

CHAPTER 1 BIODIVERSITY

Learning Outcomes:

1. To learn about the diversity of organisms
2. To learn about the classification of organisms



1.1 Diversity of Organisms

What is biodiversity?

1. All living things are known as organisms.
2. Biodiversity is the variety of living things that exist on Earth, which consist of plants, animals and microorganisms.

How does biodiversity exist?

1. Biodiversity exists due to the variety of habitats and climates on Earth.
2. Habitat is the natural home of an organism, in which animals and plants can adapt to survive in their respective habitats.
3. Scientists estimate that there are roughly 13 million species of animals and plants. However, there are only 1.7 million species that have been identified and given names systematically.
4. Malaysia is known for her endemic species that are almost extinct on Earth surface.

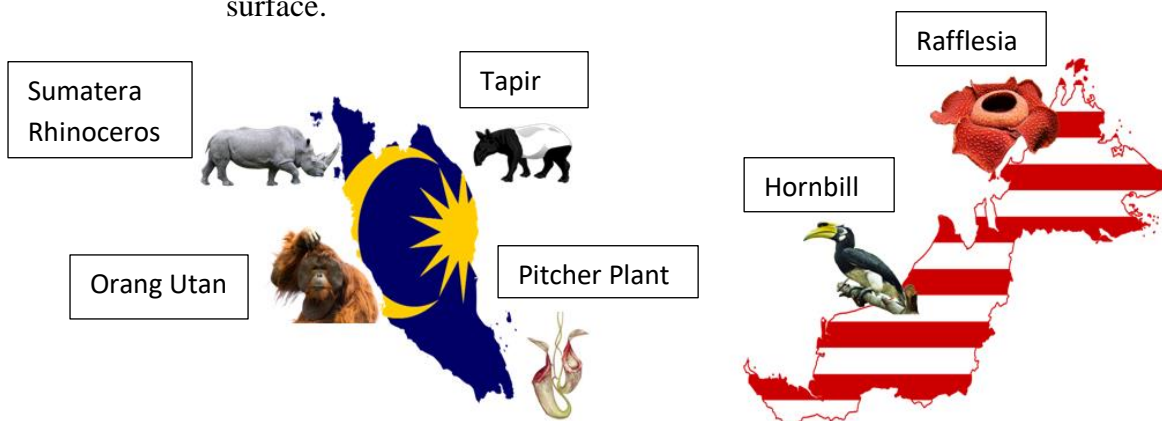
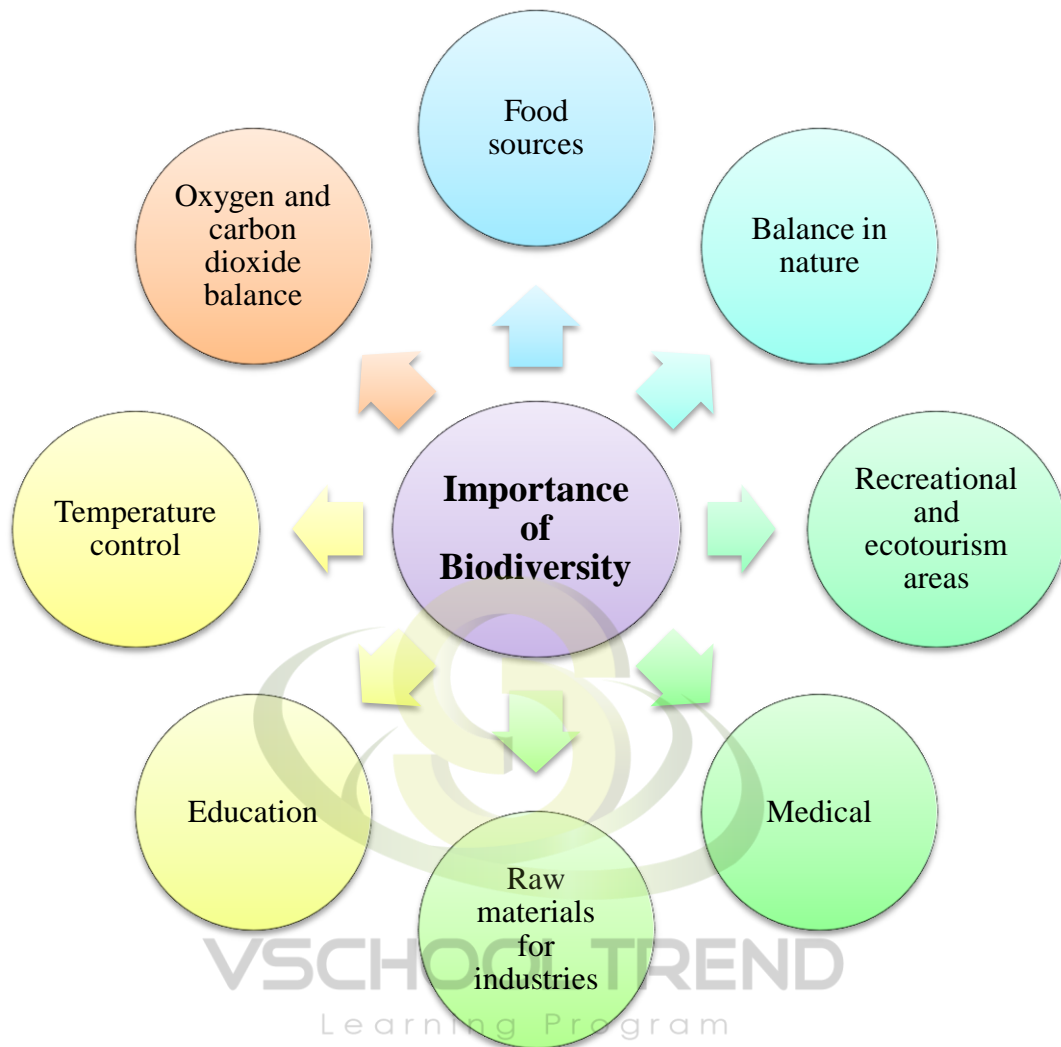


