Leaving Certificate
Biology
Ecology and Ecosystems

Please see *Teachers' Notes* for explanations, additional activities, and tips and suggestions.

Levels	Students' English-language skills should be developed to **Level B1** during funded Language Support. Mainstream subject learning will require the development of skills at **Level B2** if students are to cope with public examinations.	
Language focus	Key vocabulary, word identification, sentence structure, extracting information from text, writing text, grammar.	
Learning focus	Using Biology textbooks and accessing curriculum content and learning activities.	
Acknowledgement	The *English Language Support Programme* gratefully acknowledges the permission of Gill and Macmillan to reproduce excerpts from *Biology Now!* by Tommy Murtagh.	
Contents of this Unit		**Page**
	Keywords	3,4
	Vocabulary file	5,6,7
	Activating students' knowledge	8
	Focus on vocabulary	9,10
	Focus on grammar *(conditional sentences, prepositions)*	11,12
	Focus on reading	13,14,15
	Focus on writing *(writing paragraphs)*	16
	Answer Key	17,18

Using this unit

Language support and mainstream subject class

The sections ***Activating students' knowledge***, ***Focus on vocabulary***, and ***Focus on grammar*** have been designed, in particular, for Language Support classes.

Focus on reading and ***Focus on writing*** are suitable for use in either Language Support or subject classes.

Answer Key

Answers are provided at the end of the unit for all activities except those based on free writing.

Textbooks

This unit focuses on the section *Ecology and Ecosystems* of the Leaving Certificate Biology curriculum. Students will need to use their textbooks if they are to gain the most benefit from the activities.

Learning Record

The Learning Record is intended to help students monitor their progress. This can be downloaded or printed from the website in the section *Advising Students and Record of Learning for the Leaving Certificate.* A copy of the Learning Record should be distributed to each student for each Unit studied.

Students should:

1. Write the subject and topic on the record.
2. Tick off/date the different statements as they complete activities.
3. Keep the record in their files along with the work produced for this unit.
4. Use this material to support mainstream subject learning.

Symbols

Symbols are used throughout the unit to encourage students to develop their own learning and support materials.

prompts students to file the sheet when they have completed the activity. This is used for activities which can be used as a reference in the future e.g. for subject classroom, revision, homework etc.

prompts students to add vocabulary, definitions, or examples of vocabulary in use to their own personal glossary for the topic. A personal glossary makes study and revision more efficient.

Keywords

Nouns

abundance
acid
adaptations
aeration
algae
ammonia
animals
aphids
apparatus
atmosphere
availability
bacteria
barnacles
biomass
biosphere
camouflage
carbon
carnivores
CFCs
competition
concentrations
conservation
constraints
control
cycle
data
debris
deer
detritus
diagrams
dinosaurs
dioxide
disease
disposal
distribution
diversity
ecology
ecosystem
effects
energy
environment
factors
feeding
fish
fishing nets
fixation
food chain
food web
fossil fuels
fungus / fungi
global warming
grass
greenfly
greenhouse effect
habitat
hawks
herbivores
herring
honeysuckle
host
humans
insects
jar
ladybirds
level
light
limpets
mammal
mesh
methane gas
methods
minerals
mutualism
nature
niche
nitrates
nitrogen
nutrients
orchids
organism
other
overview
oxygen
ozone layer
parasite
parasitism
pesticides
ph
photosynthesis
pitfall
plankton
plants
pollutants
pollution
pond
population pyramid
portfolio
predation
predator
prey
proteins
radiation
rain
relationship
relationships
respiration
results
rubbish
seashore
seaweed
sewage
shrub
sludge
slugs
soil
species
study
symbiosis
techniques
thrushes
toxins
treatment
voles
waste
water
webs
wolves
woodland

Verbs

to absorb
to collect
to convert
to decompose
to decrease
to feed
to fell
to flow
to harm
to identify
to impact
to increase
to interact
to kill
to measure
to obtain
to produce
to recycle
to release
to reproduce
to throw
to trap

