

Project summary

SCORE REEF

Spatio-temporal variability of coral reefs at the global scale: causalities, idiosyncrasies and implications for ecological indicators

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SCORE REEF is an innovative project that assesses the overall health of coral reefs. By combining global databases with long-term data series from the French overseas territories and other regions, it develops indicators aimed at guiding conservation actions for reefs, which are facing multiple pressures.

Context and objectives

Coral reefs are essential habitats that host exceptional biodiversity and provide crucial services supporting 500 million people worldwide. However, they are rapidly degrading due to climate change and other pressures such as overfishing and pollution. Today, it is difficult to precisely understand how all these problems combine, making it harder to make informed decisions to protect reefs. The SCORE REEF project aims to develop indicators to assess the state of coral reefs, taking into account both the taxonomic and functional aspects of biodiversity. These indicators are based on global and long-term data

to better understand reef dynamics in the face of environmental impacts.

Methods and approaches used for the project

The SCORE REEF project innovated with unique methodological approaches by combining bioenergetic modeling, artificial intelligence, and vast global datasets. This approach works like a toolkit: it uses simple and understandable indicators, as well as a detailed analysis of 14 key ecological functions, linked to the essential services that reefs provide to nature and humans.

Principal conclusions

The results revealed significant variability in how coral reefs function across different regions, time periods, and levels of disturbance. This unpredictability makes management more challenging and increases the risk of unforeseen ecological changes. However, acknowledging this diversity presents new opportunities for more effective action. While restoring reefs to their original state may seem unrealistic today, it remains possible to focus efforts on preserving the essential ecological functions they provide. This approach reflects a recent shift in thinking, which encourages us to rethink the future of reefs by accepting their ongoing changes and recognizing the difficulty of returning to past conditions. In this context, adaptive management strategies focused on enhancing resilience are becoming crucial. The future of coral reefs will depend on our ability to support their dynamic nature while safeguarding the services they offer in the face of growing environmental challenges.

Anticipated (or actual) impact of these results for science, society, and public and private decision making

From a scientific perspective, the results show that a functional approach allows for a more nuanced and accurate description of the state of coral reef ecosystems. Contrary to expectations, reefs with low coral cover and fish biomass can still perform well in certain functions, particularly in fish biomass production, which is crucial for human populations. From a management standpoint, this suggests that it is not always necessary to aim for high coral cover and fish biomass. Environmental variables also influence these dynamics and must be considered in management strategies. Expanding the range of states considered desirable for coral reefs could improve the ability to set realistic and achievable goals through tailored conservation strategies.

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