



Oceans of Opportunities or Challenges?

A Literature Review of the Involvement of Indigenous Communities
 in Marine Protected Area Co-Management



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Sources figures front page

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Challenges and Opportunities for Indigenous Peoples' Sustainability | DISD. (n.d.).

<https://www.un.org/development/desa/dspd/2021/04/indigenous-peoples-sustainability/>

Lecoeur, G. (n.d.). *National Geographic image collection*. [Photograph]. National Geographic.

<https://www.nationalgeographic.com/science/article/scientists-work-to-save-coral-reefs-climate-change-marine-parks>

Sieber, C. (2018). *New Ireland The Shark Callers of Kontu 84*. [Photograph]. Claudio Sieber Photography.

<https://csp.photoshelter.com/gallery-image/PNG-New-Ireland-The-Shark-Callers-of-Kontu/G0000MZb3LxbR7wA/I0000ATtly2wThKU/C00002klpV8UV0ms>

Schwemmer, R. (n.d.) *Members of the Chumash community paddle a traditional redwood plank canoe, called a tomol*. [Photograph]. Sanctuaries, NOAA.

<https://sanctuaries.noaa.gov/magazine/1/indigenous-cultures/>

Hall, N. (n.d.) *Fishing on the reefs near Walalung Village*. [Photograph]. The Nature Conservancy.

<https://www.nature.org/en-us/what-we-do/our-insights/perspectives/strong-voices-active-choices/>

Abstract

Marine degradation is co-occurring with the erosion of Indigenous traditional knowledge. The implementation of marine protected areas (MPAs) to conserve biodiversity can have an impact on local Indigenous communities. Accordingly, it is important to recognise Indigenous knowledge and consider its involvement in marine biodiversity conservation. This paper aims to answer the following question: What are the successes and challenges in the involvement of Indigenous communities in MPA co-management? The involvement of Indigenous communities in MPA management is analysed by using case studies with different levels of co-management. Ranging from strong co-management to mild co-management to no co-management at all. It compares the aspects of co-management that are successful in MPA implementation. Recognition of Indigenous communities and knowledge are crucial for restoring marine ecosystem health. In conclusion, successful co-management of MPAs requires shared decision-making power, the recognition of Indigenous rights and the involvement of Indigenous communities in monitoring. Clear communication and negotiated agreements can resolve conflicts and effectively implement conservation efforts. More research is needed to guarantee that future MPAs can meet biodiversity outcomes while also involving Indigenous communities.

Keywords: Biodiversity loss, Co-management, Indigenous communities, Marine protected area, Traditional ecological knowledge

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Introduction

Oceans are the foundation of all life on Earth because: they cover over 70% of the Earth's surface, they provide abundant resources, and marine ecosystems regulate the climate (Simeoni et al., 2022). Unfortunately, marine life is direct and indirectly threatened and degraded by human activity via: eutrophication, habitat destruction and overfishing (Nurse-Bray & Rist, 2009). To hamper marine environment degradation, Marine Protected Areas (hereafter referred to as MPAs throughout the text) have been introduced globally to increase biodiversity and improve habitats (Jentoft et al., 2011). However, establishing MPAs also comes with conflicts.

Indigenous communities sustain themselves with resources from the marine ecosystems, and implementing MPAs in their area can sometimes have negative effects on their community (Ban & Frid, 2018). Ecological and economic consequences of biodiversity loss are well documented, but the societal impact of biodiversity loss on Indigenous cultures is often overlooked (Dick et al., 2012). Indigenous communities have a strong connection to their land because they obtain all their resources from it, such as fish for protein. However, protected areas sometimes lead to the displacement of Indigenous communities in these areas, which are often rich in flora and fauna (e.g., Dick et al., 2012; Holden et al., 2011; Nepal, 2002). Leaving their tribal lands makes it challenging to access their traditional resources.

It is concerning that the cultural consequences of local Indigenous communities are poorly understood considering the estimated 5000-6000 Indigenous groups that are living in over 70 countries (Nepal, 2002). Approximately 40% of them are associated with islands, marine, and coastal regions (Nurse-Bray & Rist, 2009). The United Nations describes Indigenous communities as followed: "*Indigenous communities, peoples, and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them*" (United Nations, 2004).

For countless generations, Indigenous communities have protected their lands because of their connection and dependence on them (Lloyd-Smith, 2017). They have used traditional ecological knowledge based on years of observations and practical experience. This is valuable for stock assessments and management (Mccarthy et al., 2013). Additionally, the understanding of animal behaviour and phenology supports activities like hunting and harvesting (Knopp et al., 2022). This made them use the resources of their homeland in a sustainable way, allowing them to live in one place. This approach is seen to be essential to restoring the ecosystem's health (Stephenson et al., 2014).

An MPA is a defined area of marine character which is managed through legal or other explicit means (Humphreys & Herbert, 2018). Implementing and managing MPAs is complex because of all the interactions between social, economic, and environmental concerns, and the interests of various stakeholders often interfere (Humphreys & Herbert, 2018). Collaborative-problem solving has become an important strategy to bring together different perspectives of scientists,

policymakers, and locals, which is key to successful MPA implementation (Davies et al., 2018; Zurba et al., 2012). Co-management is the management of a set of resources or an area between multiple stakeholders with different interests (Zurba et al., 2012).

Indigenous governance has partly benefited by co-management, however, in practice, Western and Indigenous views on resource management show major differences (Andersson & Ostrom, 2008; Nursery-Bray & Jacobson, 2014). While the management of marine realms by Indigenous communities used to be common, it has decreased in many places because of the effects of colonization and the social exclusion of Indigenous communities (Ban & Frid, 2018). Because of this exclusion, traditional conservation practices were restricted (including the utilisation of fish traps to monitor populations). Consequently, the ability to pass down customary practices in harvesting and managing local food sources to their descendants has been hindered (Stephenson et al., 2014). This is unfortunate since local knowledge can be important, especially in ecosystems with little scientific data (Humphreys & Herbert, 2018). Loseto et al. (2018) demonstrated the importance of Indigenous knowledge in the conservation of Beluga whales in the Arctic's first MPA. This knowledge was crucial in understanding environmental shifts in the area and whale population dynamics.

Marine ecosystem degradation is occurring simultaneously with the erosion of Indigenous traditional ecological knowledge. This knowledge has supported biodiversity for generations (Stephenson et al., 2014). Therefore, it is important to recognise Indigenous knowledge and consider its involvement in marine protection. Especially because peer-reviewed literature shows little involvement of Indigenous communities in MPA management.

Accordingly, this paper aims to answer the following question: What are the successes and challenges in the involvement of Indigenous communities in MPA co-management?

This literature review examines case studies on the involvement of Indigenous communities in MPAs. Three protected areas with different levels of management are discussed, including: Gwaii Haanas National Marine Conservation Area (Canada), Maketu taiāpure (New Zealand), and Bastimentos Island National Marine Park (Panama).

This paper is based on the framework used in the literature review and analysis of West Coast Environmental Law (2019). I compare the different aspects of co-management that contribute to the successful implementation of MPAs. By aspects, I mean: 1) Recognition of Indigenous laws 2) True co-management 3) Scope of authority 4) Funding 5) Monitoring and enforcement.

