Make a booklet about the living species you observed and their special features.

Natural terrestrial environments

A vast bio-diversity can be observed in natural terrestrial environments in Sri Lanka. Some information about diversity in some terrestrial environments are given below.

Forests

Figure 12.21 - Tropical rain forests

Tropical rain forests (Tropical lowland rain forests/ Wet evergreen forests)

- There is a warm-wet climate with a rainfall throughout the year.
- Receives over 2000 mm of annual rainfall
- Mineral are cycling
- Located in areas with an elevation up to 900 m
- The trees with a higher economic value such as 'Hora'/'Ennai', 'Keena'/'Punnai', 'Milla'/'Kattamanakku', 'Halmilla'/'Chavandalai' and Teak are common in these forests.
- Vegetation reach about 40 m of height and grow densely.
- A canopy structure can be seen. Epiphytes and climbers are common on trees.
  e.g. 'Sinharaja', 'Kanneliya', 'Dediyagala', 'Nakiadeniya' forests

Importance

- Endemic plants and animal species are very common
- Can be considered as a special environment that protects the water resources of a country
- Acts as a catchment area

Montane forests

Figure 12.22 - Montane forests

- Located in areas above 900 m from the sea level
- Annual rainfall is about 4000 mm.
- As there is heavy wind the trees are stunted. Also they are with twisted stems and smaller leaves. The tops of the trees have become flat.
- Plant species such as 'Walsapu',' Veralu'/'Veralikkai', 'Mihiriya', 'Dan'/'Kirampu', 'Keena' and animal species such as monkeys, loris, giant squirrel, stag can be seen.
  e.g. 'Haggala', upper part of Knuckles

Importance

- Endemic plant and animal species are common
- Act as catchment areas and protects many water sources
- Minimize soil erosion

Dry-mixed evergreen forests / Monsoon forests

Figure 12.23 - Monsoon forests

- Can be seen in dry zone but not much arid
- Annual rain fall is about 1200 mm-1900 mm
- May to September is a long drought season
- Evergreen and deciduous plants are present
  e.g. Wasgamuwa, Yala, Willpaththu

Importance

- A lot of economically valuable plants such as 'Palu'/'Pasippayaru', 'Burutha'/'Mutirai', 'Weera'/'Veerai', 'Koan'/'Kula', Ebony, 'Welang'/'Taddaemarum', 'Kolong'/'Manchal-kadampa', 'Kalumadiriya', 'Halmilla', Neem are common.
- Also animals such as deer, monkeys, leopards, bears, giant squirrel and elephants can be seen in these forests.
- Act as catchment areas for reservoirs in dry zone

Thorn bushes and scrublands

Figure 12.24 - Thorn bushes and scrublands

- Annual rain fall is over 1250 mm and temperature is high over 34 ^{0}C
- Considered as semi xeric areas.
- There are many adaptations in trees to withstand the arid environmental conditions.
- Some of the adaptations are having smaller leaves, fleshy leaves, ability to store water in the stem and thorny bushes.
- 'Nawahandi'/'Kally', Cactus, 'Daluk'/'Sadurakkalli', 'Kaneru'/'Alari', 'Eraminiya', 'Andara'/'Vidaththal', *Aloe* are some of the trees that can be seen in these forests.
  e.g. Hambanthota District, Puttalam District, Killinochchi District

Grasslands

Given below are some information about the grasslands in different climatic zones of Sri Lanka.

Figure 12.25 - 'Wet patana'

'Wet patana'

- Located in areas of over 2000 m altitude. There is heavy rainfall in these areas.
- Normally located near forests. In addition to grass there are also trees grown alone. 'Maharathmal' plant is prominent among them. 'Usnia' lichens grow on these trees. The fern 'Pteridium' also can be seen in these grasslands.

  e.g. Horton plains, 'Bopaththalawa', 'Bagawanthalawa'

'Dry patana'

- Widely spread than wet Patana.
- The grass 'Mana'/'Narippul' is very common.
- Apart from small forests in the valley and hills, other areas are covered with grass only.
- Usually grass is burnt during the drought season. Soil gets eroded during the rainy seasons.

