PHOSPHORUS CYCLE

• No gaseous phase.
• Slow rate of transfer.
• Released by erosion of exposed rock.
• Absorbed by plants, algae, and some bacteria.
• Exported from terrestrial ecosystems by runoff to oceans.
• May be returned through seabird guano.
The global phosphorus cycle.

Modified from D. T. Krohne, General Ecology
Phosphorous cycle:

- **Atmosphere**: Never enters the atmosphere.
- **Hydrosphere**: Absorption.
- **Biosphere**: Absorption, Waste & Decomposition, Weathering & Erosion, Weathering & Erosion.
- **Lithosphere**: Weathering & Erosion, Sedimentation.
Phosphorous Cycle

Human Impacts

Net Effect:
Increase in phosphorous in water & “algal blooms”; Depletion in soils

Mining, use (fertilizer, detergent, etc.) & increased runoff

Hydrosphere

More Phos. for organisms

Biosphere

Lithosphere
Dissolved in Ocean Water

Marine Sediments

Marine Food Webs

Dissolved in Soil Water, Lakes, Rivers

Land Food Webs

Rocks

Phosphorous Cycle

- Mining
- Agriculture
- Weathering
- Leaching, runoff
- Uplifting over geologic time

Marine Sediments

Dissolved in Soil Water, Lakes, Rivers

Land Food Webs

Fertilizer

Guano

Marine Food Webs

Dissolved in Ocean Water

Excretion

Uptake by autotrophs

Weathering

Settling out

Death, decomposition

Sedimentation

Death, decomposition
The phosphorus cycle is long and slow, but it is an important part of the environment. It helps plants grow, and is used by farmers to fertilize them. When animals eat the plants, they absorb phosphates.
When the animals die, their body decays and the phosphorus is absorbed into the soil, where it re-enters plants. What isn’t absorbed by plants ends up in rock, and may stay there for millions of years, slowly being released as the rocks weather.
Atmosphere

The Phosphorus cycle has no involvement in the atmosphere, because it does not naturally form in gaseous forms.
Hydrosphere

- Phosphorous usually enters the hydrosphere by the phosphate salt rocks found on the ocean floor. As the water erodes them away, the phosphorous escapes.
- Marine organisms take some of the phosphorus particles in order to live and grow.
Lithosphere

- Phosphorous is presented in the form of rocks and soil.
- Phosphates go down to the bottom of the ocean and forms rocks over million of years.
- Phosphates enters the soil when plant and animal matter decompose, the cycle repeats.
Biosphere

- Phosphorous is used for organisms to build DNA, RNA, and ATP.

- Phosphate is in plants, which the herbivores eat, which the herbivores are eaten by the carnivores. Than phosphorus is released back into the soil by the herbivores and carnivores waste.
Impact on landscape by open-pit mining.
Effects of Human Activities on the Phosphorous Cycle

- We remove large amounts of phosphate from the earth to make fertilizer.

- We reduce phosphorous in tropical soils by clearing forests.

- We add excess phosphates to aquatic systems from runoff of animal wastes and fertilizers.
The Phosphorus Cycle

- How and in what form(s) does phosphorus enter and leave the cycle?

- How do the roles of autotrophs and heterotrophs differ?

- What are the human impacts on the cycle?
THANK YOU