Although the case studies discussed in this paper show a good representation of the aspects that contribute to successful or failed co-management, additional case studies are needed to investigate the effect of Indigenous' involvement in MPA co-management on biodiversity. I argue that the recognition of Indigenous communities and their sustained knowledge is needed to restore the marine ecosystem's health. To conclude, successful co-management of MPAs requires shared decision-making power, the recognition of Indigenous rights and the involvement of Indigenous communities in monitoring. Clear communication and negotiated agreements can help in resolving conflicts and implementing conservation efforts effectively.

MPAs and Management

MPAs are referred to by different names, e.g., parks, reserves, and sanctuaries (Jentoft et al., 2011). The aim of an MPA is to protect and maintain biodiversity, and natural cultural resources by providing a higher level of protection than that of the surrounding area (Humphreys & Herbert, 2018; Nursey-Bray & Rist, 2009). A network of MPAs seems to be most effective and can either be fully protected areas or multiple-use areas zoned according to their level of protection (Nursey-Bray & Rist, 2009). Different zones can have different levels of protection to accomplish the stated management goals (Lester & Halpern, 2008). For example, no-take zones provide the highest level of protection for biodiversity. Both commercial and recreational fishing are prohibited. Also, other recreational activities such as snorkelling and boat traffic are banned. Habitat protection zones minimise high-impact activities such as destructive fishing and anchoring to protect highly diverse breeding grounds. Certain parks in Australia incorporate special protection zones that allow traditional Indigenous use (Department of Primary Industries, n.d.).

MPA management consists of creating a management plan and conducting scientific research. They are both executed by different actors, each with specific roles and responsibilities. The management planners make guidelines and the scientists monitor the environment (West Coast Environmental Law, 2019).

As mentioned earlier, co-management is one means of successful MPA implementation (West Coast Environmental Law, 2019). Co-management can be defined in many ways. Some of these terms are interchangeable, such as joint or shared decision-making, collaborative governance, and collaborative problem-solving (Lloyd-Smith, 2017). In this paper, I use the term co-management to describe the shared governance arrangements between Indigenous communities and national governments. As Indigenous communities are often local resource users, the sharing of power and responsibilities with the government is an important aspect of MPA co-management (Nursey-Bray & Jacobson, 2014). However, the level of equal cooperation differs. In this paper, I discuss several forms of co-management: strong co-management, mild co-management and no co-management at all.

Successful co-management of MPAs is recognised by the following aspects (West Coast Environmental Law, 2019):

1. Recognition of Indigenous laws
 - a. Incorporation of Indigenous rights (e.g., right to manage their ancestral lands, recognition of an entity to have legal rights, use of law in the native language)
2. True co-management
 - a. There must be an equal number of Indigenous peoples and national government representatives
 - b. Conflicts over ownership of land and waters, and jurisdiction, can be resolved through negotiated agreements, such as "agreements to disagree".

3. Scope of authority

There needs to be a clear definition and understanding of authority within a co-management body.

The following questions are taken into account to analyse the scope of authority of the case studies:

- a. Where does the authority for final-decision making rest?
- b. What topics (e.g., zoning systems, monitoring, catch limits) can both parties decide?

4. Funding

The following question is taken into account to analyse the funding of the case study:

- a. How are the parties funded? (e.g., trusts, own source revenues, park fees)

5. Monitoring and enforcement

The following question is taken into account to analyse the monitoring and enforcement of the MPA of the case study:

- a. Do Indigenous communities have a role in monitoring, compliance and enforcement?

Case Studies

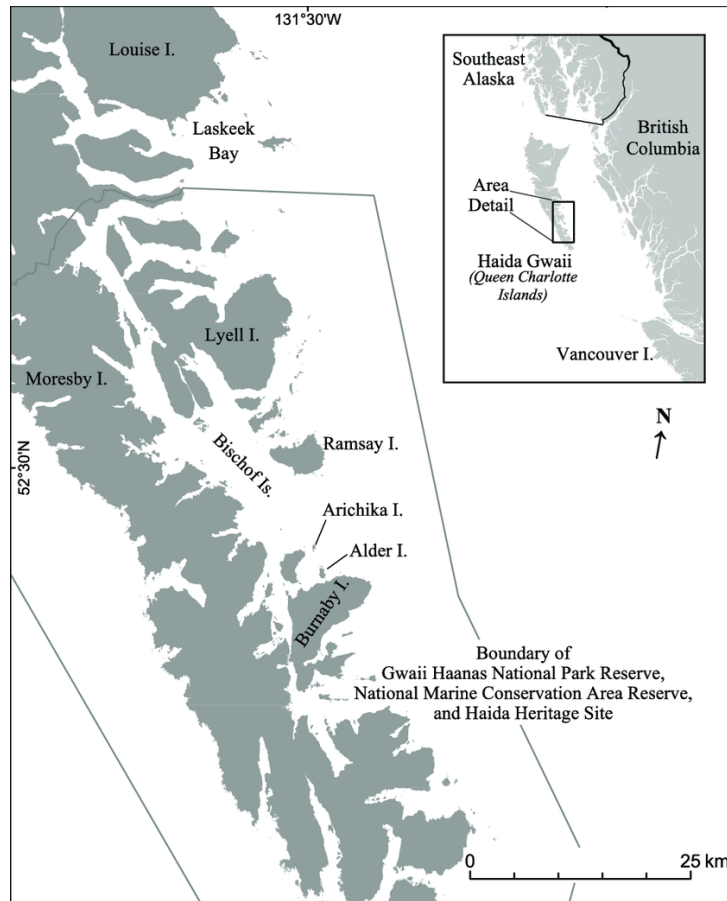
1. Gwaii Haanas National Marine Conservation Area Reserve

1.1 Marine protected area

The Gwaii Haanas National Marine Conservation Area Reserve (hereafter referred to as Gwaii Haanas NMCAR throughout the text) is located in the archipelago known as Haida Gwaii or Islands of the People (XUnderline Xaayda Gwaayaay) (N 52° 39.3741', W 131° 48.7064') (Jones et al., 2017) (Figure 1). This archipelago consists of 350 islands and is located 100 km off the North Pacific coast of British Columbia (BC), Canada (West Coast Environmental Law, 2019).

1.2 Indigenous community

The Haida community is the Indigenous community that has been living on Haida Gwaii for generations. These islands are characterized by abundant food and natural resources within Gwaii Haanas' marine realm and land (Jones et al., 2010). Various ecological features, habitats, and animals can be found here, such as kelp forests providing habitat for the Pacific salmon, the herring and the rockfish and more species (Parks Canada Agency, Government of Canada, 2022a). The Gwaii Haanas protection started in response to the concerns of the Haida community regarding the destruction of their ancestral villages and forests. The aim is to preserve and restore the cultural and ecological features of Gwaii Haanas for present and further generations (Stephenson et al., 2014).



Note: From "The Black Oystercatcher as a Sentinel Species in the Recovery of the Northern Abalone", by Bergman et al., 2013. The Condor (<https://doi.org/10.1525/cond.2013.120182>). Copyright 2013 by Oxford University Press.

Figure 1. Map of study location at Haida Gwaii

The map shows the location of Gwaii Haanas National Marine Conservation Area Reserve off the mainland of Canada. Boundaries show the protected area Gwaii Haanas.

1.3 Management

Gwaii Haanas is the most well-known example of co-management in protected areas. In 1985, the Gwaii Haanas protected area, both land and sea, was created when the Council of the Haida community declared the Haida Heritage Site. Included is the SGang Gwaay Llnagaay village which is a UNESCO World Heritage Site (UNESCO World Heritage Centre, n.d.). In 1988, the Government of Canada expanded this area into the Gwaii Haanas National Park Reserve. This was followed by the establishment of Gwaii Haanas NMCAR in 2010 (Jones et al., 2017; Lloyd-Smith, 2017) (Figure 2).

