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INTERNATIONAL
CORAL REEF INITIATIVE

CASE STUDY 2.

THE REPUBLIC OF PALAU

The case studies form part of the International Coral Reef Initiative's Guidance Document on Integrating Coral Reefs and Associated Ecosystems into National Biodiversity Strategies and Action Plans.

SECTION 1.
INTRODUCTION

The Republic of Palau is the westernmost nation of Micronesia, situated north of the island of New Guinea and east of the southern Philippines. Palau consists of more than 586 islands across 629,000 km^2 of ocean. The country has eight principal islands, with the island of Babeldaob making up nearly three-quarters (73%) of Palau's land area of 456 km2.

The most populous islands are Anguar, Babeldaob, Peleliu and Koror, with about two-thirds of the population living on the latter island. The uninhabited Rock Islands containing the iconic marine lakes are south-west of the main island group. The country is made up of 16 states and has a total population of 21,779 (2023)[1] , with 82% classed as urban (2022)[2].

Palau has a diversity of rich coral reefs including fringing, barrier and atoll reefs that cover 525 km^2 [3] , with additional hard bottom areas increasing this to 892 km^2. Marine habitats cover approximately 1,478 km^2 with 47 km^2 [4] of mangroves and 75 km^2 of seagrass meadows[5]. Palau has the most diverse coral reef fauna in Micronesia with 425 coral species, 1700 fishes, 302 molluscs and 234 species of crustaceans[6]. These diverse reefs are a major source of economic revenue through tourism, with 80% of visitors coming to dive on coral reefs. Coral reefs and associated ecosystems also support a mix of subsistence, artisanal and commercial fisheries. The marine and coastal ecosystems of Palau are critical for the provision of food, income and livelihoods for Palauan people.

1- https://www.census.gov/data-tools/demo/idb/#/dashboard?COUNTRY_YEAR=2023&COUNTRY_YR_ANIM=2023&FIPS_SINGLE=PS&CCODE_SINGLE=PW&CCODE=PW
2- https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=PW
3- Yukihira, H., Shimoike, K., Golbuu, Y. et al. 2007. Coral reef communities and other marine biotopes in Palau. In: Coral Reefs of Palau, H. Kayanne et al. (eds.). Palau International Coral Reef Center: Koror, Republic of Palau, p. 231.
4- Chin, A., Lison de Loma, T., Reytar, K., et al. 2011. Status of Coral Reefs of the Pacific and Outlook. Global Coral Reef Monitoring Network. 260 p.
5- McKenzie, L.J., Yoshida, R.L., Aini, J.W. et al. 2021. Seagrass ecosystems of the Pacific Island Countries and Territories: A global bright spot. Marine Pollution Bulletin 167: 112308.
6- Yukihira, H., Shimoike, K., Golbuu, Y. et al. 2007. Coral reef communities and other marine biotopes in Palau. In: Coral Reefs of Palau, H. Kayanne et al. (eds.). Palau International Coral Reef Center: Koror, Republic of Palau, p. 231

SECTION 2.

PRESSURES AND IMPACTS ON TROPICAL COASTAL AND MARINE ECOSYSTEMS

The coral reefs and associated ecosystems of Palau are subject to both acute and chronic disturbances but have been relatively resilient to date[7]. Chronic disturbances are mainly caused by over-harvesting of marine species such as reef fish and terrestrial run-off polluting coastal waters[8 9].

These effects are strongest adjacent to the more populated islands and coastlines. The major disturbances that have affected Palau's coral reefs over large spatial scales over the past few decades are linked to the climate: the 1998 mass coral bleaching event and two super typhoons[10]. There was a 43% loss of live coral cover after the 1998 mass bleaching event with recovery of coral reefs taking between 9 to 12 years[11]. Typhoons Bopha and Haylan in 2012 and 2013 caused a decrease in coral cover of more than 80% for outer reef habitats on eastern reefs[12]. Recovery of eastern coral reefs is progressing slowly through natural coral recruitment.

Chronic stressors are also affecting coral reef health in Palau with greater effects on inshore and patch reefs that are subjected to higher fishing pressure[13] and greater levels of pollution from run-off. High levels of local-, tourism- and export-driven demand for fresh fish resulted in the over-exploitation of Palau's reef fish populations[14]. The threat from the overfishing of reef fish to coral reef ecosystems led to the passing of a national law in 2020 to ban the export of all living resources that inhabit reef areas[15].

