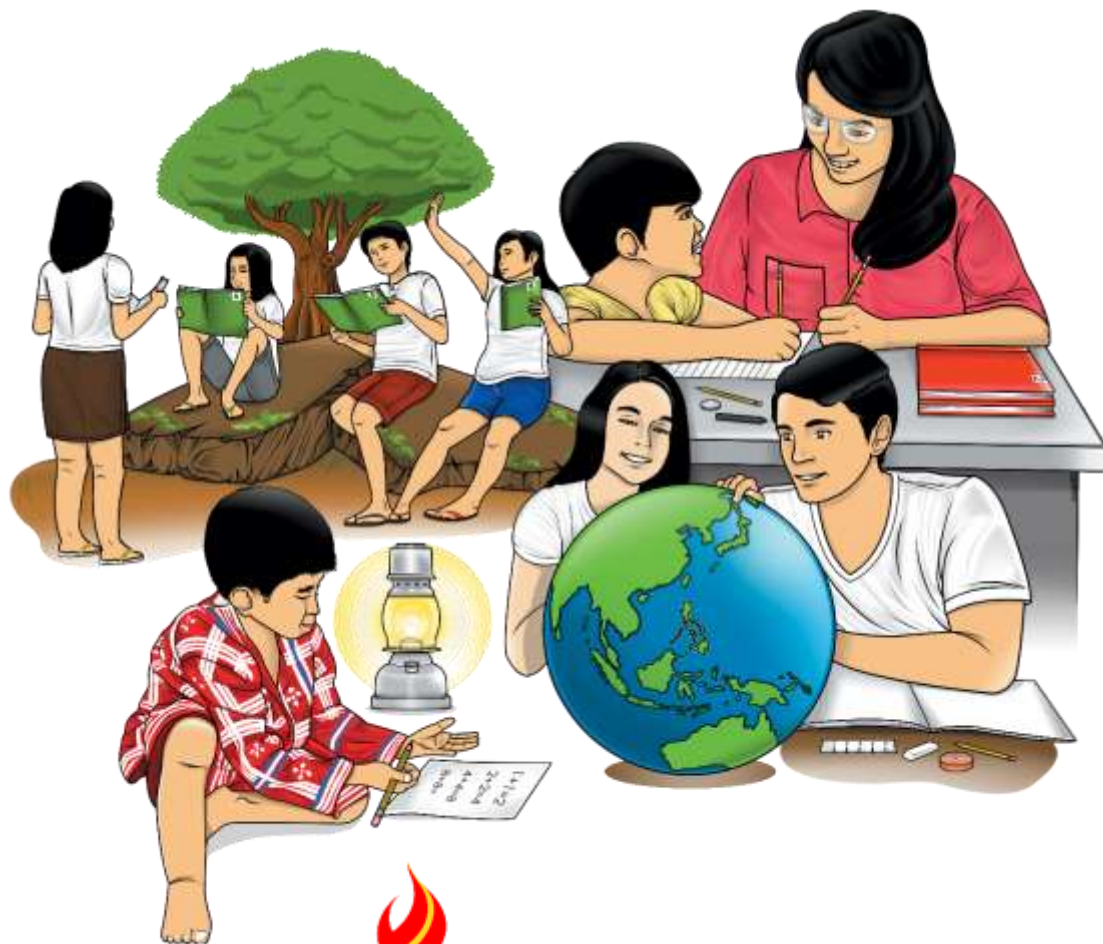


Science

Quarter 2 – Module 6: Estuaries and Intertidal Zones



Science – Grade 5
Alternative Delivery Mode
Quarter 2 – Module 6: Estuaries and Intertidal Zones
First Edition, 2020

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Science

Quarter 2 – Module 6: Estuaries and Intertidal Zones

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.

Good luck and happy learning!



What I Need to Know

Estuaries and intertidal zones supply essential foods for all living things. The living or biotic factors like plants, animals, and microorganisms affect the ecosystem that includes coral reefs, salt marshes, mudflats, rocky shores, and mangrove forests.

