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DEPARTMENT OF EDUCATION

Science

Quarter 2 – Module 6

Ecosystem: Tropical Rainforests, Coral Reefs and Mangrove Swamps

ALTERNATIVE DELIVERY MODE
ADM

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Alternative Delivery Mode
Quarter 2 – Module 6 Ecosystem: Tropical Rainforests, Coral Reefs and Mangrove Swamps
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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 discussion are carefully stated for you to understand each lesson.

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

Pre- test are provided to measure your prior knowledge on lesson on each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator on 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 key 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 facilitator.

Thank you.

For the learner:

Welcome to the **Science 6** Alternative Delivery Mode (ADM) Module on **Ecosystem: Tropical Rainforests, Coral Reefs and Mangrove Swamps**!

This module was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will be enabled to process the contents of the learning resource while being an active learner.

This module has the following parts and corresponding icons:

 ***What I Need to Know***	This will give you an idea of the skills or competencies you are expected to learn in the module.
 ***What I Know***	This part includes an activity that aims to check what you already know about the lesson to take. If you get all the answers correct (100%), you may decide to skip this module.
 ***What's In***	This is a brief drill or review to help you link the current lesson with the previous one.
 ***What's New***	In this portion, the new lesson will be introduced to you in various ways; a story, a song, a poem, a problem opener, an activity or a situation.
 ***What is It***	This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.
 ***What's More***	This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.
 ***What I Have Learned***	This includes questions or blank sentence/paragraph to be filled in to process what you learned from the

lesson.

 ***What I Can Do***	This section provides an activity which will help you transfer your new knowledge or skill into real life situations or concerns.
 ***Assessment***	This is a task which aims to evaluate your level of mastery in achieving the learning competency.
 ***Additional Activities***	In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned.
 ***Answer Key***	This contains answers to all activities in the module.

At the end of this module you will also find:

References	This is a list of all sources used in developing this module.

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. You can do it!

What I Need to Know

This module was designed and written with you in mind. It is here to help you master the different interactions of living things and non-living things in tropical rainforests, coral reefs and mangrove swamps. The scope of this module is used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

This module is divided into three lessons:

- Lesson 1. Identifying and discussing the interactions among living and non- living things in tropical rainforests
- Lesson 2. Identifying and discussing the interactions among living and non- living things in coral reefs
- Lesson 3. Identifying and discussing the interactions among living and non- living things in mangrove swamps

After going through this module, you are expected to:

- Identify and discuss the interactions among living and non-living things in tropical rainforests
- Identify and discuss the interactions among living and non-living things in coral reefs
- Identify and discuss the interactions among living and non-living things in mangrove swamps

What I Know

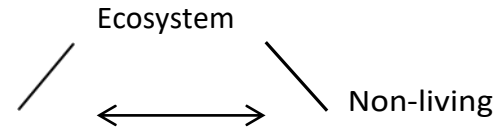
Directions: Read each item carefully and choose the letter of the best answer. Write your answer on your answer sheet.

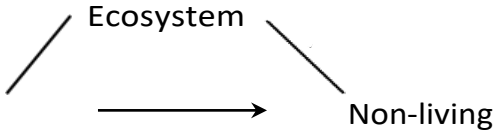
1. What are the things needed by plants to make their own food?
   a. water, chemicals and oxygen
   b. oxygen and carbon dioxide
   c. oxygen and chemicals
   d. carbon dioxide, soil and sunlight

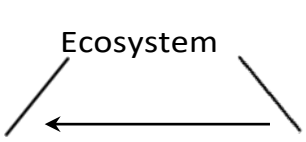
2. What kind of interaction is shown when worms live in the guts and flesh of a fish?
   a. mutualism
   b. commensalism
   c. predation
   d. parasitism

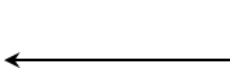
3. What kind of interaction is shown when monkeys in tropical rainforest compete for food with other animals?
   a. mutualism
   b. commensalism
   c. competition
   d. predation

4. Which of the following represents the ecosystem?

a. Living Community 

b. Living Community 

c. Living Community 

d. Living Community 

5. Which of the following pairs of organisms shows commensalism?
    a. butterfly sucking the flowers
    b. ferns attached to a tree
    c. flatworms in coral reefs
    d. snake eating a rat

6. Which of the following describes a canopy of the rainforest?
    a. composed of trees that are 130 to 180 feet tall
    b. about 59 feet and consists of trunk of canopy, shrubs, small plants and trees
    c. consists mostly of fungi, insects, worms and litter from taller trees
    d. has slender tees from a dense platform of vegetation with 60 to 129 feet

7. Why is producer important in an ecosystem?
    a. It is the source of food to the consumers.
    b. It is an organism that eats plants.
    c. It breaks down organism into smaller particles.
    d. It is a series of feeding relationship.

