# BASIC 9

# WEEKLY LESSON PLAN – WEEK 7

| Strand: | Systems | | | Sub-Strand: | | Ecosystem | |
|---|---|---|---|---|---|---|---|
| **Content Standard:** | B9.3.3.1 Recognize the interdependence of organisms in an ecosystem and appreciate their interaction to maintain balance in the system | | | | | | |
| **Indicator (s)** | B9.3.3.1.1 Conduct research into the composition of an ecosystem and discuss how the components depend on each other for survival. | | | **Performance Indicator** Learners can differentiate between food chain and food web. | | | |
| **Week Ending** | 23-02-2024 | | | | | | |
| **Class** | B.S.9 | | **Class Size:** | | | **Duration:** | |
| **Subject** | Science | | | | | | |
| **Reference** | Science Curriculum, Teachers Resource Pack, Learners Resource Pack | | | | | | |
| **Teaching / Learning Resources** | Pictures, Videos, Charts. | | | **Core Competencies:** | | • Communication and collaboration <br> • Critical Thinking and Problem solving <br> • Personal Development <br> • Creativity and Innovation | |

| DAY/DATE | PHASE 1 : STARTER | PHASE 2:    MAIN | PHASE 3: REFLECTION |
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| **TUESDAY** | Discuss with the Learners about keywords and terminologies in the lesson. <br><br> **Terminologies;** <br><br> • Biotic <br> • Abiotic <br> • edaphic factors <br> • Climatic factors <br> • Decomposer <br> • micro-organisms <br> • heterotrophs <br> • carnivores <br> • saprotrophs | 1. Explain the concept "Ecosystem" to the Learners. <br> 2. Discuss with the Learners about the components of an ecosystem. <br> 3. Learners brainstorm to identify examples of ecosystem. <br> 4. Using a chart, explain the components of ecosystem. <br> 5. Assist Learners to describe how organisms depend on each other in different ecosystems. <br><br> Ecosystem is defined as the earth's vital units encompassing the entire system of living organisms (biotic) and the physical factors (abiotic or non-living things) that make up the environment. Otherwise stated, the interaction of a community of organisms with their physical environment constitutes the ecosystem. Therefore, the connectedness of the ecosystem brings about its categorization on the basis of functions and structure. <br><br> **1. Abiotic** <br><br> The abiotic component of the ecosystem refers to the physical environment or the non-living factors. Examples of the abiotic component comprise the soil, atmosphere, solar radiation and water. Abiotic factors greatly determine the functions, distribution, structure, behavior and inter-relationship of | Through questions and answers, conclude the lesson. <br><br> **Exercise;** <br><br> Distinguish between biotic and abiotic components of ecosystem. |

| | | organisms in a habitat. Without the abiotic component, organisms cannot live or survive. Some of the most essential elements for food production and survival for both animals and plants like water and air are abiotic components<br><br>**2. Biotic**<br><br>The biotic components of the ecosystems are the living organisms including animals, plants and micro-organisms (Fungi and Bacteria) | |
|---|---|---|---|
| **THURSDAY** | Assist Learners to differentiate between an ecosystem and a habitat. | 1. Learners brainstorm to identify the types of abiotic and biotic components of ecosystem.<br>2. Discuss with the Learners about the types of habitat.<br>3. Show Learners pictures and video displaying the types of habitat.<br><br>**Types of Abiotic ecosystem;**<br><br>- *Climatic factors:* Climatic factors include elements namely rain, light, temperature, humidity, wind and air.<br>- *Edaphic factors***:** These are elements such as minerals, soil, topography and pH just to mention a few.<br>  **Examples of the abiotic component**<br>- Soil<br>- Atmosphere<br>- solar radiation<br>- water<br>**Types of biotic ecosystem;**<br>- **Producers:** Producers, also known as autotrophs, are the green plants with chlorophyll which gives them the ability to use solar energy to manufacture their own food through a process termed as photosynthesis.<br>- **Consumers:** Consumers are on the second level. Since they lack chlorophyll, they depend on producers for food. Also known as heterotrophs, consumers are additionally grouped into primary consumers, secondary consumers, tertiary consumers, and quaternary consumers.<br>1. *Primary consumers:* Also referred to as first order consumers or herbivores, the animal species under this category primarily feeds on plants or primary producers. Examples include zebras, goats, cattle, rabbits, grasshoppers, deer etc.<br>2. *Secondary consumers:* species under this category are also known as second order consumers or primary carnivores. They mainly feed on herbivores and examples here are rats, foxes etc.<br>3. *Tertiary consumers:* Tertiary consumers are the third order consumers (large carnivores) that feed on the | Learners brainstorm to identify examples of the various types of habitat.<br><br>**Exercise;**<br><br>Explain 3 types of habitat. |

secondary consumers. Examples are the wolves, owls, snakes.

