



Status of Coral Reefs of the World: 2020

Chapter 1. Introduction

Edited by: David Souter, Serge Planes, Jérémy Wicquart, Murray Logan, David Obura and Francis Staub



Australian Government



AUSTRALIAN INSTITUTE
OF MARINE SCIENCE



Australian Government
Department of Foreign Affairs and Trade



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Chapter 1.

Introduction

The International Coral Reef Initiative (ICRI)

The International Coral Reef Initiative (ICRI) is the only international partnership, between nations and organizations, focussing solely on the protection of coral reefs and related ecosystems worldwide.

The Initiative was founded in 1994 by eight governments: Australia, France, Japan, Jamaica, the Philippines, Sweden, the United Kingdom, and the United States of America. It was announced at the First Conference of the Parties of the Convention on Biological Diversity (CBD) in December 1994, and at the high-level segment of the Intersessional Meeting of the United Nations Commission on Sustainable Development in April 1995. The work of ICRI has been pivotal in continuing to highlight globally the importance of coral reefs and related ecosystems to environmental sustainability, food security and social and cultural wellbeing. The work of ICRI is regularly acknowledged in United Nations documents, highlighting the Initiative's important cooperation, collaboration and advocacy role within the international arena. Most recently, ICRI's engagement has been pivotal in providing technical contributions on coral reefs to the post-2020 global biodiversity framework of the CBD, which establishes the next generation of biodiversity conservation targets to 2030 and 2050, and the indicators required to monitor progress toward their achievement.

The Global Coral Reef Monitoring Network (GCRMN)

The Global Coral Reef Monitoring Network (GCRMN) was established as an operational network of ICRI in 1995. It has worked through regional nodes, with a mandate to aggregate data and report on coral reef health at regional and global levels, to build local and national capacity in coral reef reporting, and to improve actions to sustain coral reefs in response to priorities set across all these levels. In December 2018, an Implementation and Governance Plan¹ (IGP) was adopted to strengthen GCRMN in tracking and reporting on coral reef status and trends.

The primary outputs of the GCRMN are regional, global and thematic reports on coral reef status and trends. The role of regions in coordinating and organising the aggregation and reporting of data is central to the GCRMN and in many regions, relies on the UNEP Regional Seas Programme. Key partners and supporters to the GCRMN include other international and inter-governmental bodies and entities with relevant mandates and expertise that support coral reef monitoring.

¹ GCRMN 2019. GCRMN Implementation and Governance Plan. International Coral Reef Initiative (ICRI). Available: <https://www.gcrmn.net/about-gcrmn/igp/>

GCRMN Status Reports

2018 - Status of Coral Reefs in East Asian Seas Region
 2018 - Status and Trends of Coral Reefs of the Pacific
 2017 - Status of Coral Reef in the Western Indian Ocean
 2014 - Status of Coral Reefs in East Asian Seas Region
 2012 - Status and Trends of Caribbean Coral Reefs: 1970-2012
 2011 - Status of Coral reefs of the Pacific and outlook
 2010 - Status of Coral Reefs in East Asian Seas Region
 2008 - Status of Coral Reefs of the World
 2005 - Status of Coral Reefs in Tsunami-affected Countries
 2005 - Status of Caribbean Coral Reefs after Bleaching and Hurricanes
 2004 - Status of Coral Reefs of the World
 2004 - Status of Coral Reefs in East Asian Seas Region
 2002 - Status of Coral Reefs of the World
 2000 - Status of Coral Reefs of the World
 1998 - Status of Coral Reefs of the World

UNEP Regional Seas with coral reefs

- **Caribbean Environment Programme (CEP)** – member of the GCRMN Steering Committee
- **Coordinating Body on the Seas of East Asia (COBSEA)**
- **Regional Organisation for Protection of the Marine Environment (ROPME) Sea Area**
- **The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA)**
- **South Asia Cooperative Environment Programme (SACEP)** – supports the South Asian Coral Reef Task Force. Member of the GCRMN Steering Committee
- **The Nairobi Convention** - supports the Nairobi Convention Coral Reef Task Force (CRTF)
- **Secretariat of the Pacific Regional Environment Programme (SPREP)** – recently released a Pacific Coral Reef Action Plan 2020- 2030. Member of the GCRMN Steering Committee

The international policy context for coral reefs

Coral reefs feature prominently in global policy initiatives owing to their immense value for biodiversity and for peoples' livelihoods and welfare, and their increasingly threatened status. The 2019 global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Service (IPBES), and the Intergovernmental Panel on Climate Change (IPCC) Special Report on the Ocean and Cryosphere in a Changing Climate, warn that:

- Over half of the world's coral reefs have been lost;
- At warming of 1.5°C, 70-90% of the world's coral reefs are expected to be lost. At 2°C degrees, this increases to >99% loss of coral reefs.

