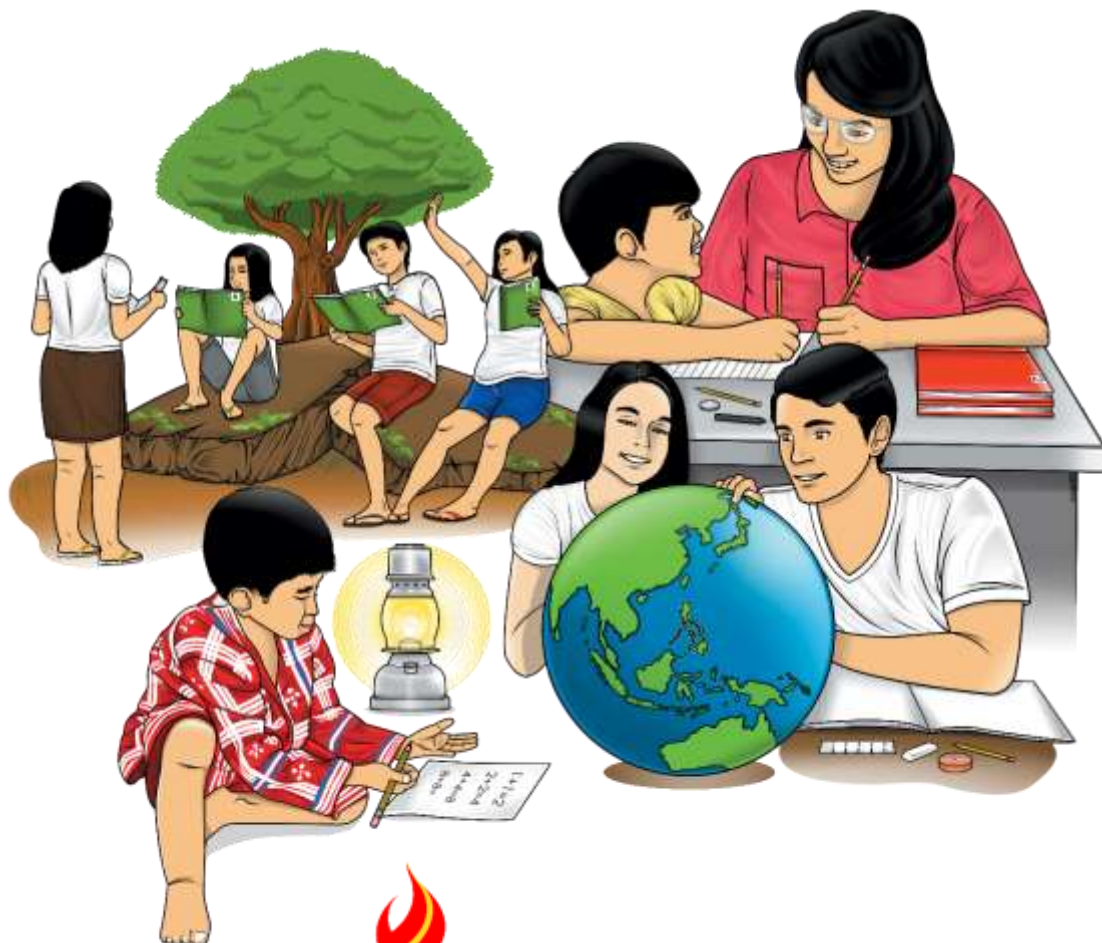


Science

Quarter 2 – Module 7: Conservation and Protection of Estuaries and Intertidal Zones



Science – Grade 5

Alternative Delivery Mode

**Quarter 2 – Module 7: Conservation and Protection of Estuaries and Intertidal Zones
First Edition, 2020**

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Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

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Printed in the Philippines by _____

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Science

Quarter 2 – Module 7: Conservation and Protection of 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.

Thank you.



What I Need to Know

Seventy-five percent of the Earth's surface is composed of aquatic ecosystems. They help in maintaining the ecological balance and home to many organisms that can be a source of food and raw materials for humans. The aquatic ecosystems are our estuaries and intertidal zones. Specifically, it comprises all our coral reefs, salt marshes, mudflats, rocky shores, and mangrove forests. Since we get so much from these ecosystems, which are abundant in marine life and other resources, their destruction would largely affect the community that depends on them. Some of our estuaries and intertidal zones have already been destroyed due to industrialization, and most of the remaining are already under threat. So, one should learn the value of these ecosystems and how we can conserve and protect them.