Both the terrestrial and marine areas are managed cooperatively by the Haida community and the Government of Canada through the Archipelago Management Board (hereafter referred to as AMB throughout the text) (Lloyd-Smith, 2017). The AMB's authority comes from the Gwaii

Haanas Agreement (hereafter referred to as GHA throughout the text) 1993² (Lloyd-Smith, 2017) and the Gwaii Haanas Marine Agreement (hereafter referred to as GHMA throughout the text) 2010³ (Parks Canada Agency, Government of Canada, 2022b) (Figure 2). The AMB is represented equally by the Council of the Haida community (three representatives) and representatives of the Government of Canada (two Parks Canada, one Fisheries and Oceans Canada) (Figure 3). The two organisations strongly agree on preserving the region’s natural, cultural and marine resources while acknowledging differing views regarding ownership (Stephenson et al., 2014). If there is a dispute between the organisations, the parties agree to accept their conflicting views for the sake of the Archipelago. Subsequent, consensus-based decisions are made to enable them to move forward and manage the area in a way that benefits both parties (Lloyd-Smith, 2017).

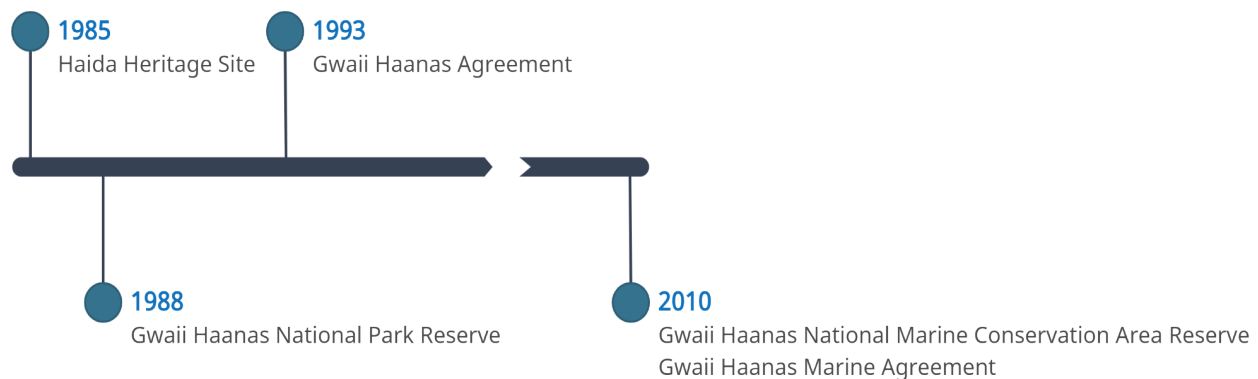


Figure 2. Timeline of Gwaii Haanas protection

1985: Establishment of the Haida Heritage Site; 1988: Establishment of the Gwaii Haanas National Park Reserve; 1993: Gwaii Haanas Agreement, addresses the co-managed terrestrial area by the Council of the Haida community and the Government of Canada through the Archipelago Management Board; 2010: Establishment of the Gwaii Haanas National Marine Conservation Area Reserve; 2010: Gwaii Haanas Marine Agreement, addresses the expanded role of the Archipelago Management Board to include management of the Gwaii Haanas marine area.

Management is based on several guiding principles that support the ethics and values of the Haida community. Among them is “respect for all living things” (yahguudang). Its goal is to balance the protection of nature and food, cultural and economic needs of the Haida community. Aligning these principles with ecosystem-based management, they use both traditional knowledge and Western science (Stephenson et al., 2014).

² Gwaii Haanas Agreement, 1993

³ Gwaii Haanas Marine Agreement, 2010

Archipelago Management Board

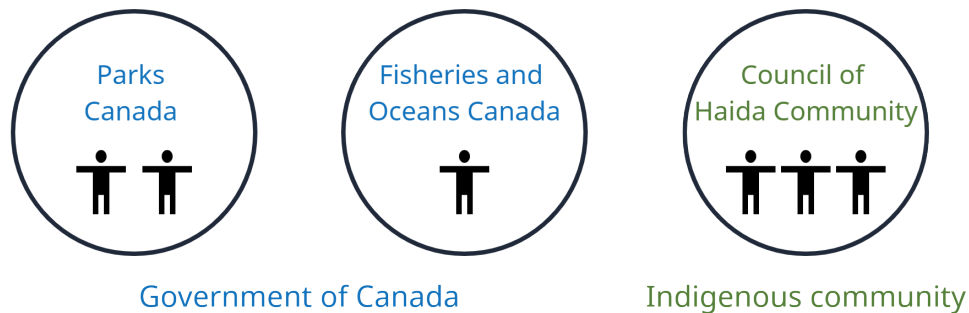
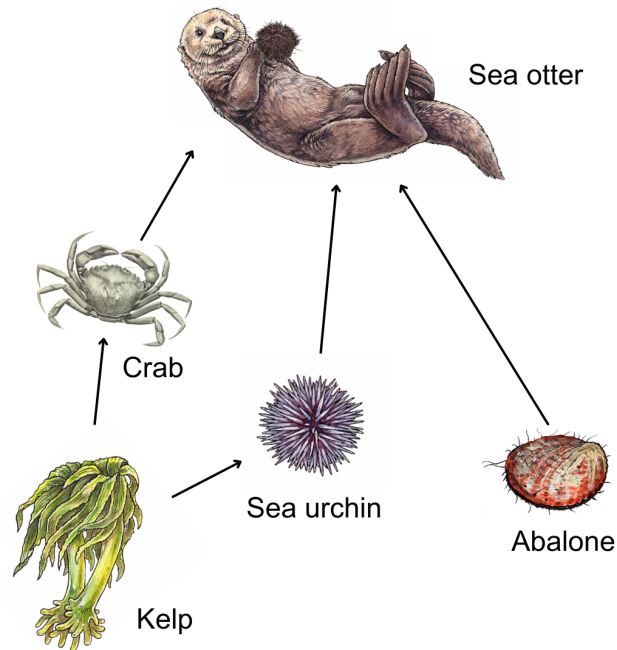


Figure 3. Archipelago Management Board

The Archipelago Management Board consists of two representatives of Parks Canada, 1 representative of Fisheries and Oceans Canada, and three representatives of the Council of the Haida Community.

A notable co-management success of the AMB is the kelp forest restoration project, Nurturing Seafood to Grow (Chiixuu TII iinasdli). This ongoing project aims to restore kelp forests that have been overgrazed by the widespread sea urchin, limiting kelp distribution (Eger et al., 2022). Around 1800, when settlers arrived, sea otters (*Enhydra lutris*) were ecologically extirpated from Haida Gwaii as a result of maritime fur trade hunting. The absence of the keystone predator resulted in a number of social-ecological consequences including a decrease in depth distribution and size of the kelp forest, and an overabundance of its shellfish prey (such as sea urchins, crabs and abalone) (Figure 4). Moreover, introduced diseases by settlers caused a decline in the Haida population which likely led to cultural disconnection (Lee et al., 2018). To restore ecosystem balance, sea otter predation on urchins was mimicked by removing or cracking 75-95% of the urchins in the area to lessen the pressure of algal grazing and enable naturally-settled kelp spores to thrive (Lee et al., 2021). This was accomplished with the assistance of Haida and commercial divers (Eger et al., 2022). When possible, urchins with high-quality gonads (roe) were caught for community food and commercial markets, and the remaining ones were cracked underwater to feed coastal ecosystems (Lee et al., 2021). Pre- and post-restoration monitoring in 2017-20 showed an increase in kelp cover and a reduction in urchins (Lee et al., 2021). As the re-introduction of the sea otter to Haida Gwaii is not part of the plan, continued monitoring is required to see if the long-term effects of the kelp restoration recover otter populations (Parks Canada Agency, Government of Canada, 2021).