Coastal and watershed development to support changes in land use, infrastructure (construction and road building) linked to tourism expansion, resulted in increased erosion and sedimentation and poorer water quality for coastal waters around more populous islands such as Babeldaob and Koror. In addition to the clearance of terrestrial and mangrove forests, poor farming practices contributed to sediment pollution. Studies conducted by the Palau International Coral Reef Center (PICRC) revealed that the coral reef degradation was a direct result of land-based sediments with reefs in Airai Bay, a lagoon in south-eastern Babeldaob, particularly affected by sediment. This led to the establishment of the Belau Watershed Alliance (BWA), which successfully merged the interests of communities, government agencies, conservation practitioners, and traditional leaders to protect entire watershed areas that ultimately protect the water source[16]. Although watershed management has improved markedly for Babeldaob through the work of the BWA, sedimentation remains an issue for coral reefs and associated ecosystems in other parts of Palau.

7- Gouezo, M., Nestor, V., Otto, E.I., et al. 2019. Palau's coral reefs are generally in good condition apart from reefs still recovering from typhoon damages. Palau International Coral Reef Center. PCRC Technical Report 20-09. December 2019.
8- Golbuu, Y., Wolanski, E., Harrison, P., et al. 2011. Effects of land-use change on characteristics and dynamics of watershed discharges in Babeldoab, Palau, Micronesia. Journal of Marine Biology 2011: 1-17.
9- Bejarano, S., Golbuu, Y., Sapolu, T., and Mumby, P. 2013. Ecological risk and the exploitation of herbivorous reef fish across Micronesia. Marine Ecology Progress Series 482: 197-215.
10- Gouezo, M., Golbuu, Y., van Woesik, R. et al. 2015. Impact of two sequential super typhoons on coral reef communities in Palau. Marine Ecology Progress Series 540: 73-85.
11- Gouezo, M., Golbuu, Y., Fabricius, K. et al. 2019. Drivers of recovery and reassembly of coral reef communities. Proceedings of the Royal Society B: Biological Sciences 286:10.
12- Nestor, V., Otto, E.I., Olsudong, D. et al. 2023. Palau reefs after 19 years of monitoring show steady recovery from Typhoon. Palau International Coral Reef Center. PCRC Technical Report 23-08. August 2023.
13- Muller-Karanassos, C., Filous, A., Friedlander, A.M. et al. 2021. Effects of habitat, fishing and fisheries management on reef fish populations in Palau. Fisheries Research 241.
14- National Environmental Protection Council. 2017. State of the Environment Report – Republic of Palau. 76 pp. Independent Report presented to the President of the Republic of Palau.
15- Republic of Palau Public Law (RPPL) No. 10-54. 2020. To ban the export of any living resource that primarily inhabits the reef areas, territorial sea, and internal water of the Republic.
16- https://reefresilience.org/case-studies/palau-land-based-pollution/

SECTION 3.
PRIMARY TYPE OF CORAL REEF (OR ASSOCIATED ECOSYSTEM) INTEGRATION

Theme: SAFEGUARDING SPECIES AND ECOSYSTEMS

A revised (second) version of the Republic of Palau's NBSAP was published in 2016 and covers a ten year period from 2015 to 2025[17].

The aim of the revised NBSAP is to *"encourage, guide and coordinate an integrated national process that will engage stakeholders across sectors to achieve the holistic conservation and sustainable use of biodiversity while protecting and enhancing economic opportunity, sustainability of livelihoods, food security, culture and the environment for present and future generations"*. The policy document includes the following key strategic areas: i. protected/managed areas; ii. species protection; iii. biosecurity/invasive species and bio-safety; iv. integrating biodiversity and ecosystem services into development policies; v. reducing direct pressures on biodiversity through sustainable use; vi. ensuring food security through maintenance of agricultural biodiversity; and vii. mainstreaming conservation. All strategic areas can be linked to coral reefs and associated ecosystems either directly or indirectly. Of the seven listed, strategic areas for protected/managed areas, species protection and reducing direct pressures are all highly relevant for coral reefs and associated ecosystems in Palau. This section focuses on species protection (Strategic Area 2) which falls within the 'safeguarding species and ecosystems' theme.

