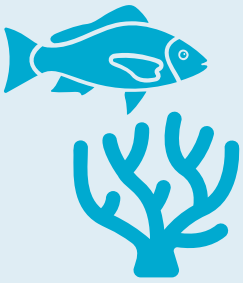
Marine ecosystems and fisheries

Key findings for the Pacific from the United Nations **Intergovernmental Panel on Climate Change's** (IPCC) Sixth Assessment Report (AR6) on Impacts, Adaptation and Vulnerability



MARINE HABITATS

are being impacted by

- ocean temperature rise
- sea level rise
- ocean acidification (CO_2)
- reduced oxygen levels (O_2)
- extreme weather events

CHANGES

- loss of coral and reef structure
- reduced fish biomass
- pest species outbreaks
- changes in fish distribution

Loss of marine and coastal biodiversity and ecosystem services is a key risk

Nature-based solutions can achieve many benefits

Adaptation options include diversifying livelihoods and changing practices

ADAPTATION

RIDGE TO REEF

approach uses best practices across the watershed

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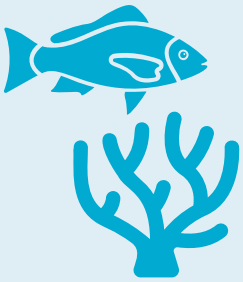


WHAT IS HAPPENING

Marine habitats such as coral reefs, mangroves and seagrass beds are being damaged and, in some cases destroyed. Marine habitats are being impacted by increasing ocean temperature, sea-level rise, extreme weather events, reduced ocean oxygen levels, and ocean acidification. The loss of habitat negatively impacts many marine species and shoreline protection. Furthermore, declines of important fish species are impacting food security.[2]

Long-lasting and more frequent marine heatwaves are placing pressure on marine species and ecosystems.* More frequent bleaching events are causing a loss of coral cover. In addition, bleaching events are happening closer together, leaving less time for reefs to adequately recover. [3]** Many Pacific islands have already documented declines in coral abundance.[4]

Mangroves face serious risks from climate change, deforestation and unsustainable coastal development. Mangroves are retreating closer to shorelines partly due to the rise in sea levels and are at risk of inundation-related mortality. Tropical cyclones also pose a major threat to these ecosystems. Many small islands have already recorded large-scale declines in mangrove populations.[5]

Increases in ocean temperatures are exacerbating the prevalence of marine pest species. Global projections suggest that disease is as likely to cause mortality in coral reefs as bleaching in the coming decades, with the Pacific being one of the earliest affected.[6]

Loss of marine and coastal biodiversity and ecosystem services is a key risk in small island states.[1] While coral bleaching is the most visible and widespread manifestation of climate change in small islands, there are many other impacts on marine ecosystems.

* = medium confidence (about 5 out of 10 chance)
** = high confidence (about 8 out of 10 chance)
*** = very high confidence (at least 9 out of 10 chance)

1 15.3.3.1.3
2 FAQ 15.3
3 Chapter 15, Executive Summary
4 15.3.3.1.3
5 15.3.3.1.3
6 15.3.3.1.3

WHAT COULD HAPPEN FURTHER

Climate change impacts, together with local human disturbances, will continue to impact on coral reef, seagrass, mangrove and sandy beach ecosystems.***
As these ecosystems disappear, so do fish and other dependent organisms that benefit industries such as ecotourism and fisheries.[7] Furthermore, ecosystem degradation leads to the loss of ecosystem services important to island communities.[8] For example, coral reefs, mangroves, and seagrass all reduce wave height and can protect human livelihoods. Furthermore, mangroves which can slow erosion may not be able to keep up with rising sea levels.[9]

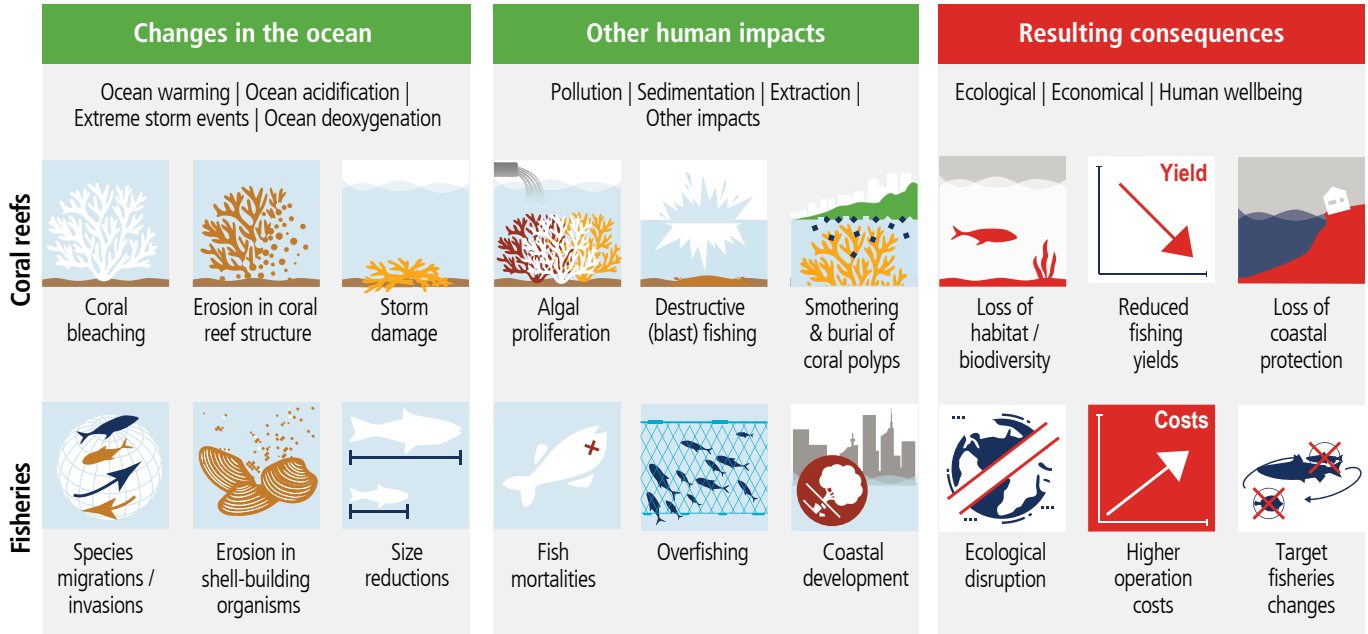
While not every reef is equally vulnerable to increasing temperatures - some may experience severe bleaching events on an annual basis under future climate scenarios.** This could lead to further loss of live coral cover and associated reef fish species, as well as lowering the potential for coral regrowth.[10] Furthermore, significant loss of reef-building corals may still occur in the coming decades under a warming scenario consistent with the 1.5°C Paris Agreement.**

