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**B.Sc. PART- III [Botany Hons.]
PAPER- VII, GROUP- C**

**(i) ECOSYSTEMS -
PHOSPHORUS CYCLE.**

Paper - VII, Group - 'C'

Ecosystem - Phosphorus cycle

"It is a sedimentary cycle in which phosphorus circulates between abiotic and biotic components of the ecosystem." A gaseous part is negligible in the cycle. Therefore, addition of phosphorus by rainfall is quite insignificant. Phosphorus is a vital element involved in forming important biochemicals and structures like DNA, RNA, ATP, plasma membrane, teeth, bones etc. Its cycling pool is small with fewer steps and fewer microbes. The availability of the element in the terrestrial habit is low. After nitrogen, phosphorus is the second most critical element. Reservoir pool consists of rocks having rock phosphate and other phosphorus containing minerals. A small quantity of rock phosphate becomes available through weathering of rocks. Mining of the mineral and using it as fertilizers also augments phosphorus supply. Phosphorus also becomes available from industrial wastes formed during treatment of minerals and metals. Some detergents are rich in phosphates.

In the soil, phosphate

is locked up with iron, calcium and aluminium metals. Solubility decreases with rise in acidity and alkalinity. phosphate is solubilised by root excretions and micro-organisms. phosphate is then absorbed by plants as orthophosphate $(PO_4)^{3-}$. Inside plants it is incorporated into organic molecules. From plants it passes to animals. Bones and teeth of animals have a large quantity of inorganic phosphate. Both plants and animals provide organic matter to decomposers. Decomposers bring about breakdown of phosphate containing organic molecules. Phosphatizing bacteria change the organic phosphate into inorganic phosphate. Higher plants are also able to absorb phosphorus from organic source with the help of mycorrhizae.

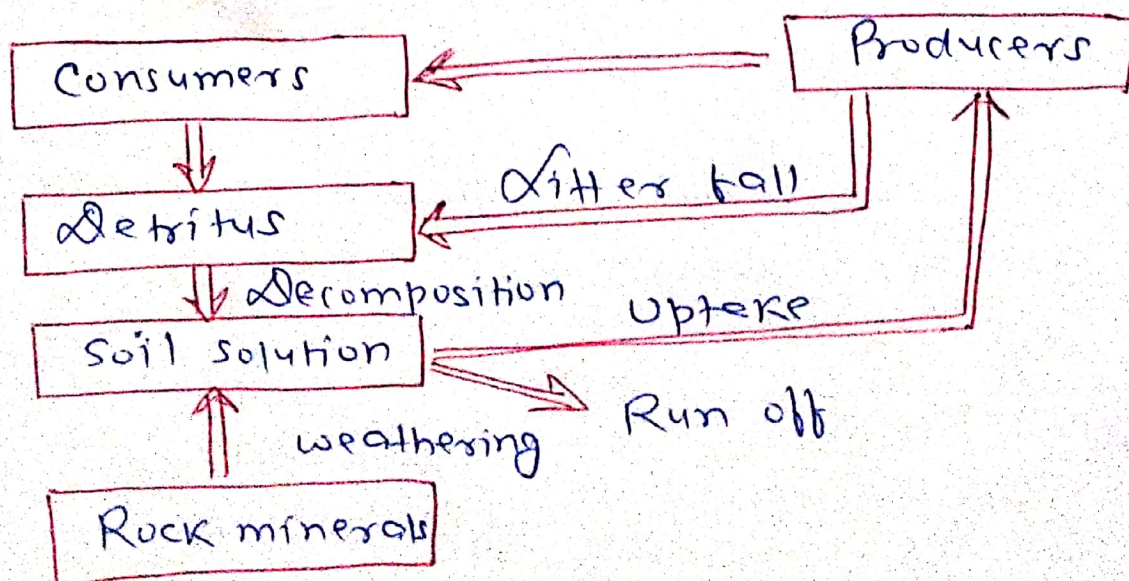


Figure → Simplified model of phosphorus cycle in terrestrial ecosystem.

Aquatic ecosystem generally receive higher quantities of phosphate due to soil wash, detergents and industrial effluents. Part of it is used by organisms while the remaining deposits at the bottom. Sea is a large repository of mineral receiving some 20 million tonnes annually from land. A part of phosphorus is retrieved from sea through -

- (i) fishing
- (ii) collection of sea weeds for food
- (iii) Bird excreta or guano.

marine bird

rest on near by sea coast and island. Guano is rich in phosphorus and is used as fertilizers.