Directives for Strategic Area 2 – Species Protection are focused on improving the understanding of conservation needs for species in Palau and creating strategies to identify and protect high priority species (from extinction). The main objectives are to improve species protection by creating a comprehensive inventory of species, evaluating conservation priority status and developing species-specific management strategies for high priority species. The overall goal (Goal 2 of the Palau NBSAP)) is **to maintain healthy populations of key species and habitats.** Species groups that are found in coral reef ecosystems are specifically mentioned in Objective 2.2 for this

strategic area: "Assess conservation needs of high priority species (i.e. **corals, fish, edible macro invertebrates**, bats, birds, plant species)". Once the status of these high priority species and habitats was assessed then a national strategy and action plan for protecting and conserving vulnerable and endangered species was developed as part of Objective 2.3 (Develop appropriate and specific management strategies for high priority species). For the national strategy and species-specific management strategies the NBSAP emphasised the use of ecosystem-based conservation approaches including the Ridge to Reef approach, integrated water resources management (IWRM) and the ecosystem approach to fisheries. Implementing these approaches would ensure that coral reefs and associated ecosystems (mangroves and seagrass beds) are all included in conservation and management strategies for the marine and coastal environment of Palau.

17- The Republic of Palau Revised National Biodiversity Strategy and Action Plan 2015-2025: Promoting Wise Development to Achieve Conservation and Sustainable Use of Biodiversity. Palau Conservation Society, Policy and Planning Department, November 2016, Malakal, Koror, Palau.

SECTION 4.
SECONDARY TYPE OF CORAL REEF (OR ASSOCIATED ECOSYSTEM) INTEGRATION

Theme: ADDRESSING UNDERLYING CAUSES OF BIODIVERSITY LOSS AND MAINSTREAMING

Palau's revised NBSAP includes a key strategic area that focuses on mainstreaming conservation to build broad engagement and support across all sectors so that measures for the conservation and sustainable use of biodiversity are implemented effectively (Strategic Area 7).

Although coral reefs and associated ecosystems are not specifically mentioned under this strategic area it is assumed that marine and coastal biodiversity will be an integral part of the mainstreaming policy within the NBSAP. The specific goal (Goal 7) is that **biodiversity conservation and sustainable resource use is integrated into all aspects of government and community planning, development and operations.** Strategic Area 7 includes seven objectives to comprehensively build conservation awareness and engagement across multiple sectors in Palau while also building conservation capacity both for the public and for government and civil society organisations. The policy directives for mainstreaming conservation will be achieved by:

- Increasing public awareness of biodiversity issues and engagement in the environmental decision making process.
- Integrating biodiversity education into school curriculum at all levels through the Ministry of Education.
- Establishing sustainable cooperatives (including for reef fisheries, coastal aquaculture and tourism) and civic associations for individuals and businesses engaged in the use of biological resources to encourage stakeholder input and enable communities to better participate in conservation initiatives.
- Building organisational/institutional capacity of government/civil society to monitor and assess progress towards conservation goals, and.
- Enabling better information/knowledge exchange at the local, regional and global level through cooperative research between agencies within Palau and with academia/research institutes overseas.

5- Stratégie Nationale Biodiversité. 2023. Ministère de la Transition Écologique et de la Cohésion des Territoires, Paris, France.

The activities listed above demonstrate that Palau had a detailed plan in the existing NBSAP to build biodiversity conservation mainstreaming across sectors and society, which would include marine and coastal biodiversity such as coral reefs and associated ecosystems. Building awareness and engagement of coastal communities, marine resource users and the youth through the school curriculum are all critically important for the success of existing or proposed conservation and sustainable management measures for coral reefs and associated ecosystems in Palau. Similarly, the initiatives to ensure there is sufficient capacity within the various actors and stakeholders living and working with the inshore marine and coastal environment is equally important for long-term success.

Although Palau's revised NBSAP called for broad-scale integration through a more holistic way of thinking and operating (i.e. a systems approach), one lesson learned since its implementation is that the NBSAP could have been more effective if the overall 'systems approach' was coupled with strategies that identified transitional phases and actions to facilitate this type of approach in biodiversity conservation. A more strategic approach that identified a pathway to the systems thinking and operation would have helped to facilitate the shifts required in organisational and societal culture to embrace holistic long-term thinking over short-term gains. This is required if a whole of government and whole of society approach is to be established to support GBF implementation. Therefore, Palau recommends that countries that are developing their NBSAP should **ensure that transitional strategies and actions are included to enable the shift to a more integrated long-term approach** at the national level.

The case study was developed in collaboration with the country represented and existing information for the purpose of the International Coral Reef Initiative's Guidance Document on Integrating Coral Reefs and Associated Ecosystems into National Biodiversity Strategies and Action Plans.

Download the full guidance document: https://icriforum.org/documents/icri-coral-reefs-nbsaps/

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