

Aquatic food resources

Chapter topics

- Marine productivity
- Fishing
- Aquaculture

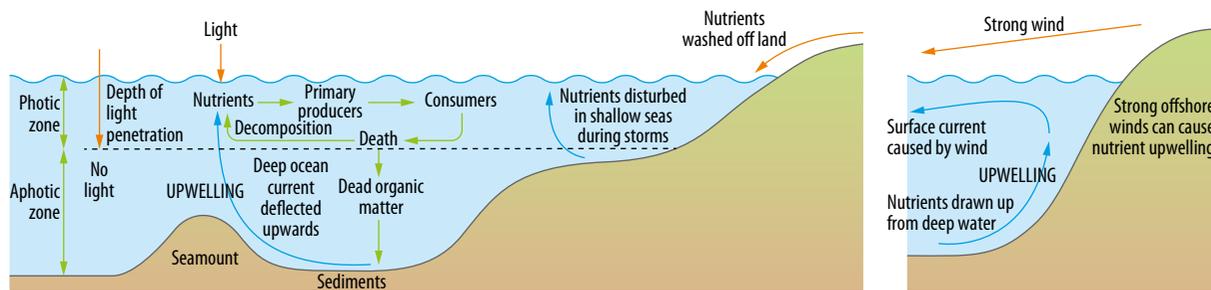
Marine productivity

Oceans cover over 70% of the Earth's surface but only a small proportion is biologically productive as limiting factors restrict the growth of the most important photosynthetic organisms which are algae.

Variations in light levels

Little light penetrates water to a greater depth than 100m, less if the water is turbid, so photosynthesis is limited to the surface water layers, called the photic zone. Most life at greater depths, in the aphotic zone, relies on food produced near the surface, for example, planktonic algae that is carried down by water currents, or the bodies of dead organisms that sink.

How nutrient movements in the sea affect productivity



How upwellings caused by a seamount and storms over shallow water affect nutrient movements

Coastal upwelling caused by an offshore wind

Nutrient availability

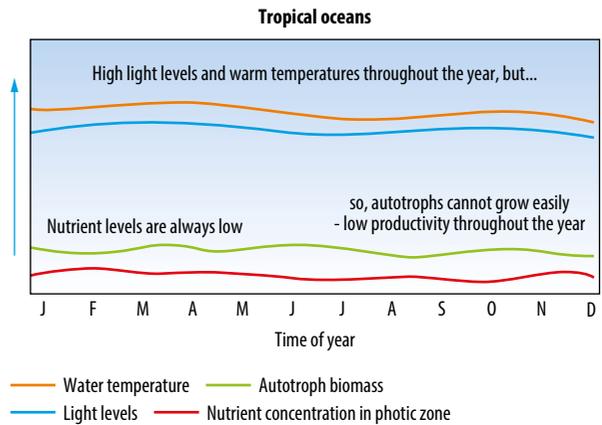
Algae absorb nutrients directly from the water because there is no soil and they don't have roots. Some nutrients are readily available, such as carbon dioxide. Others are often the limiting factor on biological productivity when they are not sufficiently abundant, for example, phosphates.

The low solubility of phosphates causes the oceans to be deficient in phosphates except where there are processes that cause phosphates to be added.

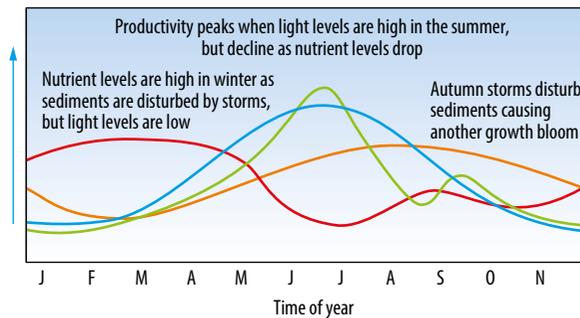
Phosphate levels in the photic zone are increased by runoff from rivers and in areas in which deep, cold water rises towards the ocean surface, a process known as upwelling, but these

are not found in most areas of open ocean. In open areas the nutrients contained in planktonic organisms are carried to the seabed when they die. This may reduce nutrient availability in the surface photic layer so future biological productivity is reduced.

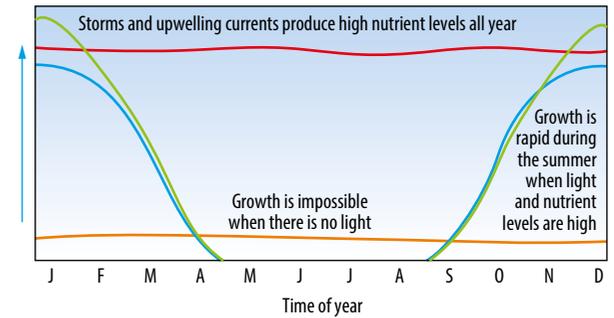
Variations in the factors that affect productivity in different oceans



Temperate oceans (northern hemisphere)



Ocean around Antarctica

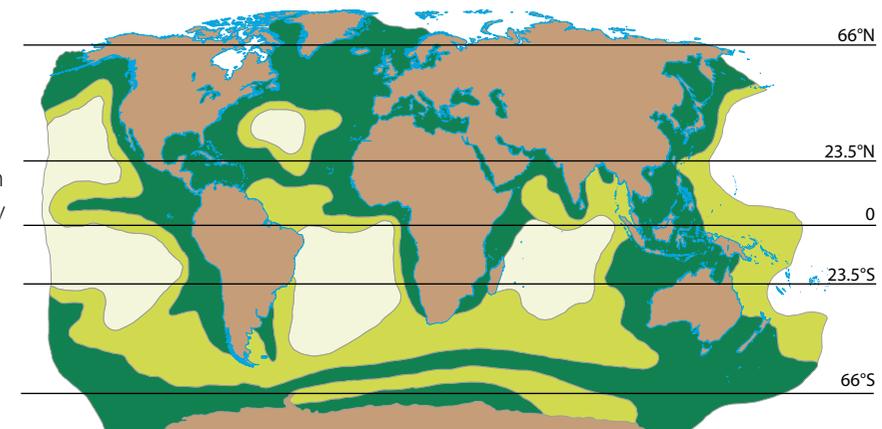


Water temperature, Light levels, Autotroph biomass, Nutrient concentration in photic zone

Water temperature, Light levels, Autotroph biomass, Nutrient concentration in photic zone

Freshwater productivity

Water bodies on land are often very productive as they receive nutrient runoff from the land and receive high light levels because they are relatively shallow. Total productivity is limited by the relatively small total area of rivers and lakes.



Key: Level of biological productivity: High (dark green), Medium (light green), Low (yellow)

Regional variations in marine productivity