Note. Adapted from "Ocean Treasures - Sea Otter" Print, by N. Domsife, n.d. (<https://www.thomsonif.com/shop/ocean-treasures-sea-otter>).

Figure 4. Simple kelp forest food web

A simple representation of a kelp forest food web. The sea otter is the keystone predator with shellfish prey such as crabs, sea urchins and abalone. Kelp is grazed by crabs and sea urchins.

2. Maketu Taiāpure

2.1 Indigenous community

Around 1000 AD, Māori settled in New Zealand (Aotearoa). They travelled from Polynesia by canoes (waka), each carrying a distinctive group of people. Their descendants formed different tribes (iwi) and hapū (sub-tribe) throughout New Zealand (Kumar et al., 2012; Taiepa et al., 1997). Historically, Māori relied on seafood for their diet, and the gathering takes place in coastal and estuarine traditional food-gathering sites (mahinga kai). These sites continue to be major sources of traditional foods (Dick et al., 2012). Across generations, to avoid overexploitation of food resources, they employed a range of conservation practices (Kitson & Møller, 2008). Among these were: monitoring of population sizes; temporarily restricting fishing or access of areas (rāhui); distributing harvest pressure through rotating traditional food-gathering sites; reseeding and active translocation to replenish resources; protecting breeding grounds (kōhanga); and preserving breeding stocks by collecting immature stages (Dick et al., 2012).

2.2 Marine protected area

Despite fishing being crucial for the livelihood of many Māori communities, they only participated in the marine conservation measures in 1980. They successfully filed a legal challenge during the implementation of the Quota Management System. As a result, the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992⁴ was enacted. Consequently, the government of New Zealand was required to create regulations that would allow Māori communities to manage traditional fisheries (Coates, 2009; McCormack, 2010). Three co-management tools resulted.

1. **Taiāpure**

Areas designated for local Māori (tangata whenua) to participate in the conservation and management of a fishery. Both commercial and recreational fishing is allowed and can only be prohibited if authorised by the government (Stephenson et al., 2014).

2. **Māitaitai reserves**

Designed to protect traditional fishing grounds while allowing for traditional management practices and food harvests (Stephenson et al., 2014). Commercial fishing is prohibited within a Māitaitai, but recreational and Māori customary fishing is permitted (Mossop, 2020).

3. **Temporary closures**

By taking into account Māori traditional and customary fishing practices, temporary limitations of fisheries can be implemented in response to the localised depletion of fisheries resources. They enforce a legally binding ban on fishing or restriction on fishing practices within a specific area, usually for up to two years (Mossop, 2020; Stephenson et al., 2014).

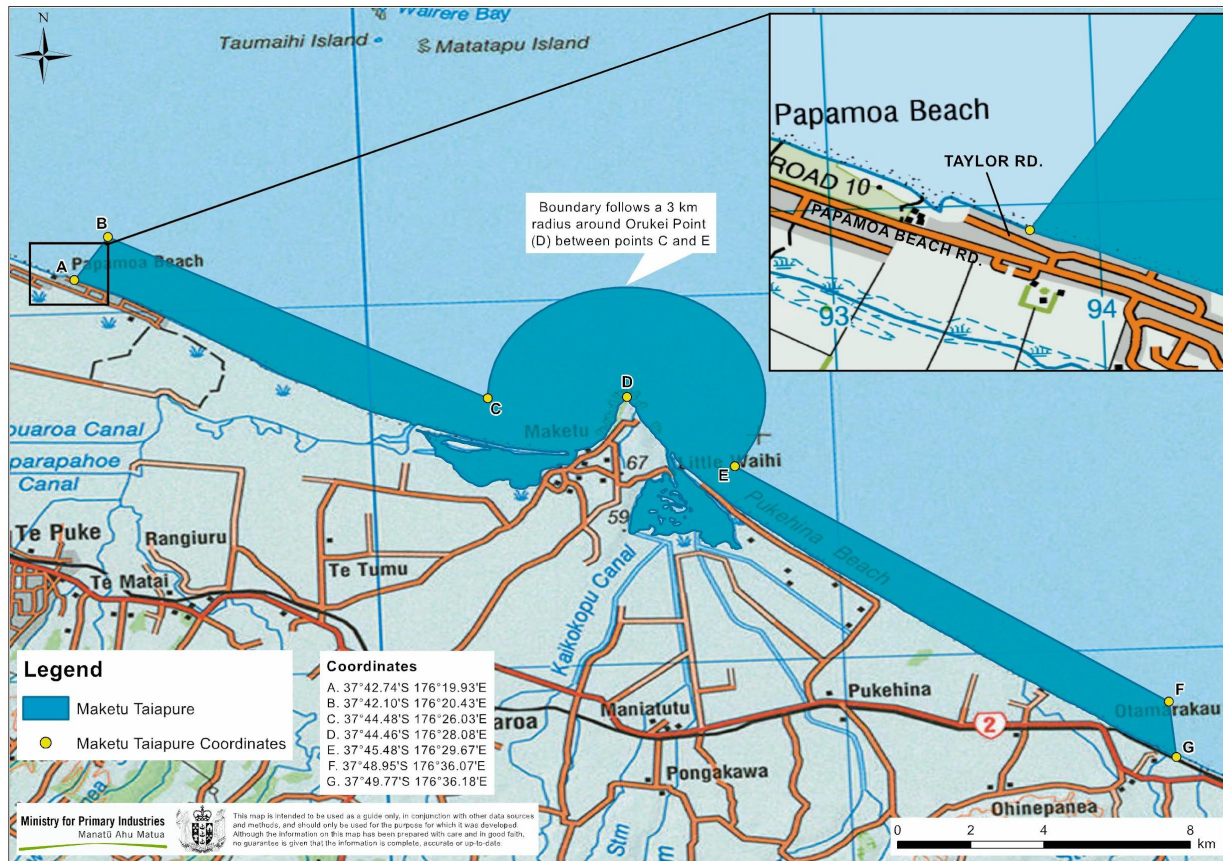
2.3 Management Maketu Taiāpure

The taiāpure located in Maketu, New Zealand's Bay of Plenty is an example of mild co-management between Indigenous peoples and the national government (Stephenson et al., 2014). The protected area is within the tribal area (takiwā) of the *Te Arawa* people, with over 55 km² of estuarine and inshore waters (S 37° 45' 59.99', E 176° 26' 59.99') (Figure 5). The *Te Arawa* is a tribe of New Zealand's North Island settled in the Bay of Plenty and around the Rotorua lakes (Simon, 2019). They have a long history of supplying seafood (kaimoana) for traditional gatherings. The Maketu taiāpure was established in 1996 via an application to the Ministry of Fisheries. The main concerns of this application were the detrimental effects of: pollution, overfishing and land use on the seafood (Stephenson et al., 2014). The area of interest is important for the Maori due to its spiritual, cultural, and customary significance (Stephenson et al., 2014).