This module will help you understand better how organisms interact with one other to survive in intertidal zones and estuaries.

The module is divided into two lessons, namely:

- Lesson 1: Interactions among living things and non-living things in estuaries
- Lesson 2: Interactions among living things and non-living things in intertidal zones

At the end of this module, you will be able to:

- identify the biotic and abiotic components in estuaries
- identify the biotic and abiotic components in intertidal zones
- explain how these components interact with each other for the survival of organisms in estuarine and intertidal zone ecosystems

Note: Use a separate sheet for your answers in all the activities in this module



What I Know

Directions: Match the descriptions in Column A with the correct terms being described in Column B. Write your answers on your answer sheet.

A

1. It is the amount of salt in water.
2. It is the hotness or coldness of the water.
3. It is the type of water in estuaries.
4. These are the living components in the ecosystem.
5. It is the area where the sea meets the land between high and low tides.
6. These are non-living factors in the environment.
7. It is a source of nutrients for living organisms like plants.
8. It is an area where the river meets the sea.
9. It provides shelter to thousands of fishes.
10. These serve as breeding grounds for organisms in estuaries.

B

- A. soil
- B. intertidal zones
- C. mangrove forests
- D. salinity
- E. coral reefs
- F. brackish
- G. biotic
- H. estuaries
- I. temperature
- J. abiotic

Lesson

1

Interactions Among Living Things and Non-living Things in Estuaries

Estuaries, like any other ecosystem, consists of **biotic** and **abiotic** factors. The biotic and abiotic factors or components of estuarine ecosystems interact in such a unique way, thus make some organisms choose to reproduce in these areas. For such reason, estuaries are also called “nurseries of the seas.”

The biotic factors are living things which include plants, animals, and microorganisms, while abiotic factors are the non-living things found in the ecosystem.

In this lesson, you will learn about the different biotic and abiotic components in estuaries, their interactions, and their importance.



What's In

Directions: Read the poem and make a list of biotic and abiotic factors mentioned by the author. Make a table like the one below on your answer sheet where you can write your answer.

AMAZING ECOSYSTEM

Author: Rachel E. Oronia

Sunlight, soil, waves, temperature, nutrients, & salinity
Are abiotic factors affecting organisms' survival in estuarine ecology
Sunlight helps them grow, it aids plants' photosynthesis
It secures animal growth and plants' food-making process
Nutrients and minerals from soil keep plants healthy
Organisms keep up with temperature changes though oceans are wavy
Salinity in estuaries is also a great need
For organisms to survive and feed

Biotic Factors	Abiotic Factors



What's New

Directions: Identify the **biotic** and **abiotic** factors found in the picture. Make a graphic organizer on your answer sheet like the one below where you can write your answer.