Figure 1.1 Endemic species in Malaysia

Importance of biodiversity



1. Living organisms interact with each other and their surroundings through the processes of photosynthesis, respiration, transpiration and decomposition of dead organism.
2. Hence, the cycles of nature such as oxygen cycle, carbon cycle, nitrogen cycle and water cycle are maintained through those processes. It forms a balanced environment.

Effective biodiversity management

1. Human uses natural resources every day. Thus, human needs to manage biodiversity well to ensure the existing flora and fauna on Earth are protected and do not become extinct.
2. Examples of human activities that can threaten the environment:
 - i. Deforestation without control
 - ii. Pollutions of air and water
 - iii. Illegal hunting to get valuable animals
 - iv. Excessive usage of chemicals such as pesticides, inorganic chemicals and insecticides.

Steps to protect biodiversity



1.2 Classification of Organisms

+ Classification of animals

1. Animals can be classified into two groups: vertebrates and invertebrates.

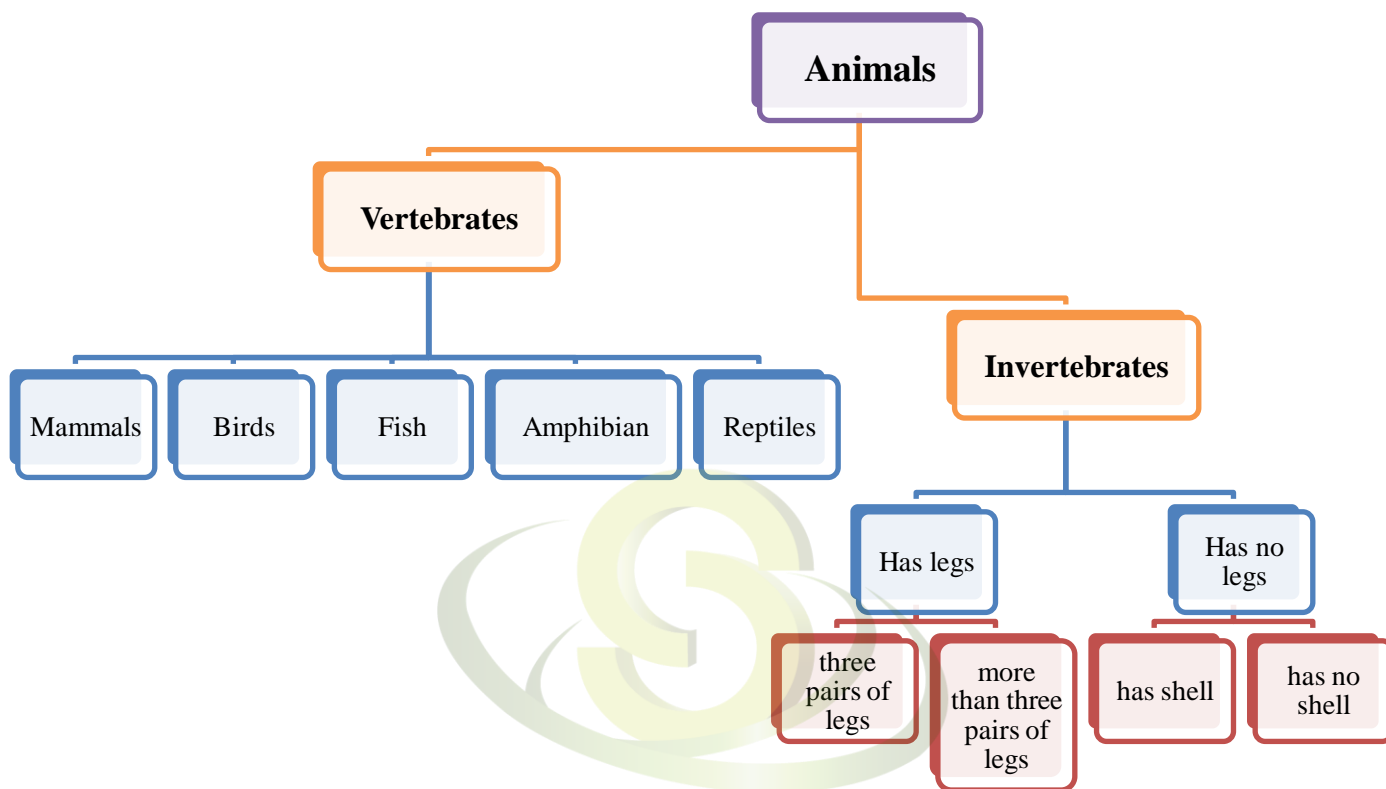


Figure 1.2 The map of classification of animals

Learning Program

+ Vertebrates

1. Vertebrates are animals with a backbone.
2. Vertebrates are bigger in sizes than invertebrates.
3. The common characteristics of vertebrates include:
 - ✓ Warm-blooded or cold-blooded
 - ✓ Types of lining of the body
 - ✓ Types of respiration
 - ✓ Methods of reproduction
 - ✓ Types of fertilisation






Mammals	Bird	Fish	Amphibian	Reptiles
e.g. 	e.g. 	e.g. 	e.g. 	e.g. 
Warm-blooded	Warm-blooded	Cold-blooded	Cold-blooded	Cold-blooded
Has hair/fur (except anteater)	Has feathers	Has slimy scales	Has moist skin	Has dry, scaly skins
Give birth to young (except platypus)	Lay eggs with shell	Lay eggs without shell	Lay eggs without shell	Lay eggs with shell
Internal fertilisation	Internal fertilisation	External fertilisation	External fertilisation	Internal fertilisation
Homeothermic	Homeothermic	Poikilothermic	Poikilothermic	Poikilothermic
Breathe with lung	Breathe with lung	Breathe with gills	The young breathe through gills. The adults breathe with lung when on land and through skin in water.	Breathe with lung