8. _____ results from the interconnected food chains.
    a. consumer
    b. producer
    c. food web
    d. biotic component

9. A reef that stands between the open sea and a lagoon refers to ____.
    a. Barrier Reefs
    b. Fringing Reefs
    c. Coral Atolls
    d. Coral reefs

10. Why is there a need to protect and conserve the mangrove swamp ecosystem?
    a. It is home to animals like jaguar, monkey and owl.
    b. It serves as breeding or nesting grounds of fishes.
    c. It protects sea animals like sponges, mollusks and crustaceans.
    d. It provides livelihood to the farmers.

Lesson 1 Ecosystem: Tropical Rainforests

Living things and non-living things interact with each other in a Tropical Rainforest Ecosystem. Living things include plants and animals. Non-living things include soil, air, humidity, water and sunlight.

What's In

Directions: The following are found in tropical rainforests. Classify them as living or non-living things. Write your answers in your Science Journal.

tropical shrubs trees birds
carbon dioxide sunlight oxygen

Living Things	Non-living Things

What's New

Have you gone to a forest? How will you describe this ecosystem? How do living and non-living things interact in this ecosystem? Write your answer in your Science Journal.

Figure 1: Tropical rainforest

What Is It

The Ecosystem is an environment where both living and non-living things exist and interact with one another. This interaction enables the survival of living things and affects non-living things. Example of ecosystem is the tropical rainforests. Living things that can be found here composed of plants and animals. Non-living things include soil, air, humidity, water and sunlight.

Rainforest has different layers namely emergent, canopy, understory and forest floor. **Emergent** refers to trees that are 130 to 180 feet tall. **Canopy**, on the other hand, has tall slender trees from a dense platform of vegetation with 60 to 129 feet of the ground.

The **understory** is about 59 feet and below and consists of trunks of canopy, shrubs, trees and small plants. The **forest floor** is home to animals like jaguars, tigers and cassowaries which thrive in a deep shade part of the forest where plant life is thin. This is because only a small percent of sunlight gets through the thick canopy and understory and reaches the forest floor. Organisms like fungi, insects, worms and litter from taller trees that fall on the forest floor can be found here.

