



# REGIONAL CORAL BLEACHING REPORT

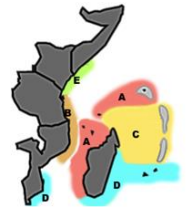
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2024

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# WESTERN INDIAN OCEAN – Regional coral bleaching Report 2024



*DATE OF THIS REPORT: 04 July 2024*

## Executive Summary

The 2024 coral bleaching season in the Western Indian Ocean (WIO) region was severe, driven by El Niño and positive Indian Ocean Dipole (IOD) phases that developed in late 2023, and record temperatures globally that started in May 2023. Together, these climatic conditions led to elevated sea surface temperatures, resulting in widespread coral bleaching and mortality across the region.

73% of the submitted field observations indicated moderate to severe bleaching. 43.3% of these cases were categorized as Medium bleaching severity, while 30.9% were classified as High severity. In terms of coral mortality, most observations were within the Low (34.3%) and Medium (29.1%) categories. However, there were notable instances of high mortality, with 9.9% of observed reefs reporting severe impacts, though with potential for high-mortality observations to be confirmed after this report is produced.

This report confirms substantial thermal stress affected coral reefs throughout the WIO in early 2024, as part of the fourth global coral bleaching event [announced on 15 April 2024](#). It includes detailed analyses of the regional data, highlighting the ongoing threat to coral health, and offers recommendations for future actions to mitigate the impacts of coral bleaching.

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## Key Highlights of the 2023-2024 Bleaching Season

### Pre-Bleaching Events

In anticipation of the severe bleaching predicted due to the developing El Niño and the positive Indian Ocean Dipole, preparatory measures were initiated to prepare stakeholders to monitor the degree of bleaching on coral reefs in the Western Indian Ocean region. In 2023, three information blogs were published (see <https://cordioea.net/blog/>) to raise awareness among stakeholders about the impending bleaching risks and the critical importance of monitoring coral health. These blogs provided detailed information on the expected climatic changes and their potential effects on coral reefs, emphasizing the need for initiative-taking measures.

Additionally, a preparatory webinar (<https://reefresilience.org/preparing-monitoring-and-responding-to-coral-bleaching-in-the-western-indian-ocean-webinar/>) hosted through the Reef Resilience network was conducted on 16 January 2024, attended by over 200 participants, including researchers, conservationists, and stakeholders from various organizations across the region. The webinar served as a platform to share the latest scientific insights and tools, discuss strategies for monitoring and reporting bleaching events, and coordinate efforts to respond to the anticipated bleaching event. The recording of this bleaching alert webinar is available at <https://youtu.be/ZW44iw7b7Gk> for reference.



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## Heat Stress

The 2024 coral bleaching season in the Western Indian Ocean (WIO) region was influenced by a combination of climatic events that led to elevated sea surface temperatures and severe coral bleaching. Global temperatures, including of the tropical oceans, were at record highs for every single month from April 2023 onwards, continuing through to April 2024 (Figure 1).

