COURSE LEARNING OUTCOME

- *Imbibe the importance of science and technology in the preservation of the environment and the development of the Filipino nation.*

STUDENT LEARNING OUTCOME

- *Describe biodiversity and its components and how it affects the health of society;*
- *Cite factors and activities that destroy biodiversity;*
- *Explain the impact of COVID-19 pandemic on the Philippine biodiversity; and*
- *Develop values of loving, caring, and helping protect the Philippine biodiversity.*

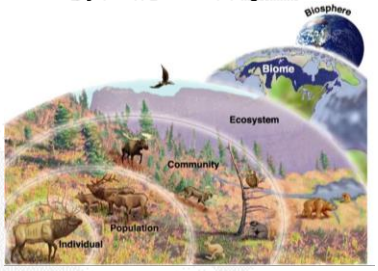
LEARNING CONTENT: BIODIVERSITY AND A HEALTHY SOCIETY

I. INTRODUCTION

Biodiversity comprises all living forms that we see around us. These include all essential goods and services we derive from the environment. Therefore, we can say that we depend on the richness of biodiversity for our survival. Any alteration in the biodiversity of species can affect our lives whether directly or indirectly.

It is sad to know that these diverse life forms are exploited and unmanaged. Some components are becoming endangered, worst they are becoming extinct. This is the best time to find ways and act to protect and preserve our environmental resources.

II. LESSON CONTENT



Biodiversity refers to the richness and variety of life forms on Earth. It includes all the species of living organisms, whether bacteria, plants, animals, and humans, that can be found in one distinct area. To date, it has been recorded that there are approximately 8.7 million species of plants and animals on earth. Surprisingly, only about 12 million species have been identified and classified properly. Insects have the greatest number of organisms that have been identified. Because of this, millions of species or organisms are waiting to be explored and named accordingly (National Geographic Society, 2020).

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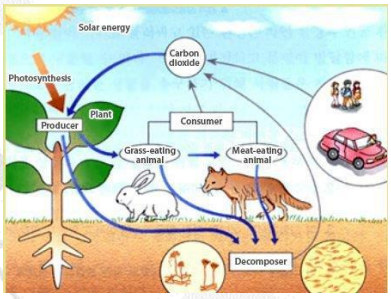
Biodiversity is defined as the variety of life present in an ecosystem. Biodiversity is important in how society benefits from it. There are three different types of biodiversity: genetic, specific, and ecological diversity. *Genetic biodiversity* refers to the variations among organisms of the same species. These variations are usually passed down from parents to offspring. *Species diversity* refers to the variety of species within a particular region.

Species diversity is influenced by the environmental conditions in the region. Species are the normal measure of biodiversity for these are basic units in biological classification. Species are grouped together in families based on shared characteristics. Lastly, *ecological diversity* refers to the network of different species in an ecosystem and the interaction of these species. The variations of climatic and altitudinal conditions along with varied ecological habitats are the reasons for the richness in biodiversity of a particular region on earth.

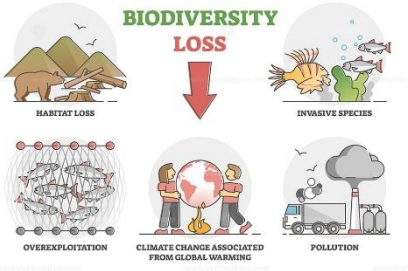
Society benefits greatly from the richness of biodiversity since humans can source from nature biological resources such as food, medicine, energy, and more. Biodiversity in natural ecosystems can also regulate climate, food, pollination, water and air quality, water storage, decomposition of wastes, among others. However, these numerous benefits of biodiversity are vulnerable to exploitation. Humans need to be responsible in optimizing the benefits of biodiversity through the proper utilization of science and technology.



Evolution is a mechanism allowing organisms to develop traits favorable for their survival and growth and also making them distinct from other species in the environment. Because of these unique features, the species can be easily recognized from others. In general, species that can reproduce with their fellow species belong to one species while those that cannot reproduce among themselves often belong to different species of groups.

There are so much to explore and work on in terms of biodiversity globally. There are certain regions in the globe where species are rich and abundant while others may contain just a few. Hotspots are the areas with high levels of biodiversity. Endemic species or species that are located in one particular region are usually found in hotspots. Scientists are in continuous study of identifying, classifying, and characterizing different species of microorganisms, plants, and animals. They are also looking at possible applications in the society and benefits we can derive from these species.

Aside from studying biodiversity on a global scale, scientists also look at diversity of species within ecosystems. They delve into characterizing ecosystems such as terrestrial (forest, tundra, grassland, and valley) and aquatic (river, swamp, lake, sea, and ocean) habitats. Some of these habitats may consist of a wide range of species while others support minimal number of species. Both macroscopic and microscopic organisms are present in ecosystems. Each component of an ecosystem plays a role for the sustainability of the ecosystem. Producers, consumers, and decomposers have their own unique and significant functions in the ecosystem. For instance, microscopic decomposers do play their role of breaking down waste materials that can be toxic to other living components of the ecosystem. Manure from dead organisms fertilize soil and helps promote growth of plants. Humans benefit from other components of the ecosystem for food, shelter, clothing, livelihood, and medicine among others.