Value of ecosystem services provided by coral reefs

- **Human health and wellbeing:** 70% of the protein in the diets of Pacific Islanders comes from reef-associated fisheries (SDGs 2, 3, 6, 9 & 14; Aichi Biodiversity Targets 13, 14, 16).
- **Shoreline protection:** a healthy coral reef can reduce coastal wave energy by up to 97%. Globally, USD6 billion of built capital is protected from flooding by coral reefs (SDGs 1, 8, 11, 13, 14).
- **Food security and livelihoods:** coral reef fisheries support as many as six million people and are worth USD6.8 billion per year, providing an average annual seafood yield of 1.42 million tonnes (SDGs 2, 4, 5, 8, 12, 13, 14, 16).
- **Tourism:** coral reef tourism contributes USD36 billion to the global tourism industry annually (SDGs 2, 4, 5, 6, 8, 9, 12, 14).
- **Biodiversity:** coral reefs support approximately 4,000 species of fish and 800 species of hard corals, Globally, about 830,000 species of multicellular plants and animals are estimated to occur on coral reefs, of which an estimated 13% are unnamed and 74% are yet to be discovered. Most of these species are cryptic, small and relatively rare.
- **Medicines:** coral reefs are the medicine chests of the 21st century, with more than half of all new cancer drug research focusing on marine organisms.

Reflecting their importance and the urgency of their predicament, over 230 international policy instruments, and more than 590 voluntary commitments support conservation and sustainable management of coral reef ecosystems². In 2019, the United Nations Environment Assembly (UNEA), the world's highest-level decision-making body on the environment, adopted a resolution on 'Sustainable coral reef management'. During the G7 Environment Ministers' Meeting in Metz, France (May, 2019), coral reefs were highlighted on the ministers' agenda. In 2018, Governments of the Commonwealth adopted the Commonwealth Blue Charter, a principles-based agreement by all 54 member governments to actively cooperate to tackle ocean-related challenges, including coral reef protection and restoration.

In 2017, His Serene Highness Prince Albert II of Monaco was joined by His Royal Highness the Prince of Wales and Her Majesty Queen Noor of Jordan, and by the Heads of State, Ministers and high-level representatives of 12 countries to launch the Coral Reef Life Declaration³.

The years 2020 and 2021 present new opportunities for major global policy changes to support coral reefs. Under the CBD, the post-2020 global biodiversity framework (GBF) will succeed the Strategic Plan for Biodiversity 2011–2020 and the Aichi Targets. ICRI submitted a recommendation to the CBD to include coral reefs in the new framework to ensure that matters relating to the critical status of

² UN Environment (2019) Analysis of Policies related to the Protection of Coral Reefs-Analysis of global and regional policy instruments and governance mechanisms related to the protection and sustainable management of coral reefs. Karasik, R., Pickle, A., Roady, S.A., Vegh, T. and Virdin, J. (Authors). United Nations Environment Programme, Nairobi, Kenya. [https://www.icriforum.org/wp-content/uploads/2020/05/Coral_Policy%20\(1\).pdf](https://www.icriforum.org/wp-content/uploads/2020/05/Coral_Policy%20(1).pdf)

³ To date the the Coral Reef Life Declaration was signed by the following countries and economies (alphabetic order): Australia, Cook Islands, Costa Rica, Ecuador, Fiji, France, French Polynesia, Grenada, Indonesia, Mexico, Monaco, Mozambique, Niue, New-Caledonia, Palau, the Philippines, Seychelles, United Kingdom, Vanuatu.

enormously diverse ecosystems will be appropriately addressed. The recommendation identified six key indicators for incorporation into the monitoring framework of the GBF to effectively track coral reef health and status. Further, at its 26th Conference of Parties at the end of 2021, the UN Framework Convention on Climate Change will evaluate Nationally Determined Contributions of countries in achieving the Paris Agreement, and much higher ambition will be needed to keep warming within safe levels for coral reefs.

Coral reef indicators recommended by ICRI for inclusion in the monitoring framework of the Global Biodiversity Framework.