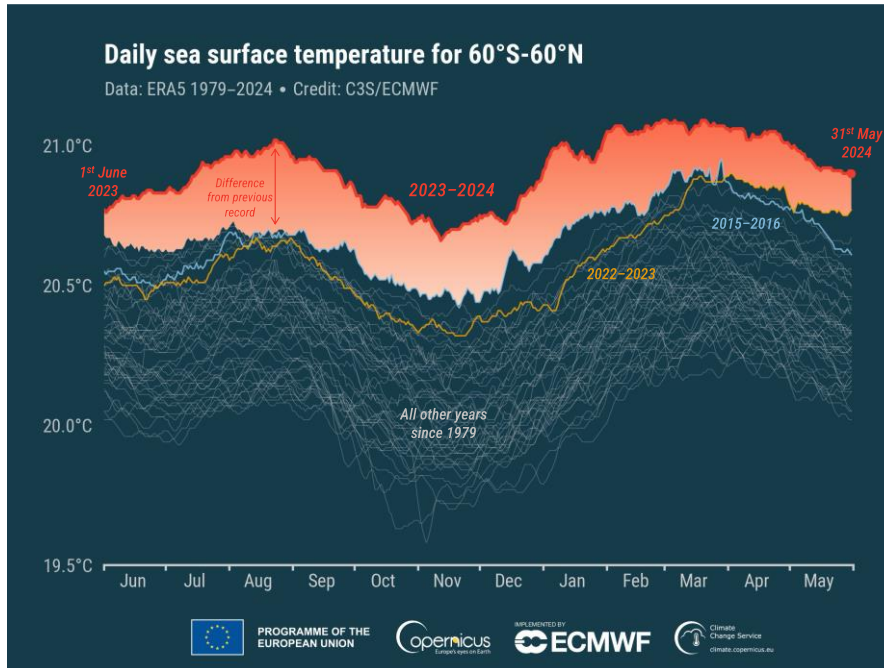


Figure 1 Global Sea surface temperatures between 60N to 60 S from 1979-2024 showing the positive anomaly starting in April 2023 and persisting at record high levels continuously through to 31 May 2024. Source - Copernicus Climate Change Service.

The prolonged three-year La Niña phase, which had moderated sea temperatures, ended in late 2023. This shift was followed by the forecast and subsequent development of an El Niño event that persisted throughout the first quarter of 2024 (Figure 2).

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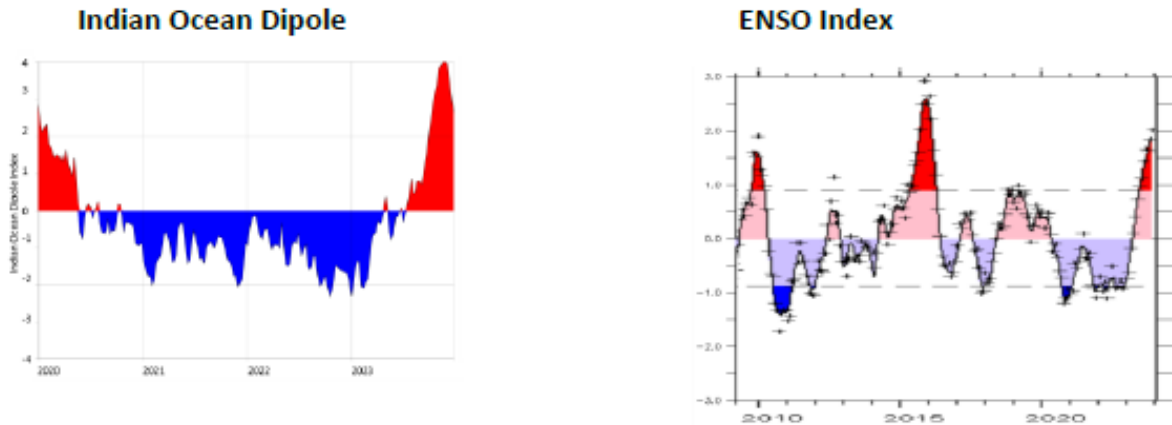


Figure 2 Left: Indian Ocean Dipole (IOD) and Right: El Niño Southern Oscillation Index (ENSO) Both positive at the beginning of 2024.

Additionally, the Indian Ocean Dipole (IOD) was in a positive phase, coinciding with the El Niño, throughout the bleaching season (Figure 2). A positive IOD exacerbates the thermal stress on corals and created a synergistic effect that significantly increased the sea surface temperatures across the WIO region.

At the start of the southern summer period global temperatures were at record levels, and both the Indian Ocean Dipole (IOD) and the El Niño-Southern Oscillation (ENSO) index were strongly positive and in phase, mirroring the conditions experienced during the first global coral bleaching event in 1997/98. As a result, these formed a solid belt of heat across the southern latitudes in the Indian Ocean. This situation transitioned into an intensified warming pattern (Figure 3.) throughout the region, with heat stress building up to over 8 Degree Heating Weeks (DHW) by February 2024 and intensifying to over 12 DHW by April 2024.

