Module 4

The Biogeochemical Cycles

Module Overview

The purpose of this Module is to enable students to diagram the essential biogeochemical cycles and explain how the important elements of life namely hydrogen, nitrogen, oxygen, carbon, phosphorus, and sulfur are cycled in the biosphere. The information provided in this module will enable the students to trace the different elements in various forms and how man can disrupt the natural processes of the biogeochemical cycles.

Learning Objectives

Upon completion of this Module, you will be able to:

- diagram the major biogeochemical cycles,
- identify the various forms of the elements (in combination with other elements) in the biosphere, and
- Identify anthropogenic disturbances that can threaten the natural processes of the biogeochemical cycles.

Readings

1. Bear, R. and Rintoul, D. (2019). Biogeochemical cycles. Retrieved June 30, 2014, from https://cnx.org/contents/D-ygu4Ty@13/Biogeochemical-Cycles
2. Moses, M. (2012). Biogeochemical cycles. Retrieved October 16, 2022, from https://editors.eol.org/eoearth/wiki/Biogeochemical_cycles

Lectures

- Lecture Video1: Biogeochemical Cycles (8:34 minutes) Source: https://youtu.be/Bn41lXKyVWQ

Study Questions

Review your notes and prepare answers to the following questions in order to help you review for the Module 3 Quiz:

1. What are the major nutrients that give life to organisms?
2. How can man influence the biogeochemical cycles?
3. Explain why phosphorus is a limiting factor.
4. Diagram the processes involved in the six biogeochemical cycles. Label the nutrient forms in the hydrosphere, lithosphere, and atmosphere.

Assignment

Write a 400-word article about the influence of a human activity on any of the biogeochemical cycles. Submit your printed output on October 7, 2019. Include your name, subject, date of submission, and professor in the first page of your paper (8.5 x 11 in). Please see suggested format below.

Submitted by:	*Subject:*	*Date of Submission:*	*Professor:*
Juan dela Cruz	Esc 203	October 17, 2022	Dr. John Patrick A. Regoniel

Quiz on Esc 203 Module 4: Biogeochemical Cycles

Name: _____ Date: ___/___/___/

Quiz 4

1. Which of the following are the "big 6" or so-called macronutrients required by microorganisms?

   (a) Zn, C, N, H, P, S
   (b) S, Ca, P, O, H, C
   (c) S, P, N, C, O, H
   (d) N, K, C, H, O, N

2. Which of the following biogeochemical cycles does the extensive forest fire in Indonesia directly affect?

   (a) Nitrogen cycle
   (b) Carbon cycle
   (c) Sulfur cycle
   (d) Phosphorus cycle

3. Macronutrients are nutrients that are required by all living organisms in

   (a) small quantities
   (b) moderate quantities
   (c) large quantities
   (d) any of these

4. Which of the following is a "sink" for carbon?

   (a) photosynthesis
   (b) chemical weathering and erosion
   (c) volcanic eruptions
   (d) respiration

5. Which of the following biogeochemical cycles drives the other biochemical cycles?

   (a) Nitrogen cycle
   (b) Carbon cycle
   (c) Water cycle
   (d) Oxygen cycle

6. Which of the following processes in the water cycle does not belong to the group?

   (a) precipitation
   (b) evapotranspiration
   (c) condensation
   (d) evaporation

7. Which process below refers to the conversion of nitrogenous wastes from living animals or from the remains of dead animals into $NH4^+$?

   (a) nitrification
   (b) ammonification
   (c) denitrification
   (d) eutrophication

8. Which element moves so slow in the ecosystem, sometimes taking thousands of years, thus is not easily cycled.

   (a) carbon
   (b) phosphorus
   (c) nitrates
   (d) sulfur

9. Approximately one percent of the earth's water is potable freshwater for human use. Thus, saltwater compose around ___ percent of water on earth.

   (a) 2.5
   (b) 5
   (c) 97.5
   (d) 68.9

10. Which of the following can modify the biogeochemical and physical processes of the earth?

    (a) automobile exhaust
    (b) use of fertilizers
    (c) burning coal
    (d) all of these