Table 1.1 Classification of vertebrates based on their characteristics

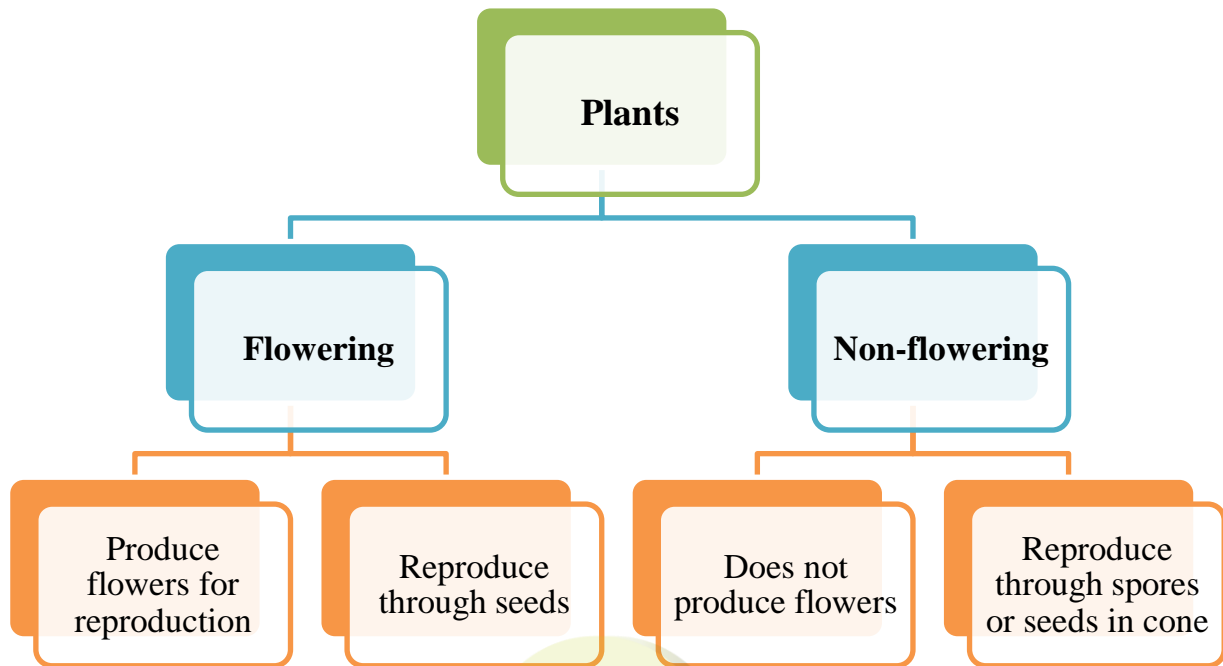
Invertebrates

1. Invertebrates are animals without a backbone.
2. Most invertebrates are small in size and have a simple structure, but they comprises of more than 95% of animal species.
3. Invertebrates can be divided into two: animals with legs and without legs.

Invertebrates with legs	
Characteristics: <ul style="list-style-type: none">- Have segmented bodies- Have hard outer shells (exoskeleton)	
1. Three pairs of legs <ul style="list-style-type: none">❖ Cockroach❖ Ant❖ Grasshopper	2. More than three pairs of legs <ul style="list-style-type: none">❖ Spider❖ Centipede❖ Prawn
Invertebrates without legs	
Characteristics: <ul style="list-style-type: none">- Some have segmented bodies; some have unsegment bodies- Some have shells; some do not have shells	
1. Segmented body <ul style="list-style-type: none">❖ Tapeworm❖ Earthworm❖ Leech	2. Unsegment body <ul style="list-style-type: none">❖ Jellyfish❖ Starfish❖ Snail

Table 1.2 Invertebrates

Classification of Plants



Flowering Plant



Monocotyledons

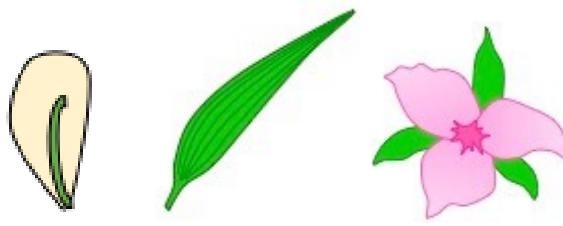
- Seed with one cotyledon
- Leaves with parallel veins
- Soft and non-woody stems
- Petals in multiples of three
- Fibrous root
- Examples: Coconut tree, orchid plant, sugarcane plant, paddy plant, banana plant and oil palm tree.



Dicotyledons

- Seed with two cotyledon
- Leafs with network-like veins
- Hard and woody stem
- Petals in multiples of four or five
- Tap root
- Examples: Rambutan tree, rose plant, sunflower plant, balsam plant, rubber tree and papaya tree.