Biotic and Abiotic Factors in an Estuary

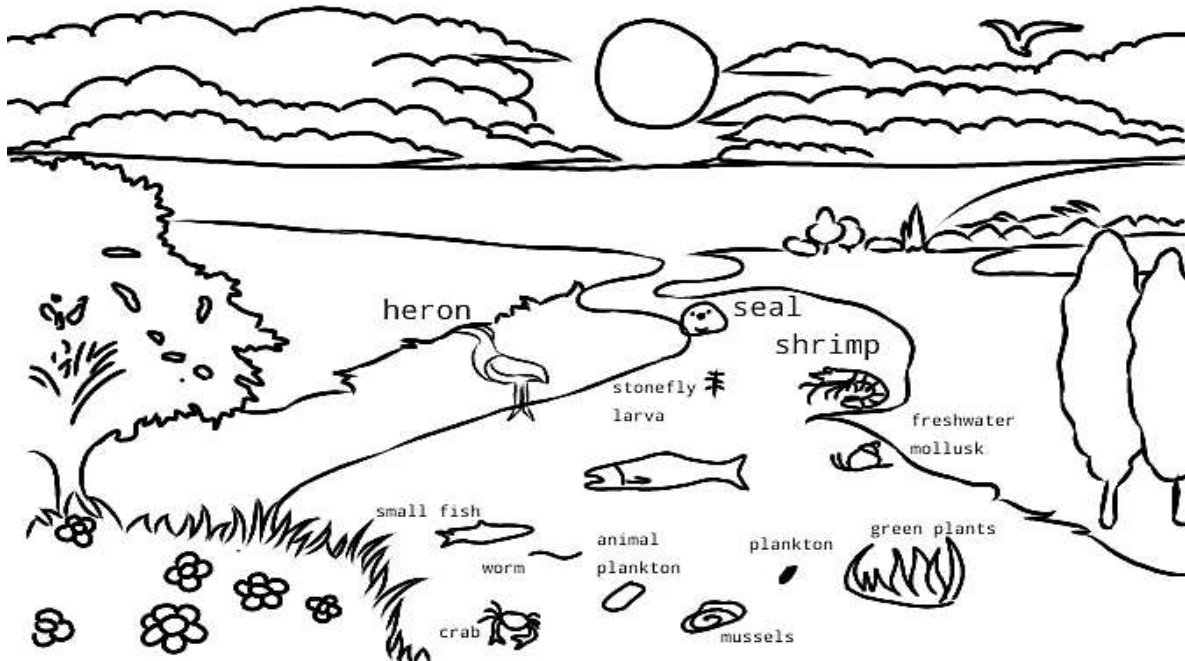
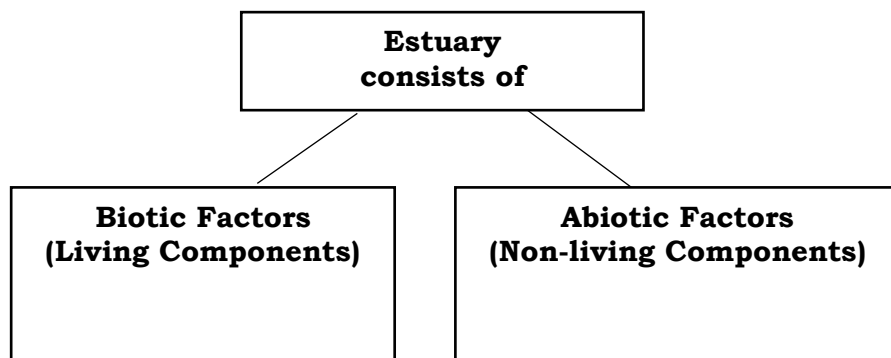


Figure 1

(Pogoy, Charlito Louis S. nd)





What Is It

What are the biotic and abiotic components in estuaries? An **estuary** is a place where the freshwater from the river mixes with the salt-water from the sea.

Biotic factors are the living components in an ecosystem. These include all the plants, animals, and microorganisms found in estuaries such as mangrove trees, migratory birds, and small fishes.

Abiotic factors, on the other hand, are non-living components in the ecosystem. These are the factors that affect organisms in estuaries. These include waves, salinity, temperature, amount of sunlight, and type of soil.

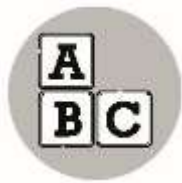
Biotic and Abiotic Factors in an Estuary

Figure 2
(Oronia.nd)



- ❖ **Waves** refer to the movement of the surface of the water. These are strong forces that organisms must learn to live with. An example of these organisms is the kelp, a kind of algae, which has strong root-like structures that attach themselves to rocks to keep it from being carried away by the waves.
- ❖ **Salinity** refers to the amount of salt in water. The combination of seawater and freshwater in estuaries is called brackish water. Mangroves and blue crabs have adjusted well to the constantly changing salinity of water due to the nonstop flow of freshwater and saltwater through the estuary.
- ❖ **Temperature** refers to the level of hotness and coldness of the water. Temperature differs because of the tides and the amount of sunlight. Some organisms use plants like mangroves to keep themselves concealed from direct sunlight or away from the coldness of the water.