Continued…

NAME: _____ DATE:_____

Leaving Certificate Biology: Ecology and Ecosystems

Adjectives

abiotic
acidic
anaerobic
aquatic
bacterial
beneficial
biodegradable
biological
biotic
chemical
ecological
essential
freshwater
harmful
inorganic
marine
natural
organic
possible
qualitative
quantitative
rocky
scientific
trapped
trophic

Vocabulary file for the topic

Ecology and Ecosystems

Word	Meaning	Page(s) in my textbook	Note
ecology			
habitat			
ecosystem			
biosphere			
abiotic factors			
biotic factors			
climatic			
edaphic factors			
geographic			

NAME: _____ DATE:_____

Leaving Certificate Biology: Ecology and Ecosystems

Word	Meaning	Page(s) in my textbook	Note
aquatic			
carnivores			
omnivores			
detritus			
food chain			
food web			
pyramid of numbers			
parasites			
biomass			
recycling			

Word	Meaning	Page(s) in my textbook	Note
conservation			
pollution			
insecticide			
aquaculture			
mutualism			
commensalism			
parasitism			
predator			
prey			
population curve			

Introduction

Activating students' existing knowledge

Use a spidergram to activate students' ideas and knowledge on the key points in this chapter. See **Teachers' Notes** for suggestions.

Possible key terms for the spidergram:

The natural world

Pollution

- Invite students to provide key words in their own languages.
- Encourage dictionary use.
- Encourage students to organise their vocabulary into relevant categories (e.g. meaning, nouns, keywords, verbs etc.).

Students should record vocabulary and terms from the spidergram in their personal dictionaries.

Level: B1
Individual / pair

Focus on vocabulary

1. Word building

The verbs in column A appear in this unit in your textbook. Complete the grid by writing the noun forms in Column B. **Some** of the verbs or nouns are followed by prepositions. Check these in your textbook or dictionary and complete Column C.

Column A Verbs	Column B Nouns	Column C Preposition which often follows either the verb or noun
to decompose	*decomposition*	
to increase		an _____ _____
to reproduce		
to impact		to impact _____
to convert		to convert _____
to interact		to interact _____
to adapt		
to distribute		the _____ _____

2. Matching

Match each term in Column A with a definition in Column B. Draw a line between them. Look at your text book if you need help.

Column A	Column B
abiotic factors	the debris that results from felling trees
biotic factors	the relationships that exist in an ecosystem in order to balance the natural environment
food webs	the functional role of an organism in its ecosystem
niche	living factors resulting from the presence of other organisms
forestry waste	one organism kills and eats another organism
ecological relationships	non-living factors such as temperature, water availability and soil type
the predator prey relationship	a set of interconnected food chains

3. Key phrases in use

The sentences below are all from your text books. They are missing 4 of the key terms from exercise 2. Select the correct ones.

a) Seagulls eating crabs is an example of _____.

b) _____ can block waterways and affect the oxygen levels of water.

c) Light, temperature and wind are all examples of _____ in an ecosystem.

d) Organisms usually have a choice in what they eat and are members of _____.

4. Vocabulary in use

Write a short sentence using each of the following terms. Check your Word File, text book or dictionary if you need help.

carnivores

_____

pollution

_____

parasites

_____

habitat

_____

biosphere

_____

Level: B1
Individual / pair

Focus on grammar

5. Conditional forms

A conditional sentence is used to talk about a **possible situation and its result**. There are different forms of the conditional.

Here we are using a **conditional form in the present tense**. In this type of conditional sentence there is a real possibility that what is described will definitely happen.

In this conditional form it is possible to replace **if** with **when**.

This conditional is formed as follows:

Conditional clause	**Main clause**
If + present simple	present simple

Example: **If it rains**, we **take** the bus.

Use the example to help you make the sentences below into conditional sentences. The verbs are provided in brackets.

