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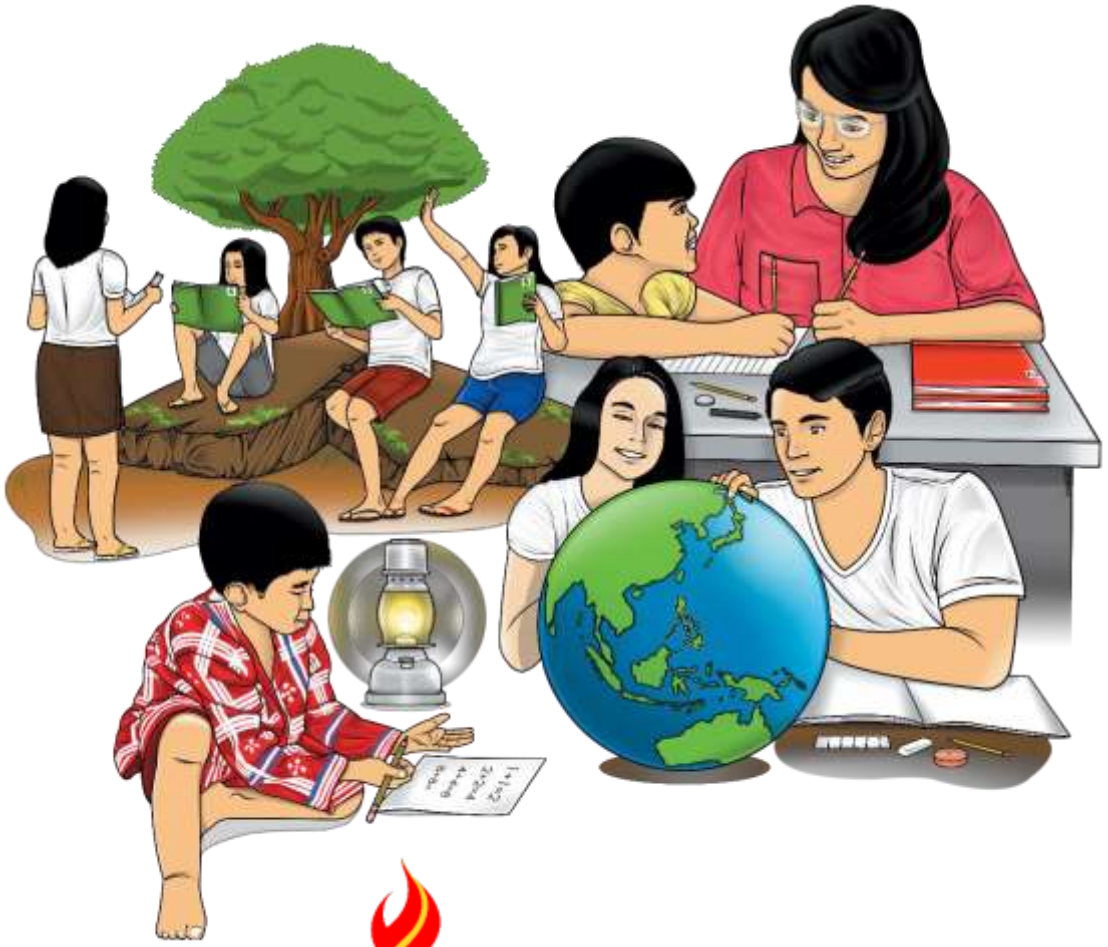
DEPARTMENT OF EDUCATION

Science

Quarter 3 – Module 8:
Biodiversity and Stability



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Quarter 3 – Module 8:
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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

"At least 40 percent of the world's economy and 80 percent of the needs of the poor are derived from biological resources. In addition, the richer the diversity of life, the greater the opportunity for medical discoveries, economic development, and adaptive responses to such new challenges as climate change."

-*The Convention about Life on Earth,* Convention on Biodiversity website.

The Philippines is known for its rich biodiversity but also considered as a biodiversity "hotspot" for it is continuously experiencing an alarming rate of environmental destructions. Climate change, pollution and extractive industries are among the major threats to country's biodiversity.

This module provides you information on the importance of biodiversity. It also helps you understand the relationship between biodiversity and stability of an ecosystem, and how diversity of species increases the probability of adaptation and survival of organisms in changing environments. Awareness on your present environment will also be heightened for the protection and conservation of the community you live in.

After going through this module, you are expected to:

1. explain how species diversity increases the probability of adaptation and survival of organisms in changing environments(**S10LT-IIIh-41**);
2. analyze how biodiversity affect the stability of an ecosystem; and
3. suggest ways on how local biodiversity can be protected and conserved in the community.

Going through this module can be an effective learning experience. All you need to do is make use of your time and resources efficiently and effectively. To do this, here are some tips for you:

1. **Take the pretest** before reading the rest of the module. Pretest is given as a tool to measure your prior knowledge on biodiversity and stability of an ecosystem and to determine the skills needed for you to accomplish the learning tasks.
2. **Take time** in reading and understanding the lesson. Follow instructions carefully. Do all the activities diligently. This module is designed for independent or self-paced study. It is better to be slow but sure than to hurry and miss the concepts you are supposed to learn.

3. Use **a clean sheet of paper** for your answers in each activity or assessment. Don't forget to write your name. Label it properly.
4. Try to **recall and connect the ideas** about the species diversity that you had in the lower years. Use the concept discussed in the lesson to explain the results of activities or performance task. You may answer in English or a combination of your vernacular and English.
5. **Be honest.** When doing the activities, record only what you have really observed. Take the self-assessments after each activity but do not turn to the Answer Key page unless you are done with the entire module.
6. **Don't hesitate to ask.** If you need to clarify something, approach your teacher or any knowledgeable persons available to help you. You may also look into other references for further information. There is a list of references at the back part of this module.
7. **Take the posttest** prepared at the end of the module, so you can assess how much you have learned from this module.
8. You can **check your answers** in the activities, self-assessments, and posttest after you finished the entire module to determine how much you have gained from the lesson and activities.