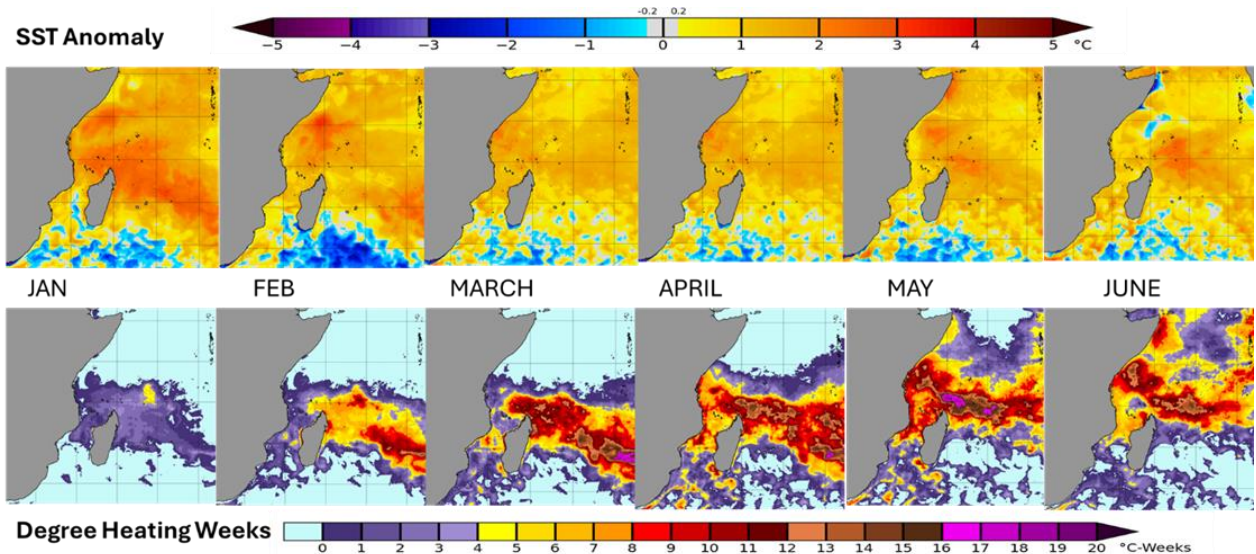
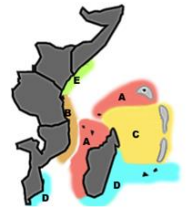


Figure 3 Sequential maps illustrating sea surface temperature (SST) anomalies (top row) and Degree Heating Weeks (DHW) (bottom row) in the Western Indian Ocean region.

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These climatic conditions led to mass bleaching with widespread and severe coral bleaching observed across the region.

## Bleaching Observations

Bleaching reports began early in 2023 in other parts of the world, indicating an earlier start to the global bleaching season. In the Western Indian Ocean (WIO), the first observation was reported in January in the northern latitudes, which is unusually early for this part of the region and may have been due to El-Niño associated heavy rains and sedimentation in late 2023.