- ❖ Since estuaries are shallow as compared to the seas, they are conducive for photosynthesis to take place. Algae, seaweeds, seagrasses, and other marine plants depend on the **amount of sunlight** that they receive in the estuaries.
- ❖ The **type of soil** varies in the estuaries depending on the strength of waves and the kinds of rocks present in the area. Some areas are full of rocks, sand, pebbles, or clay. The topsoil layer found in an estuary is composed mostly of peat or salt crust. Salt can be found within the soil which can be acidic, posing problems to the survival of plant life.



What's More

Activity 1

Directions: Unscramble the letters in Column A to form the word being described by the phrase in Column B. Write your answers on your answer sheet.

Column A	Column B
1. NIALSIYT	amount of salt in water
2. PUREMEATTER	hotness or coldness of water
3. SEAWV	movement of the surface of water
4. LOSI	source of nutrients of living organisms like plants
5. LUNGTHSI	needed by plants for the photosynthesis

Activity 2

Directions: Write **True** if the statement conveys correct information and **False** if not. Write the answers on your answer sheet.

1. Biotic factors are the non-living factors in the environment.
2. Plants and animals need abiotic factors in order to survive.
3. Mangroves provide shelter to marine organisms.
4. Sharks, dolphins, and other big fishes may also be found visiting in estuaries.
5. Migratory birds would stay in estuaries because of the availability of food in the area.

Activity 3

Directions: Read the description and the situation given below, then identify the abiotic and biotic factors that interact in each situation. The first one is done for you. Write your answers on your answer sheet.

Description and Situation	Abiotic Factor	Biotic Factor
It refers to the movement of the surface of the water. Some organisms like mussels and seaweeds attach themselves to the rocks so that they will not be carried by the strong force.	1. Waves	Mussels and seaweeds
It refers to the amount of salt in the water. The salt amount in estuaries is lower than that of the sea and ocean due to the continuous flow of freshwater and saltwater. Some organisms, like fishes prefer to breed in places with a low amount of salt.	2.	
It refers to the hotness and coldness of the water. It changes because of the tides and the amount of sunlight. Some organisms use plants like mangroves to keep themselves from direct sunlight or away from the coldness of the water.	3.	
It is the source of energy needed for photosynthesis. Marine plants create their own food and produce oxygen through photosynthesis. These plants support other organisms like marine animals in order to survive.	4.	
It is the source of nutrients for living organisms like plants. Some areas are full of rocks, sand, pebble, or clay. Salt can be found within the soil which can be acidic, posing problems to the survival of plant life.	5.	

Lesson

2

Interactions Among Living Things and Non-living Things in Intertidal Zones

Intertidal zones are areas that are constantly exposed to the changing tides. They provide homes to many kinds of plants and animals. The daily changes in the tides play a major role in the life of living things in this area. The intertidal zone, which is also known as the foreshore or seashore, is the area that is above water level at low tide and underwater at high tide.



What's In

- A. On November 8, 2013, Typhoon Yolanda hit most provinces in Eastern Visayas. Many houses, properties, and trees were destroyed. Many people died especially those who lived near the seashore. The entire ecosystem was damaged during that time.

Aftermath of the Catastrophic Typhoon Yolanda



Figure 1
(Fiel.nd)

What do you think are the specific factors that caused damages to the habitats of organisms in the seashores and the nearby areas?

B. Directions: Write **true** if the statement is correct and **false** if the statement is wrong. Write your answers on your answer sheet.

1. The intertidal zone is known as the area where land meets the sea, between high and low tide zones.
2. All plants and animals can survive in too much salty water.
3. The temperature in an intertidal zone changes because of the tides and the amount of sunlight.
4. The different types of soil in an intertidal zone have an effect on the kind of living organisms that lives on it.
5. Intertidal zones are covered with water during low tide.



What's New

Directions: Read the short story then answer the questions that follow. Write your answers on your answer sheet.