Before you proceed in studying this module, let's check how much do you know about the topic. An Answer Key is provided at the end of the module. But do not try to look at it while answering. You can check your answers after you are done with the pretest.

What I Know

Directions: Read carefully each item. Choose the letter of the correct answer. Use a separate sheet of paper for your answers.

1. Which of the following is an ecosystem?
   A. fishpond C. temperature
   B. sunlight D. thunderstorm
2. Which of the following statements **BEST** describes biodiversity?
   A. It includes variety of living things and other species in a given area.
   B. It pertains to the number of plants throughout the world.
   C. It refers to the number of different animals in the world.
   D. It simply means the study of life.
3. Which of the following is **TRUE** about species diversity?
   A. High species diversity tends to be more productive and sustainable.
   B. High species diversity tends to create chaos in an ecosystem.
   C. More diverse ecosystem has lesser ability to withstand environmental stressors.
   D. Species minimize interaction with their environment, thus perform certain functions.
4. Which of the following ecosystems would you expect to have the most biodiversity?
   A. banana plantation C. pond
   B. forest D. rice field
5. Which of the following statements **BEST** describes adaptation?
   A. It is a characteristic that improves the organism's ability to survive.
   B. It is a characteristic that prevents an organism's ability to survive.
   C. It is a place where an organism lives.
   D. It is a stage in an animal's life cycle.
6. Organisms need to constantly adapt to their environment in order to_____.
   A. be able to survive and reproduce.
   B. have a variety of resources.
   C. increase their population.
   D. push other competitive species out of their environment.
7. Which of the following forms of adaptation enables the animals to disguise its appearance, usually to blend in with its surroundings?
   A. camouflage C. mimicry
   B. herbivore D. warming coloration

8. Turtles have adapted to their habitat to protect themselves from their predators. Which **BEST** describes this adaptation?

A. camouflage
B. mimicry
C. parasitism
D. protective covering

9. If animals cannot adapt to changes in their environment, what will most likely to happen to them?

A. die
B. hibernate
C. migrate
D. mimic

10. Pangasinan is known for its beautiful places and beaches that make it more attractive to tourists. Which of the following classifications of value of biodiversity is described?

A. aesthetic value
B. direct economic value
C. indirect economic value
D. both b and c

11. How should the rainforest be used to conserve its resources?

A. Advertise it as a camping site.
B. Cut the trees into logs and make timber.
C. Restore damaged ecosystem by planting trees.
D. Turn it into a logging area.

12. Which of the following **DOES NOT** contribute to maintenance of ecological balance?

A. complex food web
B. conserving biodiversity
C. segregation of garbage
D. spraying insecticide over a rice field

13. Which of the following environmental problems is responsible for "fish kills" in the country?

A. acid rain
B. deforestation
C. water pollution
D. wildlife depletion

For items 14 and 15, refer to the causes of deforestation listed below:

I. Forest fires
II. Human settlements
III. Indiscriminate logging
IV. *Kaingin* farming
V. Natural calamities
VI. Overpopulation

14. Which of these environmental problems are difficult to solve because of the unprecedented growing population in rural and urban areas?

A. I, II
B. I, III
C. II, VI
D. III, V

15. Which of these are difficult to solve because they are basically natural causes?

A. I, V
B. II, IV
C. III, VI
D. II, VI

Answer Key on page 24

Find the pretest easy? Well, this is just a warm up test. If you find it easy and difficult as well, continue accomplishing the learning tasks in this module.

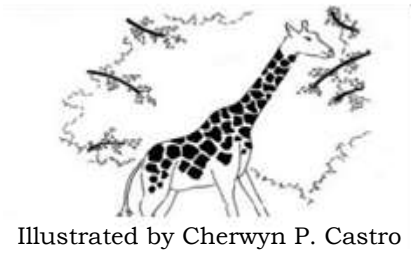
Lesson 1 Biodiversity and Stability

You have learned in your previous lessons how evolution through natural selection can result in biodiversity. Natural selection is a mechanism of evolution. Species of today have been shaped by natural selection.

Can you still remember the theory of natural selection? What particular animal is commonly used in this theory? You got it right! What body parts of giraffes are used for survival and adaptation?

What's In

Directions: Below are pictures of some animals and their different forms of adaptation. Match the words in Column B (*forms of adaptation*) and the related use of adaptation in Column C with the pictures in Column A. Write the letter and number *(in Roman Numeral*) for coding your answer. An example has been given as your guide. Use a separate sheet of paper to record your responses.

A Picture	**CODED ANSWER**	**B** Form of Adaptation	**C** Use of Adaptation
Example:  Illustrated by Cherwyn P. Castro	**C II**	A. Migration	**I.** They travel seasonally to find a climate best suited for their survival.

1.  Illustrated by Cherwyn P. Castro	___ ___	B. Hibernation	**II.** This animal uses its very long neck as an adaptation to feeding at high levels in the treetops.
2.  Illustrated by Cherwyn P. Castro	___ ___	C. Structural	**III.** This enables the animal to experience long deep sleep over the cold months.
3.  Illustrated by Cherwyn P. Castro	___ ___	D. Camouflage	**IV.** This defense mechanism helps this animal to be unnoticed and to hide from its predators by blending in with the surroundings.
4.  Illustrated by Cherwyn P. Castro	___ ___	E. Mimicry	**V.** This animal has the ability to copycat and imitate traits from other animals, to fool its predators and be able to live longer.

What would happen if an animal's habitat changes due to climate change or destruction? How could it adapt to survive in a new habitat? Could it move to another habitat?

Let's find out…

What's New

The Struggle is Real! Adapt, Migrate or Die?

Directions: Identify which species of plants or animals will be able to survive, migrate and die. An example has been given as your guide. Use a separate answer sheet of paper for your answer.