- Hard coral cover* and composition*
- Cover of fleshy algae* and other benthic groups*
- Fish abundance and biomass*
- Global coral reef extent
- Red List of Ecosystems
- Protected area coverage of coral reefs
- Index of coastal eutrophication

* indicates indicators analysed in this report;

+ indicates indicators collected by the GCRMN but not yet with sufficient consistency to compile and quantitatively analyse at a global scale.

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, across all countries. At its heart are the 17 Sustainable Development Goals (SDGs), providing a narrative for how ending poverty must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic prosperity, all while preventing dangerous climate change and halting and reversing declines in nature. Coral reefs and associated ecosystems directly support at least 10 of the goals and 25 targets within the goals.

This report

This report provides new findings on the status and trends of the world's coral reefs, and is the first such report in 13 years. It is targeting a large audience from national policy makers, to coral reef managers, and of course, the general public.

During 2021-22, against the backdrop of the COVID-19 pandemic, key global policy processes will redefine the environmental agenda for the next decade and beyond. Thus, the timing of the release of this report provides an unprecedented opportunity to contribute to global decisions on biodiversity, climate and sustainable development. We hope that this report, and its findings, will help inform decision-makers to set ambitious targets in the global biodiversity framework of the Convention on Biological Diversity, to strengthen the climate action of all countries to keep the Paris

Agreement-aligned temperature limit within reach, and revitalise actions to deliver on the Sustainable Development Goals.

This report also supports calls by the International Coral Reef Society at its 16th Symposium in July 2021 to reinvigorate commitment to coral reef conservation by reducing global threats, building reef resilience locally to withstand change, and support innovations in restoration and rehabilitation tools to get coral reefs through the coming decades of threats and rebuild them at scale in the future.

This report is also a concrete step reaffirming the GCRMN as the reference network for reporting on the status and trends of coral reefs worldwide. As part of the global 'ecosystem' of data and monitoring networks reporting on biodiversity in the ocean (i.e. the Global Ocean Observing System and Marine Biodiversity Observing Network of GEOBON), and as the UN Decade on Ocean Science for Sustainability opens, this report presents the GCRMN's ongoing role and commitment towards building capacity at national and regional levels, sharing scientific information and knowledge, and building technical and scientific cooperation, technology transfer and innovation. The report focuses on two key indicators proposed in the monitoring framework of the GBF, establishing a baseline for the GBF and the Ocean Decade for coral reefs.

Box 1.

Policy and Management Solutions

Gabriel Grimsditch¹, Caren Eckrich², Lina Mtwana Nordlund³, Ulrike Kloiber⁴, Joannie Jomito⁵

¹United Nations Environment Program

²STINAPA Bonaire

³Uppsala University

⁴Chumbe Island Coral Park

⁵WWF

Coral reefs are resilient to disturbance events when anthropogenic stressors on the ecosystem are managed and reduced. Coral reefs ‘bounce back’ from major disturbance events such as mass coral bleaching when they are remote from human influence or when management and policy interventions reduce causes of degradation. Integrated coastal management and policy approaches that include all stakeholders in the management of coral reefs and benefit local communities can improve the chances of survival for coral reefs in an uncertain future. Here we highlight three case studies that illustrate different scales and approaches to coral reef management with benefits to both local communities and coral reef resilience.

Case study 1: Chumbe Island Coral Park, Tanzania

Chumbe Island Coral Park (CHICOP), is a privately established and managed island nature reserve and includes a 55.06 ha reef sanctuary with diverse habitats such as sandy shores, seagrass meadows, a fringing coral reef, and a 16.64 ha forest reserve with mangrove and tropical dry forest¹. The island is located off the west coast of Unguja island, Zanzibar, Tanzania. Some of the main threats to coral reefs in the area include beach seining, overfishing, coral mining, and pollution from sewage and coastal development². The reserve was recognized by the Government of Zanzibar in 1994, defining the area as a no-take-area where “no fishing or any extractive use shall be permitted in the area so declared”, even for research³. CHICOP started ecotourism operations in 1998 and, since 2006, the income has been sufficient to cover recurrent management costs, making the marine park financially sustainable⁴. By working with a broad section of stakeholders, including government agencies; fishers and local communities; schools, universities and academic institutions; non-governmental organizations; and the tourism industry, CHICOP has shown remarkable success in coral reef

¹ CHICOP (2017) 3rd Ten Year Management Plan for Chumbe Island Coral Park. https://chumbeisland.com/wp-content/uploads/2017/12/Chumbe_Management_Plan_2017-2027.pdf

