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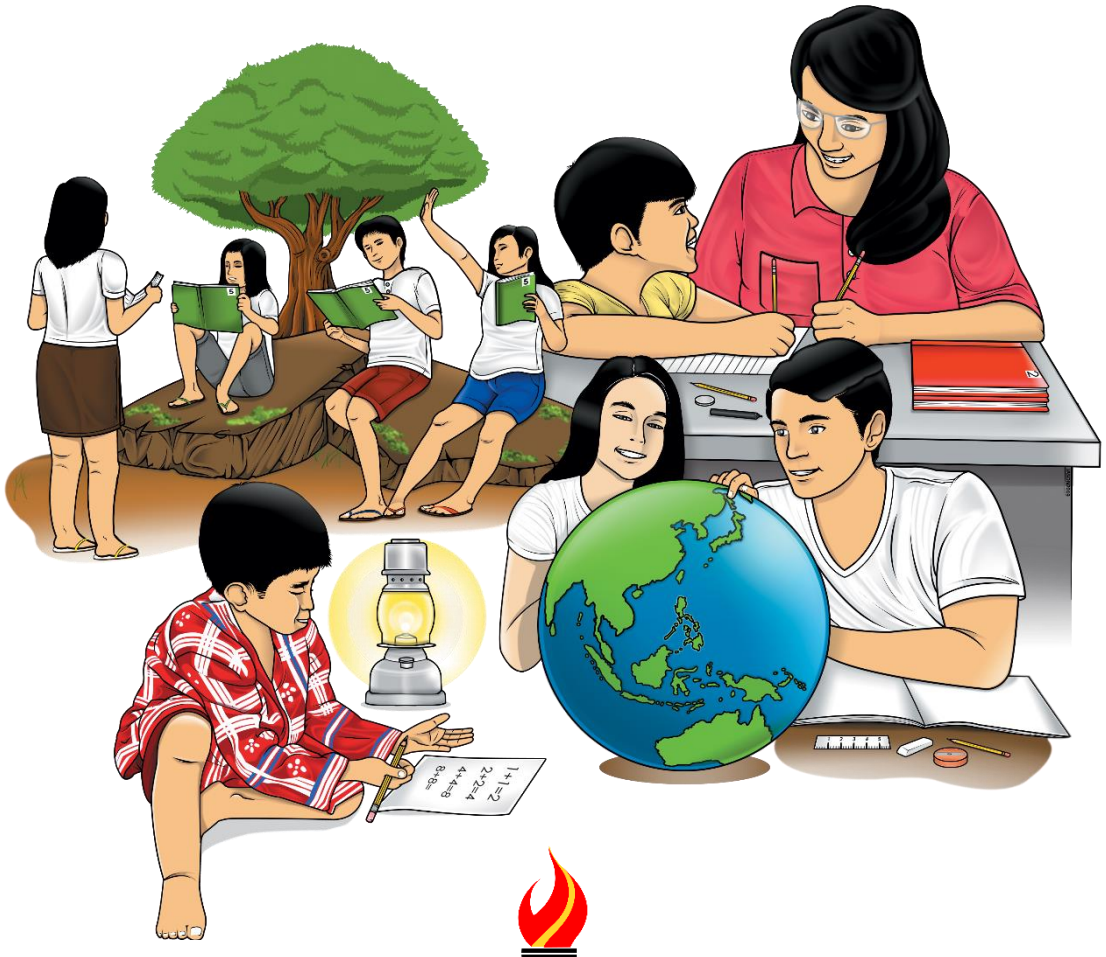
DepED
DEPARTMENT OF EDUCATION

Science

Quarter 2 – Module 9:

Effects of Changes in the Abiotic Factors



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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

Hi there! How are you? I hope you have a nice day. Are you aware that abiotic factors play an important role in maintaining the balance of our ecosystem and any changes in these factors may cause destruction in our environment?