4. *Quaternary consumers:* These are the last order consumers and they are considered the largest carnivores. They feed on primary, secondary and tertiary consumers and are not eaten by any other animal. They are animals with little or without natural enemies. Examples are the tigers, cheaters, lions, hawks, polar bears, alligators, sharks etc.

- **Reducers or Decomposers:** Reducers also known as detrivores (such as worms, dung flies, vultures and crabs) are responsible for breaking down dead organic matter. Decomposers, also known as saprotrophs, are the fungi and bacteria which finish the process by further breaking down the dead remains of plants and animals into simple nutrients through decomposition/biodegradation. The nutrients (byproducts of the dead organic materials) are then used by producers resulting in cyclic exchange of materials in the ecosystem.

**Types of Habitat;**

- **Forests**

Forests are large areas covered with plants. Forests cover about one-third of our planet. Different types of plants and animals are found in forests.

There are three major types of forests on Earth: tropical, temperate, and boreal.

- *Tropical forests* Tropical forests, also known as rainforests, are found between the equator and the two tropics (Tropic of Cancer and Tropic of Capricorn).
The temperature of these forests ranges from 20°C to 34°C. These regions receive heavy rainfall throughout the year; the annual rainfall is more than 200 cm. The variety of flora and fauna found in these forests is vast (Fig. 10.1).
**Plants:** Orchid, vine, moss, and fern.
**Animals:** Bat, gorilla, monkey, jaguar, sloth, macaw, toucan, and a variety of insects.

Orchid                    Macaw

Fig. Plants and animals of tropical forest

*Temperate forests* Temperate forests are found in eastern North America, northeastern Asia, and western and central Europe. The temperature of these regions ranges from -30°C to 30°C. The annual rainfall is about 150 cm and is even throughout the year. Most trees found here are deciduous, that is, they shed their leaves once a year (mostly in winter).
Temperate forests have well-defined winter and summer seasons.
**Plants:** Maple, oak, and elm.
**Animals:** Fox, bald eagle, mountain lion, bobcat, and black bear.
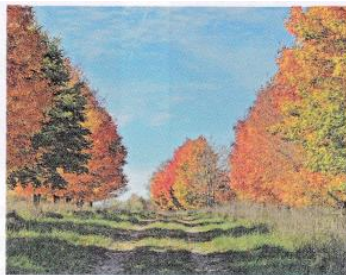

Maple                    Fox

Fig. Plants and animals of temperate forest

*Boreal forests* Boreal forests are also called taiga. These forests are found in Canada, Russia, Scandinavia, China, Mongolia, and northern Japan. These forests are characterized by very low temperatures, that is, between -50°C and 30°C. The annual snowfall in these regions ranges from 40 to 100 cm.
**Plants:** Evergreen trees like pine, fir, and spruce.
**Animals:** Wolf, lynx, fox, deer, woodpecker, hare, bat, bear, moose, and chipmunk.


Pine            Wolf            Woodpecker

Fig. Plants and animals of boreal forest

**Grasslands**

Grasslands are regions dominated by grasses. There aren't too many trees and shrubs here. Temperature ranges between -20°C and 30°C. The annual rainfall varies between 50 and 90 cm. Grasslands provide shelter to a large variety of animals including giraffe, zebra, lion, elephant, and gazelle.



Zebras feed mainly on grasses.

