

APES ACTIVITY
BIOGEOCHEMICAL CYCLES
 Friedland, Ch. 3

INTRODUCTION: The biogeochemical cycles are Earth’s closed systems and describe the complete pathway that a chemical element and any forms that it takes follows through the Earth’s spheres.

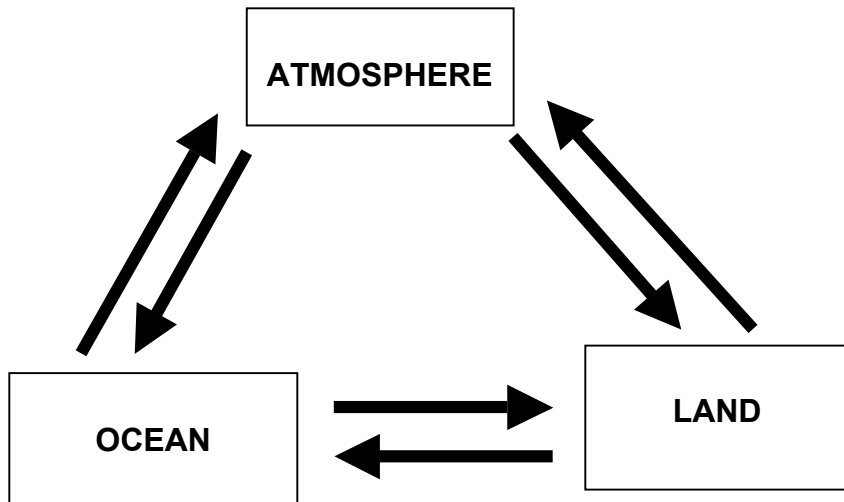
Bio – because the cycles involve life

Geo – the cycles include air, water, rocks, soil and sediments

Chemical – matter is being considered in the cycle.

The simplest way to view a biogeochemical cycle is as a box and arrow diagram: the boxes are places where a chemical element is stored and is called a “reservoir” or “sink”. Arrows show pathways of transfer. In each reservoir there is an average length of time that any atom of an element is stored before it is transferred and this is called the “residence time”. The amount that leaves or enters the reservoir per unit of time is called a “flux” or “rate of transfer”.

EXAMPLE:



How many reservoirs? _____ If you were following the path of a drop of water, label the flux that would represent precipitation and the one that would represent runoff.

PART 1: Access the diagrams from the Friedland text for the BG Cycles.

Fill in the table below by checking the boxes that apply to show what spheres would have the type of matter at some time in its cycle through Earth’s systems:

TYPE	HYDROSPHERE	LITHOSPHERE	BIOISPHERE	ATMOSPHERE
Water				
Carbon				
Nitrogen				
Sulfur				
Phosphorus				

Name _____ Date _____

PART 2: For this table, use your text or the attached table to write the word “most” in the sphere where the type of matter is most abundant and the word “least” for where the type of matter is least abundant.

TYPE	HYDROSPHERE	LITHOSPHERE	BIOISPHERE	ATMOSPHERE
Water				
Carbon				
Nitrogen				
Sulfur				
Phosphorus				

PART 3: Use your text or the internet to list three ways in which humans interfere and disrupt the normal flow of each BG Cycle:

TYPE	Human Intervention 1	Human Intervention 2	Human Intervention 3
Water			
Carbon			
Nitrogen			
Sulfur			
Phosphorus			

PART 4: The Nitrogen Cycle

PROCESS	What Happens	What form? (N₂, NH₃, etc.)
Fixation		
Assimilation		
Decay		
Nitrification		
Denitrification		

What microorganisms are important in the nitrogen cycle? _____

Name _____ Date _____

PART 5:

TYPE OF MATTER	MAIN NONLIVING RESERVOIR	FORM(S) IN LIVING THINGS	OTHER NONLIVING RESERVOIRS
CARBON			
NITROGEN			
PHOSPHORUS			
SULFUR			

PART 6: The Challenge

Construct a sketch to show the flow of carbon, nitrogen, sulfur and phosphorus collective on one page!! Clearly label the reservoirs and fluxes. Show the main reservoir of the type of matter and illustrate it in a unique way on the drawing.