



Core units: Exemplar – Year 9

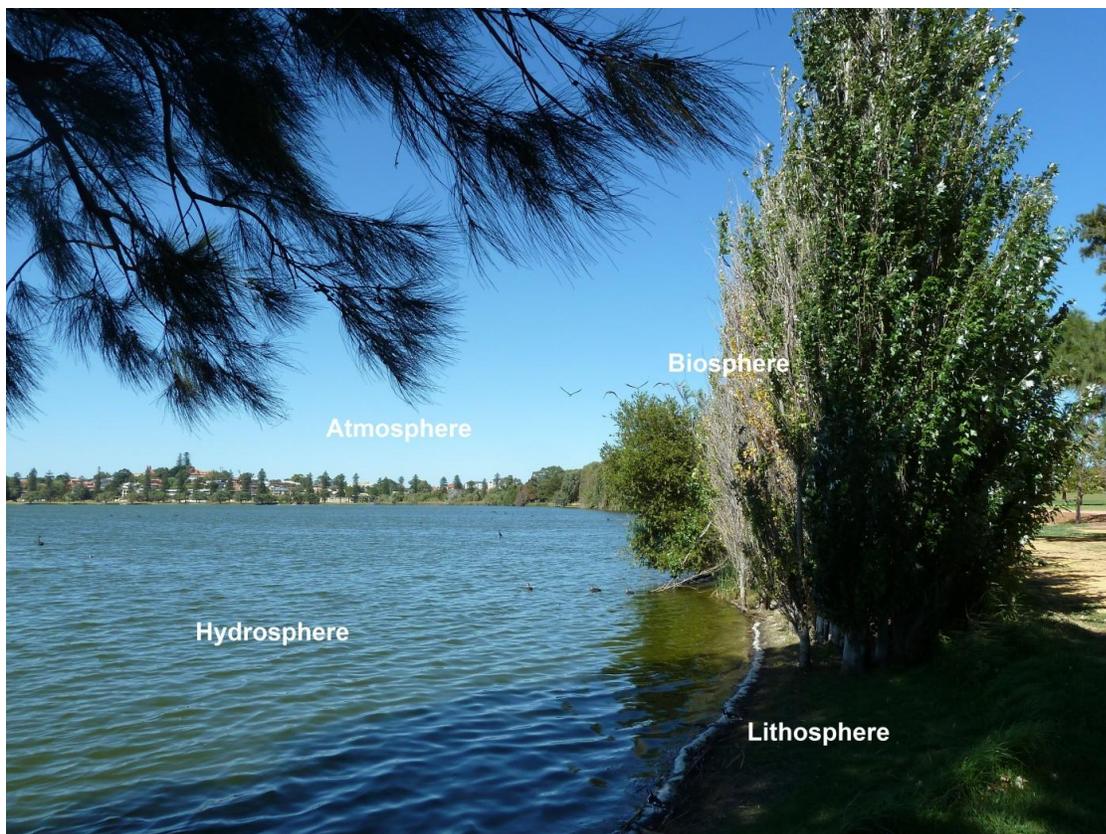
Illustration 1: Biomes and ecosystems

Introduction to ecosystems

The natural environment

Earth's natural environment can be seen as four interacting spheres. The solid part of the earth's crust, consisting of rocks and soil, is known as the lithosphere. All of earth's water bodies, including lakes, rivers, streams, oceans, groundwater and ice caps, are known as the hydrosphere, and the layer of gases surrounding the earth is known as the atmosphere. As energy and materials flow between these first three spheres, the perfect conditions for life to exist are produced which supports the fourth sphere. This realm of living things, including plants and animals, is known as the biosphere.

Earth's four spheres can be identified in the photograph below.



