

# Science

## Quarter 4 – Module 10: Roles of Organisms in the Cycling of Materials



**Science– Grade 8**  
**Alternative Delivery Mode**  
**Quarter 4 – Module 10: Roles of Organisms in the Cycling of Materials**  
**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 4 – Module 10 Roles of Organisms in the Cycling of Materials

## **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***

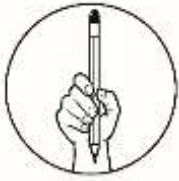
This module was designed and written with you in mind. It is here to help you master the roles of organisms in water cycle, oxygen-carbon cycle and nitrogen cycle. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary 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 learner's material you are now using.

This module contains,

- **Lesson 1** – Roles of organisms in the cycling of materials

After going through this module, you are expected to:

1. Identify the roles of organism involved in the water cycle, oxygen-carbon cycle and nitrogen cycle; and
2. Analyze the roles of organisms in the cycling of materials.  
***(MELC Week 10 9S8LT-IVi-23)***



## ***What I Know***

**Directions:** Choose the letter of the correct answer. Write your answers on a separate sheet of paper.

1. Which organism helps in Nitrogen fixation?
  - a. Algae
  - b. Nitrobacteria
  - c. Fungi
  - d. Virus
2. Which substance is released into the environment by animals and is needed by plants to survive?
  - a. Carbon dioxide
  - b. Oxygen
  - c. Salt
  - d. Sugar
3. What is the role of animals in oxygen-carbon dioxide cycle?
  - a. They exhale oxygen for plants use.
  - b. They release oxygen to the atmosphere.
  - c. They give off carbon dioxide for photosynthesis.
  - d. They inhale carbon dioxide from plants for survival.
4. Animals directly get the nitrogen they need from the \_\_\_\_\_.
  - a. air they breathe
  - b. plants they eat
  - c. soil in their habitat
  - d. bacteria surrounding them
5. What is the role of nitrogen-fixing bacteria in the nitrogen cycle?
  - a. converts proteins into nitrates
  - b. changes ammonia into proteins
  - c. converts nitrogen gas into ammonia
  - d. transforms nitrates into nitrogen gas
6. Out of the total amount of water absorbed by the plants, what percentage of water is released back to the environment by plants through transpiration?
  - a. 3%
  - b. 6%
  - c. 8%
  - d. 10%
7. Which of the following organisms are involved in the water cycle EXCEPT:
  - a. bacteria
  - b. fungi
  - c. mosquito
  - d. minerals
8. Which of the following is the best condition for faster decomposition of dead organisms?
  - a. Warm, dry condition
  - b. Cold, moist condition
  - c. Cold, dry condition
  - d. Warm, moist condition

9. Why is carbon dioxide important for plants?
- It absorbs water.
  - It breaks down oxygen.
  - It gets rid of waste products.
  - It is used for photosynthesis.
10. Which of the following does NOT belong to biogeochemical cycle?
- Life Cycle
  - Water Cycle
  - Nitrogen Cycle
  - Oxygen- carbon dioxide Cycle
11. Which organisms are involved in nitrogen fixation?
- Animals
  - Plants
  - bacteria in soil
  - parasites in soil
12. Which of the following DO NOT have a direct role in the nitrogen cycle?
- nitrifying bacteria
  - denitrifying bacteria
  - decomposers
  - parasites
13. Organisms need nutrients in order to \_\_\_\_\_.
- harm the ecosystem
  - destroy the environment
  - carry out essential life functions
  - break down ecological relationship
14. The following organisms obtain nutrients by breaking down dead and decaying plants and animals EXCEPT:
- large animals
  - bacteria
  - fungi
  - insects
15. What happens to the nitrogenous molecules in organisms when they die and decompose?
- Their bodies are kept intact.
  - They keep their nitrogen.
  - Their nitrogen returns to the soil.
  - They totally vanish from the earth.

## Lesson

# 1

# Roles of Organisms in the Cycling of Materials

Producers, consumers, and decomposers play important roles in the cycling of materials in the environment.