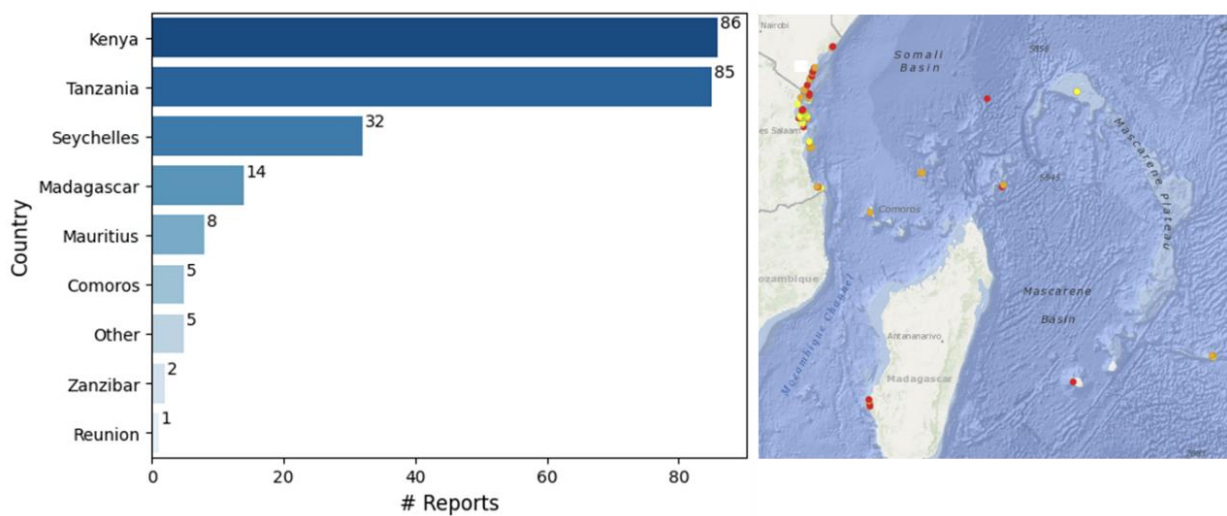


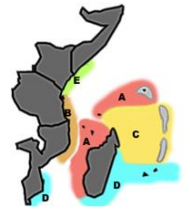
Figure 4 Distribution of bleaching reports submitted by country in the Western Indian Ocean (WIO) region during the 2024 coral bleaching season.

By the end of June 2024, a total of 238 bleaching observations had been submitted from eight countries, with contributions from over 30 participants representing 26 organizations (Figure 4). Kenya and Tanzania submitted the highest number of reports (>80 each), followed closely by Seychelles (37), while Mauritius and Madagascar submitted 8 and 14 reports, respectively. Comoros, Zanzibar and Reunion submitted 2 and 1 report respectively. Notably, bleaching was low in the Mozambique Channel and only reported from one location, unlike prior mass bleaching years when early observations in SW Madagascar precede widespread bleaching across both coastlines of the channel.

Of the 238 bleaching observations (Figure 5), the largest proportion fell within the Medium (45%) and High (35%) severity categories, suggesting substantial bleaching events across the region. Extreme bleaching was relatively low at 3%, but combined with the High category, nearly 38% of coral reefs experienced severe bleaching.

For coral mortality, most observations were in the Low (35%) and Medium (30%) categories. However, a notable 10% of reefs experienced High mortality, and 0.6% faced Extreme

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mortality. When combined, the High and Extreme mortality categories account for 10.6% of the total observations, indicating a significant impact on coral health.

Overall, the combined data for coral bleaching and mortality reveal that approximately 96% of reefs experienced some level of bleaching (Figure 5), with 80% falling within the Medium to Extreme categories (excluding NA and None). Similarly, 80% of reefs faced mortality, with 40% within the Medium to Extreme categories. These observations highlight the considerable stress that coral reefs in the Western Indian Ocean region endured during the 2024 bleaching season, underscoring the urgent need for targeted conservation and mitigation efforts to protect these vital ecosystems.