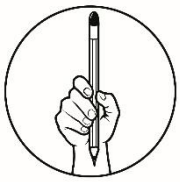
In this module we will explore and understand together how important are these non-living components in our ecosystem and how they affect not just the plants and animals but as well as human beings.

Most Essential Learning Competency

Predict the effect of changes in abiotic factors on the ecosystem.

After going through this module, you are expected to:

1. identify the abiotic factors in the ecosystem;
2. determine the effects of changes in abiotic factors on the ecosystem; and
3. give the importance of abiotic factors in maintaining the balance in the ecosystem.



What I Know

Directions: Read and understand each question. Write the letter of the best answer on a separate sheet of paper.

1. Plants need water, radiant energy, minerals, oxygen, and carbon dioxide to live. These requirements needed by plants are categorized as ____.
   A. Climate
   B. Minerals
   C. Biotic Components
   D. Abiotic Components

2. Which of the following is **NOT** an abiotic factor?
   A. Light
   B. Moisture
   C. Temperature
   D. Number of organisms

3. Which of the following is **NOT** an abiotic factor of aquatic ecosystem?
    A. Salinity
    B. Light Levels
    C. Water Levels
    D. Location of predator

4. Which of the following is an example of biotic factor in an ecosystem?
    A. Rock
    B. Stream
    C. Sunlight
    D. Tree

5. What do you call the physical location of an ecosystem in which a given species lives?
    A. Habitat
    B. Level Niche
    C. Biotic Factor
    D. Tropical Level

6. Which of the following contributes the biggest impact on the environment?
    A. Predation
    B. Competition
    C. Human interference
    D. Migration of organisms

7. Which phrase BEST describes *ecosystem*?
    A. Individual cells
    B. Individual organisms
    C. Interactions among cells
    D. Interactions among organisms

8. Which of the following is an abiotic factor that may affect the population of organisms?
    A. Parasites
    B. Predators
    C. Food availability
    D. Extreme temperatures

9. Which of the following is an example of changes in abiotic factor?
    A. Air
    B. Soil
    C. Water
    D. Wildfire

10. Which of the following is affected by the abiotic factors in the ecosystem?

I. migration of organisms II. size of populations of organisms III. the temperature of an ecosystem IV. amount of light the sun produces

A. I and II only
B. I, II, and III only
C. II, III, and IV only
D. I, II, III, and IV

11. Which of the following is an example of abiotic factors affecting an ecosystem?

I. quantity and quality of water II. amount of light available III. nitrogen fixing bacteria IV. quantity of minerals

A. I and II only
B. I, II, and III only
C. I, II, and IV only
D. I, II, III, and IV

12. Which of the following scenario show/s change/s in abiotic component in an ecosystem?

I. A farmer used to pump water from a well to irrigate a piece of land. II. A tiger and a lion fighting for their territory near a lake. III. Grasses grow and spread faster during rainy season. IV. Animals inhales oxygen and exhales carbon dioxide.

A. I and II only
B. I and III only
C. II and IV only
D. I, II, III, and IV

13. Human activities are considered as the most destructive interference in the ecosystem? How does human activity affect an abiotic factor negatively?
A. Tree planting activities to avoid flash flood and soil erosion.
B. Using of reusable bags instead of disposable plastic containers.
C. Online campaign act about solid waste management to avoid littering and promote recycling.
D. Inventions of automobiles that contributes to a large amount of carbon dioxide in the atmosphere pollutes the air.

14. In December 2004, a tsunami (giant wave) destroyed many of the marine organisms along the coast of the Indian Ocean. What can be expected to happen to the ecosystem that was most severely hit by the tsunami?
    A. The organisms in the ecosystem will become extinct.
    B. Ecological succession will no longer occur in this marine ecosystem.
    C. The ecosystem will change until a new stable community is established.
    D. Succession will continue in the ecosystem until one species of marine organism is established.