In this module, you will be able to:

1. explain the need to protect and conserve estuaries and intertidal zones; and
2. enumerate ways of conserving and protecting our estuaries and intertidal zones.

Note: Write all the answers of the activities in a separate sheet.



What I Know

Directions: Read the questions carefully. Write the letter of the correct answer.

1. Why do we need to protect and conserve estuaries and intertidal zones?
 - A. Because they are found near our barangays
 - B. Because they make the Earth more beautiful
 - C. Because they serve as home to various aquatic life
 - D. Because they store harmful chemicals
2. What do you think will be the worst consequence to our safety if people cut mangrove trees and beach forests along and near estuaries and intertidal zones?
 - A. Loss of beauty in the surroundings
 - B. Depletion of living aquatic resources for food
 - C. Scarcity of resources for firewood and timber for houses
 - D. More damaged houses due to tides, waves, and strong winds
3. What should you NOT do to prevent pollution on nearby bodies of water such as estuaries and intertidal zones?
 - A. Planting native vegetation along the coastline and estuaries
 - B. Using toxic pesticides and fertilizers especially near bodies of water
 - C. Creating septic tanks on comfort rooms.
 - D. Utilizing recyclable materials to form new products
4. What should you do when you go boat riding with your friends so that you won't disturb or damage the marine life?
 - A. I will dump your trash overboard.
 - B. I will regularly check the boat's engine to reduce oil leaks.
 - C. I will sail on the sensitive areas like seagrass beds.
 - D. I will not install marine sanitation devices on your boat.
5. What will you do if you see products made from endangered marine animals being sold in the market?
 - A. I will patronize their products.
 - B. I will report them to the authorities.
 - C. I will help them to sell their products.
 - D. I will encourage them to make more of these products.
6. The following statements show practices in conserving aquatic environment, EXCEPT one. Which is it?
 - A. Pumping of septic tanks at least every three years
 - B. Using organic fertilizers to nourish plants in the backyard
 - C. Catching animals found along the seashore to serve as pets
 - D. Participating in beach and river clean-ups

7. Rodel buys products with plastic containers such as soft drinks. After drinking, he immediately throws them into the trash can intended for non-biodegradable wastes. Do you think his action is right? Why or why not?
- A. Yes, because he throws them in the proper trashcan.
 - B. No, because he does not know how reuse or recycle them.
 - C. Yes, because those are wastes to be thrown.
 - D. No, because plastic is biodegradable.
8. What is likely to happen if you catch too many fish?
- A. There will be a decrease of their population.
 - B. There will be an increase of their population.
 - C. There will be a balance in the ecosystem.
 - D. Many fish will transfer from other marine habitat.

Read and analyze the following scenarios to answer the succeeding question.

- i. Jonel collects young and mature seashells for food regularly along the coastline during low tide.
 - ii. Gilbert dumps his pet's waste along the rivers.
 - iii. John constantly collects excessive amount of sand along the coastline to sell to construction companies.
 - iv. Mary plants mangrove seedlings.
9. Who among them shows proper way of conserving and protecting estuaries and intertidal zones?
- A. John B. Mary C. Gilbert D. Jonel
10. Mrs. Cruz assigned your group to conduct a community activity that would help to conserve and protect estuaries and intertidal zones. What will be the most impactful activity that your group could organize?
- A. Conduct an orientation with the parents on proper handling of aquatic animals.
 - B. Conduct a regular tree planting activity in the community.
 - C. Post some signages and posters about conservation of bodies of water.
 - D. Conduct a clean-up drive at the coastal areas once.



What's In

Directions: Examine the illustration below where the river flows and meets the sea, creating a flourishing estuarine ecosystem. Copy the table in your answer sheet and list down at least 5 biotic and 5 abiotic factors that you can find.



(Cayobit.nd)

| Biotic Factors | Abiotic Factors |
|-----------------------|------------------------|
| | |
| | |
| | |
| | |
| | |



What's New

Directions: Read and understand the poem entitled “Mother Nature”.

Mother Nature

Arlyn P. Cayobit

Glassy and clear waters in the oceans and seas,
Blue skies with cotton puffs of white clouds on the breeze,
Mangroves and sea grass meadows in sparkling dew,
Fresh air touching one's soul in calming view,
Such are wonderful gifts of our Mother Nature.