Environmental Change	Which species of plants or animals will be able to…		
	Adapt/Survive?	*Migrate?*	*Die?*
Example: Three birds loved to eat beetles especially the green (female) and the brown (male). But their favorites are the green beetles. Generations later, green beetles have been selected and brown beetles have increased in number.	**brown beetles**	**birds**	**green beetles**
1. In a food web, the grass is the producer. Rabbits, insects and snails all eat grass. For an uncertain reason, the population of insects decreased.			
2. Insecticides are sprayed over a large area in an effort to reduce the number of grasshoppers that are eating the corn plants. Lizards that eat grasshoppers and hawks which eat lizards are also inhabiting the place.			
3. In a farm, soy beans were the only crop that was planted on several hectares of land. A farmer noticed that a fungus was growing all over the soy bean fields.			
4.Forests are home to an amazing diversity of animals.			

Trees for most animals serve as place for resting, nesting, hunting, storing food and taking shelter in extreme weather. Some of the animals that depend on trees include monkeys, kangaroos, birds, squirrels, geckos, flying snakes, to name a few. After a period of time, most of the trees were cut down.			

Answer the following questions in a sentence form. A rubric is given to rate your answers. Use a separate sheet of paper for your answers.

1. What are the environmental changes that may cause organisms to adapt, migrate or die?

   _____

2. What happens to organisms that cannot adapt to the changes that occur in their environment?

   _____

3. What do you think will happen if a disease was introduced and invaded the species living in an ecosystem?

   _____

Note to the Teacher

You may use the following criteria to rate your student's output.

Performance Rubric

Score	Indicators
3 points	The answer is clear and well-expressed.
2 points	The answer is clear but not well-expressed.
1 point	The answer is not clear or no specific explanation.

.

How did you find the activity? Have you realized how changes in the environment can cause some species of plants and animals to die (*become extinct*), move to new locations (*migrate*) or ensure survival (*adapt*)?

Do you want to know why? You better proceed…

What is It

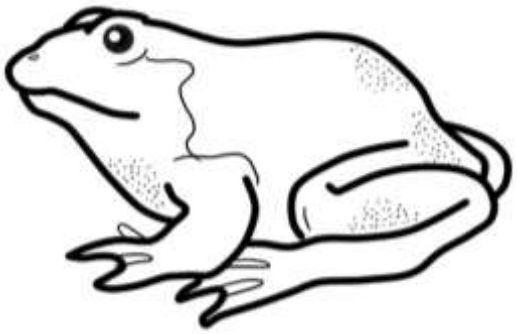
Every organism has a unique ecosystem within which it lives-its natural habitat. This is where its basic needs to survive are met: food, water, shelter from the changing weather and climate and place to breed its offspring. Habitats are constantly changing and evolving. Animals living within must constantly adapt to environmental changes, big or small.

Adaptation is all about survival. When the environment dramatically changes, some animals move to other places, others die, and some develop adaptations over generations to survive.

Animals have variety of ways to adapt to their environment. These include:

1. *Structural* or *Physical* or using body structures to help an animal survive.

a. *Camouflage*- a defense mechanism or tactic that the organisms use to disguise their appearance, usually to *blend* in with their surroundings.



Illustrated by Cherwyn P. Castro

Figure 1. The incredible camouflage of the Frog

b. *Mimicry*-ability of an organism to *imitate* and *copycat* another species in terms of sound, appearance, smell, behavior or location to protect itself. It also refers to the resemblance of an animal species to another species or to natural objects.

Illustrated by Cherwyn P. Castro

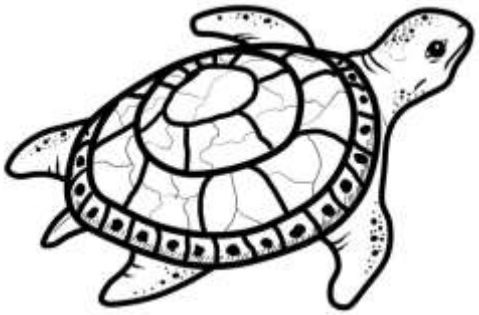
Figure 2. Praying Mantis imitating a small twig on a branch of a plant.

c. *Chemical defenses*-include substances utilized by prey which are harmful to invading organisms.

Illustrated by Cherwyn P. Castro

Figure 3. Skunk spray contains a cocktail of foul-smelling chemicals.

d. *Body coverings*- cover the body and protect animals from external factors.

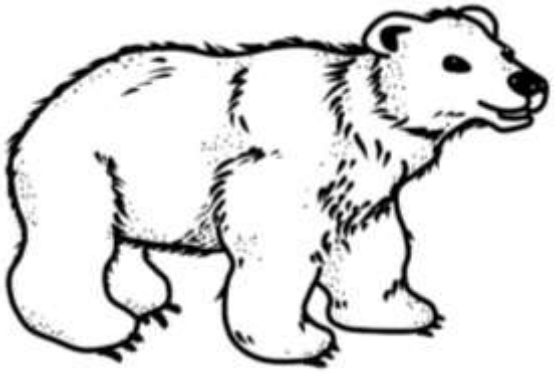


Illustrated by Cherwyn P. Castro

Figure 4. This turtle use its flexible neck to pull back its head safely inside its shield-like shell when danger strikes.

2. *Behavioral* or how animals respond or act to life needs. Behavioral adaptation could be instinctive or happen naturally.

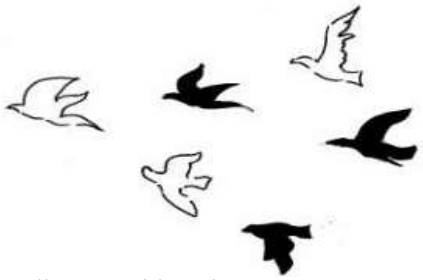
a. *Hibernation*- when animals bare sleep as a response to cold weather and survive the cold winter.