  e.g. 'Rakwana', 'Uva Basin'

Figure 12.26 - 'Dry patana'

'Damana'

- This is a type of grassland in the abandoned chena cultivation ('Hena') areas in the low country dry zone.
- Grasses such as 'Mana', 'Illuk'/'Tharppaipul', 'Bata' and trees such as wood apple, 'Palu', 'Myla'/'Aththi', 'Madan'/'Perunaval' are common in these areas.
- This is the most preferred area of the elephants.

  e.g. 'Wilpaththu', 'Maduru oya', 'Walikanda'

Figure 12.27 - 'Damana'

'Talawa'

- A type of a grassland formed as a result of chena cultivation in low country wet zone.

  e.g. Located in 'Kalutara' District, 'Haldummulla', 'Matara' District

Figure 12.28 - 'Talawa'

Let us engage in assignment 12.5 to study natural ecosystems in Sri Lanka.

Assignment 12.5

Following is a map that depicts the natural ecosystems in Sri Lanka. Study the map well and identify the ecosystems and their locations.

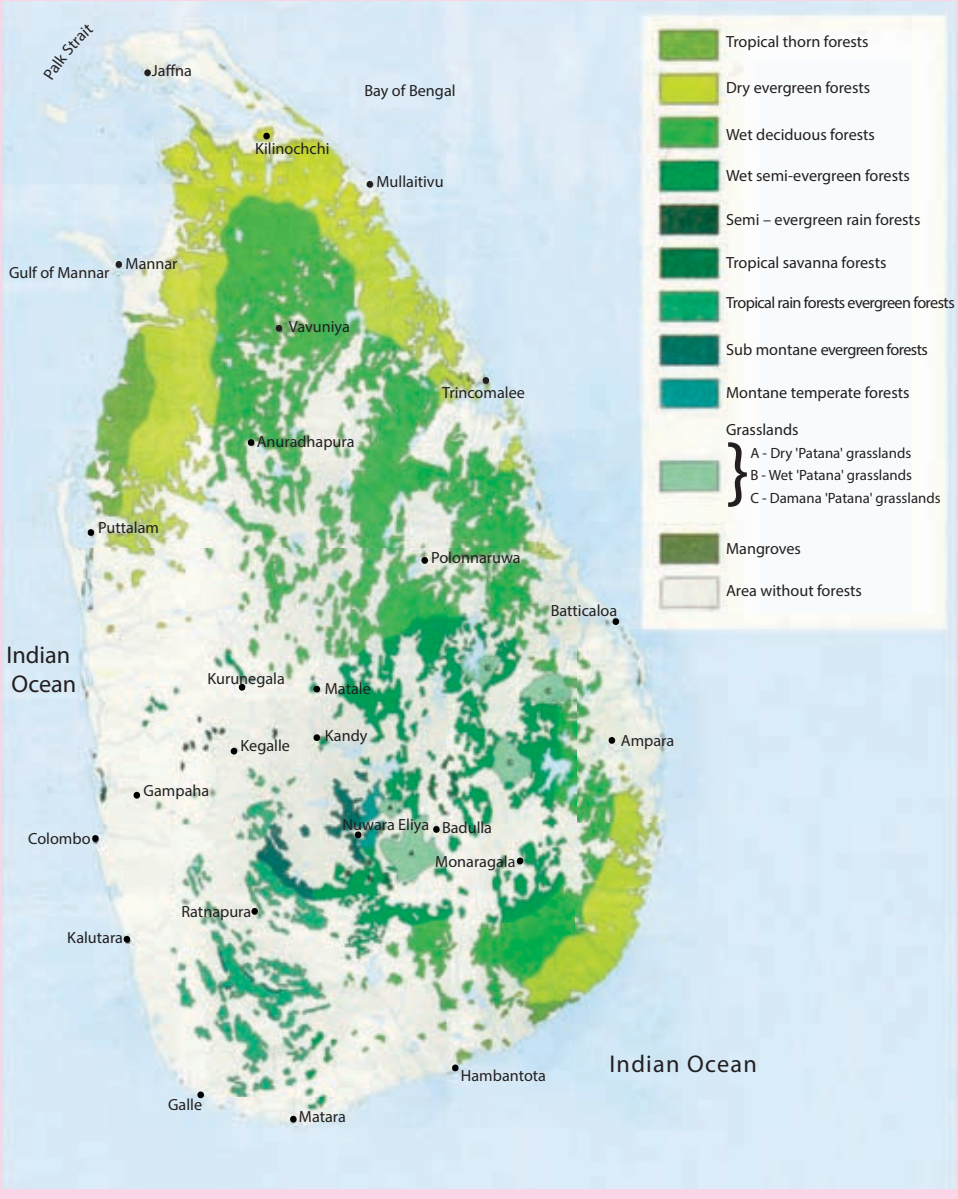


Figure 12.29 - Natural ecosystems in Sri Lanka

Source - The National Map Collection of Sri Lanka, School Edition, Survey Department

Man-made ecosystems in Sri Lanka

The man-made ecosystems in Sri Lanka can be categorized into 3 groups.

- **Agricultural environments**
- **Industrial environments**
- **Settlement environments**

Agricultural environments

Figure 12.30 - Agricultural environment

- An ecosystem designed for cultivation of crops and animal husbandry to meet the food requirement is called an agricultural environment.
- Occasions where humans have taken into their control of certain plants and animals that were distributed in natural environment are found in agricultural environments.
- For the cultivation of paddy, tea, vegetables particular land preparations should be carried out. Also lands must be allocated for animal husbandry. In this case when the grasslands are regularly grazed, the plants do not exist. Hence the bio-diversity is limited.