² UNEP (2019): Enabling Effective and Equitable Marine Protected Areas –guidance on combining governance approaches. Case Study Compendium. Authors -Jones PJS, Murray RH and Vestergaard O. https://wedocs.unep.org/bitstream/handle/20.500.11822/27851/MPA_CS.pdf?sequence=1&isAllowed=y

³ Nordlund et al 2013. Chumbe Island Coral Park—governance analysis <https://doi.org/10.1016/j.marpol.2012.018>

⁴ OECD, 2017. Marine Protected Areas: Economics, Management and Effective Policy Mixes (<https://dx.doi.org/10.1787/9789264276208-en>)

management. The advisory committee for the marine protected area has two representatives from private sector entities and eleven representatives from different stakeholder groups and institutions, mainly departments of the Government of Zanzibar, research organizations and community leaders from adjacent villages. CHICOP works in collaboration with the Department of Fisheries Development for any legal prosecutions needed to enforce the 0.55 km² no-take-zone². This is a good example of a successful public-private partnership for coral reef conservation. Local fishers have also been retrained as unarmed park rangers who “enforce” the protected area by informing local fishers of the value of the protected area for fisheries and livelihoods. Thanks to enforcement efforts, benthic communities within the reserve have remained healthy, with increases in both hard and soft coral cover, and decreases in the cover of algal turf and macroalgae. In 2015, Chumbe Reef had live hard coral cover of around 75%, with at least 59 genera of scleractinian coral present⁵. In addition, the incidence of coral disease is very low¹ and recovery from bleaching events has been good⁶. The reef has 514 recorded reef fish species and has had a steady increase of fish biomass over the past 10 years¹. Spillover catch benefits for the local fishing community have been reported, enhancing local support for the park and keeping illegal fishing incidents low⁴. Positive relationships and frequent communication of the livelihoods benefits for the local community have been critical for the success of Chumbe Island, which is today one of the most biodiverse and resilient coral reefs in East Africa.

Case study 2: Bonaire National Marine Park

Bonaire is a small island north of Venezuela whose economy is based largely on coral reef tourism. For 40 years, STINAPA, the national parks authority of this Dutch Caribbean island, has been actively managing the coral reefs through regulation and outreach initiatives. Since the 1970s, there has been a steady decline in coral reef cover throughout the Caribbean⁷. However, biennial monitoring since 2003 demonstrates evidence of coral reef resilience on Bonaire's reefs, with an increase in coral cover, an increase in the density of juvenile corals and a decrease in macroalgal cover since 2015⁸. In addition, recent coral restoration projects with endangered staghorn and elkhorn corals (*Acropora palmata* and *A. cervicornis*) have been highly successful⁹. Some highlights in a long history of local conservation measures include: a ban on spearfishing in 1971; the legal protection of all corals in 1975; mooring buoys replacing anchoring in 1978; the establishment of the Bonaire National Marine Park (BNMP) in 1979 with marine park orientations mandatory for all divers; the creation of no-fishing zones in 2008; the passing of legislation protecting vulnerable marine species including parrotfish, sharks and rays in 2010; the implementation of a lionfish control program in 2010; the listing of BNMP under the Specially Protected Areas and Wildlife Protocol in 2012; and

⁵ Zvuloni, Assaf, V.W. Robert and Y. Loya (2010) Diversity partitioning of stony corals across multiple spatial scales around Zanzibar Island, Tanzania. *Plos One* 5(3), pp.e9941

⁶ Obura et al, 2017. Coral reef status report for the Western Indian Ocean <https://gcrmn.net/wp-content/uploads/2019/03/COI-REEF-LR-F2.compressed.pdf>

⁷ Jackson JBC (author), Donovan MK, Cramer KL, Lam VV (editors; 2014). Status and Trends of Caribbean Coral Reefs: 1970-2012. Global Coral Reef Monitoring Network, IUCN, Gland, Switzerland.

⁸ Steneck RS and Wilson M (2019). Status and Trends of Bonaire's Reefs in 2019: managing to stay healthy but concerns remain. Report to STINAPA Bonaire. (https://stinapabonaire.org/wp-content/uploads/2019/02/2017_-Steneck-Wilson_Status-and-Trends-of-Bonaire%E2%80%99s-Reefs-in-2017-.pdf)

⁹ Reef Renewal Bonaire Annual Report 2019

the installation of a wastewater treatment plant that treats wastewater from large hotels and businesses near the coast in 2015. Furthermore, STINAPA provides nature education classes and field trips as an integral part of the local school curriculum. After-school programs for youth, such as the Tortuganan program since 1995 and the Junior Ranger program since 2010, raise awareness of nature conservation from a young age. In Bonaire, the dive industry and other tourism operators are largely responsible for collecting the nature conservation fees that finance the park. With an island economy increasingly dependent on tourism, a major challenge is to regulate recreation and uncontrolled urban development. The BNMP demonstrates that sustained local action and transparent governance can effectively increase coral reef resilience.