15. Which of the following are adaptations of organisms in avoiding unfavorable condition due to a change in abiotic factor?
    A. Migration of birds due to change in seasons.
    B. Hibernation of a snake from September to December.
    C. Plants die due to lack of water and high temperature.
    D. Body temperature regulation of polar bears during winter.

What's In

There you go! Now, may I ask you, what do you think will happen if plants do not receive water for several weeks? Or what will happen if there are too much greenhouse gases in our atmosphere? Do you think this will affect us? In the previous module you have learned that the environment is a collection of biotic and abiotic components. Biotic components interact with each and with other abiotic factors in order to survive. Each component contributes a significant role in maintaining the balance in our ecosystem. Any changes in abiotic factors will affect the whole ecosystem. That is why, we will find out more about the significance of the non-living components in our ecosystem in this lesson.

What's New

Hello there! I need your help. I want to find out the abiotic components present in our ecosystem. Can you help me? All you have to do is read and understand the context below to find out. Are you ready? Let's start!

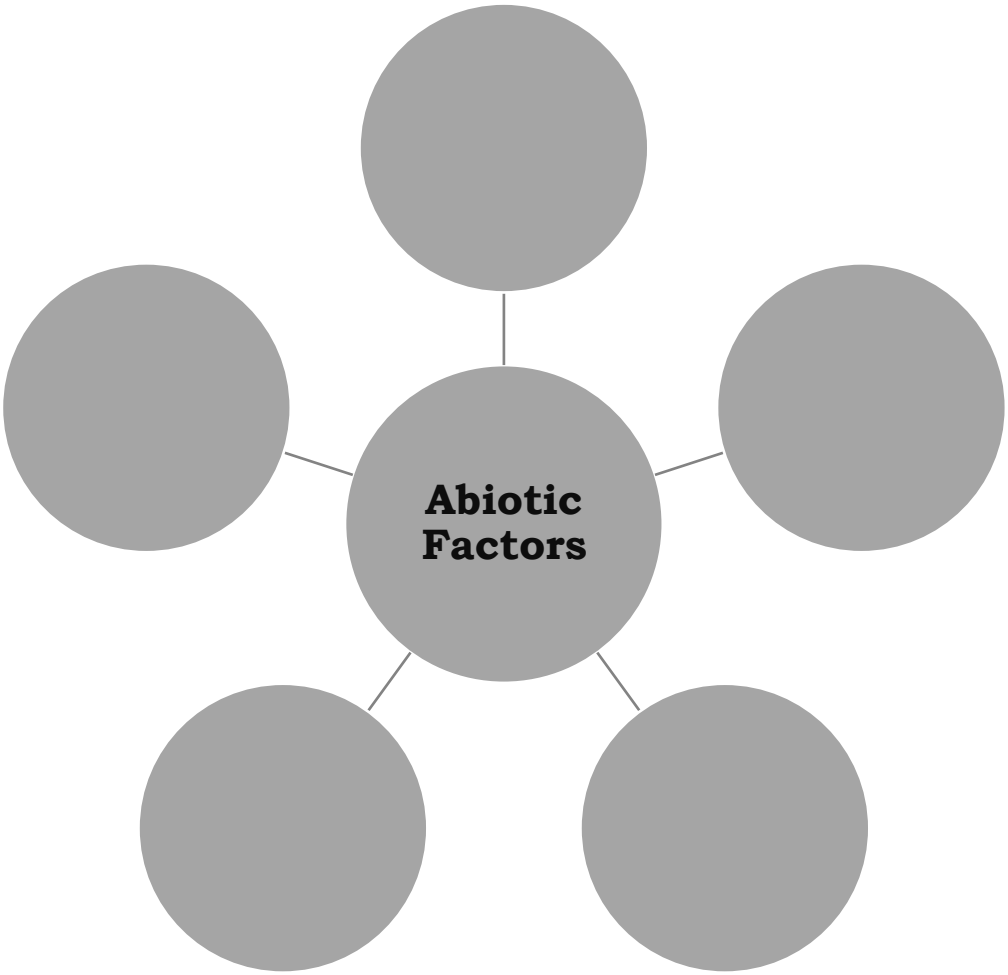
The world where we live in is a place made up of both living (biotic) and non-living (abiotic) factors, which refer to the organisms that interact directly or indirectly. Organisms interact with one another in the ecosystem in order to receive the resources they need to survive. All organisms in an ecosystem are interdependent. Interdependence is the reliance of every life form on other organisms and the environment.