Note: We always put a comma between the two clauses.

a) If animals (to be) small, they (to reproduce) faster.

_____

b) If organisms (to eat) other species, they (to get) energy through the food chain.

_____

c) When plants and animals (to die), bacteria and fungi (to decompose) the remains.

_____

d) If CFCs (to escape), they (to rise) to the ozone layer.

_____

e) If we (to burn) fossil fuels, acidic oxides (to enter) the air.

_____

6. Prepositions

(preposition: a word used before a noun to show place, direction, time etc)

Some prepositions have been removed from this paragraph from your textbook. Select a preposition from the box below. You will find one preposition for every gap.

Ozone (O_3) is a pale blue gas formed _____ oxygen gas (O_2). It forms _____ the upper atmosphere _____ the action of the sun's ultraviolet radiation _____ O_2 molecules. Ozone is also formed _____ car engines _____ electrical discharge _____ generators, electric trains, lifts or electric storms. Ozone forms a layer _____ the atmosphere about 30 km ____, which filters the ultraviolet radiation of the sun. It absorbs the ultra violet (UV) components that can damage DNA _____ living tissue but does not absorb the UV responsible _____ sunburn and sun tanning. Chlorofluorocarbons (CFCs) have been used _____ fridges and aerosols _____ the last 50 years. If CFCs escape, they rise _____ the ozone layer and reconvert O_3 _____ O_2.

in	from	in	into	from	inside	in	to	inside
on	from	up	for	during	over			

Level: B1 / B2
Individual / pair

Focus on reading

7. Read the text carefully and find the correct statement below. There is one correct answer for each question. Circle the correct answer.

Pollution

Pollution is any human addition to the environment that leaves it less able to sustain life. It is the most harmful human impact. Examples include pollution of air, fresh water, the sea, the soil on land, radiation pollution and even light and noise pollution. Chemicals of human origin that harm the environment are termed pollutants.

Note that pollutants are produced from human activities. The same chemicals made by natural processes over millions of years are generally absorbed by the environment and are not considered polluting; although they might place stress on certain living organisms in the short term. For example, naturally-made CO_2 from respiration is not a pollutant, but excess CO_2 from burning fossil fuels is. Sulphur dioxide from marshes and volcanoes is not a pollutant, but SO_2 from factory chimneys is.

Some pollutants are chemicals that are normally present in the environment but reach a much higher level due to human activity, for example, carbon dioxide in the air or nitrates in river waters. Other pollutants are chemicals which never exist in the normal environment, such as oil slicks at sea or CFCs in the atmosphere.

1) Pollution is

a) a natural activity. **b) a human activity.**

c) created by organisms. **d) a good thing.**

2) Pollutants are

a) produced naturally. **b) produced by all animals.**

c) produced by humans. **d) produced by the wind and sea.**

3) Sulphur dioxide is

a) always a pollutant. **b) never a pollutant.**

c) always produced naturally. **d) a pollutant when produced from fossil fuels.**

4) Chemicals produced by human activity are

a) in very small amounts. **b) at the same level as natural chemicals.**

c) at higher levels. **d) not pollutants.**

5) Oil slicks and CFCs

a) never exist in the natural world. **b) can be found in the normal environment.**

c) are found in the soil. **d) are not bad for the environment.**

6) Name **four** examples of human pollution:

_____

8. Reading for the main idea

It is not always necessary to read through every sentence and paragraph of text. Nor do you have to understand every single word. However, It is important to read with a purpose.

1. In this exercise you must read each paragraph (taken from your textbook) to decide on the main idea of that paragraph.
2. Then write **a phrase** on the blank line which **summarises** the topic of the paragraph.

