

Biogeochemistry

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What is Biogeochemistry?

Biogeochemistry is the study of the [cycles](#) of [chemical elements](#) and their interactions with and incorporation into [living things](#) transported through earth scale biological systems in space through time. Thus biogeochemistry encompasses many aspects of the abiotic and biotic world that we live in.



Biogeochemistry is a systems science closely related to Systems ecology. There is a relationship between global warming, decomposition and respiration in soils and wetlands producing significant climate feedbacks and altered global biogeochemical cycles

Russian scientist [Vladimir Vernadsky](#) is the founder of Biogeochemistry.

Definition

The study of how living systems influence the geology and chemistry of the earth.

Biogeochemists:

The scientists use to study earth systems.

Biogeochemical process:

- 6 Elements influencing the process:

1. H ([hydrogen](#))
2. C ([carbon](#))
3. N ([nitrogen](#))
4. O ([oxygen](#))
5. S ([sulfur](#)),
6. P ([phosphorus](#))

Understanding the relations and cycles mediated between these elements and their ecological pathways ease the understanding of biogeochemistry. Biogeochemistry focuses on 4 chemical cycles ([carbon](#), [nitrogen](#), [sulfur](#), and [phosphorus](#) cycles) which are either driven by or have an impact on biological activity.

Principles and Tools

Most of the major environmental problems can be analyzed using biogeochemical principles and tools.

Major Environmental problems

- Global warming
- Acid rain
- Environmental pollution
- Greenhouse gases

The principles and tools can be broken down into 3 major components: element ratios, mass balance, and element cycling.

1. Element ratios

An organism can change only slightly the amount of these elements in their tissues if they are to remain in good health.

2. Mass Balance

Using a mass balance approach we can determine whether the system is changing and how fast it is changing. The equation is:

$$\text{NET CHANGE} = \text{INPUT} + \text{OUTPUT} + \text{INTERNAL CHANGE}$$

3. Element Cycling

It describes where and how fast elements move in a system.

Two general classes of systems :

- closed system
- open systems

A closed system:

A system where the inputs and outputs are negligible compared to the internal changes.

An open system:

There are inputs and outputs as well as the internal cycling.

Biogeochemistry Research:

Research Fields:

- [global change](#)
- [climate change](#)
- biogeochemical [prospecting](#) for ore deposits
- [modelling](#) of natural systems
- soil and water acidification recovery processes
- [eutrophication](#) of surface waters
- [carbon sequestration](#)
- soil remediation

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Reference Links:

- <http://en.wikipedia.org/wiki/Biogeochemistry>
- <http://www.globalchange.umich.edu/globalchange1/current/lectures/klings/ecosystem/ecosystem.html>
- <http://en.wikipedia.org/wiki/Ecology>