The sun keeps on shining and so energy is always provided to the Earth for life to continue. In addition, molecules such as carbon, nitrogen, oxygen, and others undergo biogeochemical cycle that provides the other materials needed by organism to survive.



## *What's In*

In **Module 9**, you have learned the roles of organisms in the cycling of materials in the ecosystem. Let us have a quick review of your understanding in the previous module!

### **Activity 1. True or False**

**Directions:** Write True if the statement is correct and False if the statement is wrong. Write your answers on a separate sheet of paper.

1. Animals and plants get nitrogen directly from the atmosphere.
2. Plants absorb nitrogenous compounds from the soil for their growth.
3. Bacteria found in the soil can fix nitrogen into useful compounds.
4. Animals need oxygen in order to survive.
5. Plants take up carbon dioxide to be used during photosynthesis.
6. Plants absorb water only during photosynthesis.





## What's New

### Activity 2. Search me!

**Directions:** Encircle from the grid the words inside the box. Words appear straight, down and diagonally. Write your answers on a separate sheet of paper.

Decompose	Catalyze	Oxygen production
Respire	Transpire	

O	D	E	C	O	M	P	O	S	E	F	T	R	Y	Q	A	S	T	E
X	O	S	E	F	T	R	Y	Q	A	S	T	E	V	M	P	M	M	P
Y	R	E	C	O	M	P	O	S	E	F	T	R	Y	E	A	E	T	R
G	M	E	O	S	E	F	T	R	Y	Q	A	X	C	E	V	E	C	P
E	M	P	S	S	E	F	T	R	Y	Q	A	L	V	P	F	P	C	F
N	E	C	O	P	P	O	S	E	F	T	R	Y	Q	P	S	P	E	F
P	M	W	E	C	I	E	F	T	R	Y	Q	A	S	T	E	Q	X	O
R	F	T	R	Y	Q	R	T	E	F	T	R	Y	Q	A	S	S	E	E
O	L	K	Y	Q	F	T	E	Y	Q	T	V	D	F	P	Q	R	P	I
D	F	T	R	Y	Q	N	X	E	C	V	Q	V	B	R	S	R	R	Q
U	E	F	T	R	Y	Q	A	S	T	E	P	S	S	P	R	E	P	P
C	A	T	A	L	Y	Z	E	X	Z	O	R	Q	Q	F	R	T	F	R
T	O	L	A	Y	Q	F	T	R	Y	Q	P	S	S	F	E	E	F	P
I	P	L	X	I	T	E	F	T	R	Z	F	R	R	O	T	X	O	F
O	F	T	R	Y	Q	F	T	R	Y	Q	F	R	R	R	E	Q	E	F
N	F	T	R	Y	Q	T	R	Y	Q	A	S	T	E	P	B	C	I	O
R	E	S	P	I	R	E	T	E	F	T	R	T	F	V	Z	B	C	E



#### Note to the Teacher

Please provide the learners with a loose copy of Activity 2.



## ***What is It***

The chemical cycling of nutrients involves both biotic and abiotic components, thus, called the **biogeochemical cycles**. Examples of these cycles are the following:

### **Water cycle**

**Water cycle** refers to continuous movement of water on earth. The whole cycle involves the following processes, evaporation, condensation, precipitation, infiltration, and runoff. Around 90% of water vapor came from evaporation of water from big bodies of water like oceans, lakes and rivers. Although, living things play a vital role in the process of water cycle.

The roots of the plants take in water from the soil. Water is distributed to all parts of the plants and is utilized in the different processes such as plant growth. The loss of water from the plants happens when plant pores called stomata allow water to escape in the form of water vapor into the atmosphere contributing to the water cycle.

Animals do not contribute as much as plants but through breathing, perspiration and urination adds water vapor in the atmosphere. When animals exhale, they release water vapor, which contributes to the amount of water that will undergo the water cycle. Also, when animals regulate their temperature by sweating, the evaporation of the sweat that allows them to cool down adds more water to the cycle. This is also true for other water-based excretions of animals that will evaporate when exposed to the atmosphere.

### **Oxygen-Carbon Dioxide Cycle**

Organisms utilize and release gases through photosynthesis and respiration. These gases flow to the environment as they are exchanged between organisms in a cyclic process called **oxygen-carbon dioxide cycle**.