Ecosystem can be as small as the community of insects living in a single tree or as large as the entire planet. While ecosystems appear very different from one another they all contain biotic and abiotic components. These components make up our ecosystem.

Look around you. What do you see? Everything you see is part of our ecosystem. From the air that we breath, the swaying of trees caused by the wind, the burrowing worms in the soil, the hot temperature caused by the sun rays and the splashing of water in a stream are some of the biotic and abiotic components in our ecosystem.

Changes in the environment specifically in abiotic factors can disrupt the natural balance in the ecosystem. Human interaction has been the cause of many changes in the environment. That is why we need to take care of our environment to maintain its ability to support varied forms of life.

List down in the circles below the abiotic factors in the ecosystem.



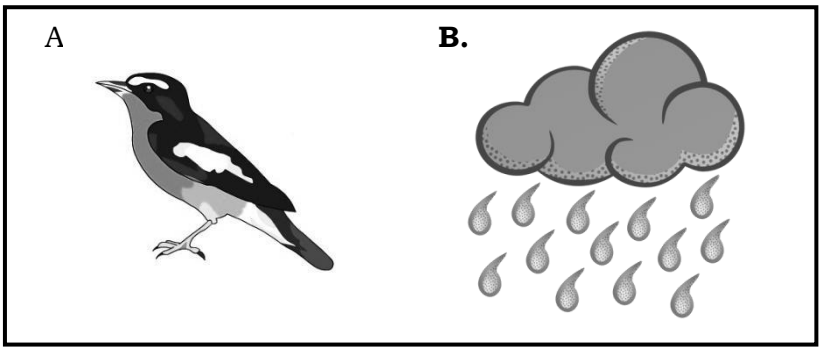
What is It

Ecosystem refers to communities interacting with each other and to the physical environment. It can be a pond, a dessert, an ocean, a forest or your neighborhood.

Two Components of Ecosystem

1. Biotic Components – are the living components of ecosystem, including various organisms.
2. Abiotic Components – are the non-living components of an ecosystem.

Look at the figures below. Can you identify which of them is an example of abiotic factor? Write the letter of your answer on a separate sheet of paper.



Major Abiotic Factors & their Effects on the Ecosystem

1. Air (Atmosphere)

The atmosphere provides living things with oxygen. It consists of 78% Nitrogen, 21% Oxygen and 1% Carbon Dioxide and other gases. This also protects organisms from certain harmful rays from the sun.

However, a change in the number of gases present in our atmosphere can cause global warming. For example, if humans keep on burning fossil fuel as well as cutting of trees, this may lead to the increased amount of carbon dioxide and other greenhouse gases in the atmosphere. Too much of these gases can cause Earth's atmosphere to trap more and more heat leading to global warming and it is one of the reasons why some animals or plants die because they cannot adapt to too much heat

2. Water

Water is one of nature's most important factors that support life. Essential to life processes, an organism's survival depends on water in order to grow and reproduce.

What do you think will happen to plants and animals if there is no water? Try to imagine life without water. Do you think life would still exist? Due to various reasons, some oceans, lakes or rivers become polluted which may cause death of some aquatic animals. These kill organisms like fishes and dolphins that depend on these bodies of water.

3. Sunlight

The sun provides light and warmth and is the energy source for almost all ecosystems on Earth. Sunlight powers photosynthesis of plants which are the main producers in terrestrial ecosystems.