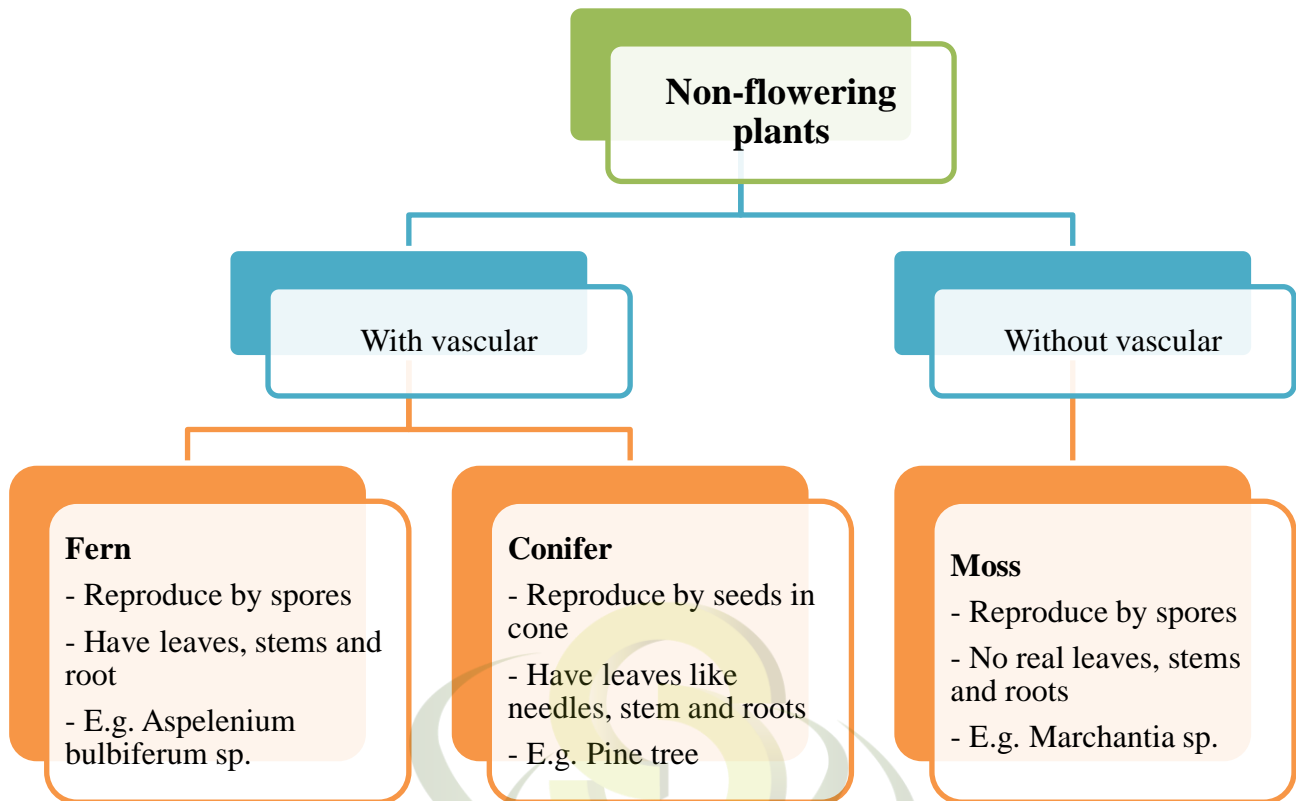
Monocotyledons:



Dicotyledons:



Non-flowering Plant



Dichotomous key

1. A method that is used to identify and classify organisms according to their similarities and differences for the systematic study of biodiversity.
2. Example of dichotomous key:

✓ Dichotomous key for animals



Starfish



Spider



Ant



Butterfly



Snail

1. (a) With legs ----- 2
(b) Without legs ----- 4
2. (a) Has three pairs of legs ----- 3
(b) Has more than three pairs of legs ----- Spider

3. (a) With wings ----- Butterfly
(b) Without wings ----- Ant
4. (a) With shell ----- Snail
(b) Without shell ----- Starfish

✓ Dichotomous key for plants



Ferns



Mosses



Paddy



Hibiscus

1. (a) Flowering ----- 2
(b) Non-flowering ----- 3
2. (a) Monocotyledon ----- Paddy
(b) Dicotyledon ----- Hibiscus
3. (a) Vascular ----- Ferns
(b) Non-vascular ----- Mosses