The Maketu taiāpure is partially governed by the Taiāpure Committee made up of local Māori representatives and local recreational and commercial fishers to meet various goals of the local community (New Zealand Ministry of Primary Industries, 2013; Stephenson et al., 2014). They came up with a long-term management strategy focused on harvest regulations to restore taiāpure's ecological health while preserving recreational fishing and cultural practices. The

⁴ Treaty of Waitangi (Fisheries Claims) Settlement Act 1992

Committee works with a range of governance levels, including with central government agencies, local authorities and various sector groups, to achieve its objectives. To illustrate, the Committee conducts stock evaluation surveys with the help of a local technical college (Stephenson et al., 2014).



Note: From Maketu Mussel Limit Halved, by NZ Herald, 2013
<https://www.nzherald.co.nz/bay-of-plenty-times/news/maketu-mussel-limit-halved/UC23SCQGL5EUXXLQCMTRZFUJLA/>

Figure 5. Map Maketu Taiāpure

The map shows the location of the taiāpure in Maketu, Bay of Plenty, North Island, New Zealand.

The Committee protects and manages the tribal territory (rohe), addressing possible unsustainable fishing practices inside the protected area. According to the New Zealand Ministry of Primary Industries (2013), the Committee is particularly concerned about key shellfish stocks in the taiāpure, namely the green-lipped mussel (*Perna canaliculus*) and New Zealand sea snail species (*Haliotis iris*, *Haliotis australis*, and *Haliotis virginea*) (pāua). Besides being an important food source, mussels also contribute to biodiversity. They form reef beds that provide habitat and food availability for many species. Additionally, they improve water quality by acting as filter feeders (Paul-Burke et al., 2018). Sea snails are considered a delicacy, and the shells are used for sculptures and jewellery. The Committee links observed losses in shellfish stocks to excessive recreational activities from people beyond the local area. These losses have been seen to affect the local community's ability to collect these stocks in easily accessible

places. In a recent proposal, the Committee sought a reduction in the bag limit for green-lipped mussels from 50 to 25. This has been legally authorised by the government (New Zealand Ministry of Primary Industries, 2013; Stephenson et al., 2014). Despite Indigenous communities' ability to propose their visions of conservation and management for small areas, the state controls their implementation, since they cannot exclude commercial fishing without government regulation (Ban & Frid., 2018).

3. Bastimentos Island National Marine Park

3.1 Marine protected area

The Bastimentos Island National Marine Park (Parque Nacional Marino Isla Bastimentos, hereafter referred to as PNMIB throughout the text) is located in the archipelago of Bocas del Toro, Panama (N 9°16'57', W 82°8'23') (Figure 6). It is a group of islands and islets with an area of 13,360 hectares (11,730 marine and 1630 terrestrial) (Rivera et al., 2012). The national park is very diverse with different ecosystems such as: coral reefs, mangrove stands, and seagrass beds. The reefs are home to 52 of the 71 recognised Caribbean coral species, as well as over 250 species of fish and marine mammals such as manatees and dolphins (Guerrón-Montero, 2015).

3.2 Indigenous community

The archipelago of Bocas del Toro holds a multicultural community, composed of the Indigenous community Ngäbe, Afro-Antilleans, Latinos, Chinese-Panemans, and migrants mainly from the United States, Europe, and New Zealand. In Panama, the Ngäbe number around 285,000 people, making them the largest Indigenous community (Cansari & Gausset, 2013; Guerrón-Montero, 2015). The Ngäbe people living in PNMIB have a close relationship with the resources within the region as they engage in fishing in mangroves and coral reefs, slash-and-burn agriculture, livestock grazing, and selective timber harvesting (Cramer, 2013; Lawrence et al., 2021).

3.3 Management

PNMIB is an example of a failed effort to incorporate Indigenous concerns into MPA management (Ban & Frid, 2018). The park was established in 1988 by the National Environmental Authority (Autoridad Nacional del Ambiente, hereafter referred to as ANAM throughout the text), a Panamanian government agency in charge of environmental and natural resource concerns (Ban & Frid, 2018; Guerrón-Montero, 2015; Spalding et al., 2015). The ANAM created the park with a species-specific approach. The aim was to conserve a regionally representative sample of the marine and coastal ecosystems with a focus on marine turtles (Guerrón-Montero, 2015). They also considered recreation and tourism in the creation of the park. The area offers hiking trails, camping, snorkelling, and surfing opportunities (Mach & Vahradian, 2021).



Figure 6. Map Bastimentos Island National Marine Park

The map shows the location of the Bastimentos Island National Marine Park in the archipelago of Bocas del Toro, Panama. The protected area is represented by a dotted black line.

The main problem in the creation of the park was that the ANAM created it without seeking input from local communities, including the Ngäbe Indigenous people. There was no request for feedback from local communities that live around or rely on the area regarding the limits and use of land and marine resources (Guerrón-Montero, 2015). PNMB was not designed with the needs of the local people in mind, but rather with strictly ecological protection aims (Guerrón-Montero, 2015). It was formed around the areas regarded as abundant in marine resources and potential for tourism. Like other marine environments worldwide, a large part of the park is set up for conservation and tourism. But, it does not comply with the way in which local communities use the park (Salm & Clark, 2000). The Panamanian government did not consider the needs and rights of the stakeholders and representatives of the Ngäbe Indigenous people when developing the park's limits (Ban & Frid, 2018). Marine resources for subsistence decreased due to high tourist demand, and certain species were prohibited from fishing. As a fishing community, the Ngäbe people's ability to survive in their ancestral lands was adversely impacted (Guerrón-Montero, 2005; Spalding et al., 2015).

Believing that the government was unable to safeguard the archipelago’s natural resources with its coercive way of conservation, the local communities united to create the Consulting Assembly (Consejo Consultivo). They aimed to create a management plan for the marine park that was more socially inclusive and environmentally friendly (Guerrón-Montero, 2015). This assembly included representatives from four non-governmental organisations (including IUCN), nine governmental organisations (including ANAM), a US-base scientific organisation (Smithsonian Tropical Research Institute), funding agencies (The Nature Conservancy and PROARCA/COSTAS), eight Ngäbe communities and two non-Indigenous communities from around the park (Figure 7). From mid-1997 to mid-2000, they met every two to three months to design the management plan, which featured a co-management structure (Ban & Frid, 2018; Guerrón-Montero, 2015). The plan aimed to improve protection and promote conservation and sustainable resource use through local community participation, environmental education campaigns, and scientific research (Guerrón-Montero, 2015). It emphasized the need for clear park boundaries, interpretive paths, and detailed maps to indicate restricted activities such as snorkelling and boat traffic. The plan also addressed the decline of marine fauna populations and proposed measures such as closed seasons, size controls, and control of fishing techniques (Guerrón-Montero, 2015).