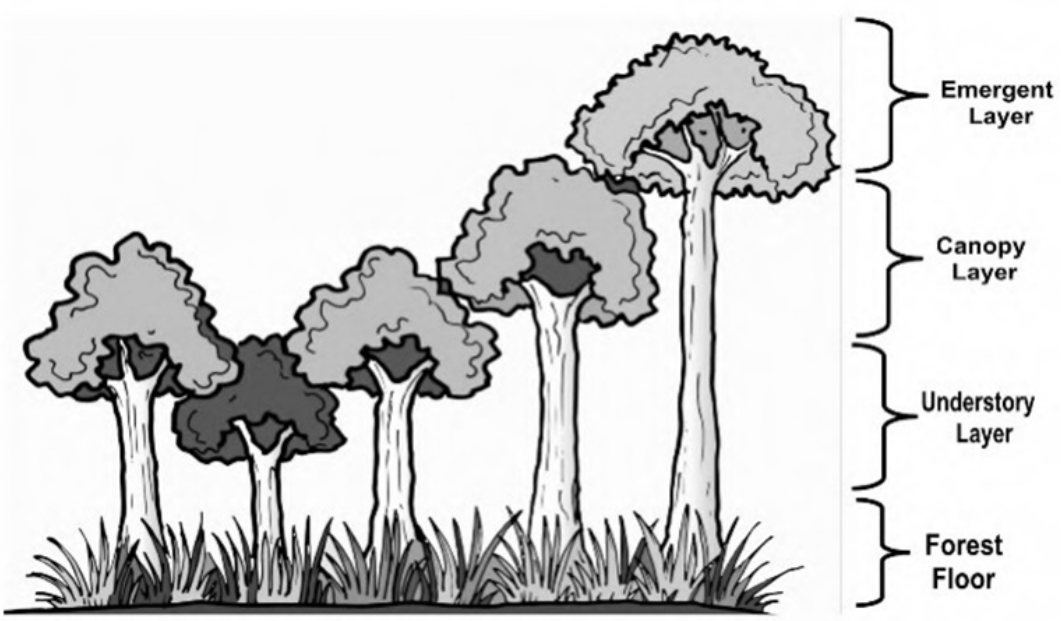


Figure 2: Layers of the rainforest

Producers provide food for the consumers which include herbivores-plant eating animals and carnivores-flesh eating animals. Herbivores provide food to the carnivores. Producers include trees, shrubs and other plant life in the forest.

Feeding relationships like food chain and food web occur among species in the forest ecosystem. Food chain starts with producer, a series of consumers and decomposers. Food web results from the interconnected food chains.

Figure 3: Food chain

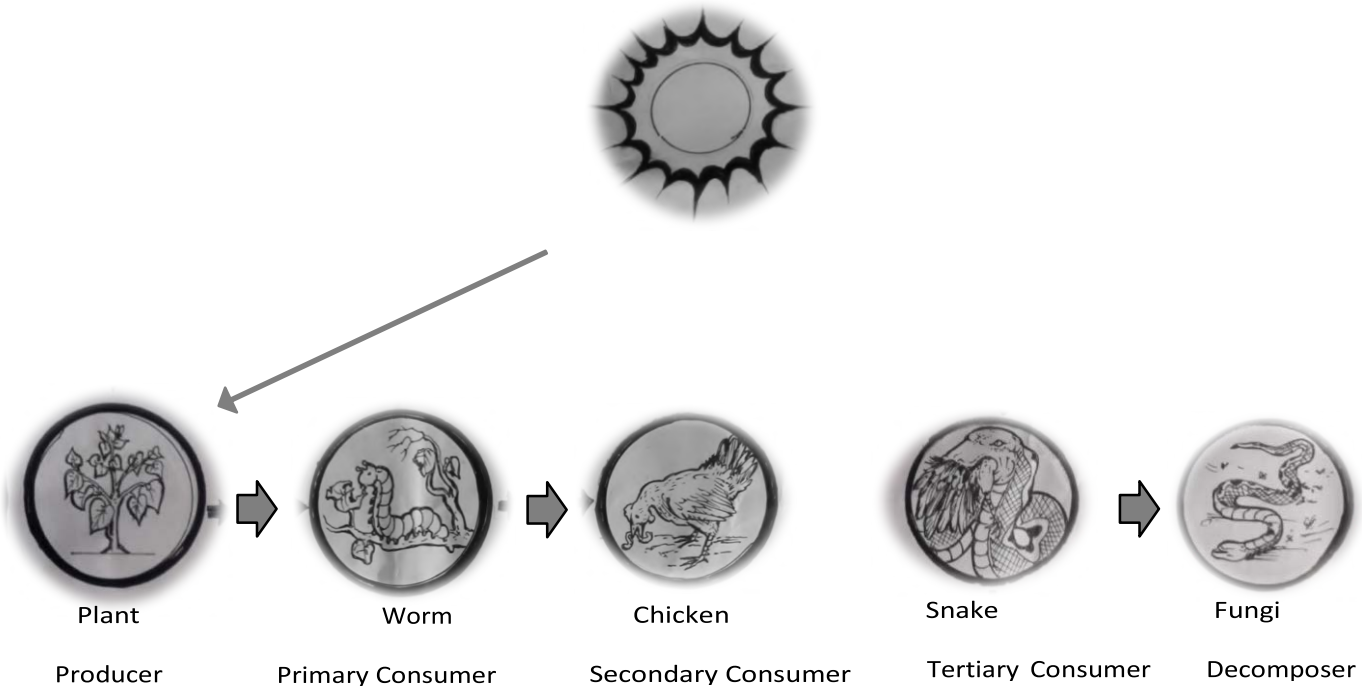
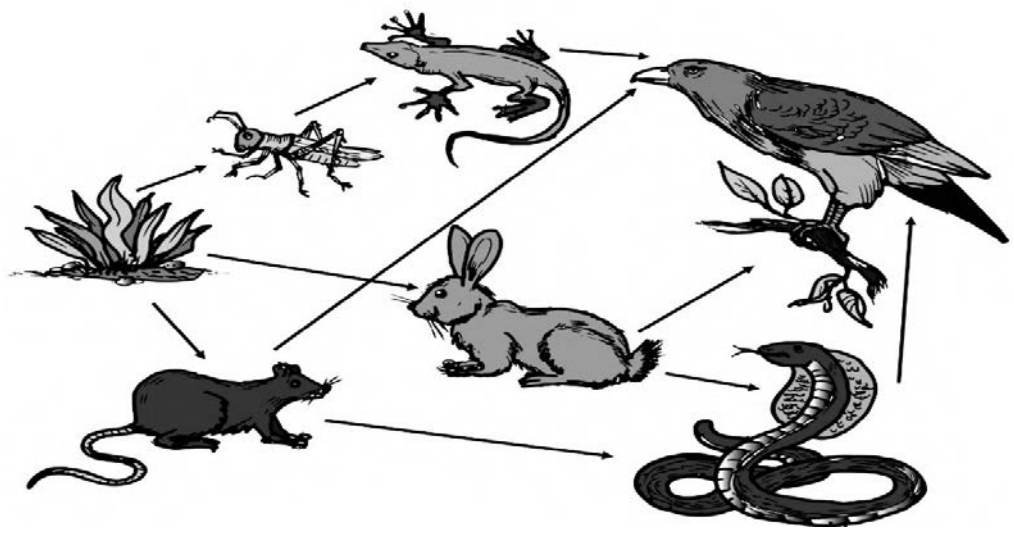
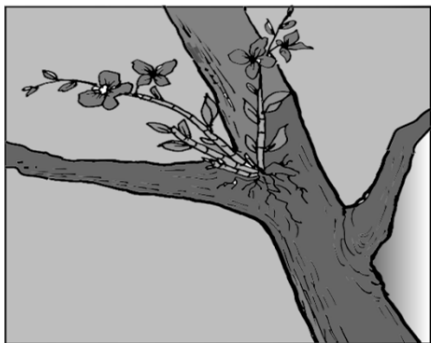


