# Scientists reveal ocean darkening threatens 75 million sq km of marine life



Over the past two decades, a staggering transformation has gripped a fifth of the world's oceans. Researchers have now unveiled that more than 75 million square kilometres of these vital waters are succumbing to a phenomenon alarming scientists: ocean darkening. This term describes the considerable shrinkage of the photic zone—the sunlit top layer of the ocean, where approximately 90% of marine life flourishes. The study, conducted by teams from the University of Plymouth and Plymouth Marine Laboratory, indicates that the upsurge of dark waters poses an existential threat to marine ecosystems globally.

The investigation highlighted that between 2003 and 2022, over 9% of the ocean has experienced a retreat of photic zones by more than 50 metres, with 2.6% witnessing a more drastic decline of over 100 metres. As Dr Thomas Davies, an Associate Professor of Marine Conservation, pointed out, these changes ultimately reduce the habitats available for many marine species that depend on sunlight and lunar light for vital life processes. He remarked, “Our findings represent genuine cause for concern,” emphasising the broader implications for both marine biodiversity and human wellbeing. The team’s analyses leveraged NASA’s Ocean Colour Web, employing high-tech algorithms to gauge light penetration in the ocean across vast datasets.

Among the most adversely affected areas are the Arctic and Antarctic regions, as well as the Gulf Stream. These ecosystems are already under significant stress from climate change, making the implications of ocean darkening even more dire. Coastal regions are particularly vulnerable, as a 2021 study has shown that sediment and algal blooms contribute significantly to this darkening phenomenon. Such conditions hinder the growth and productivity of crucial marine habitats, notably kelp forests, by reducing light penetration by as much as 95%. These forests, essential for carbon sequestration, serve not only as habitats for diverse marine species but also play a critical role in mitigating climate change.

The impact of coastal darkening extends even further, disrupting food webs that sustain various marine life. As light availability diminishes, primary producers like plankton and seagrass—which serve as the foundation of the marine food web—suffer dramatically. A report related to coastal darkening underscores the urgent need for stricter land-use regulations to combat pollution and runoff, which exacerbate these changes.

While the situation appears grim, not all is lost. Approximately 10% of global oceans—around 37 million square kilometres—have demonstrated a paradoxical increase in light availability. This unexpected result may be linked to shifts in plankton communities, altered rainfall patterns, and changes in agricultural runoff. However, these positive developments should not eclipse the urgent need for proactive measures to address the overarching threats posed by ocean darkening.

In addition to ecological impacts, the study also ties into a broader narrative of ocean health. Ocean acidification, driven by carbon emissions, threatens key marine organisms, particularly those with calcified shells, presenting further challenges to the delicate balance of ocean ecosystems. Although the effects of ocean darkening on marine biodiversity require further exploration, it is clear that the interplay between light levels, species survival, and overall oceanic health demands immediate attention from both the scientific community and policymakers.

As we continue to grapple with the realities of climate change, these findings underscore the urgency of collective action to safeguard our oceans—an irreplaceable resource that supports life on Earth.

## Reference Map:

* Paragraph 1 – [[1]](https://www.express.co.uk/news/science/2061422/scientists-warn-swathes-earths-waters)
* Paragraph 2 – [[1]](https://www.express.co.uk/news/science/2061422/scientists-warn-swathes-earths-waters), [[2]](https://www.scientificamerican.com/article/coastal-darkening-could-block-kelps-carbon-sink-potential/), [[3]](https://www.smithsonianmag.com/science-nature/how-coastal-darkening-is-harming-kelp-forests-180978994/)
* Paragraph 3 – [[4]](https://www.ecowatch.com/coastal-darkening-ocean-pollution-2650785212.html), [[6]](https://www.theatlantic.com/science/archive/2021/02/coastal-darkening-threatening-marine-life/618007/)
* Paragraph 4 – [[1]](https://www.express.co.uk/news/science/2061422/scientists-warn-swathes-earths-waters), [[5]](https://www.theguardian.com/environment/2017/oct/23/ocean-acidification-deadly-threat-to-marine-life-finds-eight-year-study)
* Paragraph 5 – [[1]](https://www.express.co.uk/news/science/2061422/scientists-warn-swathes-earths-waters)

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## Bibliography

1. <https://www.express.co.uk/news/science/2061422/scientists-warn-swathes-earths-waters> - Please view link - unable to able to access data
2. <https://www.scientificamerican.com/article/coastal-darkening-could-block-kelps-carbon-sink-potential/> - A 2021 study highlighted that coastal darkening, caused by sediment and algal blooms, reduces sunlight penetration, severely hindering kelp growth and productivity. This decline in kelp productivity, by up to 95%, has significant consequences for marine ecosystems, as kelp forests are vital habitats and carbon sinks. The study underscores the need to address coastal darkening to preserve these essential marine environments.
3. <https://www.smithsonianmag.com/science-nature/how-coastal-darkening-is-harming-kelp-forests-180978994/> - Research indicates that coastal darkening, resulting from increased sediment and organic matter in the water, diminishes light availability, leading to a substantial decrease in kelp forest productivity. This reduction, up to 95%, adversely affects marine life that depends on kelp for food and shelter. The study emphasizes the broader implications of coastal darkening on marine ecosystems and the importance of mitigating this phenomenon.
4. <https://www.ecowatch.com/coastal-darkening-ocean-pollution-2650785212.html> - A 2021 report discusses how coastal darkening, driven by increased runoff and pollution, leads to reduced light penetration in coastal waters. This phenomenon negatively impacts primary producers like plankton, kelp, and seagrass, disrupting food webs and affecting fish species that rely on these habitats. The report highlights the need for stricter land-use regulations to address the causes of coastal darkening and protect marine ecosystems.
5. <https://www.theguardian.com/environment/2017/oct/23/ocean-acidification-deadly-threat-to-marine-life-finds-eight-year-study> - An eight-year study found that ocean acidification, a byproduct of burning fossil fuels, is making seas more hostile to vital marine life. The research indicates that many organisms, including those that create calcified shells, are at risk due to increased acidity. The study underscores the urgency of addressing ocean acidification to protect marine biodiversity and the health of ocean ecosystems.
6. <https://www.theatlantic.com/science/archive/2021/02/coastal-darkening-threatening-marine-life/618007/> - A study published in 2021 examines how coastal darkening, caused by increased sediment and organic matter, reduces light penetration in coastal waters, adversely affecting primary producers like phytoplankton. This disruption has cascading effects on marine food webs and ecosystems. The research highlights the need for further studies to understand the full impact of coastal darkening and to develop strategies to mitigate its effects.
7. <https://www.hull.ac.uk/work-with-us/research/themes/case-studies/impact-of-ocean-acidification-on-marine-life> - Researchers at the University of Hull are investigating how increasing ocean acidification affects marine life, particularly their ability to communicate through chemical signals. The study suggests that heightened acidity could disrupt these interactions, with significant implications for marine ecosystems. The research emphasizes the importance of understanding and mitigating the effects of ocean acidification to preserve marine biodiversity and ecosystem health.