

# Science for Environment Policy

## Mediterranean seagrass meadows threatened by increasing sulphide stress

**Warmer sea temperatures** are increasing the toxic effect of sulphides on seagrass meadows in the Mediterranean Sea, new research reveals. Higher sea temperatures in the region, as projected using climate modelling, will therefore further threaten these habitats which are already declining from the damage caused by other human activities.

**Meadows of seagrass** (*Posidonia oceanica*) are important and widespread ecosystems in the Mediterranean Sea, but are under threat from human influences such as dredging and trawling as well as eutrophication caused by excess nutrients from agricultural runoff, sewage wastewater and aquaculture. These impacts have caused the meadows to shrink in area by 5-20% since the early 20<sup>th</sup> century and there is concern that they will be further threatened by the effects of climate change, as the grass is sensitive to warmer temperatures.

Seagrass is particularly vulnerable to the toxic effects of sulphides. Sulphides occur naturally, and can accumulate in sediment when there are high concentrations of organic matter (which typically occurs in nutrient-enriched waters) and under anaerobic (i.e. without oxygen) conditions. In these situations, sulphides enter and damage the plants, leading to seagrass loss.

This study, partly funded by the EU WISER<sup>1</sup> project, investigated the impact of warmer [sea](#) temperatures on the sulphide stress of seagrass based on records which monitored meadows around Spain's Balearic Islands in the northwestern Mediterranean over eight years. The researchers used chemical tracing techniques to estimate the percentage of sulphur entering seagrass leaf tissue from sedimentary sulphides, as well as the total sulphur content.

Higher concentrations of sulphur in leaf tissue had reduced the growth and development of the studied meadows and the percentage of sulphur in the plants that came from sediment sulphides increased between 2002 and 2008. Two heat waves occurred in the summers of 2003 and 2006 which pushed the maximum sea surface temperatures to 28.5 °C and 29.5 °C, respectively.

These results indicate that sulphide intrusion into the seagrass was enhanced by the warmer temperatures and that even warmer sea temperatures projected under [climate change](#) modelling will exacerbate this process.

Shallower meadows also appeared to be more prone to sulphide intrusion than deeper ones, implying that deeper meadows would be better protected from sulphide intrusion under the temperatures observed in this study. However, if sea temperatures in the western Mediterranean reach 30.5 °C, as predicted, then even meadows as deep as 40 m below the surface of the sea would be exposed to a risk of sulphide intrusion.

Given that seagrass meadows are already declining and climate change is likely to lead to even greater losses, the researchers call for rapid action to reduce the impacts of human activities such as eutrophication and physical damage to the seabed. They also call for a reduction in greenhouse gas emissions, mitigating the long term impacts of climate change.



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