Plants and other photosynthesizing organisms take in carbon dioxide when they perform photosynthesis. The carbon of carbon dioxide will be used by plants and the other organisms to make carbohydrates like sugar and starch. In the process of photosynthesis, oxygen is released to the environment as a by-product.

Animals and other non-photosynthesizing organisms depends on the oxygen in the atmosphere for them to survive. As plants release oxygen in the atmosphere, animals take them in. Oxygen is needed by both plants and animals in the process of cellular respiration that allows them to produce energy.

Breathing is the process of inhaling and exhaling air in animals.

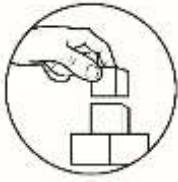
## Nitrogen Cycle

Nitrogen is a key chemical element on Earth - a colorless and odorless component of air and needed by living organisms to survive. There are five processes of Nitrogen cycle that happen in the environment: nitrogen fixation, assimilation, ammonification, nitrification, and denitrification.

**Nitrogen fixation** is a process by which nitrogen ( $N_2$ ) in the atmosphere is changed into ammonia ( $NH_3$ ). The nitrogen in the atmosphere can be transformed into usable form through lightning fixation. The microorganisms involved in nitrogen fixation are called nitrogen-fixing bacteria like *Rhizobium*. Some of these nitrogen-fixing bacteria are freely scattered in the environment (soil, water, or air) while others are found in the root nodules of leguminous plants. They take in nitrogen from the atmosphere and fix it to become ammonia. This is immediately followed by **nitrification** that converts ammonia into nitrate or nitrite that plants can readily absorb and use. The uptake and use of nitrates and nitrites by plants is called **assimilation**. They need nitrogen to make proteins and nucleic acid. Animals get their nitrogen from eating plants. When plants and animals die, decomposition releases nitrogenous materials and returns nitrogen to the soil, **ammonification**, and then to the atmosphere, **denitrification**.

**Ammonification** is performed by soil bacteria and fungi. When a plant or animal dies, decomposers like fungi and bacteria break down the amino acids and nucleic acids in dead organisms into nitrates and ammonia and return these compounds to the soil.

In the process of **denitrification**, nitrate and nitrites are reduced to gaseous form of nitrogen through the action of denitrifying bacteria. The action of these bacteria in conversion of nitrites in the soil to free atmospheric nitrogen depletes soil fertility and reduces agricultural yield. Nitrogen is returned to the atmosphere when denitrifying bacteria breaks down nitrates to nitrogen and nitrous oxide.



## ***What's More***

### **Activity 3. Know My Role!**

**Directions:** Fill up the table below by providing the role or contribution of plants, animal and decomposers in the given biogeochemical cycles.

	<b>Water cycle</b>	<b>Oxygen-Carbon Dioxide Cycle</b>	<b>Nitrogen Cycle</b>
<b>Plant</b>			
<b>Animal</b>			
<b>Decomposers (Bacteria, Fungi)</b>			

#### Scoring Rubric

- 3 - Description has no misconceptions with complete scientific evidence.
- 2 - Discussion has no misconceptions with incomplete scientific evidence.
- 1 - Discussion has misconceptions and without scientific evidence.
- 0 - No discussion.



## ***What I Have Learned***

**Directions:** Complete the statements below. Write your answers on a separate sheet of paper.

1. The leaves of the plants undergo \_\_\_\_\_ that adds water to the atmosphere.
2. The bacteria found in the root nodules of leguminous plants that convert nitrogen to ammonia are \_\_\_\_\_.
3. Plants are responsible in producing \_\_\_\_\_ which is needed by animals to survive.