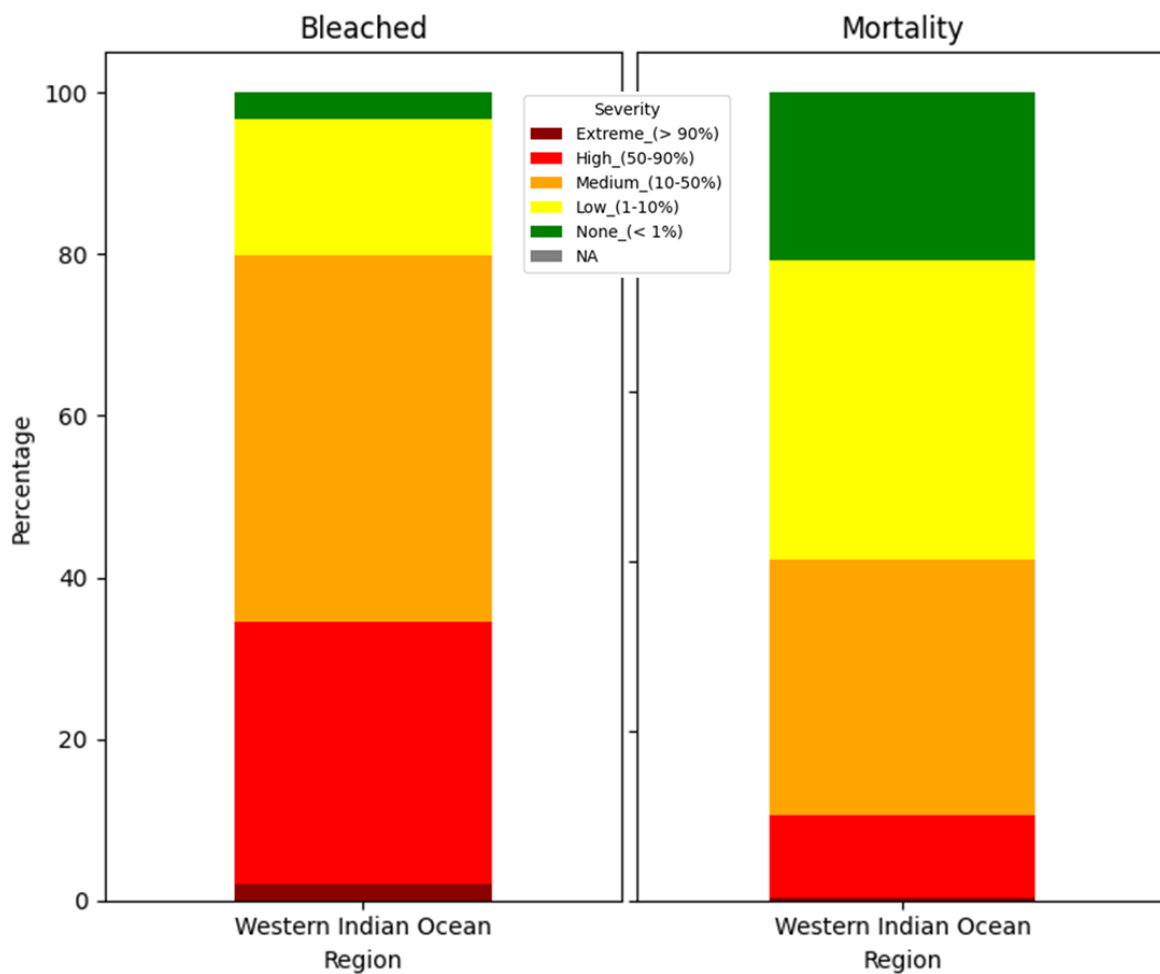


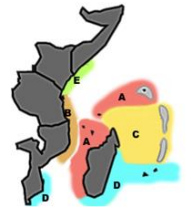
Figure 5 Bar charts showing the distribution of coral bleaching (left) and mortality (right) severity in the Western Indian Ocean from January - May 2024.

## National Reporting

The 2024 bleaching report data reveal that Kenya, Tanzania and Seychelles were significantly affected, reporting the highest counts of both bleaching and mortality (Figure 6). Seychelles also experienced notable impacts, whereas Madagascar and Mauritius showed moderate



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effects. The higher submission of reports from Kenya, Tanzania and Seychelles contributed to the detailed accounting of the bleaching and mortality impacts observed in these countries.