Illustrated by Cherwyn P. Castro

Figure 5.Female polar bears build their dens beneath masses of snow.

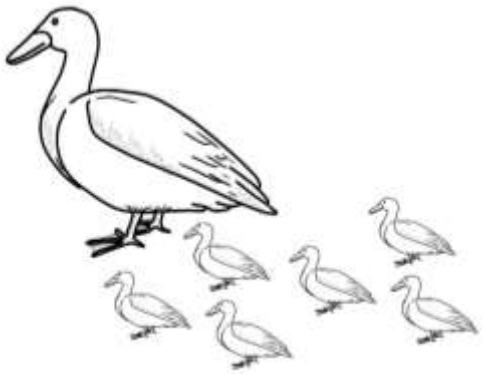
b. *Migration*-a behavioral adaptation that involves an animal or group of animals travelling from one place to another and then back again when seasons change.



Illustrated by Cherwyn P. Castro

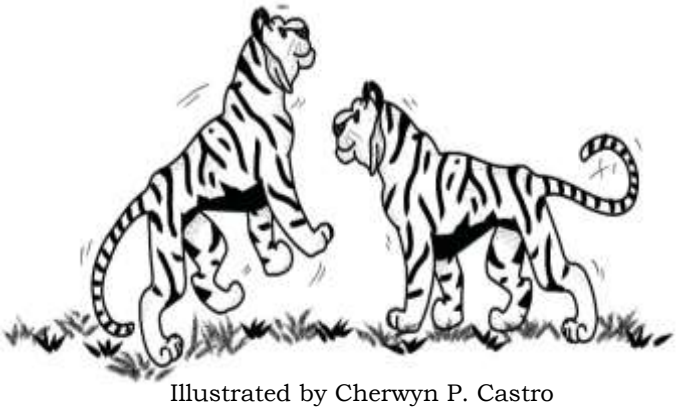
Figure 6. Birds seek out places that have warmth, food and are safe for breeding.

c. *Learned Behaviors*. These animal behaviors are obtained and acquired by interacting with the environment and cannot be passed on to the next generation except by teaching. Examples are swimming, playing, walking, jumping, etc.



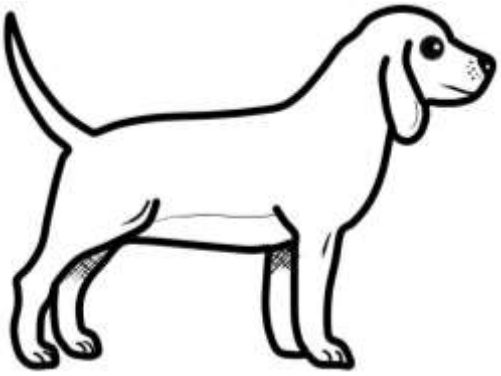
Illustrated by Cherwyn P. Castro

Figure 7. Ducklings walking after their mother.



Illustrated by Cherwyn P. Castro

Figure 8. By playing, these tigers are learning moves that will help them become successful predators as adults.



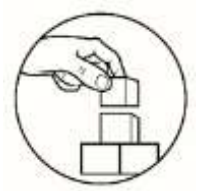
Illustrated by Cherwyn P. Castro

Figure 9. Dog on a skateboard

Each adaptation has been produced by evolution. This only means that the adaptations have developed over many generations. Adaptations of species of plants and animals in their environment could result to high biodiversity.

How does biodiversity affect stability of an ecosystem? How does it contribute to the sustainability of an ecosystem? What makes a community stable? What makes it a healthy community?

Let's find out more…



What's More

Can you imagine a world where there is only one type of animal, a tree or a bird for example? Variety is everything! You have learned that more diversity means better chances of survival. High biodiversity means healthy ecosystem. Healthy ecosystems can better withstand and recover from a variety of disasters.

Enrichment Activity 1: Stability Matters!

Biodiversity can be quantified in many different ways. The two main factors that should be taken into account when measuring diversity are richness and evenness. **Richness** is a measure of the number of different kinds of organisms or species present in a particular area. The more species present in a sample, the "richer" the sample. However, diversity depends not only on richness, but also on evenness. **Evenness** compares the similarity of the population size of each of the species present. More diverse and evenly distributed ecosystems mean more stable ecosystems.

Keep in mind that if the ecosystem has equal number of species, it is evenly distributed, more diverse, stable and has more chance of survival. But if the ecosystem has unequal number of species, it is not evenly distributed, less diverse, not stable and has less chance of survival.

Directions: Consider the following ecosystems and complete the missing information before answering the questions that follow. Use a separate sheet of paper for your answers. An example has been given as your guide.

Ecosystem with different species of trees	Name of individual species	Number for each individual species	Percentage of abundance of individual species **(%=number of individual species/total number of species X 100%)**	evenly distributed or not evenly distributed (species evenness)?	more diverse or less diverse? (species richness)	stable or not stable?
Ecosystem 1 5 coconut trees 5 mango trees 5 avocado trees	Coconut	5	33.33%	evenly distributed	more diverse	stable
	Mango	5	33.33%			
	Avocado	5	33.33%			
Ecosystem 2 10 coconut trees 3 mango trees 2 avocado trees						

In an ecosystem with high biodiversity, abundant sunlight, nutrients and water make up an environment that is hospitable to the evolution of a wide variety of living things. On the other hand, ecosystem with low biodiversity would contain very few species, perhaps only one or two. Ecosystems with many different species will be able to withstand environmental changes rather than ecosystems with only few species.

Do you want to survive in any given environment or situation? Better equip yourself with things and skills you need to survive.

Let us see if you have grasped the essence of our first enrichment activity. Answer the Assessment below:

Assessment 1

Directions: Read and answer the following questions. Write only the letter of your choice. Use a separate sheet of paper for your answers.