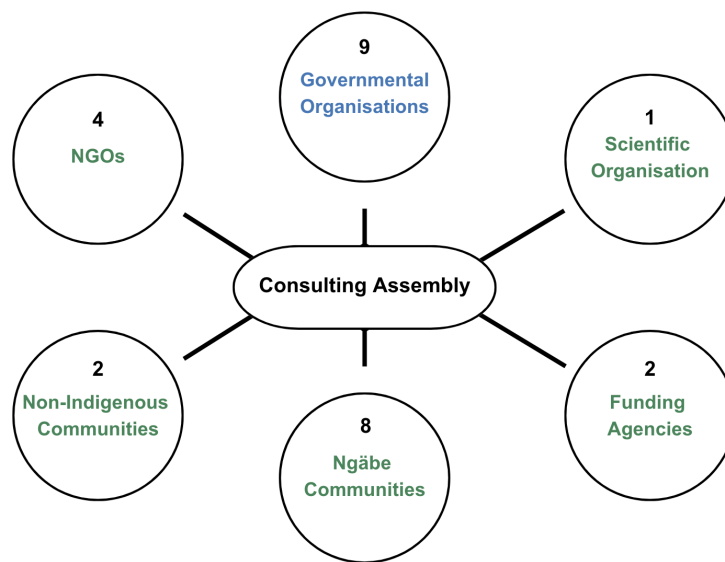


Figure 7. Consulting Assembly

The Consulting Assembly consists of 4 non-governmental organisations (NGOs), 9 governmental organisations, 1 scientific organisation, 2 funding agencies, 8 Ngäbe communities, and 2 non-Indigenous communities.

The government rejected the management plan and eventually funding ran out (Ban & Frid, 2018). The absence of governmental support and international funding discouraged the organisations and individuals engaged, and without any legal strength, the plan could not be implemented. Consequently, the Consulting Assembly is no longer together (Guerrón-Montero, 2015). The MPA is entirely managed by the Panamanian Government, represented by ANAM (Rivera et al., 2012).

Discussion

The degradation of marine ecosystems is occurring simultaneously with the erosion of Indigenous traditional ecological knowledge. This knowledge has supported biodiversity for generations. Many Indigenous communities have suffered from colonization and the subsequent implementation of different political and legal systems. Reclaiming control over traditional resources is important for Indigenous communities to support local customary practices. Co-management of MPAs by Indigenous communities and the national government is one way to recognise traditional knowledge. However, it is a complex management system because the perspectives of various stakeholders often interfere. There are different levels of co-management of MPAs with each its successes and challenges. By comparing different aspects of co-management, this paper aims to determine the successes and challenges in the involvement of Indigenous peoples in MPA co-management. An overview table of the successes and challenges of the case studies is presented in the Appendix.

Co-management focuses on the fact that Indigenous law has its own principles, processes, and dispute-solving that differ from modern law. The incorporation of Indigenous rights is one of the aspects that contribute to successful MPA co-management. Haida law is recognised in the agreements (GHA and GHMA) that authorise AMB's role in Gwaii Haanas. It enables the Haida community to participate in the implementation and management of the Gwaii Haanas NMCAR, which is part of their ancestral lands. The Treaty of Waitangi (Fisheries Claims) Settlement Act 1992⁵ supports the application of the Māori law. The act required the New Zealand Government to establish regulations to enable Maori communities to manage traditional fisheries. The traditional fisheries are managed based on Maori traditional practices and are located in tribal areas. Indigenous rights were not taken into account with establishing PNMIB in Panama. This led to a conflict between the sustenance needs of Indigenous communities and the conservation goals of the government.

The AMB of Gwaii Haanas shows some successes regarding true co-management. The AMB is driven by an agreement-to-disagree approach, with the Haida community and the Canadian government having an equal role in decision-making processes. Consensus-based decision-making can help in conflict resolution. Nursey-Bray and Rist (2014) argue that in order for a co-management process to be effective and lasting, agreement on power-sharing must underpin a negotiated agreement. This will ensure that the outcome is environmentally sustainable and culturally just. While the dual outcome is what we strive for, processes can slow down if problems remain unresolved.

Māori in Maketu successfully reclaimed control over resources by setting up a management strategy. Indigenous communities can propose marine conservation measures that the national government can review for potential implementation. A challenge here is that the government has ultimate decision-making authority. The Ministry of Fisheries must give permission before catch limits can be enforced, as they did for the bag limits on green-lipped mussels (Stephenson

⁵ Treaty of Waitangi (Fisheries Claims) Settlement Act 1992

et al., 2014). Limited decision-making authority makes it more difficult for Indigenous communities to address ideas that are aligned with their traditional practices, values, and socio-economic needs. Consequently, it can have an effect on their well-being. Restricted authority can lead to Indigenous communities feeling excluded with their input not being taken seriously. Trust between both parties may diminish, impeding the possibility of stronger co-management. However, strong co-management also has its limitations. The MPAs' co-management bodies are not authorised to make decisions about all activities within the MPAs without the government's intervention. International standards usually have authority over commercial fishing, shipping, oil, gas or tourism transport (West Coast Environmental Law, 2019). Although Gwaii Haanas NMCAR is managed through strong co-management, it is important for the MPA co-management body to know its assigned responsibilities to face this challenge. How these responsibilities for specific activities, such as shipping, are shared between different parties is also important.

Secure, long-term funding is required to meet the costs of maintaining an MPA, including staff salaries, training programs, and monitoring. A challenge arose when funding ran out for the Consulting Assembly and there was not sufficient support from the Panamanian government. Guerrón-Montero (2005) argued that the government ignored the plan set up by locals because it was a small-scale project focusing on conservation and scientific research and not profit.

Indigenous communities can play an important role in monitoring and enforcement of MPAs. They have a deep cultural and ecological understanding of their traditional lands. In Canada, Haida divers were involved in the monitoring of the kelp forest restoration project. A success since new employment opportunities were available to the Haida community as a result of training from professional divers. By harvesting urchins for community food, traditional practices were recognised as red urchin roe is a traditional food for the Haida people. Education and awareness can help Indigenous communities to get a better understanding of the reasons behind the implementation of MPAs. Training programs can offer them job opportunities, allowing them to actively participate in conservation efforts. Collaborations between academic restoration practitioners and Indigenous communities are, however, less widespread in the English-speaking world. (Eger et al., 2022). The language barrier makes it difficult to communicate and exchange knowledge with Indigenous communities.

The kelp forest restoration project in Gwaii Haanas also gained ecological success as kelp cover increased and urchin populations decreased. It is remarkable that the other case studies of New Zealand and Panama lack literature about the effects of its MPA management strategy on biodiversity. Especially, because the main focus of MPAs is the protection of habitats and their biodiversity (Jentoft et al., 2011). Because traditional ecological knowledge contributed to the maintenance of biodiversity for many generations, it is reasonable to expect that involving Indigenous communities in MPA management would lead to successful outcomes for biodiversity. Indigenous communities have learned how to use local ecosystem resources sustainably due to their strong connection and reliance on the land (Lloyd-Smith, 2017). To maintain biodiversity conservation, Indigenous communities practice principles such as taking

only what is needed (Ban & Frid, 2018). This is in contrast with the prevailing practices of overfishing, driven by the current high demand for seafood.

Although biodiversity outcomes are not prevalent, the case studies in Canada and New Zealand highlight the successes of the involvement of Indigenous communities in MPA co-management. More studies are needed to prevent failed co-management as seen in Panama. This can be done by gaining a better understanding of the impact of Indigenous' involvement in MPA co-management. Future studies should take into account the biodiversity outcomes of the co-management plan. In this way, we can ensure that present and future MPAs will achieve both biodiversity conservation and the involvement of Indigenous communities (Ban & Frid, 2018). In order to achieve successful co-management of MPAs, Indigenous rights need to be recognised, Indigenous communities must be involved in monitoring, and the sharing of decision-making power between the national government and Indigenous communities is crucial. Clear communication and negotiated agreements can help in resolving conflicts and implementing conservation efforts effectively.