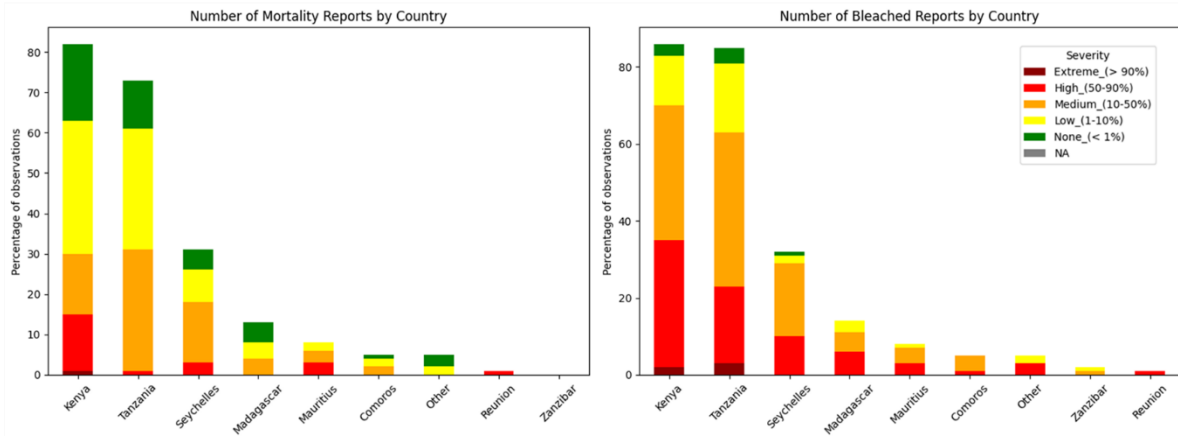


Figure 6 Stacked bar plots showing the distribution of coral bleaching (left) and mortality (right) percentages observations across countries in the Western Indian Ocean region during the 2024 coral bleaching season.

## Key Findings

Approximately 80% of locations at which observations were made in the Western Indian Ocean (WIO) bleached, with 40% experiencing moderate to extreme mortality. Seven out of ten countries reported bleaching, with no observations from South Africa, Mozambique and Somalia. The southern-most latitudes did not report any bleaching, but high temperatures causing bleaching were reported between 20° S to the equator, with heat stress accumulation reaching over 12 Degree Heating Weeks (DHW), and some pockets in Seychelles experiencing even more extreme conditions with DHW reaching 16 (figure 7). The heat stress has lagged on creating a prolonged aftermath that could affect recovery process of bleached reefs in the region.

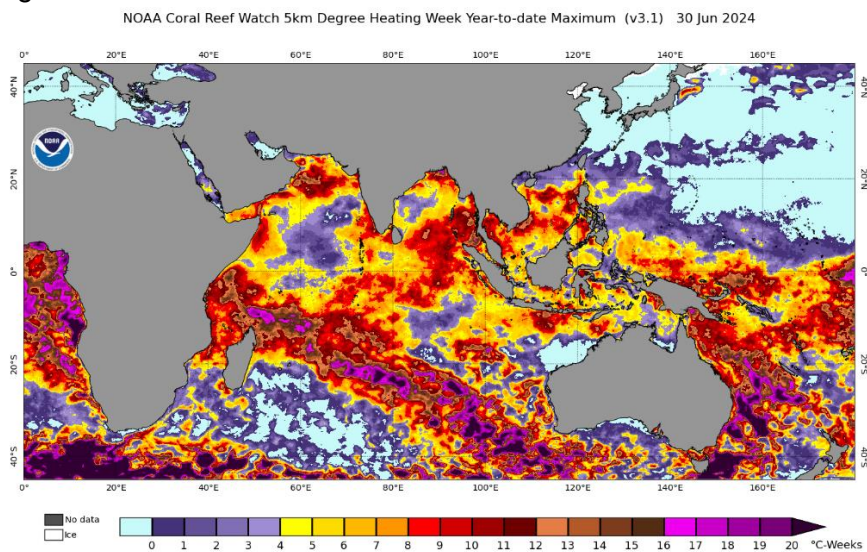
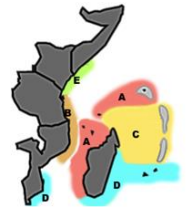


Figure 7 Degree Heating Weeks map showing distribution of heat stress across the eastern hemisphere in June 2024. Pink purple shading indicates DHW =>16

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The 2023-24 South-West Indian Ocean cyclone season was above average, with ten named storms. Tropical Cyclone Hidaya formed unusually close to the equator in the Seychelles and moved southwest and made landfall in Kilindoni (Mafia Island), southern Tanzania. The high sea surface temperatures across the region likely contributed to the unusual formation and intensity of these tropical cyclones.

There was also a notable shift from earlier bleaching patterns, with southern regions such as the Mozambique Channel and Southwest Madagascar experiencing less heat stress. Consequently, these areas reported fewer observations and limited cases of bleaching.

## Reference

- Indian Ocean Coral Bleaching Web Page: <https://cordioea.net/coral-reef-research/vulnerability/indian-ocean-coral-bleaching/>
- Coral Bleaching reporting dashboard: <https://www.arcgis.com/apps/dashboards/99a8c1212f264cbab7a3adb2982e0b6f>