Figure 4: Food Web



There are different organisms living in this ecosystem which interact with each other. There are interactions that exist among the tropical rainforest.

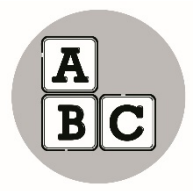


Commensalism is an interaction where organisms live together without harming one another for example orchids is attached to the trunk of a tree without harming it.

In mutualism both organisms benefit in the relationship for example, a bee or butterfly suck nectar from a flower and the flower reproduces.

Competition is an interaction wherein organisms compete for survival. For example, grass, shrubs, flowers, and trees grow together in one area where they compete for source of food, sunlight, soil nutrients and other things needed for their survival.

Predation is a kind of interaction in which one organism kills smaller organisms for food. An example of this is when a snake eats a rat for food. Predator usually organisms which are stronger, bigger and fiercer compared to prey.



What's More

Directions: Read carefully and answer the following items. Write your answers in your Science Journal.

- What are the interactions that exist among living things and non-living things in the tropical rainforest?

  _____
  _____

- Discuss interaction between plants and sunlight in a tropical rainforest ecosystem.

  _____
  _____

- What will happen if producers will decrease in a rainforest ecosystem?

  _____
  _____

- Are the interactions among living things and non-living things important? Why?

  _____
  _____

What I Have Learned

Directions: Complete the paragraph below. Choose your answer from the words inside the box. Write your answer in your Science Journal.

mutualism	ecosystem	understory	canopy
predation	emergent	forest floor	food chain
food web	commensalism		

I learned that…….

The_____is an environment where both living and non-living things exist and interact with one another.

The different layers of the rainforest are_____,_____, _____ and _____ .

_____is a series of feeding relationship, while_____is an inter-connected food chain.

_____is an interaction where organisms live together without harming one another, for example, the orchids are attached to the trunk of a tree without harming it. In_____, both organisms benefit in the relationship._____is a kind of interaction in which one organism kills smaller organisms for food.

What I Can Do

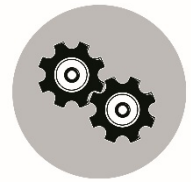
Directions: Read the paragraph and answer the questions that follow. Write your answer in your Science Journal.