But population bursts with some humans selfish and cruel,
Urban and industrial development changed mother nature,
Breaking her heart with sorrow and pain,
Overharvesting marine species for more gain,
Dredging of sand done and no one seems to care.

Clean sands covered with shattered trash thrown in hastes,
Clear water turns dark with improperly disposed wastes,
Dynamite fishing makes aquatic species weep,
Excessive use of chemicals households do keep,
Air we breathe is exhausting, it isn't fair.

Destructions of man must come to end,
For nature's revenge is cruel and hard to mend,
Take care of the environment providing our needs,
Start now, correct the wrong ways and deeds,
Take part! Conserve and protect our mother nature.

After reading the poem, answer the questions below. Write your answers on your answer sheet.

Comprehension Check

1. What is the poem all about?
2. In the poem, what are the human activities that can harm the environment like intertidal zones and estuaries?
3. Why do we need to take good care of our environment?
4. How can you help protect and conserve our mother nature?



What is It



Figure A
(Cayobit.nd)



Figure B
(Cayobit.nd)

Look at the two pictures. Which of these pictures show a healthy body of water and which shows an unhealthy one? What do you think are the factors that can lead to the destruction of these bodies of water? How can we maintain them to be clean, pristine, and thriving ecosystems? Why do we need to protect and conserve these ecosystems, including our estuaries and intertidal zones?

Intertidal zones and estuaries are examples of bodies of water which are home to various life forms such as fishes, sea grasses, sea stars, crabs, shrimps, seashells, mangroves, sea urchins and others. An intertidal zone, commonly known as seashore or coast, is where tides are observed. This area within “tidal range” is covered with sea water during high tide and exposed during low tide, thus named “Intertidal Zone”. An estuary, however, is a body of water in which sea water meets with fresh water. It connects rivers to the sea.

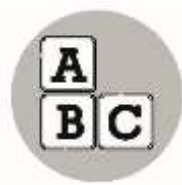
Intertidal zones and estuaries are important bodies of water because they provide a lot of benefits. These areas are home to a lot of plants and animals and provide food, medicine, and other products. They also serve as a breeding ground and nursery of young aquatic animals. They also protect us from big waves, strong winds, and even during storms. They also serve as the exit points of water during floods. Estuaries filter salt from the sea water. These areas also give significant contributions to tourism, agriculture and fisheries, and our economy as a whole.

Because of its importance, we should take care of these bodies of water. We need to protect and conserve these places. As a youth, you can do simple things at home and in your community to help these ecosystems, such as properly disposing and segregating our garbage and other waste materials. You can also tell and encourage your parents and neighbors to use organic fertilizer, grow plants that need less water, help in the clean-up activities in your barangays on cleaning these places,

and encourage classmates and friends not to disturb animals and plants in their natural habitat. Putting coconut fiber mat, planting marsh grass and mussels' bed are some activities that can protect our estuaries and intertidal zones.

There are still other ways we can do to help our environment. Can you think of some?

Moreover, sustaining the balance of these bodies of water is also a significant factor that we can do as stewards of Mother Earth. We should avoid some practices that would contribute to the destruction of estuaries and intertidal zones. Industrial pollution, overharvesting of aquatic species, dredging, draining and paving over estuarine waterways, oil spills, and population growth in coastal watersheds are some threats to estuaries and intertidal zones. Thus, in order to conserve and protect these, let's help one another and do our part as good citizens and guardians of God's creations.