References

- Andersson, K., & Ostrom, E. (2008). Analyzing decentralized resource regimes from a polycentric perspective. *Policy Sciences*, 41(1), 71-93.
<https://doi.org/10.1007/s11077-007-9055-6>
- Ban, N. C., & Frid, A. (2018). Indigenous peoples' rights and marine protected areas. *Marine Policy*, 87, 180-185. <https://doi.org/10.1016/j.marpol.2017.10.020>
- Bergman, C. M., Pattison, J., & Price, E. (2013). The Black Oystercatcher as a Sentinel Species in the Recovery of the Northern Abalone. *The Condor*.
<https://doi.org/10.1525/cond.2013.120182>
- Cansari, R., & Gausset, Q. (2013). Along the road: The Ngäbe-Buglé struggle to protect environmental resources in Panama. *International Indigenous Policy Journal*, 4(3).
<https://doi.org/10.18584/iipj.2013.4.3.5>
- Coates, N. (2009). Join-management agreements in New Zealand: simply empty promises? *Journal of South Pacific Law*, 13(1), 32-39.
- Cramer, K. L. (2013). History of human occupation and environmental change in Western and Central Caribbean Panama. *Bulletin of Marine Science*, 89(4), 955–982.
<https://doi.org/10.5343/bms.2012.1028>
- Davies, K., Murchie, A. A., Kerr, V., & Lundquist, C. J. (2018). The evolution of marine protected area planning in Aotearoa New Zealand: Reflections on participation and process.

Marine Policy, 93, 113–127. <https://doi.org/10.1016/j.marpol.2018.03.025>

Department of Primary Industries. (n.d.). *Zones*.

<https://www.dpi.nsw.gov.au/fishing/marine-protected-areas/marine-parks/solitary-islands-marine-park/park-management/zones.-regulations-and-permits>

Dick, J., Stephenson, J., Kirikiri, R., Moller, H., & Turner, R. A. (2012). Listening to the Kaitiaki: consequences of the loss of abundance and biodiversity of coastal ecosystems in Aotearoa New Zealand. *MAI Journal*, 1(2).

<https://ourarchive.otago.ac.nz/bitstream/10523/5303/1/Stephenson2012Listeningtothekaitiaki.pdf>

Dornsife, N. (n.d.). “*Ocean treasures - sea otter*” print. Thornwolf.

<https://www.thornwolf.com/shop/p/ocean-treasures-sea-otter>

Eger, A. M., Marzinelli, E. M., Christie, H., Fagerli, C. W., Fujita, D., Gonzalez, A. P., Choi, H. G., Kim, J. H., Lee, L. C., McHugh, T. A., Nishihara, G. N., Tatsumi, M., Steinberg, P. D., & Vergés, A. (2022). Global kelp forest restoration: past lessons, present status, and future directions. *Biological Reviews*, 97(4), 1449-1475. <https://doi.org/10.1111/brv.12850>

Guerrón-Montero, C. (2015). Marine protected areas in Panama: grassroots activism and advocacy. *Human Organization*, 64(4), 360-373.

Holden, W. N., Nadeau, K., & Jacobson, R. D. (2011). Exemplifying accumulation by dispossession: mining and Indigenous peoples in the philippines. *Geografiska Annaler*

Series B-human Geography, 93(2), 141-161.

<https://doi.org/10.1111/j.1468-0467.2011.00366.x>

Humphreys, J. S., & Herbert, R. B. (2018). Marine protected areas: science, policy & management. *Estuarine Coastal and Shelf Science*, 215, 215-218.

<https://doi.org/10.1016/j.ecss.2018.10.014>

Jentoft, S., Chuenpagdee, R., & Pascual-Fernandez, J. J. (2011). What are MPAs for: on goal formation and displacement. *Ocean & Coastal Management*, 54, 75-83.

<https://doi.org/10.1016/j.ocecoaman.2010.10.024>

Jones, R., Rigg, C., & Lee, L. (2010). Haida marine planning: first nations as a partner in marine conservation. *Ecology and Society*, 15(1). <https://doi.org/10.5751/es-03225-150112>

Jones, R., Rigg, C., & Pinkerton, E. (2017). Strategies for assertion of conservation and local management rights: A Haida Gwaii herring story. *Marine Policy*, 80, 154-167.

<https://doi.org/10.1016/j.marpol.2016.09.031>

Kitson, J., & Møller, H. (2008). Looking after your ground: resource management practice by Rakiura Maori Titi harvesters. *Papers and Proceedings of the Royal Society of Tasmania*, 161-176. <https://doi.org/10.26749/rstpp.142.1.161>

Knopp, J., Levenstein, B., Watson, A., Ivanova, I., & Lento, J. (2020). Systematic review of documented Indigenous Knowledge of freshwater biodiversity in the circumpolar Arctic. *Freshwater Biology*, 67(1), 194–209. <https://doi.org/10.1111/fwb.13570>

Kumar, S., Dean, P. B., Smith, B., & Mellsop, G. (2012). Which family – What therapy: Maori culture, families and family therapy in New Zealand. *International Review of Psychiatry*, 24(2), 99–105. <https://doi.org/10.3109/09540261.2012.656303>

Lawrence, T., Hart, C., Petty, K., & Bocks, S. (2021). Traditional landscapes to bolster the effective size of protected areas: an example of Bastimentos Island, Panama. *Parks*, 27.2, 27-36. <https://doi.org/10.2305/iucn.ch.2021.parks-27-2tjl.en>

Lee, L., Thorley, J. L., Watson, J., Reid, M., & Salomon, A. K. (2018). Diverse knowledge systems reveal social-ecological dynamics that inform species conservation status. *Conservation Letters*, 12(2). <https://doi.org/10.1111/conl.12613>

Lee, L., McNeill, G. D., Ridings, P., Featherstone, M., Okamoto, D. K., Spindel, N. B., Galloway, A. W. E., Saunders, G. W., Adamczyk, E. M., Reshitnyk, L., Pontier, O., Post, M., Irvine, R. L., Wilson, G. T. G. N. N., & Bellis, S. K. V. (2021). Chiixuu Tii iinasdlli: Indigenous ethics and values lead to ecological restoration for people and place in Gwaii Haanas. *Ecological Restoration*, 39(1-2), 45-51. <https://doi.org/10.3368/er.39.1-2.45>

Lester, S. E., & Halpern, B. S. (2008). Biological responses in marine no-take reserves versus partially protected areas. *Marine Ecology Progress Series*, 367, 49–56. <https://doi.org/10.3354/meps07599>

Lloyd-Smith, G. (2017, 1 June). An ocean of opportunity: Co-governance in marine protected areas in Canada. *West Coast Environmental Law*. <https://www.wcel.org/publication/ocean-opportunity-co-governance-marine-protected-areas-canada>