Living things and non-living things interact with each other in a Tropical Rainforest Ecosystem. This interaction enables the survival of living things and affects non-living things. Can you identify the living and non-living things in a Tropical Rainforest? Discuss their interaction.

Example: Plants and carbon-dioxide - Plants need carbon dioxide for food- making, in return, it releases oxygen during the process of photosynthesis.

_____

_____



Additional Activities

Directions: The table below shows the different interactions in a tropical rainforest. Choose the correct organism that shows the kind of interaction in a given ecosystem. Write the letter of the correct answer in your Science Journal.

Interaction in Tropical rainforests	**Organisms Involved**
1. Mutualism	a. The shrubs, flowers and trees grow in one area. b. The butterfly sucks nectar from a flower; flower reproduces.
2. Commensalism	a. The birds eat worms. b. The orchids attach to a branch of a tree.
3. Competition	a. The orchids attach to a branch of a tree. b. The grass, flowers, trees grow together in one area
4. Cooperation	a. The ants in a colony. b. The snake eats a rat.
5. Predation	a. The snake eats a rat. b. The ferns attach on a tree.

Lesson 2 Ecosystem: Coral Reefs

A coral reef is rich with marine life. It is a marine biome. It is composed of non-living things and living things. The living part composed of different species like fish, sea grass, corals, sponges and other marine animals.

What's In

Directions: The following are found in coral reefs. Classify them as living or non-living things. Write your answers in your Science Journal.

1. crab _____
2. turtle _____
3. fish _____
4. sand _____
5. water _____

What's New

Directions: Answer the following questions below. Write your answers in your Science Journal.

Have you gone to a coral reef? How will you describe this ecosystem? How do living and non-living things interact in coral reefs ecosystem?

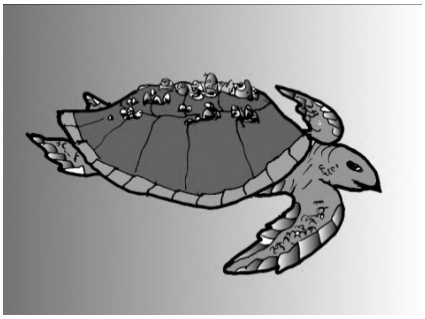
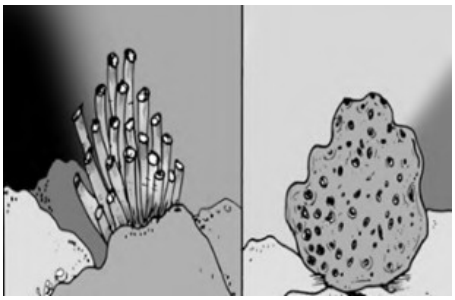
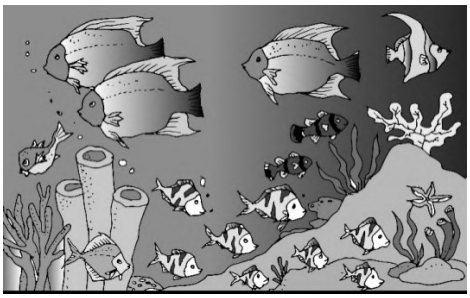
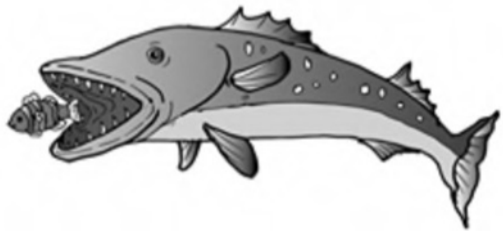
Figure 5: Coral Reef Ecosystem

Just like in other ecosystems, in coral reefs, organisms interact with each other. The producers like sea grass, provide food and nutrients to the consumers. These consumers include sea turtles, crabs, manatees (dugong), fishes and other marine animals.

The factors that contribute to the coral reef formation are temperature, light penetration, stable salinity and water movement.

There are different categories of coral reefs. Fringing reefs are reefs that hug the shore of continents or islands. Barrier reefs are reefs that stand between the open sea and a lagoon. Coral atolls are reefs that enclose a lagoon.

There are interactions that exist in the coral reefs' ecosystem.