Living at the Shoreline

Author: Perpetua M. Fiel

Shirley has lived near the shoreline with her family for 5 years. She loves living near the sea and being near to a variety of creatures on the shoreline. Some rocks are spiky and pokey, sometimes they're smooth and they come in all different colors. The sand beneath their feet is boiling, especially when you stand on it when you've been from the sea. The water's tides come and go every day and Shirley likes to play with the waves every morning. The shells on the seashore are all colorful and they glisten as the sun rises and sets each day. Her shell collection already counts up to 85 various shells! Shirley sees different sea creatures daily - from fishes popping up and down from the water, whales flapping their tails, dolphins giggling as they swim in groups, crabs making their tiny homes in the sand, and seagulls flying over the horizon and looking down to all creatures both from land and sea. The lighthouse in the north near their home shines every night, guiding all fishermen as they make their living. Clouds of all sizes and shapes follow Shirley everywhere she goes. Shirley's most favorite thing living at the shoreline is seeing the crystal-clear water change colors from blue to green, green to gray, gray to light purple, then purple to blue again. Shirley loves living near the sea and being close to beautiful ocean life.

Answer the following questions:

1. Where does Shirley play every morning?
2. What is Shirley's collection that reach almost 85 various types?
3. What type of ecosystem does the story describes?
4. What are the biotic factors found in this type of ecosystem?
5. What are the abiotic factors found in this type of ecosystem?
6. How can we protect our shoreline?

The story mentioned several biotic factors. These organisms live in different habitats or areas found in intertidal zones. These include shells, fishes, whales, dolphins, crabs, and seagulls. These biotic factors need abiotic factors for survival. Air and water are examples of abiotic factors that are needed for an organism to live.



What Is It

Intertidal zone is an area in the estuary which is covered with water during high tide and exposed to air at low tide. There are organisms that live in different habitats or areas found in intertidal zones.

Biotic factors in an ecosystem such as the intertidal zone and estuary are composed of all plants, animals, and microorganisms living in it. These organisms live in different habitats found in intertidal zones and estuaries. These include coral reefs, salt marshes, mud flats, rocky shores, and mangrove forests.

Coral reefs provide shelter to thousands of fish. The corals themselves are animals that feed on plankton. These corals form reefs that protect the coast from strong waves and currents.

Salt marshes are areas that are filled with seawater during high tides and drained during low tides. Organisms found in salt marshes are clams, mussels, oysters, crabs, snails, and shrimps. Plants found in salt marshes are sea grasses and other plants that are tolerant of saltwater.

Mud flats or tidal flats are areas where mud from the seas or rivers is deposited. They are usually the areas for migratory birds, crabs, sand dollars, mussels, clams, mollusks, shellfish, and some fish. Algae, like sea lettuce, provide food for the herbivores in this area.

Rocky shores are areas where solid rocks are found. Animals found in the rocky shores are plankton, brittle stars, sea stars, hermit crab, barnacles, limpets, mollusks, periwinkle, shore crabs, shrimp, and prawns. Mangrove forests are areas that are filled with mangrove trees. These trees have adapted to saltwater.

Mangrove forests are breeding grounds for different kinds of fish and shellfish.

Like estuaries, abiotic factors such as waves, salinity, amount of sunlight, temperature, and type of soil affect the organisms in intertidal zones.

Intertidal Zone During High Tide

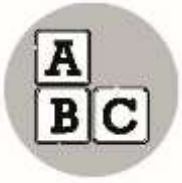


Figure 2
(Fiel.nd)

Intertidal Zone During Low Tide



Figure 3
(Fiel.nd)



What's More

Activity 1

Directions: Identify the biotic components only that are found in intertidal zones and write these on your answer sheet.

- | | | |
|-------------|-----------------------|-----------------|
| 1. mollusks | 6. shellfish | 11. corals |
| 2. starfish | 7. amount of sunlight | 12. rocks |
| 3. fish | 8. mussels | 13. clams |
| 4. mudflats | 9. salt marshes | 14. waves |
| 5. shrimps | 10. crabs | 15. sea urchins |

Activity 2

Directions: Fill in the blank with the correct answer from the box. Write your answers on your answer sheet.

temperature	mud	high tide
solid rocks	seashores	decomposing

1. Salt marshes are filled with seawater during _____ and drained during low tide.
2. A quick change of water _____ may cause death of fishes.
3. Sea stars and sea urchins can be found in _____.
4. Salt marshes are marshy because of the presence of _____ plant matter.
5. Rocky shores are areas in intertidal zones where _____ are found.