Assignment 12.6

- Compare and tabulate the differences between a natural environment and an agricultural environment.

Industrial environments

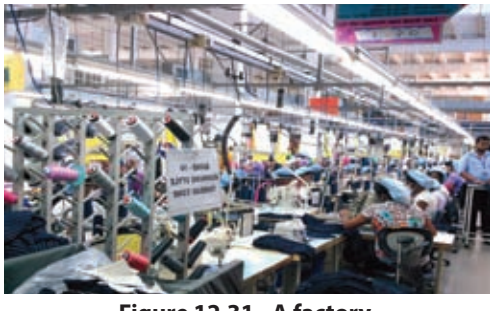


Figure 12.31 - A factory

- An ecosystem that has been built up by machines, raw materials and energy resources required for a product is called an industrial environment.
- When a community is being developed many productions (food, medicine, clothes, furniture, electrical equipment, sanitary materials) are produced, by many industries for betterment of living conditions of the citizens in a certain country.
- Even though these industrial products are useful to human they also have adverse effects.

Some of the adverse effects are,

- Heavy noise in the industrial environment
- Releasing poisonous gases and smokes
- Release of excessive heat and contamination of water bodies
- Harmful chemicals, released to the environment

Settlement environments

- A rural or urban environment where man has established his habitat is known as **settlement environments**.
- Migration to cities on a variety of needs and urbanization in cities have resulted more urban settlements.
- Many problems have arisen due to improper human settlements.

Figure 12.32 - A habitat

- Reduce the space
- Not enough light
- Less ventilation
- Diseases become to epidemic situation
- Insufficient sanitary facilities
- Difficulty in removing household garbage
- Damages from emergency fires
- Flooding
- Cultural and social issues

Assignment 12.7

- Man-made environments should be set up to ensure optimum utilization so as to minimize the damage to the natural environment. List the strategies you propose.

