

Phytoplankton Growth

Phytoplankton (unicellular algae) in the ocean are able to acquire energy by respiring organic matter generated through photosynthesis, a process transforming carbon dioxide into organic matter.

Phytoplankton are unable to grow and multiply relying on photosynthesis alone; they still depend on various other nutrient sources to survive, multiply, and conduct numerous metabolic reactions. For example, protein synthesis requires nitrogen uptake, DNA or RNA replication requires phosphorus, and various enzymes depend on a variety of trace metal elements, such as iron. When the supply of all of the essential elements is sufficient, the reproduction rates of phytoplankton can double or triple on a daily basis.

In other words, when there is a limited supply of essential nutrients, phytoplankton growth and reproduction is then restricted. The major factors that limit phytoplankton growth and reproduction are chemical nutrients or key physical factors (temperature and light intensity). These factors are called limiting factors.

In terms of chemical limiting factors, as far as we know, the three biggest limiting essential nutrients in the ocean are nitrogen, phosphorus, and iron. If you pour these three elements in bioavailable form into the ocean, microalgae will multiply and overflow into the mountains and the valleys.

