**LIVING THINGS AND ENVIRONMENT**

**INTRODUCTION**

You are advised to spend an estimated three/3 weeks on this unit.

Look all around you, including outside your house and note down a minimum of ten (10) things that are found there. Which of the substances are living things? Which ones are non-living things? Do you think all of the substances you have noted are important to you and the rest of the humankind? Do you think the substances you have named can help each other in any way?

The substances you have named constitute the living and the non-living factors of the environment. All the factors of the environment are very important and dependent on each other. This is why we need to understand the potential danger that our actions as human beings may bring to the environment.

**UNIT OBJECTIVES**

At the end of this unit, you should be able to:

* Define the terms ecology, ecosystem, population, community, habitat, ecological niche, food chain and food web.
* Give examples of living and non-living factors of the environment and state their importance.
* State the causes and effects of pollution, climate change, deforestation, endangerment of species, soil erosion, etc.
* Give examples of air, water and land pollutants.
* State the adverse effects of each pollutant.
* State the reasons for conservation of bio-diversity and the physical structure of the environment.
* Describe how the environment can be conserved.

**PRE-TEST**

1. Identify structures A, B, C, D, E, F and G.
2. Name some of the non-living/abiotic factors found in the environment.
3. Construct a food chain consisting of a minimum of four organisms which is possible at the student residences of the Lesotho College of Education.

**REVIEW OF THE ECOSYSTEM**

*Species*: a group of organisms with similar characteristics which can enable them to mate together and produce fertile offsprings. E.g. a species of cows, human beings, cling peaches, etc.

*Population*: a group of organisms of the same species living together and interacting. E.g. a population of trout fish in Maliba-mats’o river, a population of pea plants in my garden, etc.

*Community*: a group of interacting populations of organisms. E.g a community of cats, dogs, cows, people, maize, grass, spinach, etc, in the college campus.

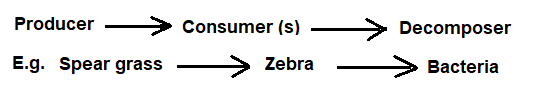
*Habitat*: a natural place where a certain species of organisms is found. E.g fresh water pond for tadpoles, tree trunk for wood pecker, dry land for grass, etc.

*Ecosystem*: a collection of all communities together with their habitats interacting in one place. E.g. a forest, a lake, a mountain, etc.

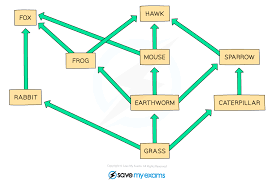
*Niche:* a position held by or role played by an organism in the environment. E.g. a bee’s niche is to pollinate flowers, any plant’s niche is to add oxygen to air, etc.

*Ecology:* a study of how organisms interact together and with their environment.

*Food chain*: a series of organisms through which energy flows from one organism to the other. i.e.



*Food web*: a network of organisms showing how energy flows throughout an ecosystem. i.e. It is an interconnection of many food chains. E.g. a forest food web.



**EFFECTS OF MAN ON THE ENVIRONMENT**

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| --- | --- | --- |
| **Phenomenon** | **Cause(s)** | **Effect(s)** |
| Soil erosion | Removal of vegetation cover of the soil.  Poor agricultural practices (overgrazing, monoculture, etc). | Loss of the fertile top soil.  Desertification (formation of dongas, lack of vegetation, drought, etc).  Loss of habitats.  Etc… |
| Deforestation | Removal of trees | Desertification  Loss of habitats  Reduced humidity  Greenhouse effect |
| Endangerment of species | Removal/burning of vegetation.  Hunting | Migration of animals  Reduced population of organisms  Extinction of some organisms |
| Pollution | Foreign bodies called pollutants | Change in the composition of the environment with a variety of bad effects (to be discussed later in the unit). |
| Climate change | Deforestation  Pollution | Sudden weather changes.  Extreme weather conditions including global warming (Floods, drought, extreme temperatures, hurricanes, etc).  Low agricultural production.  Melting of glaciers and icebergs, leading to increased sea level. |

**TYPES OF POLLUTION**

**Land pollution**

The land can be polluted through littering of **non-biodegradable** substances, also called litter. Non-biodegradable substances do not naturally decompose into harmless materials, but instead they remain in the environment for a long time. As a result, they make our environment to look dirty and may harm animals and children. Examples of litter include plastic materials, cans, pieces of glass, paper, etc.

