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Embracing Addressing Marine Heatwaves-Our Urgent Environmental Challenge

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Marine heatwaves are prolonged periods of abnormally high sea surface temperatures, lasting from days to months and covering areas from a few kilometers to thousands of kilometers. Over the past few decades, as the ocean has absorbed over 90% of the excess heat from the climate system, the frequency and severity of marine heatwaves have significantly increased.

Marine heatwaves are a severe and increasing problem. At the April 2024 UN Ocean Science conference, experts stressed the urgent need for global cooperation to tackle these events. This article highlights the significant impacts of marine heatwaves on ecosystems and coastal communities, calling for immediate and coordinated action.

For example, 2023 saw frequent global coral bleaching events, with the fourth global coral bleaching affecting 30% of the ocean. This event led to the death of millions of corals, fish, mammals, birds, and plants, causing profound damage to global marine ecosystems. The 2021 marine heatwave off the northwest coast of North America resulted in the death of approximately one billion marine organisms. In 2023, New Zealand's North Island was flooded during Cyclone Gabrielle, highlighting the role of marine heatwaves in exacerbating extreme weather events.

The impacts of marine heatwaves extend beyond direct biological effects. They also lead to long-term ecological shifts and socioeconomic consequences. Coral reefs, often referred to as the "rainforests of the sea," are destroyed, disrupting fisheries and tourism, which directly affects coastal communities that depend on these ecosystems for their livelihoods.

To effectively address marine heatwaves, we need a clear and precise definition of these events. Researchers emphasize the importance of distinguishing between short-term extreme events and long-term warming trends. This distinction is crucial for accurately assessing risks and implementing targeted mitigation strategies.

The launch of China's new marine heatwave prediction product on May 12, 2024, represents significant progress in predictive technology. This tool provides timely and accurate forecasts of marine heatwave occurrences, enabling policymakers and resource managers to take proactive measures to mitigate their impacts.

Addressing marine heatwaves requires multifaceted efforts in scientific research, technological innovation, and international cooperation. We urge marine scientists to continue to deepen their understanding of the mechanisms driving these events and develop robust predictive models. Simultaneously, global efforts must focus on reducing greenhouse gas emissions, the root cause of ocean warming, to prevent further exacerbation of marine heatwaves.

The international community, including governments, research institutions, and coastal stakeholders, must collaborate to enhance monitoring, improve predictive capabilities, and implement adaptive strategies to protect marine ecosystems and human communities. The urgency of the situation cannot be overstated; now is the time for action.

Marine heatwaves are one of the most urgent challenges in marine science today. As we navigate

the complexities of climate change, we must prioritize the health of our oceans. Through global cooperation, we can mitigate the impacts of marine heatwaves and protect the livelihoods of millions of people who depend on marine resources. By preserving the resilience and biodiversity of our oceans, we leave a valuable legacy for future generations.