- Loseto, L. L., Hoover, C., Ostertag, S. K., Whalen, D. J., Pearce, T., Paulic, J. E., Iacozza, J., & MacPhee, S. (2018). Beluga whales (*Delphinapterus leucas*), environmental change and marine protected areas in the Western Canadian Arctic. *Estuarine Coastal and Shelf Science*, 212, 128-137. <https://doi.org/10.1016/j.ecss.2018.05.026>
- Mach, L., & Vahradian, D. J. (2021). Tourists want to be spooked, not schooled: sustaining Indigenous tourism in the Bastimentos Island National Marine Park, Bocas del Toro, Panama. *Journal of Ecotourism*, 20(2), 130–144. <https://doi.org/10.1080/14724049.2019.1585439>
- Maketu mussel limit halved*. (2013, September 19). NZ Herald. <https://www.nzherald.co.nz/bay-of-plenty-times/news/maketu-mussel-limit-halved/UQ23SCQGL5EUXXLQOMTRZFURLA/>
- McCarthy, A., Hepburn, C. D., Scott, N., Schweikert, K., Turner, R. A., & Moller, H. (2013). Local people see and care most? Severe depletion of inshore fisheries and its consequences for Māori communities in New Zealand. *Aquatic Conservation-marine and Freshwater Ecosystems*, 24(3), 369–390. <https://doi.org/10.1002/aqc.2378>
- McCormack, F. (2010). Fish is my daily bread: owning and transacting in Maori fisheries. *Anthropological Forum*, 20(1), 19-39. <https://doi.org/10.1080/00664670903524194>
- Mossop, J. (2020). Marine protected areas and area-based management in New Zealand. *Asia-Pacific Journal of Ocean Law and Policy*, 5(1), 169-185. <https://doi.org/10.1163/24519391-00501009>

Nepal, S. K. (2002). Involving Indigenous Peoples in protected area management: Comparative perspectives from Nepal, Thailand, and China. *Environmental Management*, 30(6), 748-763. <https://doi.org/10.1007/s00267-002-2710-y>

New Zealand Ministry of Primary Industries. (2013). *Proposed recreational harvest regulations for the Maketu Taiāpure*. <https://www.mpi.govt.nz/fishing-aquaculture/>

Nursey-Bray, M., & Jacobson, C. (2014). 'Which way?': The contribution of Indigenous marine governance. *Australian Journal of Maritime and Ocean Affairs*, 6(1), 27-40. <https://doi.org/10.1080/18366503.2014.888136>

Nursey-Bray, M., & Rist, P. (2009). Co-management and protected area management: achieving effective management of a contested site, lessons from the Great Barrier Reef World Heritage Area (GBRWHA). *Marine Policy*, 33(1), 118-127. <https://doi.org/10.1016/j.marpol.2008.05.002>

Parks Canada Agency, Government of Canada. (2021, November 15). *Chiixuu Tll iinasdll: Nurturing Seafood to Grow. Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site*. https://parks.canada.ca/pn-np/bc/gwaiihaanas/nature/~link.aspx?id=2766AD0F23DD4F549B8F49BD1ADAE20D&_z=z

Parks Canada Agency, Government of Canada. (2022a, 19 november). *Land, Sea, People. Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site*. <https://parks.canada.ca/pn-np/bc/gwaiihaanas/culture/terre-mer-gens-land-sea-people>

Parks Canada Agency, Government of Canada. (2022b, November 19). *10 years as a National Marine Conservation Area Reserve. Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site.*

<https://parks.canada.ca/pn-np/bc/gwaiihaanas/info/ramnc-nmcar-10>

Paul-Burke, K., Burke, J. C., Bluett, C., & Senior, T. (2018). Using Māori knowledge to assist understandings and management of shellfish populations in Ōhiwa harbour, Aotearoa New Zealand. *New Zealand Journal of Marine and Freshwater Research*, 52(4), 542-556. <https://doi.org/10.1080/00288330.2018.1506487>

Rivera, V. S., Borrás, M. F., Gallardo, D. B., Ochoa, M., Castañeda, E., & Castillo, G. (2012). Regional study on social dimensions of MPA practice in Central America: cases studies from Honduras, Nicaragua, Costa Rica and Panamá. International collective in support of fishworkers.

Salm, R., & Clark, J. W. (2000). Marine and coastal protected areas: A guide for planners and managers. In IUCN eBooks. <https://doi.org/10.2305/iucn.ch.2000.13.en>

Simeoni, C., Furlan, E., Pham, H., Critto, A., De Juan, S., Trégarot, E., Cornet, C. C., Meesters, E., Fonseca, C., Botelho, A. Z., Krause, T., N'Guetta, A., Cordova, F. E., Failler, P., & Marcomini, A. (2022). Evaluating the combined effect of climate and anthropogenic stressors on marine coastal ecosystems: Insights from a systematic review of cumulative impact assessment approaches. *Science of the Total Environment*, 861, 160687. <https://doi.org/10.1016/j.scitotenv.2022.160687>

Simon, H. H. (2019). A literature review of important resource management issues relating to

the proposed dredging of Ruapeka Bay, Ohinemutu, Rotorua. Bay of Plenty Regional Council. DOI: 10.13140/RG.2.2.24676.42889

Spalding, A. K., Suman, D. O., & Mellado, M. J. (2015). Navigating the evolution of marine policy in Panama: Current policies and community responses in the Pearl Islands and Bocas del Toro Archipelagos of Panama. *Marine Policy*, 62, 161-168.

<https://doi.org/10.1016/j.marpol.2015.09.020>

Stephenson, J., Berkes, F., Turner, N.J., Dick, J. (2014). Biocultural conservation of marine ecosystems: examples from New Zealand and Canada. *Indian Journal Traditional Knowledge*, 13, 257-265.

Taiepa, T., Lyver, P., Horsley, P., Davis, J., Bragg, M. & Møller, H. (1997). Co-management of New Zealand's conservation estate by Maori and Pakeha: a review. *Environmental Conservation*, 24(3), 236-250.

UNESCO World Heritage Centre. (n.d.). *S'Gang Gwaay*. <https://whc.unesco.org/en/list/157>

United Nations, *Workshop on Data Collection and Disaggregation for Indigenous Peoples: the Concept of Indigenous Peoples*, United Nations Department of Economic and Social Affairs, Geneva, Switzerland, 2004.

Von Der Porten, S., Lepofsky, D., McGregor, D., & Silver, J. J. (2016). Recommendations for marine herring policy change in Canada: Aligning with Indigenous legal and inherent rights. *Marine Policy*, 74, 68–76. <https://doi.org/10.1016/j.marpol.2016.09.007>

West Coast Environmental Law. (2019, 30 November). *Literature Review & Analysis of Shared Indigenous and Crown Governance in Marine Protected Areas. Coastal First Nations.*

<https://www.wcel.org/publication/literature-review-analysis-shared-indigenous-and-crown-governance-marine-protected>

Zurba, M., Ross, H., Izurieta, A., Rist, P., Bock, E., & Berkes, F. (2012). Building co-management as a process: Problem solving through partnerships in Aboriginal Country, Australia. *Environmental Management*, 49(6), 1130-1142.

<https://doi.org/10.1007/s00267-012-9845-2>

Appendix

Overview of case studies: Successes and challenges are based on the publications reviewed

Country	Type or name of MPA	Indigenous Community	Level of co-management	Successes	Challenges
Canada	Gwaii Haanas National Marine Conservation Area Reserve	Haida community	Strong co-management	<ul style="list-style-type: none"> • True co-management • Recognition of Indigenous law • Monitoring • Ecological success 	<ul style="list-style-type: none"> • Scope of authority
New Zealand	Taiāpure	Māori - Te Arawa community	Mild co-management	<ul style="list-style-type: none"> • Recognition of Indigenous law • Reclaiming control over resources 	<ul style="list-style-type: none"> • No final decision-making authority
Panama	Bastimentos Island National Marine Park	Ngäbe community	No co-management	None	<ul style="list-style-type: none"> • Funding