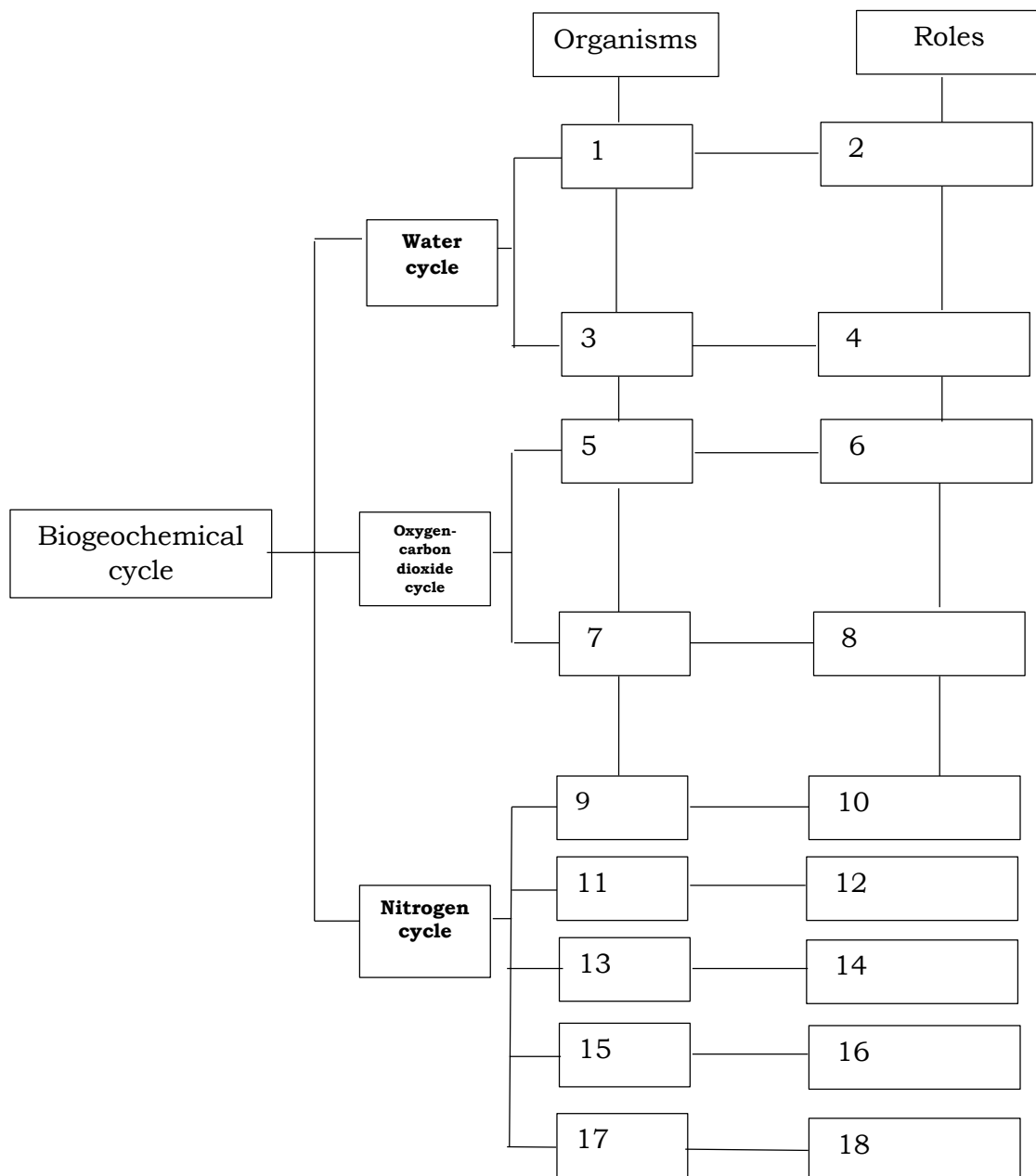
4. The uptake of oxygen produced by plants by animals, and the take up of carbon dioxide by plants from the animals is referred to as the \_\_\_\_\_
5. A type of bacteria that converts ammonia to nitrates to make it useful for plants is \_\_\_\_\_.
6. In an ecosystem, bacteria that live in the roots of certain plants and freely in the soil play an important role in the \_\_\_\_\_ cycle.



## What I Can Do

### Activity 4. Complete Us!

**Directions:** Complete the concept map on the role of organisms in the cycling of materials. Write your answers on a separate sheet of paper.