Our climate is strongly affected by the amount of solar radiation received by the Earth coming from the sun.

4. Soil

Soil is made up of bits of rocks, water, air, minerals, and the remains of once living organisms. The structure and chemical makeup of soil and rock in an area affect the types of plants that grow there.

In aquatic environments, the characteristics of the underlying sand or rock affect the types of plants and algae that grow. This in turn influences other organisms found there. Soil is important because it provides water and nutrients for plants and is a home for many organisms.

Continuing decline in soil moisture can increase the need for irrigation in agriculture and lead to smaller yields and even desertification, with potentially dramatic impacts on food production in the ecosystem.

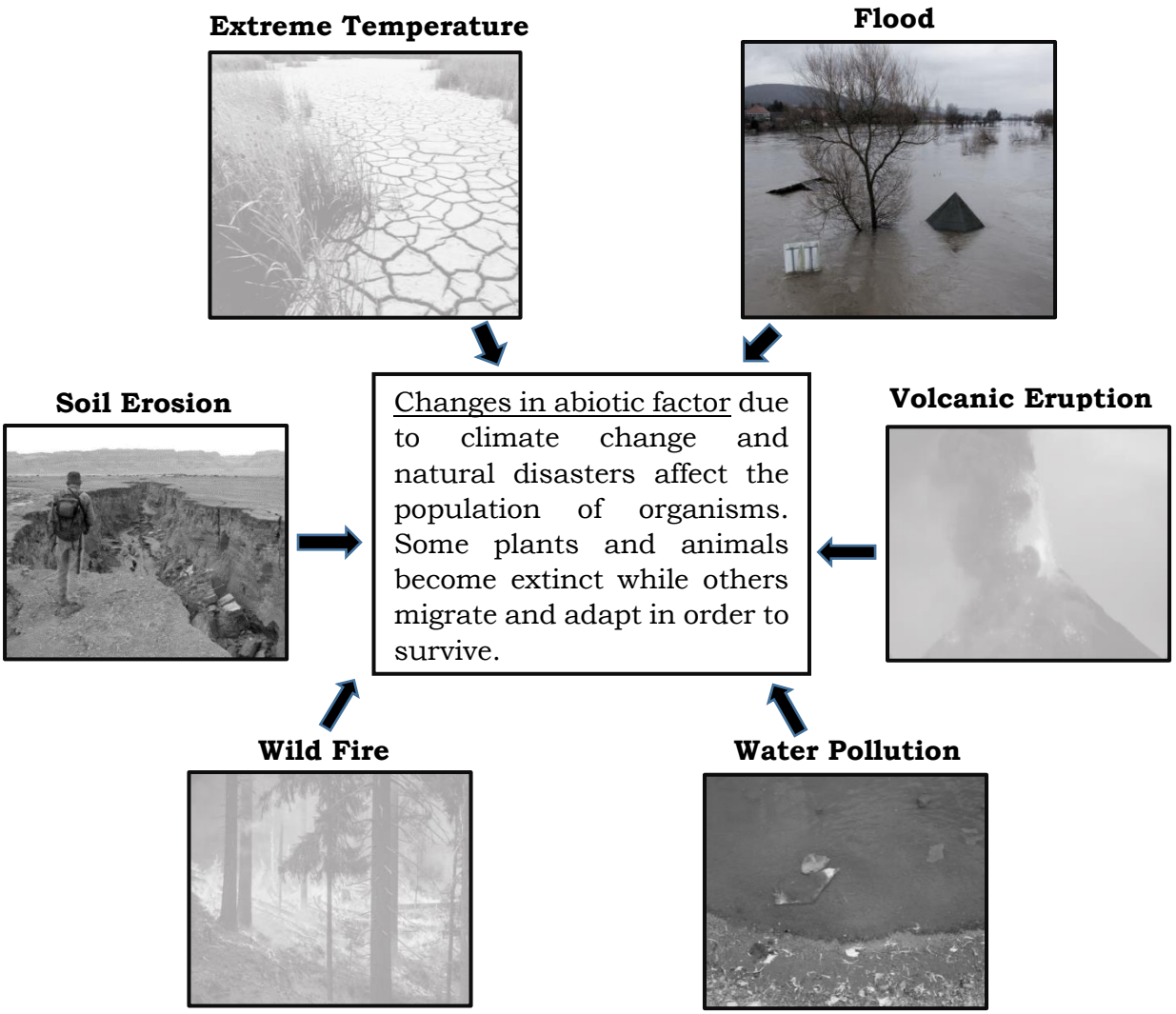
5. Temperature

All organisms are adopted to survive between a minimum and maximum range of temperature. The earth's surface has different temperatures in different areas while some animals and plants can bear extreme cold and some survive well in moderate temperature ranges. There are animals whose body temperature fluctuates in different environmental conditions.

Due to climate change, the average global temperature increases. High temperature causes damage not only directly but also because they are usually accompanied by low humidity and draught. This causes dehydration of the plant and results to death. If this happens, the population of organisms tend to decrease due to lack of food and water. Plants will also be damaged if temperature drops to 0°C. Some organisms may adapt to the change in temperature but some tend to migrate just like birds. Birds move from one region or habitat to another according to seasons.

6. Wind

Many plants use wind to disperse seeds over relatively long distances. Dispersal can be defined as the movement of individuals away from others of the same species. One common reason why organism disperse is to find new habitats rich in needed resources. Strong winds can also destroy things in many places.



What's More