Activity 3

Directions: Write the kind of ecosystem in the intertidal zone being described.
The first one is done for you. Write your answers on your answer sheet.

Ecosystem	Description	Animals living in it
1. Coral reef	Areas which are packed with many corals. These serve as the sanctuary for young fishes.	Corals, different kinds of fishes, jellyfishes, sea anemones and sea stars
2.	Areas where mud from the seas or rivers is deposited	They are usually the areas for migratory birds, crabs, sand dollars, mussels, clams, mollusks, shellfish, and some fish.
3.	Areas that are filled with seawater during high tides and drained during low tides.	Organisms found in these areas are clams, mussels, oysters, crabs, snails, and shrimps.
4.	Areas where solid rocks are found	Animals found in these areas are plankton, brittle stars, sea stars, hermit crab, barnacles, limpets, mollusks, periwinkle, shore crabs, shrimp, and prawns.



What I Have Learned

Directions: Fill in the blanks with the correct word to complete the statement. Write your answers on your answer sheet.

Ecosystems consist of 1. _____ and 2. _____ factors. Abiotic factors are the 3. _____ components in the environment. In estuaries and intertidal zones, these include the amount of 4. _____, waves, 5. _____, 6. _____, and type of 7. _____. These factors affect the survival of organisms in these types of ecosystems.

Biotic factors, on the other hand, are composed of all 8. _____, 9. _____, and microorganisms. These organisms live in different habitats found in intertidal zones and estuaries. These habitats include 10. _____ reefs, 11. _____ marshes, 12. _____ flats, rocky shores, and 13. _____ forests.



What I Can Do

Directions: Identify the word being described. Choose your answers from the pool of options inside the box. You can use the word more than once. Write your answers on your answer sheet.

Soil	Salinity	Waves
Sunlight	Abiotic	Temperature

1. It is a light from the sun.
2. It is the hotness or coldness of water.
3. It refers to the amount of salt in water.
4. The non- living factors in the environment.
5. The upper layer of earth in which plants grow.
6. It is one of the factors that affect the rate of photosynthesis.
7. Refer to the movement of the surface of the water.
8. It is the main source of nutrients needed for plant's growth.
9. The source of energy needed for photosynthesis in plants.
10. These non-living factors exemplified by water in waves, salinity, temperature, amount of sunlight, and type of soil.



Assessment

Directions: Choose the letter of the correct answer to the corresponding questions. Write your answers on your answer sheet.

1. How do coral reefs contribute to the survival of fishes?
 - A. fishes fly in coral reefs
 - B. fishes play in coral reefs
 - C. fishes swim in coral reefs
 - D. fishes get food and shelter from coral reefs
2. How do organisms use the areas under the mangrove trees?
 - A. as fuel
 - B. as foods
 - C. as forest
 - D. as breeding grounds
3. What serves as food for herbivores in a mudflat area?
 - A. seaweeds
 - B. sea grasses
 - C. sea lettuce
 - D. sea spaghetti

4. Algae provide food to the _____ organisms in mudflats area.
- A. carnivorous
 - B. herbivorous
 - C. omnivorous
 - D. reptile
5. What is the source of energy needed for photosynthesis so that marine plants like algae and seaweeds can make their own food?
- A. air
 - B. soil
 - C. sunlight
 - D. water
6. What will happen to the ecosystem if more garbage will be dumped at the seashore?
- A. It becomes attractive.
 - B. It becomes polluted.
 - C. It helps the corals become healthy.
 - D. It helps produce large number of fish.
7. How does cleaning the coastal areas affect the ecosystem?
- A. It gives jobs to people.
 - B. It destroys the environment.
 - C. It contributes a small number of fishes.
 - D. It provides sustainable shelter to organisms.
8. Which statement is NOT correct about coral reef?
- A. It provides shelter for marine organisms.
 - B. It is the source of food for fishes.
 - C. It is found in estuaries and not in intertidal zones.
 - D. It protects small fishes from predators.
9. How can people protect the ecosystem?
- A. Cut the trees in the forests.
 - B. Kill the endangered species.
 - C. Plant more trees.
 - D. Sell the corals.
10. Which of the following provides oxygen to the ecosystem?
- A. fish
 - B. rock
 - C. sand
 - D. trees



