SCI – PHOSPHORUS CYCLE

The phosphorus cycle is representative of the cycles of all the biologically important mineral nutrients—those elements that have their origin in the rock and soil minerals of the lithosphere, such as iron, calcium and potassium. We focus on phosphorus because its shortage tends to be a limiting factor in a number of ecosystem and its excess can seriously stimulate unwanted algal growth in freshwater systems.

Phosphorus exists in various rock and soil minerals as the inorganic ion phosphate (PO_4^{3-}). As rock gradually breaks down, phosphate and other ions are released. This slow process is the normal means of replenishing phosphorus that is lost to runoff.

Plants absorb PO_4^{3-} from the soil or from a water solution, and once the phosphate in incorporated into organic compounds by the plant, it is referred to as organic phosphate. Moving through food chains, organic phosphate is transferred from producers to the rest of the ecosystem. As with carbon, at each step it is highly likely that the organic compounds containing phosphate will be broken down in cell respiration or by decomposers, releasing PO_4^{3-} in urine or other waste material. The phosphate may then be reabsorbed by plants to start the cycle again.

Phosphorus enter into complex chemical reaction with other substances that are inorganic such as iron (Fe^{3+}), aluminium (Al^{3+}), and calcium (Ca^{2+}), to form insoluble chemical precipitates. These chemical precipitates that form usually releases PO_4^{3-} slowly, thereby causing plants to not have adequate access to precipitated phosphorus. However, plants withdraw naturally occurring PO_4^{3-} from soil, water, or sediments.

Phosphorus does not have a gas phase like carbon, therefore, it is recycled only if the wastes containing it are deposited in the ecosystem from which it came.