

10 FACTS *on Ocean Acidification and Warming in the Mediterranean Sea*

This fact sheet has been compiled as part of the European project *Mediterranean Sea Acidification in a changing climate* (MedSeA). It is intended to aid scientists, science communicators, and science policy advisors. The MedSeA project included more than 100 scientists from 22 institutions in 12 countries. For information and contacts please consult www.medsea-project.eu.

1. The Mediterranean Sea is absorbing atmospheric carbon dioxide (CO₂) and heat. CO₂ from fossil fuel burning heats the atmosphere and dissolves in seawater. Although the absorption of atmospheric CO₂ by the ocean helps limit climate warming, it also changes seawater chemistry and causes ocean acidification.

2. The primary cause of Mediterranean Sea acidification is the absorption of atmospheric CO₂. Acidification may be more pronounced in areas where human impacts such as agricultural runoff further alter water chemistry.

3. The Mediterranean Sea has already warmed nearly 1 °C over the last 25 years. Forecasts predict high summer water temperatures (≥ 29 °C) in the Southeastern Mediterranean by 2050, under the assumption – inevitable if carbon emissions are not reduced dramatically – that the atmospheric CO₂ level will then be at 550 parts per million (ppm).

4. The acidity of Northwestern Mediterranean seawater has increased by 10% since 1995. If we continue to emit CO₂ at today's rate, acidity will increase another 30% by 2050 and 150% by the end of this century.

5. Warming and acidification are rapidly altering marine life in the Mediterranean Sea. Southeastern Mediterranean species are already shifting northward to cooler waters. Many organisms die during summer due to the combined effect of extreme warming and acidification. This will increase with time.

6. Ocean acidification and warming hurt marine organisms in different ways. Some planktonic organisms are more directly harmed by acidification, while

others by warming. The combined effects of these stressors can amplify their impacts on some species. Fish larvae that currently eat such plankton could be at risk of starvation in the future. In contrast, marine bacteria and viruses appear less sensitive.

7. Ocean acidification and warming threaten iconic Mediterranean Sea ecosystems like sea grass meadows and reefs. These ecosystems provide homes and shelter for thousands of other species, protect shores from erosion, and provide food and natural products for humans. Mediterranean red corals are at particularly high risk.

8. The benefits that the Mediterranean Sea provides to humans may be endangered by ocean acidification and warming. Jobs and revenues in the fishing, aquaculture and tourism sectors depend on Mediterranean Sea-based harvests, recreational opportunities, and coastal protection by reefs.

9. Mediterranean Sea aquaculture of shell-forming species is threatened by ocean acidification and warming. Harvests of these species, including mussels, clams, and oysters, had a value of about €225 million in 2012. Many local communities on the Mediterranean coast depend for their income, jobs and food on local aquaculture.

10. Mediterranean Sea tourism will suffer when gorgonians and other corals disappear and certain species of jellyfish thrive in a warmer, more acidic ocean. Increased jellyfish outbreaks on the southeastern Mediterranean coast would considerably decrease annual tourism revenue, possibly affecting more than 10% of tourism revenues.

Mitigation and adaptation

Until permanent CO₂ emissions cuts are achieved, adaptation strategies can be enacted at local, national, and international scales; cutting agricultural runoff, enlarging marine protected areas, and enhancing coastal protection can, for instance, reduce some stress on Mediterranean Sea ecosystems. These measures can help Mediterranean communities sustain their livelihoods, provide food, protect their shorelines, and maintain their cultural traditions. Reducing CO₂ emissions to the atmosphere is the only way to stop ocean acidification.



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