What's More

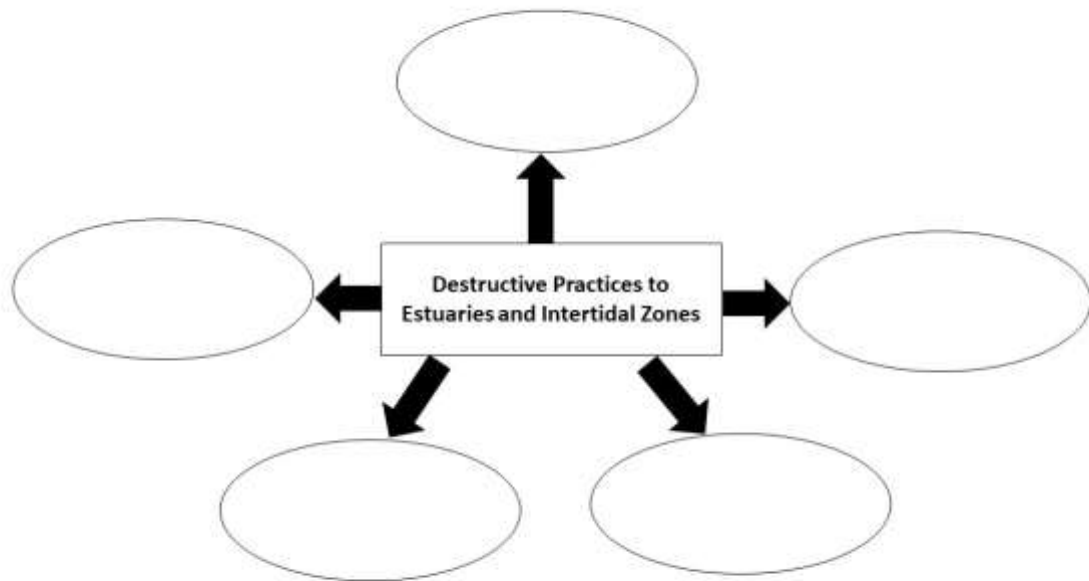
Activity 1

Directions: Draw a happy face (☺) if the statement tells a way of protecting and conserving estuaries and intertidal zones. If it does not, draw a sad face (☹).

1. I dispose toxic products properly.
2. We will use disposable plastic bags rather than reusable ones.
3. Let us encourage fishermen not to engage in dynamite for fishing.
4. Let your pet's waste be washed up to waterways.
5. Respect animals that you find along the seashore.

Activity 2

Directions: Draw the diagram below on your answer sheet. Complete the concept web by choosing 5 practices that contribute to the destruction of estuaries and intertidal zones from the box that follows.



- Planting trees or sea grasses.
- Conserving water in your daily life.
- Using dynamite and poison for fishing.
- Dumping waste materials on bodies of water.
- Encouraging children in catching young aquatic animals.
- Spilling crude oil and other substances in the bodies of water.
- Following proper disposal directions on some of your household materials.
- Increasing the number of bacteria or viruses in aquatic ecosystem.

Activity 3

Directions: Write True if the statement is correct and False if it is not. Write your answers on your answer sheet.

1. Improperly disposed household chemicals can harm our water supply.
2. Homes of vital marine life like estuaries should be treated with carelessness.
3. Planting appropriate mangroves improves our estuaries and intertidal zones.
4. Disposal of solid and liquid wastes in rivers and streams helps keep estuaries healthy.
5. Overfishing harms estuaries and intertidal zones.



What I Have Learned

Directions: Read and answer the following questions briefly. Write your answers on your answer sheet.

1. Write five ways of protecting and conserving intertidal zones and estuaries?
 - a. _____
 - b. _____
 - c. _____
 - d. _____
 - e. _____
2. Give five reasons we need to protect and conserve intertidal zones and estuaries.
 - a. _____
 - b. _____
 - c. _____
 - d. _____
 - e. _____



What I Can Do

Directions: Copy the table in your answer sheet and fill in the answers needed on the second and third columns.

| <p>Problems</p> | <p>Do you observe this in your community? <i>Put a check (/) if you observe this problem or put a cross (x) if it is not.</i></p> | <p>What can you do to lessen or solve the problem? <i>Write an activity which you can do to solve or lessen the problem.</i></p> |
|--|--|---|
| <p><i>Example:</i> <i>Wastes like plastic wrappers and empty bottles are found on our seashores and estuaries.</i></p> | <p>✓</p> | <p><i>I will pick those plastic wrappers and empty bottles I found on the seashore and put them in the proper trash cans.</i></p> |
| <p>1. Farmers use toxic pesticides for crop treatment.</p> | | |
| <p>2. Members of the family dispose household chemicals improperly.</p> | | |
| <p>3. Tourists touch coral reefs or disturb marine life organisms whenever visiting the beach.</p> | | |
| <p>4. People are not motivated in participating any clean-up drive activities in the community.</p> | | |
| <p>5. Many people use disposable plastic bags rather than reusable eco-bags.</p> | | |



Assessment

Directions: Read the questions carefully. Write the letter of the correct answer.