You should **try** to read quickly, without stopping to check every word. However, sometimes it is necessary to read with more focus when the topic is not immediately clear.

a) Topic: _____

The burning of fossil fuels (coal, oil, gas, petrol) releases acidic oxides into the air – particularly sulphur dioxide (SO_2) and nitrogen oxides (NO_x). SO_2 dissolves in rainwater to form sulphurous acid (H_2SO_3) or reacts with chemical particles in the air to form sulphuric acid (H_2SO_4). The resulting rain is highly acidic and can be carried by the wind over huge distances.

b) Topic: _____

Pollution of the seawater is caused by nitrates from agriculture, sewage, oil spillages and toxic chemicals. All of these will particularly devastate the plankton numbers and so reduce the numbers of all others in the food chains. Also pollutants tend to concentrate as they proceed through the chains, so the fish at the ends of the chains suffer the highest concentrations.

c) Topic: _____

The practice of felling trees faster than they grow has altered the landscape completely and has created various ecological problems. These problems are important in Ireland but perhaps more important worldwide, particularly in tropical rainforests and in the boreal forests near the North Pole.

d) Topic: _____

Modern urban communities produce vast amounts of rubbish. The average Irish person can produce up to ½ tonne of rubbish every year. This rubbish is mostly house dust and dirt (containing human skin cells and hair!), paper, food scraps, metal (soft-drinks cans, tin foil, and food containers), glass and plastic. Traditional disposal of this rubbish has been to use landfill sites where everything is buried. Alternatively the rubbish is burned (incinerated).

e) Topic: _____

Ecosystems and habitats are highly varied. Even habitats of the same kind vary in different parts of the country. Woodlands in Mayo are different to those in Kilkenny; the rocky seashore on the west coast of Ireland is different to the more sheltered east coast.

9. Reading for specific information

Read the following extract from your textbook. Don't read slowly though every word and sentence.

Read the questions first.
Read the text in order to find the answers.
Underline the key sentences when you have found the answers.

Tip: It's a good idea to time yourself so that you learn how to find important information quickly.

a) Transport and Communication

Questions:

1. How do people communicate nowadays?
2. How has the exchange of scientific information changed?
3. What information can satellite imaging provide?

Humans have evolved the 'global village'. It is now possible to see and talk to anyone anywhere in the world at any time. It is also possible to travel to any place in the world within a day. Satellites, telephones, the Internet, aeroplanes, radio and television and other media ensure that information on anything is available to anyone. The exchange of scientific information on the Internet alone is considered to have speeded up recent scientific advance by a factor of ten. Satellite imaging provides information about weather, animal migrations, oil pollution. algal bloom, iceberg movements, land erosion and impending famine.

b) Health and Medicine

Questions:

1. What has caused human health to improve?
2. How are humans protected from illness and disease?
3. What is the benefit of these advances?

Human health is greatly improved in recent years. Advances in food preparation, water quality and sewage systems, together with better education on hygiene and on the importance of diet and exercise have greatly increased the average human lifespan. Advances in surgery and preventative medicine protect humans from illness, disease and defects. Studies in contraception and reproduction can assist in curbing the human population explosion. All of these advances in turn benefit animal populations.

Level: B1 / B2
Individual / pair

Focus on writing

10. Writing a paragraph

Remember!

- A paragraph is a unit of information unified by a central controlling idea.
- Paragraphs should focus on one piece of information.
- The main idea in a paragraph is often expressed in *one particular sentence* (called the topic sentence). This sentence is usually at the beginning of a paragraph, but can come at the end or even in the middle.
- It is important to organise the information logically in a paragraph.

a) Write a paragraph on the topic *Human Impact on Ecosystems***.**

Include a sentence about each of the following points. Use your **textbook** if you need to check the information.

- Good (beneficial) impacts
- Harmful impacts (pollution)
- Conservation

b) Write a paragraph on the topic *Ecological Relationships***.**

Include a sentence about each of the following points. Use your **textbook** if you need to check the information.