	Commensalism is an interaction where organisms live together without harming one another, for example, barnacles attached on skin of turtles without harming them. Barnacles are benefitted while the host is not harmed.
	In mutualism, both organisms benefit in the relationship, for example, the corals receive oxygen from the algae; the algae get protection from them.
	Competition is an interaction wherein organisms compete for survival. For example, the fishes compete for source of food and space in the coral reef.
	Predation is a kind of interaction in which one organism kills smaller organisms for food. An example of this is when a big fish eats a small fish. The predator which a big fish benefits in the interaction while the prey, a small fish is harmed.

What's More

Directions: Answer the following questions. Write your answers in your Science journal.

1. What are the living and non-living things found in the coral reefs?

_____

2. How do they interact with each other?

_____

Discuss the relationship or interaction between:

3. Big fish and small fish

_____

4. Worm in the flesh and guts of fish

_____

5. Are these interactions important? Why?

_____

What I Have Learned

Directions: Complete the paragraph. Choose your answer from the words given inside the box below. Write your answer in your Science journal.

water movement	temperature
coral reefs	fringing reefs
coral Atolls	parasitism
barrier reefs	predation

I learned that ….

The_____ serve as a breeding ground of marine life.

The factors that contribute to the reef formation are light penetration, _____, stable salinity and_____.

The_____,_____and_____are categories of coral reefs. _____ is an interaction where organisms live together without harming one another, for example, barnacles attached on skin of turtles without harming them. In_ both organisms benefit in the relationship. For example, the corals receive oxygen from the algae; the algae get protection from them._____is a kind of interaction where one organism, the parasite, depends on another organism for food, production and reproduction._____is a kind of interaction in which one organism kills smaller organisms for food. An example of this is when a big fish eats a small fish.

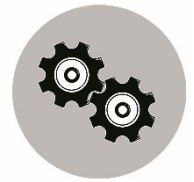
What I Can Do

Directions: Read the paragraph and answer the questions that follow. Write it in your Science Journal.

Living things and non-living things interact with each other in a Coral reef ecosystem. Coral reef is composed of non-living components such as water and sand. It serves as breeding place for fish, crustaceans, mollusks, cnidarians, sponges and echinoderms. Their interaction enables the survival of living things and affects non-living things. Can you identify the living and non-living things in Coral Reef Ecosystem? Discuss their interaction.

_____

_____



Additional Activities

Directions: Identify the interaction between the given pair of organisms in column A and its interaction in column B. Write it in your Science journal.

Column A	Column B
1. sea urchin-corals	a. mutualism
2. barnacles-turtle	b. competition
3. worm-fish	c. predation
4. tuna fish-blue marlins	d. commensalism
5. clown fish-sea anemone	e. parasitism

Lesson 3 Ecosystem: Mangrove Swamps

A mangrove swamp is a home to a diverse living and non-living things. Different species of animals like crustaceans, fish and mollusk compose the living part of mangrove ecosystem. Mangrove plants are the main organism that dominates this ecosystem. How do living and non-living things interact with each other in this environment?

What's In

Tropical Rainforest

Living Things	Non-living Things
_____	_____
_____	_____

Coral Reefs

Living Thing	Non-living Things
_____	_____
_____	_____

What's New

Direction: Pick out the animals that can be found in mangrove swamps ecosystem. Write your answer in your Science Journal.

monitor lizard	oysters	bats
white heron (tagak)	snake	fish
fiddler crab	eagle	monkey
dolphin	rat	clown fish
corals	sea urchin	sea anemone

1. _____
2. _____
3. _____
4. _____
5. _____

What Is It

Mangrove swamp ecosystem is composed mostly of mangrove plants and animals like crustaceans and migratory birds. The non-living part composed of water, sand, mud, rocks and sunlight. It is an important system that allows for the breeding of fishes and survival of other marine animals. It is also a part of the coastal and marine ecosystems.

There are varieties of marine and terrestrial life living in mangroves. Animals like white heron (tagak), and other birds inhabit the mangrove canopy. Fishes and crustaceans live underneath the mangrove roots system. Organisms like oyster, mussels attached themselves to the trunk and lower branches of the mangroves. Animals like monitor lizard, mudskipper and crustaceans such as shrimps and crabs live in mangrove swamps. Also, migratory birds like pelicans, spoon bills and bald eagles are also found in this habitat. Some saltwater crocodiles can also live in Philippine mangrove swamps.