Additional Activities

Directions: Draw an estuary or an intertidal zone on a short bond paper. Label the biotic and abiotic factors found in your drawing.

Rubrics:

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Needs Improvement (2)	Rating
Creativity	Highly demonstrated creativity in preparation.	Demonstrated creativity in preparation.	Demonstrated less creativity in preparation.	Demonstrated least creativity in preparation.	
Appropriateness to the topic	All pictures were labeled correctly.	Almost all pictures were labeled correctly.	More pictures were labeled correctly.	Less pictures were labeled correctly.	
Timely submission	Submitted the work on time.	Submitted the work few days after deadline.	Submitted the work few weeks after deadline.	Submitted the work after quarter ended.	



Answer Key

- What I know**
1. D
 2. I
 3. F
 4. G
 5. B
 6. J
 7. A
 8. H
 9. E
 10. C

Lesson 1
What's In

Biotic Factors	Plants
	Animals
	3. waves
	4. temperature
	5. nutrients
Abiotic Factors	1. Sunlight
	2. soil
	6. salinity

Lesson 1
What's More

Activity 1

1. Salinity
2. Temperature
3. Waves
4. Soil
5. Sunlight

Activity 2

1. False
2. True
3. True
4. True
5. True

Activity 3

1. Waves- mussels and seaweeds
2. Salinity- fishes
3. Temperature
4. Sunlight- plants and sunlight- plants
5. Soil- plants and marine animals

Lesson 1
What's New

Estuary consists of

Abiotic Factors (Non-living Components)	1. Sunlight
	2. Soil/rocks
	3. Waves/water
	4. Temperature
	5. salinity

Biotic Factors (Living Components)	1. Seal
	2. Heron
	3. Stonelly larva
	4. Shrimp
	5. Small fish
	6. Fresh water mollusk
	7. Worm
	8. Animal plankton
	9. Plankton
	10. Green plants
	11. Crab
	12. Mussels
	13. Big fish

<p>Lesson 2 What's In</p> <p>A. Strong winds, big waves B.1. True 2. False 3. True 4. True 5. False</p>	<p>Lesson 2 What's New</p> <p>1. Near the shoreline 2. Shell 3. Intertidal zone 4. Shellfish, fishes, whales, dolphin, crabs, sea gulls 5. Sea, sand, waves, sunlight 6. Answers may vary</p>	<p>Lesson 2 What's More Activity 1</p> <p>mollusks starfish fish shrimps shellfish mussels crabs corals clams sea urchins</p> <p>Activity 2:</p> <p>1. High tide 2. Temperature 3. Seashores 4. Decomposing 5. Solid rocks</p> <p>Activity 3</p> <p>1. Coral reef 2. Mud flats 3. Salt marshes 4. Rocky shores</p>
<p>What Can I Do</p> <p>1. Sunlight 2. Temperature 3. Salinity 4. Abiotic 5. Soil 6. Temperature or sunlight 7. Waves 8. Soil 9. Sunlight 10. Abiotic</p>	<p>What I Have Learned</p> <p>1-2. Biotic Abiotic 3. non-living 4. sunlight 5-6 temperature salinity 7. soil 8-9 plants animals 10. coral 11. salt 12. mud 13. mangrove</p>	
<p>Assessment</p> <p>1. D 6. B 2. D 7. D 3. C 8. C 4. C 9. C 5. C 10. D</p> <p>Additional Activity</p> <p>Answers/drawings may vary</p>		

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