## Activity 5. Make it!

**Directions:** Make a slogan about how you can maintain the balance in the cycling of materials in an ecosystem. Write your answers on a separate sheet of paper.

<b>Scoring Rubrics:</b>	
3 points	The slogan underscores key science concepts, is sound and concise.
2 points	The slogan underscores key science concepts, is sound and too wordy.
1 point	The slogan does not underscore key science concepts, not sound and too wordy.
0 point	No slogan submitted.



## Assessment

**Directions:** Choose the letter of the best answer. Write your answers on a separate sheet of paper.

1. Which organisms break down dead organic plants and animals?
  - a. Bacteria
  - b. Fishes
  - c. Leeches
  - d. Planktons
2. Which gas is needed by plants to manufacture food?
  - a. Carbon dioxide
  - b. Nitrogen
  - c. Oxygen
  - d. Water
3. The following are roles of plants in water cycle EXCEPT:
  - a. They take in oxygen in the atmosphere.
  - b. They absorb water, use it and give up some of it to the atmosphere
  - c. They undergo transpiration when stomata is open.
  - d. They release water vapor to the atmosphere.
4. Which of the following is the role of plants in oxygen-carbon dioxide cycle?
  - a. They have no functions at all.
  - b. They cannot do anything because they are very complex.
  - c. They take in oxygen during respiration and give off carbon dioxide.
  - d. They absorb carbon dioxide and release oxygen during photosynthesis.

5. Which is correct about the relationship of plants and animals in an ecosystem?
- Animals are dependent on dead plants.
  - Plants are used as fertilizers for animals.
  - Plants provide carbon dioxide for animals while animals provide oxygen for the plants.
  - Plants provide oxygen for the animals while animals provide carbon dioxide for the plants.
6. Which is NOT associated to nitrogen fixation?
- fixing enough nitrogen
  - breaking down proteins
  - converting nitrogen gas into ammonium
  - transforming atmospheric nitrogen into fixed nitrogen
7. Which of the following may be a role of some free living bacteria on the soil?
- to make unfertilized soil
  - help plants take in water
  - convert nitrogen into usable form
  - make carbon dioxide for plants to go through photosynthesis
8. Which cycle involves transpiration?
- Water cycle
  - Oxygen-carbon dioxide cycle
  - Nitrogen cycle
- I only
  - I and II
  - I and III
  - I, II and III
9. Which is NOT the role of nitrifying bacteria?
- converting nitrites to nitrate
  - converting ammonium to nitrate
  - converting ammonium to nitrite
  - converting nitrate to ammonium
11. Which process/es in the water cycle exclusively happens in plants?
- condensation
  - evaporation
  - precipitation
  - transpiration
- IV only
  - II and IV only
  - II, III and IV only
  - I, II, III and IV
12. What is the role of animals in the cycling of materials in the ecosystem?
- They give off oxygen to the atmosphere.
  - They release carbon dioxide during cellular respiration.
  - They release nitrogen during oxygen-carbon dioxide cycle.
  - They release nitrogen into the soil when they breakdown dead organism.

13. Which is NOT the role of *Rhizobium* in nitrogen cycle?
- They help fertilize the soil.
  - They change nitrite to ammonium.
  - They fix nitrogen gas to ammonia.
  - They convert nitrates to nitrogen gas.
14. Which is/are done by animals that gives up water to undergo the water cycle?
- breathing
  - perspiration
  - urination
- III only
  - I and II only
  - II and III only
  - I, II and III
15. Which statement is TRUE about oxygen-carbon dioxide cycle?
- Animals breathe in carbon dioxide and release oxygen.
  - Plants and animals may either take in oxygen or carbon dioxide.
  - Animals and plants can breathe in and out oxygen and carbon dioxide.
  - Animals take in oxygen and release carbon dioxide which is needed by plants.



## ***Additional Activities***

### **Activity 5. Draw Me!**

**Directions:** Make a poster on a bond paper about the importance of water cycle, oxygen-carbon dioxide cycle and nitrogen cycle.

<b>Scoring Rubrics:</b>	
3 points	The poster contains relevant scientific information, simple and clean.
2 points	The poster contains relevant scientific information, simple and messy.
1 point	The poster contains irrelevant scientific information, complex and messy.
0 point	No poster output.