Photo credit: Ester I. Posadas

Figure 6: Mangrove swamp in Bago City, Negros Occidental

The symbiotic interaction found in a mangrove ecosystem includes many organisms that depend on mangrove for survival. Animals like oysters, mollusks and barnacles are dependent on mangrove for their source of food and habitat.

Commensalism is shown when barnacles and oysters attach themselves to the roots of mangroves. Fishes stay in the mangroves during a particular stage of their life to grow and develop into a mature fish. Mutualism is shown when animals like crabs and mollusks help break down plant litter in a mangrove ecosystem through grazing. White heron (tagak) eating a fish shows predation in this kind of ecosystem.

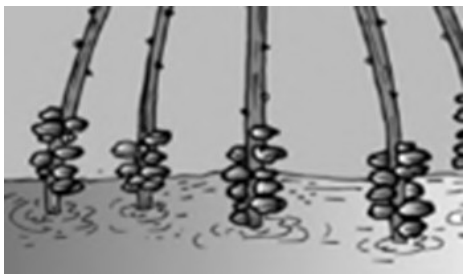
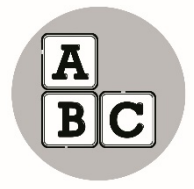


Figure 7: Oysters attached to mangrove

Figure 8: White heron eating a fish

Mangrove swamp ecosystem is important for they serve as breeding and nesting grounds of animal species. The mangrove shelter is used as shelter by fishes as breeding and nursing grounds before heading to the open ocean. Mangroves are also important habitat of organisms. Numerous animal species find protection and abundant food in this environment. It also acts as natural barrier and flood defense as they defend coast lines from flooding and erosion. Lastly, mangrove is an important source of livelihood of people living in coastal areas.



What's More

Activity 1

Directions: Identify and discuss the interaction between living and non-living things in a mangrove swamp ecosystem. Write your answers in your Science Journal.

1. oyster and mangrove

_____

2. white heron and water

_____

3. crab and mud

_____

4. mangrove and bird

_____

Activity 2

Directions: Answer the questions below. Write your answer in your Science journal.

1. What are the interactions that exist among living and non-living things in mangrove ecosystem?

_____

_____

2. Are these interactions important? Why?

_____

_____

What I Have Learned

Directions: Complete every statement by supplying the blank with a word or group of words from the box below. Write your answer in your Science Journal

commensalism	mangrove swamp
habitat of organisms	predation
natural barrier and flood defense	

I learned that …

Ecosystem is composed mostly of mangrove plants and animals like crustaceans and migratory birds.

Mangroves are important because, they serve as breeding and nesting grounds of animal species,_____, _____, a source of livelihood of people living in coastal areas.

In this kind of ecosystem,_____is shown when animals like crabs and mollusks help break down plant litter in a mangrove ecosystem through grazing. _____ is shown when white heron (tagak) ate fishes.

What I Can Do

The YES-O members of Bago City, Negros Occidental participated in the conduct of mangrove planting and clean-up drive at Purok Batad, Brgy. Sampinit, Bago City.

Photo credit: Ester I. Posadas

Figure 9: Mangrove Swamp Ecosystem

Photo credit: Ester I. Posadas

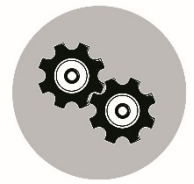
Figure 10: YES-O Bago Tree Planting Activity at Prk. Batad, Brgy. Sampinit, Bago City

to

During the mangrove planting, pupils were asked identify the different factors that would ensure the survival of plants and other living things in the mangrove ecosystem.