**Deserts**

Deserts are areas that receive very little rainfall. Sahara, Kalahari, and Thar are some deserts. In hot deserts, daytime temperature in summer can reach 45°C. Annual rainfall is less than 25 cm. Though deserts are mostly considered to be hot, some are very cold (e.g., the Gobi desert in China). Organisms like cactus, camel, rattlesnake, gila monster, and kangaroo rat are found in deserts.
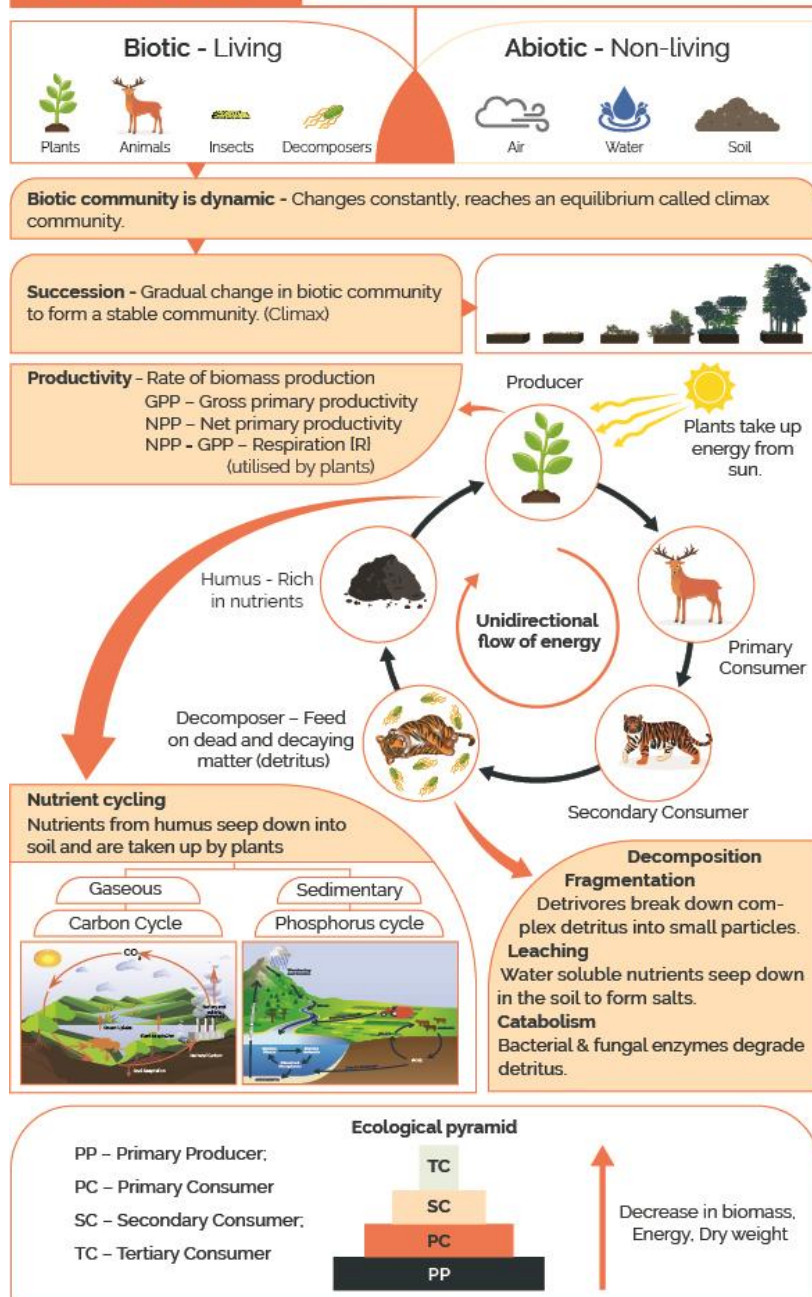


Deserts are dry because they receive very little rainfall.

| FRIDAY | Review learners knowledge on the previous lesson. | 1. Assist learners to differentiate between "food chain" and "food web".<br>2. Draw a diagram on the chalkboard to explain food chain and food web.<br>3. Learners brainstorm to identify examples of food chain and food web.<br>4. Assist learners to draw a diagram to explain energy flow between various organisms through a food web.<br><br>**Food Chain and Food Web**<br><br>Food chain is a linear sequence of organisms which starts from producer organisms and ends with decomposer species. Food web is a connection of multiple food chains. Food chain follows a single path whereas food web follows multiple paths. From the food chain, we get to know how organisms are connected with each other. Food chain and food web form an integral part of this ecosystem. Let us take a look at the food chain and a food web and the difference between them.<br><br>***Example of food chain***<br><br>Grass (Producer) ——Goat (Primary Consumer) —— Man (Secondary consumer)<br><br>When dead organic matter becomes the starting of a food chain, then it is called the *detritus food chain* (DFC). The decomposers, which are the <u>fungi</u> and <u>bacteria</u>, feed on the organic matter to meet the energy requirements. The digestive <u>enzymes</u> secreted by the decomposers help in the breakdown of the organic matter into inorganic materials. | Learners in small groups to discuss and report to the class on the factors that affect the balance in an ecosystem.<br><br><br>**Exercise;**<br><br>Explain 5 factors that affect the balance in an ecosystem. |

**ECOSYSTEM** — Interaction of biotic and abiotic factors

**Biotic - Living**: Plants, Animals, Insects, Decomposers

**Abiotic - Non-living**: Air, Water, Soil

**Biotic community is dynamic** - Changes constantly, reaches an equilibrium called climax community.

**Succession -** Gradual change in biotic community to form a stable community. (Climax)

**Productivity** – Rate of biomass production
GPP – Gross primary productivity
NPP – Net primary productivity
NPP - GPP – Respiration [R]
(utilised by plants)

Producer — Plants take up energy from sun.

**Unidirectional flow of energy**

Primary Consumer

Secondary Consumer

Humus - Rich in nutrients

Decomposer – Feed on dead and decaying matter (detritus)

**Nutrient cycling**
Nutrients from humus seep down into soil and are taken up by plants

Gaseous — Carbon Cycle

Sedimentary — Phosphorus cycle

**Decomposition**
**Fragmentation**
Detrivores break down complex detritus into small particles.
**Leaching**
Water soluble nutrients seep down in the soil to form salts.
**Catabolism**
Bacterial & fungal enzymes degrade detritus.

**Ecological pyramid**

PP – Primary Producer;
PC – Primary Consumer
SC – Secondary Consumer;
TC – Tertiary Consumer

TC
SC
PC
PP

Decrease in biomass, Energy, Dry weight

**Name of Teacher:**          **School:**          **District:**