- What the relationships do in the ecosystem
- Give some examples of the following – competition, predation, parasitism, mutualism, commensalism, human interaction

Answer Key

Focus on vocabulary

1. Word building

Column A Verbs	Column B Nouns	Column C Preposition which often follows either the verb or noun
to decompose	*decomposition*	
to increase	increase	an increase in
to reproduce	reproduction	
to impact	impact	to impact on
to convert	conversion	to convert to
to interact	interaction	to interact with
to adapt	adaptation	to adapt to
to distribute	distribution	the distribution of

2. Matching

Column A	Column B
abiotic factors	non-living factors such as temperature, water availability and soil type
biotic factors	living factors resulting from the presence of other organisms
food webs	a set of interconnected food chains
niche	the position occupied by an organism in its ecosystem
forestry waste	the debris that results from felling trees
ecological relationships	the relationships that exist in an ecosystem in order to balance the natural environment
the predator prey relationship	one organism kills and eats another organism

3. Key phrases in use

a) Seagulls eating crabs is an example of ***the predator prey relationship***.

b) ***Forestry waste*** can block waterways and affect the oxygen levels of water.

c) Light, temperature and wind are all examples of ***abiotic factors*** in an ecosystem.

d) Organisms usually have a choice in what they eat and are members of ***food webs***.

Focus on grammar

5. The conditional

a) If animals ***are*** small, they ***reproduce*** faster.

b) If organisms ***eat*** other species, they ***get*** energy through the food chain.

c) When plants and animals ***die***, bacteria and fungi ***decompose*** the remains.

d) If CFCs ***escape***, they ***rise*** to the ozone layer.

e) If we ***burn*** fossil fuels, acidic oxides ***enter*** the air.

6. Prepositions

Ozone (O_3) is a pale blue gas formed ***from*** oxygen gas (O_2). It forms ***in*** the upper atmosphere ***from*** the action of the sun's ultraviolet radiation ***on*** O_2 molecules. Ozone is also formed ***inside*** car engines ***during*** electrical discharge ***from*** generators, electric trains, lifts or electric storms. Ozone forms a layer ***in*** the atmosphere about 30 km ***up***, which filters the ultraviolet radiation of the sun. It absorbs the ultra violet (UV) components that can damage DNA ***in*** living tissue but does not absorb the UV responsible ***for*** sunburn and sun tanning. Chlorofluorocarbons (CFCs) have been used ***inside*** fridges and aerosols ***over*** the last 50 years. If CFCs escape, they rise ***to*** the ozone layer and reconvert O_3 ***into*** O_2.

Focus on reading

7.

1. **b)**
2. **c)**
3. **d)**
4. **c)**
5. **a)**
6. chemicals, noise, light, sulphur dioxide, CFCs, radiation, air, water, sea, the soil

8. Reading for the main idea

Suggested answers:

a) How acid rain is made. / How fossil fuels cause acid rain.
b) The effects of pollutants on seawater. / How pollutants affect life in the sea.
c) Felling trees is a worldwide problem. / Problems are created all over the world by tree felling.
d) Rubbish produced by humans. / How household rubbish is managed.
e) Habitats of the same type vary in different places.

9. Reading for specific information

a) Transport and Communication

Humans have evolved the 'global village'. It is now possible to see and talk to anyone anywhere in the world at any time. It is also possible to travel to any place in the world within a day. [1] Satellites, telephones, the Internet, aeroplanes, radio and television and other media ensure that information on anything is available to anyone. The exchange of scientific information on the Internet alone [2] is considered to have speeded up recent scientific advance by a factor of ten. Satellite imaging provides information about [3] weather, animal migrations, oil pollution. algal bloom, iceberg movements, land erosion and impending famine.

b) Health and Medicine

Human health is greatly improved in recent years. Advances in food preparation, water quality and sewage systems, together with [1] better education on hygiene and on the importance of diet and exercise have greatly increased the average human lifespan. [2] Advances in surgery and preventative medicine protect humans from illness, disease and defects. Studies in contraception and reproduction can assist in curbing the human population explosion. All of these advances in turn [3] benefit animal populations.