1. Which of the following shows the evenly distribution of species in an ecosystem?
   A. 5 coconut trees, 5 mango trees and 5 pomelo trees
   B. 10 duhat trees, 3 chico trees and 2 santol trees
   C. 10 acacia trees, 4 mahogany trees and 1 pine tree
   D. 12 avocado trees, 2 durian trees, 1star apple tree

2. Which of the following ecosystems is **MORE DIVERSE**?

A. forest
B. garden
C. grassland
D. vacant lot

3. What would happen to the number of coconut trees if there were a sudden increase in the population of *Cocolisap,* insects that feed on the leaves of young coconut trees that results to yellowing and fading of the leaves?

A. There would be a decrease in the survival rate of coconut trees.
B. There would be an increase in the population of *Cocolisap*.
C. There would be an increase in the survival rate of coconut trees.
D. There would be no changes in the survival rate of coconut trees.

4. What makes an ecosystem **LESS DIVERSE**?

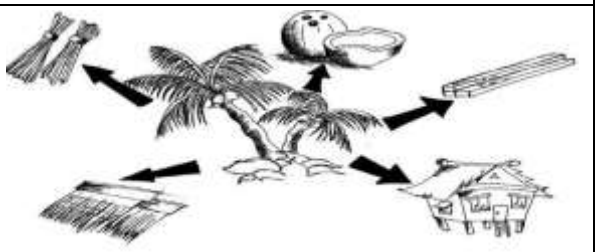
A. It has few numbers of different life forms.
B. It has high index of diversity.
C. It includes many different forms of life.
D. It can withstand environmental changes.

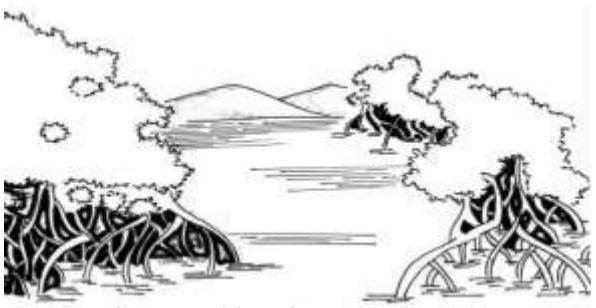
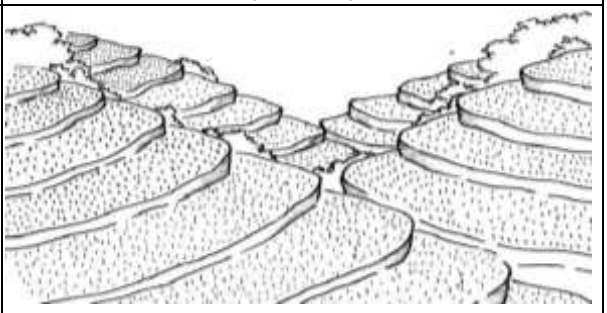
5. Why is it better for an ecosystem to have high biodiversity rather than low biodiversity?

A. Ecosystem with high biodiversity is more unstable towards environmental changes.
B. Ecosystem with high biodiversity can withstand environmental changes.
C. Ecosystem with low biodiversity is more stable than ecosystem with high biodiversity.
D. Ecosystem with low biodiversity adapts better to climate-driven environmental changes than more diverse ecosystem.

Biodiversity benefits people in many ways. The greatest value to humans, however, comes from the ecosystem services it provides.

The value of species can be divided into various categories:

Biodiversity Values	**Pictures**
1. **Direct Economic Value** -if their products are sources of food, medicine, clothing, shelter and energy. Examples are medicines extracted from plants like coconut.	 Illustrated by Cherwyn P. Castro

2. **Indirect Economic Value** -if there are benefits produced by the organism without using them. Examples include certain species that maintain the chemical quality of natural bodies of water, prevent soil erosion and floods, cycle materials in the soil and absorb pollutants such as mangroves.	 Illustrated by Cherwyn P. Castro
3. **Aesthetic Value** -a lot of species provides visual or artistic enjoyment, like a forested landscape and the calming beauty of a natural park. Examples are Banaue Rice Terraces in Ifugao and Hundred Islands in Alaminos City, Pangasinan.	 Illustrated by Cherwyn P. Castro

Enrichment Activity 2

Directions: Visit a specific area in your school or at home (e. g. garden). Using a pen and a clean sheet of paper, list down five (5) organisms found in that area and describe the value of each organism. Then, classify the value of the organisms by putting a check mark (✓) on the space under the correct column. An example has been given. If you think that an organism has more than one value, put a check mark (✓) on each.

Table 1. Organisms and Their Value

Organism	Value	Direct Economic Value	Indirect Economic Value	Aesthetic Value
Example: Trees	-Freshen the air		✓	
	-Provide shelter		✓	
	-Source of lumber	✓		

*(Adapted from DepEd Science and Technology Biology Textbook, pages 326-327)

How did you find the biodiversity values in the previous activity? Did you appreciate more the importance of the living things found in your community? How was your experience? It's now time to test your knowledge, so answer Assessment 2.

Assessment 2

Directions: Read and answer the following questions. Write only the letter of your choice. Use a separate sheet of paper for your answers.

1. The beauty of a landscape is an example of_____.
   A. aesthetic value
   B. economic valued
   C. scientific value
   D. social value

2. Which of the following is **NOT** a direct economic value from biodiversity?
   A. clothing
   B. food
   C. flood protection
   D. shelter

3. Biodiversity can affect the_____of ecosystems and the_____of populations.
   A. existence and life
   B. life and existence
   C. stability and sustainability
   D. sustainability and stability

4. Which of the following is **NOT** a benefit of biodiversity?
   A. agriculture
   B. deforestation
   C. ecotourism
   D. medicine

5. Pangasinan is known for its beautiful places and beaches that make it more attractive to tourists. Which of the following classifications of value of biodiversity is described?
   A. aesthetic value
   B. social value
   C. direct economic value
   D. indirect economic value

Philippines is naturally gifted with vast existence of biological resources. However, many of these resources are threatened due to man-made environmental degradation. The destruction is also aggravated by a high annual population growth rate, loss of agricultural lands, deforestation, soil erosion, air and water pollution, improper disposal of solid and toxic wastes, loss of coral reefs, mismanagement and abuse of coastal resources, overfishing and other human caused environmental issues. The destruction is also aggravated by a high annual population growth rate, loss of agricultural lands, deforestation, soil erosion, air and water pollution, improper disposal of solid and toxic wastes, loss of coral reefs, mismanagement and abuse of coastal resources, overfishing and other human caused environmental issues.