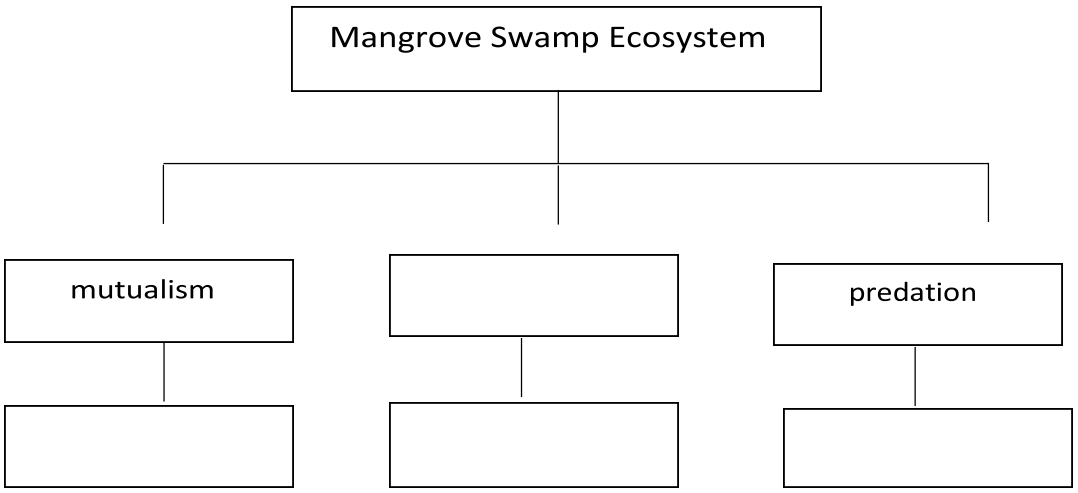
Directions: Identify the living and non-living things in the mangrove ecosystem and discuss how they interact.

Living Things and Non-living Things	**Interaction**
Example: water and mangrove	Water enables the growth of mangrove, mangrove in return helps filter the pollutants from the river run-offs making the water free from harmful build-up of sediments.
1.	
2.	
3.	



Additional Activities

Directions: Using the concept map below, identify the type of interaction that exists in mangrove swamps. Give examples of organisms involved by writing the interaction or organisms in the blank boxes. Do it in your Science journal.



Assessment

Directions: Choose the letter of the best answer. Write your chosen answer on a separate sheet.

1. Which group of organisms can be found in the mangrove ecosystem?
    a. mussels, fish, corals
    b. worm, rat, fish
    c. butterfly, snake, bird
    d. mangrove trees, fiddler crab, fish

2. What are the things needed by plants to make their own food?
    a. water, chemicals and oxygen
    b. oxygen and carbon dioxide
    c. oxygen and chemicals
    d. carbon dioxide, soil and sunlight

3. Which of the following describes a canopy of the rainforest?
    a. composed of trees that are 130 to 180 feet tall
    b. about 59 feet and consists of trunk of canopy, shrubs, small plants and trees
    c. consists mostly of fungi, insects, worms and litter from taller trees
    d. has slender trees from a dense platform of vegetation with 60 to 129 feet.

4. What kind of interaction is shown when one organism kills another organism for food?
    a. mutualism
    b. commensalism
    c. parasitism
    d. predation

5. It is an environment where both living and non-living things exist and interact with one another.
    a. ecology
    b. ecosystem
    c. community
    d. population

6. One example of competition in tropical rainforest is when the shrubs and trees are growing together in one area. What do they compete for?
    a. sunlight and soil nutrients.
    b. oxygen and carbon dioxide.
    c. chemicals and oxygen.
    d. water and chemicals.

7. _____ results from the interconnected food chains.
    a. consumer
    b. producer
    c. food web
    d. biotic component

8. Why is the relationship between the corals and the algae in the coral reefs considered mutualistic?
    a. The corals benefit in the interaction and not the algae.
    b. The corals receive oxygen from algae, the algae get protection from corals.
    c. The corals receive oxygen from algae while the algae are harmed.
    d. The corals and algae live together without harming each other.

9. What kind of interaction is shown when animals like crabs and mollusks help break down plant litter in a mangrove ecosystem through grazing?
    a. competition
    b. commensalism
    c. parasitism
    d. mutualism

10. Why is producer important in an ecosystem?
    a. It is the source of food to the consumers.
    b. It is an organism that eats plants.
    c. It breaks down organism into smaller particles.
    d. It is a series of feeding relationship.

Assessment

1. D
2. D
3. D
4. D
5. B
6. A
7. C
8. B
9. D
10. A

Lesson 3

What's In

Answers may vary

What's New

1. monitor lizard
2. white heron (tagak)
3. fiddler crab
4. oysters
5. fish

What's More

Activity 1

1. Commensalism-oysters attached to the roots and branch of mangroves without harming it

2. Commensalism-the heron gets its food from the water without affecting it.

3. Commensalism-the crab get its food from the mud and it serve as its habitat without affecting it.

4. The bird rely on the mangrove for its habitat and food, the bird aids in the pollination and propagation of the plant.

Activity 2

Answers may vary

What I Have Learned

-Mangrove swamp

-habitat of organisms

-natural barrier and flood defense

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