All the components in the ecosystem work together in balance to keep communities healthy. These components include both abiotic and biotic factors. Living organisms rely on both of these factors to sustain life. Humans, plants and animals rely on abiotic factors in order to survive. A major difference between biotic and abiotic is that a change in any of the abiotic factors affects the biotic factors, but changes in biotic factors do not necessarily result in changes to the abiotic factors.

Directions: Determine the effect of changes on abiotic factor/s in the ecosystem depicted by the pictures below. Write your answers in a separate sheet of paper.

1. What are the main abiotic factors that cause drought and forest wildfires?

   _____

2. What do you think will be the effects of drought and wildfires in the plants and animals?

   _____

   _____

   _____

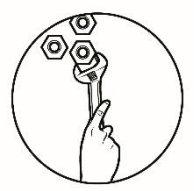
What I Have Learned

Directions: Read the paragraph carefully and identify the correct words to complete the given sentences. Choose your answer from the box. Write your answers on a separate sheet of paper.

Abiotic Factor	Ecosystem	Sunlight
Air	Migrate	Temperature
Balance	Soil	Water
Biotic Factor		

A/An (1) _____ is made up of a community of organisms and the non-living environment. The living components of the ecosystem are called (2) _____, which include plants, fish, invertebrates and single-celled organisms. The non-living components or (3) _____ include the physical and chemical components in the environment. Any change in these non-living components can cause harm to both plants and animals. Example of a non-living component is (4) _____ where it provides living things with oxygen or carbon dioxide. Both the living and non-living components influence each other to maintain (5) _____ in the ecosystem.

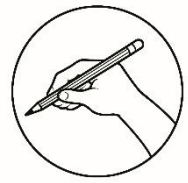
Plants need (6) _____ in order to grow and reproduce. They also need (7) _____ to make their own food in a process called photosynthesis, but the abiotic factor that provides the plants with nutrients and water is the (8) _____. The effect of changes in abiotic factor can lead to climate change and extreme weather conditions where some populations of organisms decrease. For example extreme high (9) _____ due to global warming causes dehydration of the plant tissue and results to its death. Organisms become extinct for the reasons that they cannot adapt to any changes of abiotic components in the ecosystem while others tend to (10) _____ from one region to another in search of food and new habitat.