1. Why are estuaries important to our environment?
 - i. They help filter pollutants from the water.
 - ii. They provide homes for many wildlife species.
 - iii. They are important nursery areas for a variety of aquatic life.

A. i and ii B. ii and iii C. i and iii D. i, ii, and iii
2. Why is there a need to protect the estuaries and intertidal zones?
 - A. It is our property.
 - B. It helps us come up with lessons to discuss in class.
 - C. It provides vital nesting, breeding, and feeding habitats for many species.
 - D. It is God's gift to us, thus we can do anything to it for our own benefits.
3. Which of the following situations DOES NOT show way of protecting and conserving estuaries and intertidal zones?
 - A. Arnel dumps his wastes in a proper container.
 - B. Maggy limits the use of plastic products.
 - C. Nico uses synthetic fertilizer for his crops.
 - D. Rose recycles old things.
4. Which of the following is the impact on the environment if estuaries were damaged?
 - A. There would be drought.
 - B. There would be organisms that could be wiped out or lost.
 - C. There would be decreased concentration of salt in the oceans.
 - D. There would be less boating, fishing, and swimming in local rivers.
5. Which of the following activities is the MOST environment-friendly?
 - A. Building dams along the river
 - B. Dumping chemicals into bodies of water
 - C. Commercially developing coastal watersheds
 - D. Restoring coastal watersheds from damages
6. Maya and her friends went to the beach. They brought food for them to eat. After swimming and eating, most of her friends left their wastes scattered on the beach. As a friend who values protection of environment, what would you tell them?
 - A. "It's okay to throw garbage on the beach."
 - B. "Do not leave your wastes on the beach because it can cause pollution."
 - C. "Do not bring any food when going to the beach again."
 - D. "I'll tolerate what you have done today but never do it again."

7. Mang Berting is a fisherman. Fishing is his way of living to provide the needs of his family. He usually uses dynamite when he goes fishing even though he knows that it is prohibited. If you are a fisherman, will you do the same as Mang Berting? Why or why not?
- Yes, because it is easy to catch fish using dynamite.
 - No, because many aquatic animals will die.
 - Yes, because it is the only way I can do to provide food for my family.
 - No, because I am scared to be caught by the authorities.
8. As a grade 5 pupil, in what way can you protect estuaries and intertidal zones?
- Join organizations that promote conversion of estuaries and intertidal zones to commercial areas.
 - Practice actions that could put estuaries at risk.
 - Take part in coastal clean-up drives and disseminate information on the proper care of estuaries.
 - Dispose oil and other household waste on waterways.
9. If you are a leader in the community, what would be the best title of a project that you will implement about conservation of bodies of water?
- Live Wild and Free
 - Stay Safe and Healthy
 - Save Water, Save Life
 - Live the Life You Choose
10. How can you become a good steward of mother nature?
- Follow safety practices imposed by the authorities.
 - Avoid using reusable materials at home.
 - Encourage neighbors to plant beautiful but non-native plants.
- i
 - i & ii
 - ii & iii
 - i, ii & iii



Additional Activities

Directions: On a sheet of long bond paper, draw a poster that promotes the conservation and protection of estuaries and intertidal zones. Use any desired drawing or coloring material available. Do not forget to write your name at the back of the poster

Rubrics for Assessment

| Criteria | 3 Points | 2 Points | 1 Point | Score |
|-----------------------------------|--|---|---|-------|
| Visual Appeal | All color combinations and art elements used shows a very harmonized artwork. | There are few color combinations and art elements that do not contribute to a very harmonized artwork. | Most/All of the colors combinations used and art elements does not contribute to a very harmonized art work. | |
| Relevance to the Content/ Concept | The message portrayed in the artwork is excellently conveyed and all the icons, symbols and objects used in the poster are all relevant to portray a unified message. | The message portrayed in the artwork is conveyed and some/few of the icons, symbols and objects used in the poster are relevant to portray a unified message. | The message portrayed in the artwork is not properly conveyed and most/all the icons, symbols and objects used in the poster are not relevant to portray a unified message. | |
| Creativity and Originality | All the designs, concept, theme, and other elements of the poster are original and shows high creative skills. | Some/Many of the designs, concept, theme, and other elements of the poster are original and shows a fair creative skill. | All/Most of the designs, concept, theme, and other elements of the poster are not original and shows a developing creative skill. | |

Note: For teacher's use only. Do not copy.