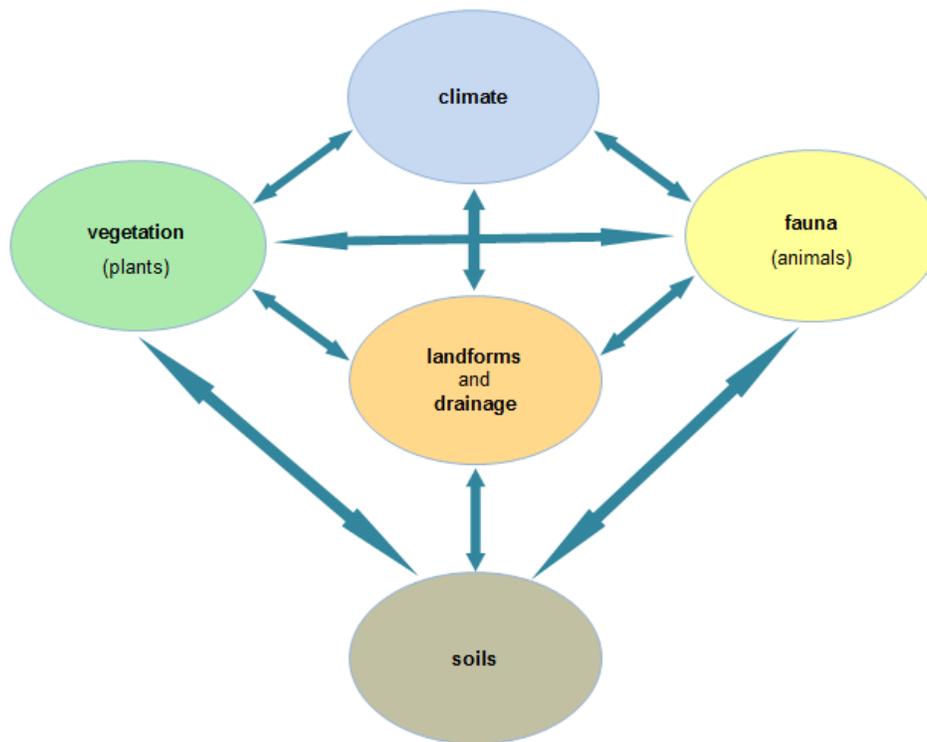
Earth's four spheres

Source: © Tamara Boyer

Ecosystems

Ecosystems are specific areas of the environment that develop as a result of the interaction between the earth's four spheres. They are characterised by a unique collection of living organisms (plants and animals) which have adapted to their surrounding non-living environment (climate, rocks, soils and water). The sizes of ecosystems vary. They can be as large as the earth's biosphere itself or the Sahara Desert, or as small as a fishpond. It is important to remember, however, that over time most of earth's ecosystems have been influenced in some way by the activities of humans, so there are very few ecosystems which remain in their purely natural state.

The model below shows the living and non-living components of an ecosystem. Each component is closely related and affects, or is affected by, each of the other components. The arrows in the diagram represent the interrelationships that occur between each part of an ecosystem. It is these specific interactions which cause each ecosystem to develop its own unique characteristics.



Simple model of an ecosystem

Climate is arguably the most important factor influencing each of the components of an ecosystem. For example, the temperature and amount of precipitation received directly influences the type of vegetation produced. Warmer climates with higher rainfall will be the most productive having taller and more closely spaced trees, like that of the tropical rainforest. Areas with the coldest climates and lowest rainfall figures have very little vegetation, like that of the Arctic Tundra.

Climate also influences the type of soils produced in a region. Deep soils tend to develop in areas where precipitation exceeds evaporation. This is because the parent rock is weathered to a greater depth. Higher rainfall also means that larger amounts of dissolved nutrients are carried down to the subsoil beyond the reach of plants, therefore reducing soil fertility. In arid areas, where evaporation exceeds precipitation, water moves upward through the soil and the dissolved salts are deposited near the surface creating an infertile soil. The most fertile soils tend to occur in areas of seasonal rainfall where leaching of nutrients during the wet season is balanced by the upward movement of minerals in the dry season.

Student activity

Draw a table like the one below into your exercise book.

With reference to the *Simple model of an ecosystem* (on page 2), suggest possible ways that each of the components of an ecosystem can influence each other.

	Climate	Vegetation	Fauna	Landforms & Drainage	Soils
Climate					
Vegetation					
Fauna					
Landforms & Drainage					
Soils					

Biomes

Not unlike ecosystems, biomes also consist of distinctive plant and animal species which have adapted to their surrounding environment. The main difference between an ecosystem and a biome is the scale at which we study them. While ecosystems vary in size, biomes are very large areas with similar characteristics, and are usually classified according to the dominant vegetation found within a particular region (that is, the plants which are the largest or that occur most frequently in response to the region's overall average atmospheric conditions). Biomes can be classified as either terrestrial (land based biomes) or aquatic (water based biomes).

For the purpose of this investigation you will be studying earth's major terrestrial biomes. Some activities are prepared for you on the following pages.

Student activity

Complete the following four tasks, and then discuss them with members of the class.

1. Study the photograph *Duke of Orleans Bay, Western Australia* below.

Identify earth's four spheres which are represented.



Duke of Orleans Bay, Western Australia

Source: © Tamara Boyer

2. In what ways might the various living and non-living components of the ecosystem at *Duke of Orleans Bay, Western Australia* influence each other?

Use the *Simple model of an ecosystem* (on page 2) to help you think about this.

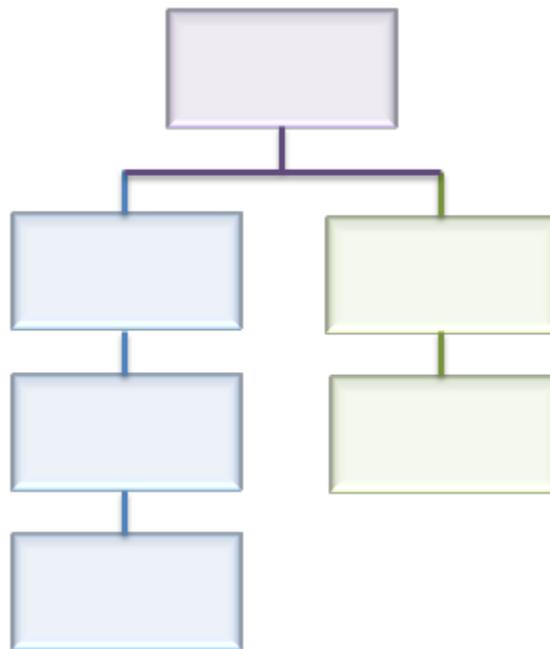
3. Describe the similarities and differences between an ecosystem and a biome.

Provide two examples of each.

4. Create a structured overview using the following labels:

- forests
- grasslands
- deserts
- mountains
- aquatic
- coral reefs
- terrestrial
- biosphere
- swamps
- mangroves
- estuaries and lagoons.

An example of a structured overview is provided below. It shows how the main heading sits at the top, and lists that relate to each other are grouped below it, with each group having its own column.



Structured overview diagram

Choose the label from the list above that describes the main heading, and place it at the top of your structured overview diagram. Then group other labels that fit together (you may have two or more groups). Each group is put in its own column (as shown by the blue and green boxes above) with one label in each box.

Once you have finished, give your diagram an appropriate title.