Science for Environment Policy

Harmful algal blooms in Europe will increase under climate change

Harmful algal blooms may become more common in north western European waters as a result of climate change, according to a new study. The researchers predicted that by the end of this century blooms of two groups of algal species will occur over larger areas and for longer periods every year.

Read more about:
Marine ecosystems, Climate change and energy

1.http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml

Algal blooms occur naturally at certain times of year when these microscopic plants multiply rapidly. However, if algae populations become abnormally large they can starve the water of oxygen, and some species produce toxins. These harmful blooms can kill fish, contaminate seafood and disturb ecosystems. The economic cost of algal blooms in Greece, Italy and Spain is over €300 million a year.

The authors modelled the effects of climate change on harmful algal blooms for the end of the current century, i.e. 2090-2100. They focused on effects for two different groups of algal species and three different regions: the northwest European Shelf–Baltic Sea; northeast Asia and southeast Asia. Their projections were based on conservative climate models used in the fourth assessment report[1] of the Intergovernmental Panel on Climate Change, published in 2007. They incorporated certain physiological 'rules' for the formation of blooms, to predict their response.

Prorocentrum and *Karenia* are groups of algal species found all over the world. The *Prorocentrum* group includes commonly recognised species associated with so-called 'red tides'. Species from this group grow rapidly in nutrient-rich waters near shorelines. *Karenia* species grow more slowly and further away from the shore, but tend to be more toxic.

The researchers' models predicted that by the end of the century, in the northwest European region, there will likely be larger areas and more months of the year when blooms of both *Prorocentrum* and *Karenia* algae are likely to occur. The results suggest conditions will favour *Prorocentrum* over *Karenia*. According to the researchers, the most important factor driving these changes was temperature.

By comparison, for northeast Asia, models predicted a smaller increase in the area where blooms are likely to occur and a reduction in the period of the year. Meanwhile, for the southeast Asia region, projections suggested there would be no increase in *Prorocentrum* blooms and a decrease in *Karenia* blooms. However, it should be noted that these are not the only species which form harmful algal blooms in these regions.

To check the accuracy of their model, the researchers compared its predictions based on current conditions with reports of actual blooms. The predictions matched the existing data well, particularly for the northwest European region. However, the researchers acknowledge their model is a simplification. For example, at present it does not account for increases in nutrient levels due to human activities such as fertiliser use. They suggest that it could be fine-tuned to include such factors, as well as including other species.