## Answer Key

<p><b>What I Know</b></p> <ol style="list-style-type: none"> <li>1. C</li> <li>2. A</li> <li>3. B</li> <li>4. B</li> <li>5. C</li> <li>6. D</li> <li>7. D</li> <li>8. D</li> <li>9. D</li> <li>10. A</li> <li>11. C</li> <li>12. D</li> <li>13. C</li> <li>14. A</li> <li>15. D</li> </ol>	<p><b>What's In</b></p> <p><b>Activity 1: True or False</b></p> <ol style="list-style-type: none"> <li>1. False</li> <li>2. True</li> <li>3. True</li> <li>4. True</li> <li>5. True</li> <li>6. False</li> </ol>	<p><b>What's New</b></p> <p><b>Activity 2: Search Me!</b></p> <p>Decompose</p> <p>Catalyze</p> <p>Oxygen production</p> <p>Respire</p> <p>Transpire</p>
<p><b>What's More</b></p> <p><b>Activity 3: Know my Role</b></p> <p>Possible answers:</p> <ol style="list-style-type: none"> <li>1. Plants</li> </ol> <p>* Water escapes through the leaf pores of plants in a form of water vapor, contributing to the water cycle in the ecosystem.</p> <p>* Plants release gas into the atmosphere, oxygen and carbon dioxide, contributing to oxygen-carbon dioxide cycle.</p>	<p>* Plants have root nodules that form a symbiosis with nitrogen fixing bacteria, <b>Rhizobium</b> which contribute to nitrogen fixation.</p> <ol style="list-style-type: none"> <li>2. Animals</li> <li>* Animals contribute to the <b>water cycle</b> through breathing, perspiration, urination.</li> <li>* In oxygen-carbon dioxide cycle, animals release carbon dioxide to the atmosphere.</li> <li>* In nitrogen cycle, animals act as decomposers of dead organic matter.</li> <li>3. Decomposers like fungi and bacteria break down dead organic matter, returning materials to the soil.</li> </ol>	<p><b>What I have Learned</b></p> <ol style="list-style-type: none"> <li>1. transpiration</li> <li>2. nitrogen fixing bacteria</li> <li>3. oxygen</li> <li>4. oxygen-carbon dioxide cycle</li> <li>5. nitrifying bacteria</li> <li>6. nitrogen cycle</li> </ol>

**What I can do**  
**Activity 4 Complete Us!**  
 Note: The sequence of answers may be interchanged for as long as the answers are appropriate for specific cycle of materials.  
 1. Plants  
 2. Water escapes through the leaf pores of plants in a form of water vapor, contributing to the amount of water to be cycled.  
 3. Animals contribute to the water cycle through breathing, perspiration, urination (respiration)  
 5. Plant  
 6. Plants release oxygen to the atmosphere and take in carbon dioxide, affecting the amount of oxygen and carbon dioxide available for the Oxygen-carbon dioxide cycle in the ecosystem.

**What I can do**  
 7. Animals  
 8. Animals release carbon dioxide to the atmosphere and take in oxygen, affecting the amount of oxygen and carbon dioxide available for the Oxygen-carbon dioxide cycle in the ecosystem.  
 9 Nitrogen fixing bacteria  
 10. contribute to nitrogen fixation.  
 11. Ammonia-oxidizing bacteria  
 (nitrosifiers)/Nitrifying bacteria  
 12. changes ammonium to nitrite/nitrate.

**What I can do**  
 13 Nitrifying bacteria  
 14. changes nitrites to nitrate.  
 15. Decomposers (bacteria and fungi)  
 16 break down dead organic matter.  
 17. Denitrifying bacteria  
 18. turns nitrates and nitrites to gaseous form of nitrogen.

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

**Additional Activities**  
**Activity 5**  
**Draw Me!**  
 Please score according to rubrics.

## ***References***

Development Team of the Learner's Module, *Grade 8 Science Learner's Module*, DepEd, Pasig City Philippines: Vibal Publishing House, Inc, 2013.

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