Total animal biomass in the Pacific Ocean is expected to decline under future climate scenarios, affecting food availability.[11]* Further, a climate change related 20% decline in coral reef fish production in some Pacific Island countries by 2050 could result could result in demand for fish exceeding sustainable harvests.[12]

Climate change is projected to change the distribution of marine species essential for Pacific economies. For example, skipjack and yellowfin tuna are expected to move eastward. This will reduce the total tuna catch within the combined exclusive economic zones of 10 Pacific Island Countries and territories by approximately 10% by 2050.[13]

7 15.3.3.1.4
8 Chapter 15, Executive Summary
9 15.3.3.1.4
10 15.3.3.1.1, 15.3.4.4
11 SPM.B.4.3
12 15.3.4.2
13 Chapter 15, Table 15.5
14 See 'Marine ecosystems and fisheries' Factsheet for more information.

Impacts and resulting consequences of climate change and other human impacts on coral reefs and fisheries



Coral reefs and fisheries are being impacted by both climate-related and human impacts. Preventing negative human impacts on ecosystems can reduce their exposure to climate hazards [5.21], for example, through ridge to reef management systems.[14]

RESPONSE OPTIONS

Nature-based solutions can achieve multiple benefits when well-designed and implemented.** Integrating Indigenous Knowledge and Local Knowledge (IKLK) is highly relevant for these solutions. IKLK has informed nature-based adaptation projects in Fiji by identifying native species suitable to strengthen the coastal environment and reduce coastal erosion.[15] Other nature-based solutions include watershed management, habitat restoration and mangrove replanting to strengthen exposed coastal foreshore.[16] However, the effectiveness of nature-based solutions can be hindered by warming and other climate stressors.[17]

A 'Ridge to Reef' management approach can improve marine ecosystem protection services and resilience. This approach incorporates better management of forests, nutrients and upstream wastewater to reduce coral reefs exposure to human impacts.[18]

Coastal fishers are already adapting to changes in environmental conditions. This has been done by diversifying livelihoods (e.g. into tourism), expanding aquaculture production, enhancing existing social networks and support systems to cope with reduced catches, switching fishing grounds and changing target species.[19] Future support may include the provision of informal food store credit for fishers after disasters, as has occurred elsewhere.[20] Furthermore, future increased inland rainfall could open new areas for inland aquaculture in the Solomon Islands, reducing pressure from coastal fishing.[21]

* = medium confidence
** = high confidence
*** = very high confide

Adaptation solutions that address climate-change risk[22]

Marine and coastal nature-based solutions
- Habitat restoration
- Marine protected areas and OECMs
- Conservation of climate habitat sanctuaries
- Sustainable harvesting
- Climate adaptive management
- Ecosystem-based management

Socio-institutional adaptation
- Knowledge diversity
- Socially inclusive policies
- Participation
- Livelihood diversification
- Mobility
- Finance and market mechanisms
- Disaster response programs
- Multi-level ocean governance
- Institutional transboundary agreements

Built infrastructure and technology
- Accommodation and relocation
- Protection and beach and shore nourishment
- Early warning systems
- Seasonal and dynamic forecasts
- Monitoring systems
- Active restoration
- Assisted evolution

Ridge-to-reef management: On small islands, land, coastal and marine ecosystems are interconnected and independent, with each system contributing towards maintaining the health of the others. The protection or restoration of one or more of these ecosystems will provide benefits to the others. Together, these ecosystems can provide protection services against natural hazards.[23]

15 15.5.4
16 FAQ 15.2; See Chapter 3, Table 3.3 for a detailed assessment of nature-based solutions
17 Chapter 3, Executive Summary
18 Table 15.6; for further detail see Figure 15.4
19 FAQ 15.2
20 Chapter 15, Table 15.7
21 15.5.6
22 3.23
23 15.4

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