**Water pollution**

|  |  |  |
| --- | --- | --- |
| **Names of pollutants** | **Sources/Cause(s)** | **Effects** |
| Detergents and soaps | Domestic waste | Addition of phosphates leading to eutrophication. |
| Sewage | Sewerage lines | Addition of nutrients resulting in eutrophication. |
| Fertilizers | Agricultural fields | Addition of nutrients contributing to eutrophication. |
| Pesticides and herbicides | Agricultural fields | Poisoning of water life leading to death of aquatic plants and animals. |
| Chemical waste | Industries | Poisoning of water, thus killing water life. |
| Oil spillage | Ships and oil tankers | Oxygen depletion in oceans leading to suffocation of water life.  Clings to feathers of water birds and prevents them from flying for survival, thus leading to their death. |

**Air pollution**

|  |  |  |
| --- | --- | --- |
| **Names of pollutants** | **Sources/Causes** | **Effects** |
| Carbon dioxide | Complete combustion of carbon-containing substances | Acid rain which destroys structures and vegetation.  Greenhouse effect leading to global warming. |
| Sulphur dioxide | Combustion of sulphur-containing substances | Acid rain.  Respiratory problems. |
| Carbon monoxide | Incomplete combustion of carbon-containing substances | Suffocation due to lack of oxygen in the body. It may also lead to death. |
| Oxides of nitrogen | Reaction of atmospheric oxygen and nitrogen in car exhaust pipes | Acid rain  Damage to the respiratory system which may lead to chronic lung disease. |
| Lead compounds | Lead-acid batteries, lead-based paint, etc | Brain damage, especially in children.  Lead poisoning in adults can cause many symptoms such as low sperm count, headache, hypertension, etc. |
| Ozone (photochemical smog) | Complex reaction between nitrogen dioxide and hydrocarbons in the presence of sunlight in cars, industries, etc | Breathing difficulties, chest pains, harms plants, etc |
| Green-house gases (water vapour, carbon dioxide, methane, nitrous oxide, ozone, etc) | Various sources | Greenhouse effect leading to global warming. |
| Chlorofluorocarbons | Aerosol sprays, refrigerators, etc | Ozone layer depletion |

<https://www.brittanica.com>, <https://www.pure-leisure.co.uk>, <https://en.wikipedia.org>

**ACTIVITY**

1. Outline the processes that lead to eutrophication.
2. Describe the greenhouse effect and how it leads to global warming.
3. Explain how Sulphur dioxide can have a bad effect to water life.

**CONSERVATION**

This refers to the protection of natural resources for current and future use. This means that we have to use our resources in a sustainable manner to ensure that everything we have in our environment is available for future generations. We conserve the natural resources because of the following main reasons:

* Some of the non-living resources are non-renewable and hence their sources are finite (limited). E.g. metals, fossil fuels, etc. While we mine and use these substances they are not being replaced but instead they get finished at a high rate.
* Some non-living resources such as water, paper (from trees), etc, are renewable. However, we still need to conserve them in order to protect their natural sources.
* These can be conserved through the three R’s (Reduce, Re-use and Recycle). Reduce means using less materials. E.g. use less water when bathing, use less paper for printing, etc. Re-use means using the same material more than one. E.g. water used for bathing can be used for irrigating/washing, paper used for writing can be used as toilet paper, etc. Recycle means making new materials from old ones. e.g. water from sewerage pipes is treated and returned to the natural sources for re-use, used paper is processed into new paper, etc.
* The living factors of the environment are conserved to protect wildlife and maintain biodiversity. We can achieve this through regulated use of plant and animal resources. i.e. We can educate people about sustainable use of the environment an make laws that regulate the use of organisms. We can also preserve indigenous plants and animals in zoos, national parks, botanical gardens, etc

**UNIT SUMMARY**

In this unit, we have covered the following points:

* The environment consists of both the living and the non-living factors, all of which have an important role to play.
* The bad effects of man on the ecosystem include deforestation, soil erosion, climate change, endangerment of species and pollution.
* Removal of vegetation can lead to soil erosion and deforestation, both of which lead to desertification and climate change.
* Removal of vegetation also causes loss of habitats leading to endangerment of species.
* Removal of vegetation also causes pollution by carbon dioxide which leads to global warming.
* Various pollutants have different effects on the environment.
* We need to conserve our natural resources through sustainable use of our environment.

**POST-TEST**

1. Differentiate between the following terms:
2. Global warming and climate change
3. Species and population [4]
4. a) Explain how deforestation can lead to both acid rain and global warming. [4]
5. Choose one natural resource found in the environment and explain why it needs to be conserved and how it can be conserved. [2]