Summary

- Combination of plants, animals, micro-organisms, genetic materials of all these living organisms and the ecosystems is known as bio-diversity.
- There are various threats for bio-diversity. These threats have led to deterioration in bio-diversity.
- The living organisms as well as non-living components in an ecosystem often interact with each other. These interactions are living-living, living-non living and non living-non living.
- Fresh water environments, marine environments and brackish water environments are the natural aquatic environments that can be seen in Sri Lanka. Rivers, estuaries, lagoons, riverine environments, man made inland water bodies and oceans belong to these environments.
- The natural terrestrial environments in Sri Lanka can be grouped as forests and grasslands.
- There are four types of forests in Sri Lanka. They are tropical rainforests, montane forests, tropical dry mixed evergreen forests and tropical thorn forests.
- Wet 'Patana', dry 'Patana', 'Damana' and 'Talawa' are the types of grasslands in Sri Lanka.
- The man-made ecosystems are agricultural environments, industrial environments and settlement environments.
- It is our responsibility to protect the bio-diversity.

Exercises

(01) Select the correct or most suitable answer.

01. Select the correct statement about bio-diversity.
    1. Bio-diversity is the diversity of all the living beings in the environment.
    2. Bio-diversity is the diversity of plants, animals and the micro-organisms in the environment.
    3. Bio-diversity is the diversity of plants, animals, micro-organisms in the environment and their genetic materials.
    4. Bio-diversity is the combination of plants, animals, micro-organisms, their genetic materials and the ecosystem.

2. Which out of the following is **not** a threat for bio-diversity?

1) Environmental pollution 2) Spread of invasive species
3) Increasing human population 4) Study of biodiversity

3. Select the correct statement regarding bio-diversity.

a - High bio-diversity will increase the well-being and stability of an ecosystem.
b - Bio-diversity has reduced the competition for the needs of living species.
c - Man has focused to conserve endemic species due to rich biodiversity.

1) a and b 2) a and c 3) b and c 4) a, b and c

4. Which of the following can be considered as a man-made environment?

1) Montane forests
2) Ponds
3) Agricultural lands
4) Wet Patana

5. Consider the following statements about an ecosystem.

a - It is an independent unit.
b - Energy flows in one direction and materials are recycled
c - There are interactions between living-living and also living-non living.

The correct statements are,

1) a and b 2) a and c 3) b and c 4) a, b and c

(02) Match the features of column A with the relevant ecosystem in column B.

A	B
With smaller leaves and twisted stems	tropical rain forests
Canopy structure can be seen	wet 'Patana'
'Palu', 'Weera', 'Koan' are abundant	montane forests
'Maharathmal' plant is prominent	monsoon forests

(03) From ancient times man-made environmental systems have been created in addition to the existing natural ecosystems.

1. Name two important features of a natural ecosystem.
2. What are the man-made ecosystems that exist in Sri Lanka?
3. Write two common issues in a man-made ecosystem.
4. Write an example for a man-made ecosystem.
5. Given below is a picture of a man-made ecosystem. Suggest two possible issues and remedies in the given ecosystem.

Technical Terms

Bio-diversity	-	ජෛව විවිධත්වය	-	உயிர்ப் பல்வகைமை
Ecosystem	-	පරිසර පද්ධතිය	-	சூழற்றொகுதி
Natural ecosystem	-	ස්වාභාවික පරිසර පද්ධතිය	-	இயற்கைச் சூழற்றொகுதி
Man-made ecosystem	-	නිර්මිත පරිසර පද්ධතිය	-	நிருமாணிக்கப்பட்ட சூழற்றொகுதி
Ecosystem diversity	-	පරිසර පද්ධතිවල විවිධත්වය	-	சூழற்றொகுதிப் பல்வகைமை
Genetic diversity	-	ජාන විවිධත්වය	-	பரம்பரையலகுப் பல்வகைமை
Species diversity	-	විශේෂ විවිධත්වය	-	இனப் பல்வகைமை
Biotic factors	-	ජෛව සාධක	-	உயிரியல் காரணி
Abiotic factors	-	අජෛව සාධක	-	உயிரற்ற காரணி
Agricultural environments	-	කෘෂිකාර්මික පරිසර	-	விவசாயச் சூழல்
Industrial environments	-	කාර්මික පරිසර	-	கைத்தொழில் சூழல்
Settlement environments	-	ජනාවාස පරිසර	-	குடியிருப்புச் சூழல்