What I Can Do

Directions: Observe the interactions of the living and non-living components in your surroundings and give at least five importance of abiotic components in our ecosystem. Write your answer on a separate sheet of paper. Example: Plants need water in order to survive. Without water as an abiotic component, life would not exist.

Category	4	3	2	1
Accuracy & Content	All of the answers are correct. Completely relates to and expands the ideas based on the lesson.	Most of the answers are correct. Related ideas cover what we have on the lesson.	Some of the answers are correct. Somewhat related ideas, but does not add to what we have on the lesson	None of the answers are correct. Ideas are not related to what we have on the lesson.
Neatness & Completion	Work is done orderly and incredibly neat with no erasures or smudges.	Work is done orderly and neat with few erasures or smudges.	Work is done orderly and neat with several erasures or smudges.	Work is done orderly with many erasures or smudges.
Spelling & Grammar	All spelling and grammar are correct.	Most of the words and grammar are spelled correctly.	Some of the words are spelled correctly and some grammars are correct.	Spelling and grammar errors are frequent.



Assessment

Directions: Read each question carefully. Write the letter of your choice on a separate sheet of paper.

1. What do you call the physical factors such as light, temperature, and moisture that can affect an organism's life and survival?
   A. Ecosystem
   B. Niche
   C. Biotic environment
   D. Abiotic environment

2. Which of the following sets includes only abiotic factors?
   A. Minerals in soil, plants, rainfall amounts
   B. Plants, animals, average daily temperature
   C. Animals, rainfall amounts, soil composition
   D. Rainfall amount, average daily temperature, minerals in soil

3. Which statement about abiotic components is TRUE?
   A. Abiotic component consists of all living organisms.
   B. Any changes in biotic components greatly affect the abiotic components.
   C. Changes in abiotic factor due to climate change and natural disaster affect the population of organisms.
   D. In a marine ecosystem, abiotic components include salinity, fishes, algae and other aquatic organisms.

4. Which of the following refers to a biological community of interacting organisms and their physical environment?
   A. Biome
   B. Biosphere
   C. Ecosystem
   D. Environment

5. Which of the following is **NOT** an example of changes in abiotic factor?
   A. Drought
   B. Flash flood
   C. Temperature
   D. Volcanic Eruption

6. Which of the following is an example of how an abiotic component affects a community?
   A. A fungus infects a population of bats and many dies
   B. A stagnant water in a creek leads to an increase in the frog population.
   C. A beetle from another continent kills a population of trees.
   D. An increase in flies leads to an increase in the swallow population.

7. Water is pumped from a well and used to irrigate a piece of land. What kind of change is this?
   A. Community
   B. Population
   C. Biotic factor
   D. Abiotic factor

8. Which of the following abiotic factors is made up of bits of rocks, water, air, minerals, and the remains of once living things.?
   A. Atmosphere
   B. Soil
   C. Sunlight
   D. Water

9. Which of the following abiotic factors provides living things with Nitrogen, Oxygen, Carbon Dioxide and other gases?
   A. Atmosphere
   B. Sunlight
   C. Soil
   D. Water

10. Which of the following scenario shows an ecosystem affected by a change in abiotic factor/s?

I. Two lions are fighting over a fresh kill.
II. Extinction of plants and animals due to wildfires.
III. Plants die because of extreme temperature and lack of rainfall.
IV. Birds sit on a horse's back and eat the insects that bite the horse.

   A. I and II only
   B. I and IV only
   C. II and III only
   D. II, III and IV only

11. Global warming affects many processes in biological ecosystems due to a change in abiotic factor/s. Which of the following changes in natural ecosystems are caused by the ongoing global warming process?

I. Different species of plants and animals change their habitats and geographical areas.
II. Plants and animals become extinct because of climate change and pollution.
III. Some animals hibernate during winter season to survive.
IV. Forest areas dry out and turn into steppes and desserts.

