

Building Resilience into Coral Reef Management

There is no longer any doubt that the earth's climate is changing due to increased greenhouse gas emissions from human activities, causing rapidly warming seas. Warming seas are causing increased mass coral bleaching and mortality, with little evidence that corals and their symbionts can evolve fast enough to keep pace. In addition to these impacts, there is now strong evidence that acidifying seas (a direct consequence of rising CO₂ levels) are reducing calcification rates. Other consequences, such as rapid sea level rise and increased frequency and intensity of tropical storms, and impacts on other organisms and ecosystems, further emphasize the urgent need to constrain the build up of carbon dioxide in the atmosphere.

Projected changes in temperature and ocean acidity pose significant problems for reef-building corals. As reef-building corals build the habitat and ecosystem in which many tens of thousands of organisms live, these changes in global climate are causing major changes to the biodiversity of the ocean. Because coral reefs directly support at least 100 million people and multi-billion dollar industries like tourism and fisheries, these impacts will cause significant socio-economic impacts and threaten food security in developing nations.

There are two strategies that must be adopted to mitigate this threat to coral reefs. The first limits the cause of climate change, the second addresses the effects. Minimizing these effects requires management practices that enhance the capacity of coral reefs to resist and recover from impacts such as mass coral bleaching and mortality. This characteristic of coral reefs has been termed 'reef resilience'. The actions required to support reef resilience to climate change are:

Recommendations:

1. Minimize climate change by stabilizing atmospheric carbon dioxide at or below 450 ppm to ensure that further increases in sea temperature are limited to 2°C above pre-industrial levels and ocean carbonate ion concentrations do not fall below 200 mmol. kg⁻¹.
2. Formally recognise that climate change impacts such as mass coral bleaching will have similar social and economic consequences as droughts, oil spills and other disasters.
3. Mandate assessments of risk and vulnerability of coral reefs to climate change.
4. Mandate and finance actions to increase resilience of coral reef social-ecological systems, particularly through MPA networks comprising at least 30% of coral reefs and associated habitats in non-extraction zones, protection of water quality and herbivore populations, and adaptive governance.
5. Mandate and finance the development and implementation of coral bleaching response programs, including contingency funding.
6. Create incentives for development of partnerships for adaptation.

7. Increase investments in targeted messages to accelerate adaptation to climate change.
8. Invest in a new infrastructure for village-to-global education and communication for climate adaptation that will integrate traditional and scientific knowledge into implementation of adaptation strategies for coral reefs around the world.

Contact Theme Organising Groups: Billy Causey
Colleen Corrigan
Ove Hoegh-Guldberg
Paul Marshall
Lizzy Mcleod
David Obura
Heidi Schuttenberg
Naneng Setiasih