Depletion → (i) phosphate settling at the bottom of lakes and oceans is lost to cycling pool.

(ii) A part of soil phosphate leached down along with percolating rain or irrigation water.

(iii) phosphate locked in bones and teeth is not released by the activity of decomposers.

Replenishment - cycling pool of phosphate is replenished through -

- (i) Addition of phosphate fertilizer, obtained through mining of phosphate rocks.
- (ii) Use of guano deposits. A large deposit

of guano occurs near the coast of Peru and several islands.

(iii) Wedging of lake bed and using it as mineral rich soil.

(iv) Industrial effluents.

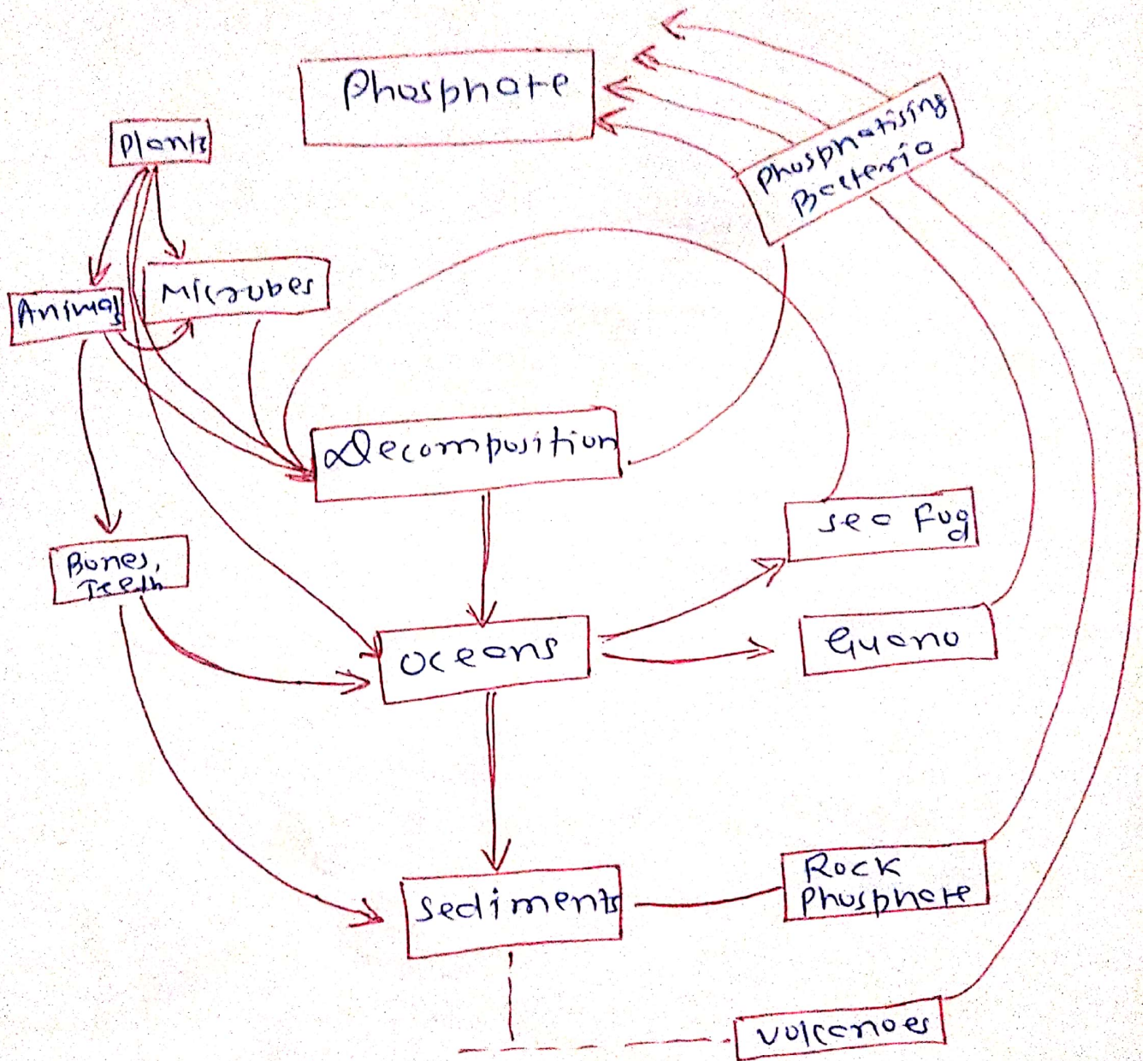


Figure - Global Phosphorus cycle

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