Nonetheless, these diverse components of the environment are in danger because of destructive activities of humans. Deforestation, pollution, soil erosion, kaingin farming, conversion of forest lands into industrial purposes, and climate change are just among the major threats to our biodiversity. These have led to escalating rate of extinction of species. Scientists even estimate that within the next century, half of the species on Earth will be wiped out. Therefore, preservation and conservation efforts are a must to protect the remaining species of organisms together with their respective habitats. These wonders of nature are not only for our generation's enjoyment but even for the any generations that will follow. The future of these rich diversity of organisms is in our hands.

BIODIVERSITY AND THE HUMAN HEALTH

Health is our most essential human right. Most people consider health as treasure and wealth. It means overall wellness that secures our physical, emotional, intellectual, spiritual, and social aspects. Therefore, health is a reliable indicator for the country's sustainable development. The health of people affects economic flow and growth (Cohabinitiative 2010).

Human health rests on biodiversity. The diverse collection of goods and services provide unending benefits to human health. On the contrary, the unprecedented loss of biodiversity globally impose threat to human health and well-being. Hence, the call to maintaining a healthy and sustainable biodiversity should not be disregarded. Life is impossible without a healthy and sustainable global environment (Cohabinitiative 2010).

Here are the points on how does biodiversity affect our health (Cohabinitiative 2010).

1. **Biodiversity helps secure food, health, and livelihood for people.**
   Diverse collection of food systems maintain crop supply and also promote resistance of crops and livestock to pests and other stressors. Diets containing various types of food promote good health and provide the necessary nutrients and vitamins for humans.
2. **Biodiversity serves as a rich source of materials for medical research.**
   Research endeavors on wildlife diversity, anatomy and physiology, ecology, and biochemistry can contribute to great developments in human medicine. Some organisms of interest in research include horseshoe crabs, bears, sharks, and cetaceans.
3. **Biodiversity provides abundant resources for traditional and modern medicine.**
   Nowadays, there are still a lot of people who rely on traditional medicine for maintaining their health. Modern drugs are also derived from natural products including pain killers, drugs against cardiovascular diseases, diabetes, and cancer. Meanwhile, millions of species are still waiting to be discovered for their potential application in medicine.
4. **Biodiversity helps in the control and prevention of infectious diseases.**
   Destruction of biodiversity contributes to the emergence and transmission of infectious diseases not only in humans but also in animals and plants. Disease outbreaks due to SARS, avian influenza, malaria, Ebola, Marburg, and Hantavirus Pulmonary Syndrome have been accounted to human induced abuse of biodiversity.
5. **Biodiversity serves important roles for the communities' cultural, spiritual, and social growth.**
   Biodiversity loss causes negative for physical, mental, and social well-being of humans. There has been an increasing rate of pathologic conditions including diabetes, hypertension, and cardiopulmonary diseases because of such loss. Access to greenspace are linked to better health outcomes and faster recovery rate for the sick.
6. **Biodiversity conservation is very important for climate change adaptation.**
   Biodiversity loss exposes the communities at greater risk of experiencing adverse effects of climate change particularly floods and droughts among others.
7. **Stable and sustainable ecosystems support relief and recovery efforts.**
   Healthy ecosystems serve as natural buffers against devastating natural phenomenon including typhoons, floods, landslides, and droughts among others. These can also provide essential resources for rebuilding livelihood during post-crisis events,

PROTOCOLS ON BIODIVERSITY

There is a need to enhance the implementation of regulations and worldwide protocols, such as the *Montreal Protocol* and *Kyoto Protocol.* The *Cartagena Protocol* among ten Pacific countries, namely, Fiji, Kiribati, the Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, the Solomon Islands, and Tonga, aims to ensure the safe transport, handling, and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biodiversity. It was adopted in January 29, 2000 and was enforced in September 11, 2003. It is linked to the *Convention on Biological Diversity,* which helps to protect Pacific communities and biodiversity from the consequences of living modified organisms. It requires having facilities in place through proper legislative frameworks, laboratory facilities, technology, and technical capabilities to enable countries to detect, measure, and monitor LMOs that come into the country (Secretariat of the Pacific Regional Environment Programme, 2016).

Locally, strict implementation of environmental laws among industries and communities alike must be ensured to prevent further damage of biodiversity from air pollution and water pollution. There should also be efforts to ensure that whatever treatment is employed, it should not promote mass pollution transfer from one matrix of the environment to another.

III. PERFORMANCE TASK: BIODIVERSITY AMIDST THE PANDEMIC

Instructions: Answer the guide question completely. Gather references online or from textbooks to support your claim.

How has the COVID-19 pandemic affected biodiversity? What is the impact on the survival and growth of various ecologically important species of plants and animals in the Philippines? You may attach pictures in order to clearly show the impact on our environment.