An EU-funded project has developed a forecasting model for biotoxic algal blooms. The project aimed at providing aquaculture farmers early warnings of approaching dangerous ‘phytoplankton’ – allowing them to take effective action to keep fish and shellfish from algae-induced contamination – and protect their livelihoods.

The aquaculture industry is a vital and growing protein resource for feeding the world. In 2010, it was worth €7.8 billion per annum in Europe and employed some 74,000 people, often in remote regions with few other job opportunities. As with traditional agriculture, aquaculture requires forecasting services which can warn of potential threats and allow better management. The EU-funded project ASIMUTH has developed just such a service for algal blooms, which can be deadly to sea life, including farmed fish and shellfish.

ASIMUTH focused on detecting and monitoring harmful algal blooms off Europe’s Atlantic coast. Algal blooms consist of marine phytoplankton. These microscopic photosynthesising organisms inhabit the upper sunlit layer of the oceans. They can form colourless blooms that multiply rapidly and cover extremely large surface areas – which can be catastrophic for fish farms.

“Certain phytoplankton are biotoxic and in fish and shellfish they present a real danger to human health,” explains Julie Maguire, project coordinator and marine researcher at Daithi O’Murchu Marine Research Station in Ireland.

Although strict European food safety regulations for aquaculture are in place, the checks are currently carried out retrospectively, after the fish are farmed.

“It can take four days to approve a batch of farmed fish,” explains Maguire, “and if they are rejected because of biotoxins then the farmer suffers the economic loss and the costs of recall. There was a real need for an early-warning mechanism, and ASIMUTH is the result.”

**Early-warning system**
The project uses satellite data provided by the marine service of the EU’s Copernicus Earth observation programme. This service offers daily information on a range of marine parameters, including chlorophyll and phytoplankton concentrations. ASIMUTH integrates this satellite data with sea-based monitoring and regional knowledge of current water column and surface current behaviour.

This not only facilitates accurate forecasts of the build-up of harmful algal blooms, but also their likely movements over the coming days.

“We can pick up algal blooms out in the ocean where they form and forecast their movements,” says Maguire. “This gives fish farmers a vital early-warning system and allows them to harvest earlier, before the blooms arrive.”

Maguire adds: “The great thing about satellite data is that it is so clear. But we also need the other sea-based information, particularly when it’s cloudy. And our test regions are very diverse, from oceanic upwelling off the Portuguese coast to the protected sea lochs in Scotland. Local knowledge plays a large role in our forecasting model.”

Below illustration of the ASIMUTH model domains and how they overlap.

**ASIMUTH Model domains: regional and trans-national models**

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**Local to global**

While local knowledge is important, the EU-wide aspect of the research also plays an important role.
“During the project, a shellfish scare led Shetland Island farmers to ask for forecasts. However, the Scottish sea loch models are not appropriate to Shetland’s open seas, so we adapted models from the Irish coasts to help them,” says Maguire.

The project brought together scientists and aquaculture organisations from Ireland, Portugal, France, Spain and the UK and produced regular email bulletins on algal blooms which were circulated free of charge among stakeholders in those countries. Since the end of the project, in November 2013, the partners have continued to produce forecasts, with a success rate of 80%. The accuracy of the forecasts is continually being improved as more is learned from each bloom event, clarifies Maguire.

Most importantly, the target group is satisfied with the service provided. Fish farmers expect a productivity increase of up to 5% because a forecast of an approaching algal bloom allows them to harvest early and send their produce to processors, freezers or fresh-produce customers depending on circumstances, says Maguire.

“As one farmer said to me,” Maguire recalls, “It’s all about having choices and allowing better management, that’s what the forecasts give us.”

**Satellite image showing an algal bloom off the coast of Ireland.**
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See also:
CORDIS [3]

Project:
Applied simulations and Integrated modeling for the understanding of toxic and harmful algal blooms

Project Acronym:
ASiMUTH

Project website:

Source URL:

Links
[1]