



## Phytoplankton loss could spell disaster for marine ecosystems

**Tiny organisms** called phytoplankton, which are crucial components of marine ecosystems, have been slowly disappearing over the last century, according to researchers. The decline is worrying because it may have profound effects on marine life, fisheries and carbon cycling. The study suggests the decline in phytoplankton could be linked to climate change.

**Phytoplankton are microscopic** marine organisms that sit at the bottom of the food chain. They are food for other plankton and small fish, as well as larger animals such as whales. Phytoplankton get their energy from carbon dioxide through photosynthesis (like plants) and so are very important in carbon cycling. Each year, they transfer around 10 billion tonnes of carbon from the atmosphere to the ocean. This is roughly the same amount of carbon sequestered by the forests of EU Member States<sup>1</sup>.

Ocean concentrations of phytoplankton can be estimated by changes in the transparency and colour of the water. Phytoplankton use the pigment chlorophyll to harness light energy for photosynthesis, so measuring chlorophyll concentrations is also a reliable predictor of phytoplankton concentrations. The researchers combined transparency data and chlorophyll measurements to estimate phytoplankton concentrations on global, regional and local scales.

They estimated that 1 per cent of global phytoplankton is lost every year. Concentrations have been steadily decreasing since the end of the 19th century, although due to a lack of data there is some uncertainty about estimates prior to the 1950s. When the researchers divided the ocean into 10 regions, they saw that eight out of 10 had experienced a decline since 1899, with the largest rates of decline in the South Atlantic, Equatorial Atlantic and Antarctic. Despite fluctuations due to seasonal effects, particularly in polar regions, the researchers say the long-term global trend is unquestionable.

At the local scale, chlorophyll concentrations have been decreasing more rapidly further away from land, which is significant because most photosynthesis takes place in these waters.

The study suggests that the changing climate, and in particular, rising sea surface temperatures, has had a profound influence on phytoplankton concentrations and their decline in the last century. Sea surface temperature was strongly associated with decreases in chlorophyll concentrations in regional analyses. The researchers say their results support the theory that ocean warming is changing marine ecosystems and that it will have important effects on carbon cycling and fisheries.

1. UNECE. (2010). Carbon sinks and sequestration. UNECE. [Online]. Available: <http://timber.unece.org/index.php?id=215>

**Source:** Boyce, D.G. Lewis, M.R., Worm, B. (2010). Global Phytoplankton decline over the past decade. *Nature*. 466: 591-596.

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