Answer Key

What's New

Possible Answers:

1. The poem talks about mother nature
2. The human activities mentioned in the poem that can harm the environment are as follows:
 - Dumping of trashes anywhere
 - Population burst
 - Urban and industrial development
 - Overharvesting of marine species
 - Dredging of sand
 - Dynamite fishing
 - Excessive use of household chemicals
3. We need to take good care of our environment especially our aquatic ecosystem (estuaries and intertidal zones) because they provide vital nesting, breeding and feeding habitats for many species.
4. I can help to protect and conserve mother nature by helping clean the environment, doing proper waste disposal and actively participating in any environmental projects and programs.

Note: Answers may vary

What I Know

1. C
2. D
3. B
4. B
5. B

6. C

7. A

8. A

9. B

10. B

What's In

Biotic

- Bird
- Crabs
- Deer
- Frogs
- Flowers
- Fishes
- Grasses
- Trees
- Turtles

Abiotic

- Air
- Water
- Sun
- Log
- Land/Soil
- Rocks
- Temperature

Note: Answers of the learners may vary from each other based on their appreciation of the illustration.

What I Have Learned
Possible Answers:

Five ways of protecting and conserving intertidal zones and estuaries

1. Active participation in coastal clean ups.
2. Reuse materials and limiting the use of plastic products.
3. Support organizations that work to protect and conserve aquatic habitats and marine wildlife.
4. Dispose waste materials properly.
5. Practice the use of organic fertilizer rather than synthetic fertilizer.






Reasons why we need to protect and conserve estuaries and intertidal zones

1. They provide essential nesting and feeding habitats to aquatic plants and animals.
2. Without intertidal zones and estuaries, there will be limited supply of aquatic organisms which mostly serve as our food.
3. They protect us from big waves, strong winds and even during storms.
4. They serve as the exit point of water during floods.
5. They give significant contribution to tourism, agriculture and fisheries and even economy.

Note: Answers may vary.

What's More

Activity 1

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

Activity 2

- Encourage children in catching young aquatic animals.
- Dumping waste materials on bodies of water.
- Spilling crude oil and other substances on bodies of water.
- Increase the number of bacteria or viruses in aquatic ecosystem.
- Using dynamite and poison for fishing.

What I Can Do

Possible Answers in column 3:

1. I will suggest to the farmers to use organic pesticides in treating their crops.
2. I will properly dispose household materials used at home such as detergents and disinfectants.
3. I will not disturb corals and other marine organisms when we go swimming at the beach.
4. I will join coastal and river clean ups in the barangay and encourage classmates and friends to do the same.
5. I will use reusable eco-bags instead of disposable plastic bags when buying from a store.

Note: Answers may vary.

Assessment

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

Additional Activities

Note: Poster Making outputs may vary

References

A. Books

Dela Cruz, Susana B, Marriane L Lekchareon, Gerlie R Guia, Karina Angela P Ortiz, and Gloria Salandanan. 2018. *21st Century Science and Health*. Quezon City: Phoenix Publishing House, Inc.

Sarte, Evelyn T, Ednaliza R Garcia, Elina A Lopez, Mary Jean G Dela Cruz, and Harold A. Arradaza. 2016. *Science Beyond Borders*. Quezon City: Vibal Group, Inc.

B. Electronic Sources

"Intertidal Zone". 1996-2021. *National Geography Society*
<https://www.nationalgeographic.org/encyclopedia/intertidal-zone/>.

"Threats to Estuaries". 2009-2021. *Restore America's Estuaries*.
<https://estuaries.org/estuary-science/threats/>.

"Why Estuaries Are Important". 2020. *NSW Environment, Energy And Science*.
<https://www.environment.nsw.gov.au/topics/water/estuaries/about-estuaries/why-estuaries-are-important#:~:text=Estuaries%20support%20a%20diversity%20of,pesticides,%20herbicides%20and%20heavy%20metals.>

"What You Can Do To Help Protect Our Coastal Watersheds And Estuaries | US EPA". 2020. *US EPA*. [https://www.epa.gov/nep/what-you-can-do-help-protect-our-coastal-watersheds-and-estuaries.](https://www.epa.gov/nep/what-you-can-do-help-protect-our-coastal-watersheds-and-estuaries)

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