Case study 3: Tun Mustapha Park, Malaysia

The Tun Mustapha Park (TMP) in Sabah State, Malaysia was gazetted in 2016 after more than 13 years of negotiation, lobbying, capacity-building, scientific research and community outreach by a range of government agencies, non-government organizations and international supporters. It covers an area of almost 900,000 hectares, making it the largest multi-use park in Malaysia where conservation, sustainable resource use and development can occur under a common management system¹⁰. The establishment of TMP as a multiple-use park under IUCN Category VI (Protected Area with Sustainable Use of Natural Resources) is the first of its kind in Malaysia, and the first under the Coral Triangle Initiative^{11,12}. TMP is regarded as a priority seascape within the Coral Triangle, which is acknowledged as the centre of the world's coral reef biodiversity. It is a home to more than 250 species of hard corals, around 430 species of fish, endangered turtles and dugongs, and significant mangroves and seagrass meadows. It supports more than 85,000 coastal people through fisheries, which collectively produce around 100 tonnes of fish per day with an estimated value of USD200,000. However, it is threatened by overfishing, destructive fishing that causes habitat degradation, land conversion and pollution as well as climate change.

There are three main objectives for the park: 1) to eradicate poverty; 2) to develop economic activities that are environmentally sustainable; and 3) to conserve habitats and threatened species. The zoning and planning process for the marine park was facilitated by a Zoning Working Group under a multi-stakeholder committee representing the region's interests and chaired by the Sabah Ministry of Tourism, Culture and Environment. Systematic conservation planning using Marxan software was used to zone the park into no-take and multiple-use areas, based on scientific data describing both social and ecological aspects of the ecosystem. Many communities depend on the coral reefs for subsistence and livelihoods through small-scale fishing, and impacts on these communities were minimized by maintaining access to fishing grounds in community-managed or multi-use zones. While zones were planned

¹⁰ Jumin, R., Binson, A., McGowan, J., Magupin, S., Beger, M., Brown, C., . . . Klein, C. (2018). From Marxan to management: Ocean zoning with stakeholders for Tun Mustapha Park in Sabah, Malaysia. *Oryx*, 52(4), 775-786. doi:10.1017/S0030605316001514

¹¹ Weeks, R., Alino, P.M., Atkinson, S., Belida, II, P., Binson, A., Campos, W.L. et al. (2014) Developing marine protected area networks in the Coral Triangle: good practices for expanding the Coral Triangle marine protected area system. *Coastal Management*, 42, 183 - 205

¹² Beger, M., McGowan, J., Treml, E.A., Green, A.L., White, A.T., Wolff, N.H. et al. (2015) Integrating regional conservation priorities for multiple objectives into national policy. *Nature Communications*, 6

and prioritized using Marxan software, comprehensive stakeholder consultations were key to their implementation. The final Marxan scenario used a target of 30% of key habitats to be designated in fully protected no-take zones, with 70% of traditional fishing grounds remaining accessible.

Four priority zones were identified: 1. Preservation zones - where all extractive activities are prohibited; 2. Community managed zones - where non-destructive small-scale and traditional fishing activities are allowed; 3. Multiple-use zones - where non-destructive and small-scale fishing activities and other sustainable development activities, including tourism are allowed; and 4. Commercial fishing zones - where all legal commercial fishing activities are allowed. Further, an innovative approach using climate change scenarios was used to make the management plan and zoning as climate-resilient as possible. Climate vulnerability assessments identified areas of higher or lower potential exposure and resilience to climate change impacts, and climate model projections of future coral bleaching stress were combined with knowledge of spatial variation in human activities to prioritize areas for conservation. Using climate data in marine spatial planning is a key innovation in this marine park.

Through an 'Ecosystem-Approach to Fisheries Management (EAFM)', the promotion of sustainable fishing was achieved by engaging the fishing communities and addressing issues such as the status of the resource, the health of the marine environment, and post-harvest technology and trade. Economic valuations and cost-benefit analyses were also key tools in informing stakeholder engagements and making the case for the value of the marine park and zoning plan. The multiple-use park management approach has ensured that all the interests of the various stakeholders have been taken into consideration to achieve the social and ecological objectives of the TMP.



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École Pratique
des Hautes Études

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