Why is conservation important? How can you help in conserving species in your community?

After knowing the benefits of biodiversity, it is now time to heighten your environmental awareness by proceeding to the next activity.

Enrichment Activity 3

Directions: The table below shows some environmental problems and issues in the community. Put a check mark (✓) on the column, YES or NO, that corresponds to your answer. Use a separate sheet of paper for your answers.

Table 2. Some Environmental Problems and Issues in the Community

Problem	YES	NO
1. Improper waste disposal.		
2. Agricultural lands are being converted to subdivisions and commercial buildings.		
3. Use of dynamites and cyanides in fishing.		
4. Burning of plastics.		
5. Continuous use of commercial (inorganic) fertilizer instead of organic fertilizer in farming.		

Answer the following questions. Use a separate sheet of paper for your answers.

1. What are some environmental problems and issues in your community? Are they similar to any of the five problems listed in the table above?

_____

2. What effects do these problems create on the ecosystem?

_____

Note to the Teacher

You may use the following criteria to rate your student's output.

Performance Rubric

Score	Indicators
3 points	The answer is clear and well-expressed.
2 points	The answer is clear but not well-expressed.
1 point	The answer is not clear or no specific explanation.

A Call for Environmental Protection and Management

Directions: Read the following situations and answer the guide questions that follow. Use a separate sheet of paper for your answers.

A. Muro-ami is a fishing method where the fishes are driven out of a coral reef by pounding the corals with a heavy weight, or simply by breaking the corals. Then the fishes are guided into the nearby fishnets.

1. Is Muro-ami illegal? Why?

_____

2. Cite at least two ways by which the different sectors of the society can help in the protection and conservation of fishes.

_____

B. Forests take in carbon dioxide from the air, thus it is called "carbon dioxide sinks" or "carbon sinks".

1. What is the use of carbon dioxide in the forests?

_____

2. As a student, is it advisable that you write to government or barangay officials about environmental problems happening in your community? Why? _____

Note to the Teacher

You may use the following criteria to rate your student's output.

Performance Rubric

Score	Indicators
3 points	The answer is clear and well-expressed.
2 points	The answer is clear but not well-expressed.
1 point	The answer is not clear or no specific explanation.

The United Nations Environmental Program (UNEP) has made the following suggestions to help conserve biodiversity in the community.

Directions: Put a check mark (✓) on the column, YES or NO, to indicate your answer in conserving biodiversity in the community. Use a separate sheet of paper for your answers.

Table 3. Conserving Biodiversity in the Community

Suggestions	YES	NO
1. Learn about local species.		
2. Support local conservation groups.		

3. Spread the importance of conserving species among friends.		
4. Plant trees (they provide habitats for many species).		
5. Don't pick wild flowers or plants.		
6. Don't disturb wild habitats.		
7. Support anti-poaching campaigns. (Illegal hunting and collecting wild animals).		
8. Don't buy products that come from endangered species.		

Answer the following guide questions:

1. Which of these suggestions can you do?

_____

2. Are there other things you can do aside from the ones suggested? What are they?

_____

Note to the Teacher

You may use the following criteria to rate your student's output.

Performance Rubric

Score	Indicators
3 points	The answer is clear and well-expressed.
2 points	The answer is clear but not well-expressed.
1 point	The answer is not clear or no specific explanation.

You did well! It's now time to assess your understanding of the lesson. Do your best!

Assessment 3

Directions: Read and answer the following questions. Write only the letter of your choice. Use a separate sheet of paper for your answers.

1. The following are some of the environmental problems that can be found in a community, **EXCEPT**?
   A. burning of plastics
   B. converting lands to commercial buildings
   C. throwing garbage everywhere
   D. using bamboo straws instead of plastic straws

2. This a fishing method used to drive out fishes by pounding the corals with a heavy weight, or simply by breaking the corals.
   A. dynamite fishing
   B. illegal logging
   C. *Kaingin* system
   D. muro-ami

3. What is the main cause of habitat destruction in animals?
   A. animals reproducing too quickly
   B. dynamite fishing
   C. earthquakes and volcanic eruptions
   D. illegal cutting of trees

4. Which of the following is an action that you could take to help protect and conserve biodiversity in the environment?
   A. Consume more electricity at home.
   B. Buy plastic bags instead of paper bags.
   C. Make use of vehicles even at short distances.
   D. Plant more trees.

5. How should coral reef ecosystem be used to conserve its resources?
   A. Collect coral fishes and sell them to pet shops.
   B. Collect corals as souvenir items for tourists.
   C. Convert the reef to an industrial area.
   D. Promote it as an ecotourism destination.

What I Have Learned

Well done! You are almost done with this module. Let's summarize what you have learned from the lesson and activities by identifying the correct answer inside the parentheses. Write your answer on a separate sheet of paper.

1-3. In an ecosystem with 1. (*low, high)* biodiversity, abundant sunlight, nutrients and water make-up an environment that is hospitable to the evolution of a wide variety of living things. On the other hand, ecosystem with 2. (*low, high*) biodiversity would contain very few species, perhaps only one or two. Ecosystems with 3. (*few, many*) species will be able to withstand environmental changes.

4-5. There are two main factors to consider when measuring diversity: 4. (*Richness, Evenness*) is a measure of the number of different kinds of organisms or species present in a particular area, while 5. (Richness, *Evenness*) compares the similarity of the population size of each of the species present.