   A. I and II only
   B. I, II and III only
   C. I, II and IV only
   D. I, II, III and IV

12. On November 8, 2013, Typhoon Yolanda made its first landfall in the central Philippines, bringing strong winds and heavy rains that have resulted in flooding, landslides, and widespread damage. How does this typhoon affect the ecosystem?

I. Livestock and other domesticated animals suffer when man-made shelters collapse.
II. Typhoons maintains the balance of the ecosystem by providing water to plants and animals.
III. Habitats can be destroyed and farms lose all crops to the winds and flood

A. I and II
B. I and III
C. II and III
D. I, II, and III

For question number 13

Volcanic eruptions can be extremely damaging to the environment, particularly because of several toxic gases present in pyroclastic materials. A Sulphur dioxide causes environmental problems because they are the main cause of acid rain. On a global scale, volcanoes play a role in recycling carbon dioxide from the Earth's interior to the atmosphere, thus helping maintain the Earth's natural greenhouse effect and volcanic ash weathers rapidly releases plant nutrients.

13. Volcanic eruption is considered as one of a change in abiotic factor in the ecosystem. Which of the following is/are the effect of volcanic eruptions in the ecosystem?

I. Volcanic eruption can produce fertile soil and plant nutrients excellent for farming.
II. Volcanic eruption causes acid rain which can be harmful to fish and other wildlife.
III. Volcanic eruption occurring close to human settlements may destroy lives and property.

A. I and II only
B. I and III only
C. II and III only
D. I, II, and III

14. Human activities have triggered a change in abiotic factor such as climate change, soil erosion, poor air quality, and undrinkable water. Which of the following poses a positive human impact on the ecosystem?

    A. Humans being dependent on coal and fossil fuels for energy.
    B. Cutting of trees to build stores, houses, and other buildings.
    C. Reducing fuel emissions associated with motor vehicles.
    D. Throwing of plastics and other wastes in the river.

15. Which of the following scenario triggers a change in abiotic factors on the ecosystem?
    A. Kyle plants Red Mulberry trees on their farm to attract birds.
    B. John burns their household garbage every week to maintain cleanliness in their area.
    C. Anne conducts a campaign in their community about solid wastes management.
    D. Emma uses bicycle as a mode of transportation in going to school to reduce the use of fossil fuels in the environment.

Additional Activities

Yes, you made it! Below are the changes in the abiotic factors that can possibly affect the population of an organism. Identify the changes in abiotic factors by picking the right words that describe the picture. Write your answer in a separate sheet of paper. Let's start!

A. Extreme Temperature	D. Volcanic Eruption
B. Flood	E. Water Pollution
C. Soil Erosion	F. Wild Fire

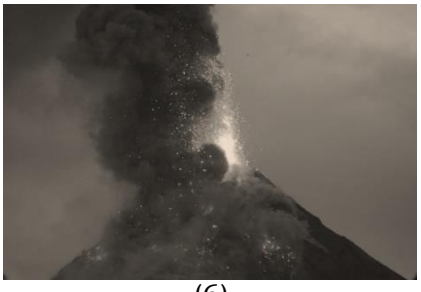
(1)

(2)

(3)

(4)

(5)



(6)

Answer Key

What I Know

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

What's New

Air
Wind
Soil
Temperature
Water

What's More

1. Water and Temperature
2. Drought and wildfires can affect the population of organisms. Because of these changes in abiotic factors some animals might lose their habitats as a result, they might become extinct.

Assessment

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

Additional Activities

1. Wilf fire
2. Soil erosion
3. Extreme temperature
4. Water pollution
5. Flood
6. Volcanic Eruption

What I Have Learned

1. Ecosystem
2. Biotic Factor
3. Abiotic Factor
4. Air
5. Balance
6-7. Water/ Sunlight
8. Soil
9. Temperature
10. Migrate

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