

8.2 A Local Ecosystem

Contextual Outline

The environment has an impact on all organisms in ways that a Biology student will learn to recognise and explain. Students are able to draw on existing knowledge of their own local area and expand on their understanding of biological concepts that can be identified through careful analysis of the biotic and abiotic factors operating.

While the study of the relationships of organisms with each other and with their physical environment can be theoretically presented in a classroom setting or by using simulations of natural populations, communities and even ecosystems, the study of ecology in the field is essential. Study of this module must include field experience of a local terrestrial or aquatic ecosystem to observe and measure some of the abiotic parameters to which the main plant and animal species are adapted and to study some of the trophic, competitive and symbiotic interactions between organisms in that ecosystem.

Students should be encouraged to analyse and report on those aspects of the local environment that have been affected by people and propose realistic solutions to the problems that exist. The report should include: a statement of purpose; a clear and detailed description of the area studied; any background material collected on the area; appropriate presentation of data collected; analysis of data; suggestions of the relationships that exist in the area; and an assessment of human impact on the area.

This module increases students' understanding of the nature, practice and applications of biology.

Assumed Knowledge

Domain: knowledge and understanding

Refer to the *Science Years 7–10 Syllabus* for the following:

- 5.10a) distinguish between biotic and abiotic features of the local environment
- 5.10b) describe the importance of cycles of materials in ecosystems
- 5.10c) describe some impacts of human activities on ecosystems
- 5.11.2a) relate pollution to contamination by unwanted substances
- 5.11.2c) discuss strategies used to balance human activities and needs in ecosystems with conserving, protecting and maintaining the quality and sustainability of the environment.

	<i>Students learn to:</i>	<i>Students:</i>
1. The distribution, diversity and numbers of plants and animals found in ecosystems are determined by biotic and abiotic factors	<ul style="list-style-type: none">▪ compare the abiotic characteristics of aquatic and terrestrial environments▪ identify the factors determining the distribution and abundance of a species in each environment▪ describe the roles of photosynthesis and respiration in ecosystems▪ identify uses of energy by organisms▪ identify the general equation for aerobic cellular respiration and outline this as a summary of a chain of biochemical reactions	<ul style="list-style-type: none">▪ process and analyse information obtained from a variety of sampling studies to justify the use of different sampling techniques to make population estimates when total counts cannot be performed

2. Each local aquatic or terrestrial ecosystem is unique

Students learn to:

- examine trends in population estimates for some plant and animal species within an ecosystem
- outline factors that affect numbers in predator and prey populations in the area studied
- identify examples of allelopathy, parasitism, mutualism and commensalism in an ecosystem and the role of organisms in each type of relationship
- describe the role of decomposers in ecosystems
- explain trophic interactions between organisms in an ecosystem using food chains, food webs and pyramids of biomass and energy
- define the term adaptation and discuss the problems associated with inferring characteristics of organisms as adaptations for living in a particular habitat
- identify some adaptations of living things to factors in their environment
- identify and describe in detail adaptations of a plant and an animal from the local ecosystem
- describe and explain the short-term and long-term consequences on the ecosystem of species competing for resources
- identify the impact of humans in the ecosystem studied

Students:

- choose equipment or resources and undertake a field study of a local terrestrial or aquatic ecosystem to identify data sources and:
 - measure abiotic variables in the ecosystem being studied using appropriate instruments and relate this data to the distribution of organisms
 - estimate the size of a plant population and an animal population in the ecosystem using transects and/or random quadrats
 - collect, analyse and present data to describe the distribution of the plant and animal species whose abundance has been estimated
 - describe two trophic interactions found between organisms in the area studied
 - identify data sources and gather, present and analyse data by:
 - tabulation of data collected in the study
 - calculation of mean values with ranges
 - graphing changes with time in the measured abiotic data
 - evaluating variability in measurements made during scientific investigations
- gather information from first-hand and secondary sources to construct food chains and food webs to illustrate the relationships between member species in an ecosystem
- process and analyse information and present a report of the investigation of an ecosystem in which the purpose is introduced, the methods described and the results shown graphically and use available evidence to discuss their relevance