6-7. Animals have variety of ways to adapt to their environment. It could be 6. (*physical, behavioral*) or using body structures to help an animal survive. It could also be 7. (*physical, behavioral*) or how animals respond or act to life needs.

8-10. Geckos use 8. (*camouflage, mimicry*) by imitating and copycat traits from other animals to fool predators and be able to live longer. Powerful hind legs and feet allow the frog to jump long distances. They also make use of 9. (*camouflage, mimicry*) to change their color to blend in with their surroundings. Birds 10. (*hibernate, migrate*) to find richer food sources, seek safer habitats, avoid predators and for the survival of the chicks they will raise.

11-12. Biodiversity benefits people in many ways. The economic value is 11. (*direct, indirect*) if the products are sources of food, medicine, clothing, shelter and energy. If there are benefits produced by the organism without using them, the economic value is said to be 12. (*direct, indirect*).

13-15. The country is considered a biodiversity 13. (*hotspot, low spot*). This is because the Philippines continues to experience an alarming rate of destruction. Continuous illegal logging, overfishing, overexploitation, and pollution are some of the environmental problems in the community brought about by 14. (*nature, human*). One of the ways to conserve biodiversity in the community is to 15. (*disturb wild habitats, plant more trees*).

What I Can Do

NOTE: *This is a make-believe activity. Pretend and internalize the role you are asked to do. Have fun!*

You are an active President of the Science Club in your school. Every time there is a heavy rainfall or typhoon, the school gets easily flooded. Aside from the fact that the school has limited space, there is also a problem on where to plant trees and on proper waste disposal.

Because of these observed problems, the organization decided to encourage students to make a commitment plan to raise awareness on how to conserve the biodiversity in locality particularly in school to lessen the effects of the mentioned environmental concerns. In stating your commitment, you can use the G-R-A-S-P model.

G-oal (What is your goal within the scenario?)
R-ole (What will be your role in conserving biodiversity in your school and community?)
A-udience (Who will be your target audience?)
S-ituation (What are the possible situations?)
P-roduct (What will be your plan in the protection and conservation of biodiversity in your school?)

You can start with your commitment by saying;

*I*_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Now that you have performed your make-believe performance task, answer briefly and honestly the questions below:

Discussion of Possible Outcomes: Use a separate sheet of paper for your answers.

1. What do you commit yourself to protect biodiversity in your community especially in your school?

_____

2. Is your commitment to conserving biodiversity achievable? How will you achieve it?

_____

3. As an Earth warrior, how will you raise and spread awareness on conserving biodiversity among your peers?

_____

Standards Rubric

You will be rated according to the following criteria:

Appropriateness of the Topic	10 points
Accuracy of Details and Information	10 points
TOTAL	**20 points**

Very well done! You are now ready to have your Posttest. You may want to go over again the lessons and activities to review for the final assessment. God bless you.

Assessment

Directions: Read carefully each item. Choose the letter of the correct answer. Use a separate sheet of paper for your answers.

1. When a change occurs in the environment, what will organisms do?
   A. adapt
   B. adapt, migrate or die
   C. die
   D. migrate or die

2. Which of the following is an ecosystem?
   A. rice field
   B. sunlight
   C. temperature
   D. thunderstorm

3. A person breeds rabbits in a cage. After a few generations, the breeder observes that the rabbits are more aggressive towards each other, the young are less healthy and more young rabbits die. What do you think will happen to the population of the rabbits?
   A. The population will not be affected.
   B. The population will decrease.
   C. The population will increase.
   D. The population will remain the same.

4. What is the significance of species diversity?
   A. High species diversity tends to be more productive and sustainable.
   B. High species diversity tends to create chaos in an ecosystem.
   C. More diverse ecosystem has lesser ability to withstand environmental stressors.
   D. Species minimize interaction with their environment, thus perform certain functions.

5. Why are invasive species a threat to biodiversity?
   A. They can be of help to other organisms.
   B. They can be beneficial to humans.
   C. They can increase the number of resources.
   D. They can outcompete native organisms for their resources.

6. *Cocolisap* infestation outbreak has been declared in some parts of the Philippines. The *cocolisap* feeds on the sap of the coconut tree and injects toxic enzymes, resulting in discolored leaves and deformed plant tissues that retard the growth of coconut tree. This results in a decrease of the survival rate of coconut trees. Which of the following factors limit the population of coconut trees?
   A. competition for resources
   B. diseases and parasites
   C. emigration
   D. predation

7. Which of the following is **NOT** a benefit of biodiversity?
   A. agriculture
   B. deforestation
   C. ecotourism
   D. medicine

8. Which of the following statements **BEST** describes adaptation?
   A. It improves the organism's ability to survive.
   B. It is a place where an organism lives.
   C. It is a stage in an animal's life cycle.
   D. It prevents an organism's ability to survive.

9. If animals cannot adapt to changes in their environment, what is likely to happen?
   A. They will die.
   B. They will hibernate.
   C. They will migrate.
   D. Both A and C are correct.

10. How should the rainforest be used to conserve its resources?
   A. Advertise it as a camping site.
   B. Cut the trees into logs and make timber.
   C. Replant replacement trees every time a tree is cut.
   D. Turn it into a logging area.

11. What do you think might happen if you remove a primary consumer from the ecosystem?
   A. The number of plants will increase.
   B. The number of secondary consumers will decrease.
   C. The number of secondary consumers will increase.
   D. There will be more food for secondary consumers.

12. Which of the following **DOES NOT** contribute to homeostasis of an ecosystem?
   A. a complex food web
   B. conserving biodiversity
   C. segregation of garbage
   D. spraying insecticide over a rice field

13. Which of the following environmental problems is responsible for "fish kills" in the country?
   A. acid rain
   B. deforestation
   C. water pollution
   D. wildlife depletion

For items 14 and 15, refer to the causes of deforestation listed below:

I. Forest fires
II. Human settlements
III. Indiscriminate logging
IV. *Kaingin* farming
V. Natural calamities
VI. Overpopulation

14. Which of these environmental problems are difficult to solve because of the unprecedented growing population in rural and urban areas?
   A. I, II
   B. I, III
   C. II, VI
   D. III, V

15. Which of these are difficult to solve because they are basically natural causes?
   A. I, V
   B. II, IV
   C. III, VI
   D. II, VI

Congratulations for accomplishing this module! May you put this lesson in action when environmental problems occur. You may now look at the correct answers to all the activities and assessments. The Answer Key is found on page 26 to 28.

Answer Key

What's New

Environmental Change	Which species of plants or animals will be able to…		
	Adapt/ Survive?	*Migrate?*	*Die?*
1. In a food web, the grass is the producer. Rabbits, insects and snails all eat grass. For an uncertain reason, the population of insects decreased.	Grass/rabbits/snails		insects
2. Insecticides are sprayed over a large area in an effort to reduce the number of grasshoppers that are eating the corn plants. Lizards that eat grasshoppers and hawks which eat lizards are also inhabiting the place.	Corn plants	hawks	Grasshoppers/lizards
3. In a farm, soy beans were the only crop that was planted on several hectares of land. A farmer noticed that a fungus was growing all over the soy bean fields.	fungus		soybeans
4.Forests are home to an amazing diversity of animals. Trees for most animals serve as place for resting, nesting, hunting, storing food and taking shelter in extreme weather. Some of the animals that depend on trees include monkeys, kangaroos, birds, squirrels, geckos, flying snakes, to name a few. After a period of time, most of the trees were cut down.		Birds/ monkeys/kangaroos/squirrels/geckos/ flying snakes	

1. a.Climate Change
   b. Natural disaster
   c. Animal interaction
   d. human activities
2. a. they will move to another location.
   b. the species may become threatened, endangered or extinct.
3. Invasive species can harm the ecosystem by breeding and spreading quickly taking over the area, outcompeting native species for food or other resources and preventing these native species from reproducing.

What's In

1. A I
2. E V
3. D IV
4. B III

What I Know (Pretest)

1. A	6. A	11.C
2. A	7. A	12.D
3. A	8.D	13.C
4. B	9. A	14.C
5. A	10. A	15.A

Enrichment Activity 2

Organism	Value	Direct Economic Value	Indirect Economic Value	Aesthetic Value
Green plants	-provide oxygen -for food consumption -source of medicine	✓	✓	
Water cycle	-gives oxygen -for ecological balance		✓	
landscape	- beautification	✓		✓

Assessment 2
1.A
2. C
3.C
4.B
5.A

Assessment 1
1.A
2A
3.A
4.A
5.B

What's More
Enrichment Activity 1

Ecosystem with different species of trees	Name of individual species	Number for each individual species	Percentage of abundance of individual species **(%=number of individual species/total number of species X 100%)**	evenly distributed or not evenly distributed (species evenness)?	more diverse or less diverse? (species richness)	stable or not stable?
Ecosystem 2 10 coconut trees 3 mango trees 2 avocado trees	Coconut trees	10	66.67%	Not evenly distributed	Less diverse	Not stable
	Mango trees	3	20%			
	Avocado trees	2	13.33%			

Assessment

1.B	**6.B**	**11.B**
2.A	**7.B**	**12.D**
3.B	**8.A**	**13.C**
4.A	**9.C**	**14.C**
5.D	**10.C**	**15.A**

What I Have Learned

1.high	**6.** Physical	**11.** direct
2.low	**7.** Behavioral	**12.** indirect
3.many	**8.** Mimicry	**13.** hotspot
4. Richness	**9.** Camouflage	**14.** human
5. Evenness	**10.** Migrate	**15.** Plant more trees

Assessment 3

1.D
2.D
3.D
4.D
5.D

Enrichment Activity 3

A. 1. Improper waste disposal, pollution, deforestation and others are all similar in the sense that all these are environmental problems brought about by human-related activities.
2. The effects of these environmental issues are in long term. Deforestation can be severely devastating and alarming as they may cause flashfloods, soil erosion, wildlife extinction, global warming and ecological imbalance.

B. 1. Yes, because it destroys the coral reef which serves as the home of the fishes.
2. Coral reefs are extensively damaged by persons who use dynamite and cyanide fishing. The government must enforce laws to protect the coral reefs. Divers and individual citizens must practice good reed etiquette.
3. Trees use carbon dioxide for photosynthesis
4. Answers may vary.

C. 1. Answers may vary.
2. Answers may vary.

References:

Printed Materials:

Acosta, H.,L. Alvarez, D. Angeles, R. Arre, Mp. Carmona, A. Gatpo, etal. Science Grade 10 Learner's Material. Pasig City, Philippines: Rex Bookstore, Inc. and Department of Education,2015

Acosta, H.,L. Alvarez, D. Angeles, R. Arre, Mp. Carmona, A. Gatpo, etal. Science Grade 10 Science Teacher's Guide. Pasig City, Philippines: Rex Bookstore, Inc. and Department of Education,2015

Rabago, Lilia M. Functional Biology. Manila: Vibal publishing House 2012
Valdoz, Melissa. *Science Links 10.* Manila: Rex Bookstore, Inc. 2017.

Department of Education. Biology Science and Technology II SEDP Edition.

Electronic Sources:

Department of Education. "*K to 12 Curriculum Guide Science (Grade 3 to 10).*" Accessed October 2019. "https://www.deped.gov.ph/wp-content/uploads/2019/01/Science-CG_with-tagged-sci-equipment_revised.pdf.

LRDMS Portal. *Science Modules.* December 29, 2014. "Accessed October 13, 2019. https://lrmds.deped.gov.ph/detail/6838.

http://www.philexport.ph/barterfli-philexport-file-portlet/download/G_meeting2011/2009/Q3/pedrosa.pdf

https://www.quora.com

https://www.conservation.org

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