



Establishing marine protected areas in Papua New Guinea using Local Level Government laws: an analysis



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Cover photograph: Overhead view of shoreline, New Ireland Province. Photograph taken by Elodie van Lierde, 2019.

Executive summary

The challenges marine managers face are complex and vary according to geographical location. In Melanesia, where coastal communities have customary ownership over their inshore waters, the complexities of marine management can be pronounced. Papua New Guinea (PNG) lies in western Melanesia and retains a strong clan-based societal system centred on land and marine tenure rights. During recent decades, attempts have been made to implement spatial marine management measures in PNG, including marine protected areas (MPAs). However, such approaches have often failed due to inappropriate enforcement and compliance measures, a lack of long-term monitoring and surveillance programmes, insufficient funding, and inadequate community engagement protocols.

Since 2017, the Wildlife Conservation Society (WCS) has been working with government, communities and other stakeholders in order to facilitate the establishment and implementation of two community-focused MPAs in New Ireland Province, PNG. Through regular stakeholder consultations and an extensive community engagement and awareness programme, encompassing over 90 communities, decisions were made to locate the two protected areas in Lovongai and Murat Local Level Government (LLG) jurisdictions. The advice obtained from several legal reviews was to formalise the two MPAs with LLG laws, which are recognised under the PNG Constitution as part of the Organic Law on Provincial and Local Level Governments, 1998.

The following report provides an analysis of existing spatial marine management initiatives in PNG formalised with LLG laws. The analysis uses twelve criteria for assessing the marine management initiatives, which were developed on factors considered integral for marine management in Melanesia. To date, only a limited number of LLG laws have been used to enforce spatial marine management in the country. Accordingly, this report focuses on two main case studies:

- i) The Kimbe Bay Network of MPAs, West New Britain Province, which was enforced with three LLG laws; and
- ii) The Lovongai Marine Environment LLG law, enacted in 2013, which provides a legal framework for formalising a future MPA in Lovongai LLG, New Ireland Province.

In conclusion, the Kimbe Bay MPA network no longer functions and the Lovongai LLG law was forsaken following enactment. Lessons can be learned from the design of the Kimbe Bay MPA network, which include conducting a robust and widespread community engagement and awareness programme prior to MPA development and implementation to ensure communities are part of the MPA decision-making process. An MPA governing body should be locally appointed to oversee the implementation of the MPA according to details listed in an MPA management plan. Once implemented, a control, surveillance and enforcement programme should also be established, together with an assessment of the MPA benefits to local people to gauge public perceptions and identify opportunities for adaptive management.

Unlike the three LLG laws developed to enforce the Kimbe Bay MPA network, the Lovongai LLG law was developed to formalise potential future MPAs within Lovongai LLG jurisdiction. For this reason, a direct comparison between the two marine management measures could not be made. Therefore, this report frequently uses the term *marine management initiative* to refer to the spatial management measures established in both Kimbe Bay and Lovongai LLG.

We hope the outcomes from this report will be of use to marine managers across the maritime provinces of PNG, and elsewhere in Melanesia, and assist with the establishment and implementation of future community-focused MPAs and other forms of spatial marine management that are of benefit to both local people and the natural world.

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Marine protected areas

Since the 1990s, marine protected areas (MPAs) have become a widespread marine conservation tool used to protect specified coastal and open-water environments by limiting impacts from human activity (Pikesley *et al.*, 2016; Sheehan *et al.*, 2013). During recent years, MPAs have been established in favour of more conventional marine management methods, including quota-specific restrictions for commercial fisheries (Botsford *et al.*, 1997; Sheehan *et al.*, 2013; Howarth *et al.*, 2015; Zhou *et al.*, 2010). Originally, environmentalists promoted MPAs for their biodiversity conservation outcomes. However, many fisheries scientists considered marine spatial management an unsuitable tool for managing fisheries because of concerns that MPAs would displace local fishing activity and increase regional fishing effort. Modellers have since evaluated optimal conditions under which MPAs are likely to achieve beneficial outcomes for both biodiversity and fisheries management (PNG Government, 2015), part of which involved taking an ecosystem-based approach to fisheries management. The role communities play in sustainably managing their marine resources has also been recognised. This is notable in Melanesia, where the cultural benefits of marine management and conservation can be pronounced.

Designing and establishing an MPA is a complex procedure that can take several years. To ensure a good MPA design process, sufficient time is required to allow for participatory stakeholder engagement, debate, and conflict resolution. Measuring ecological outcomes also takes time due to the life history characteristics of marine organisms, which regulate rates of population recovery. Spatial marine management is most appropriate for site-attached species and is not necessarily the right tool for highly mobile species that exhibit migratory behaviour, which may encompass large geographical areas and vary with seasonal change. The evidence for marine population recovery derives primarily from no-take, permanently closed MPAs with high compliance (Edgar *et al.* 2014) and less from partially protected areas that lack stringent rules (Claudet *et al.* 2011; Zupan *et al.* 2018). How coastal residents perceive marine management, including how marine management affects human well-being, can be the key driving factor for both local MPA support and success. (Mascia *et al.*, 2010; Foale *et al.*, 2016; Bennett *et al.*, 2017; Cohen *et al.*, 2019; Kinch, 2020). Accordingly, an MPA is more likely to be successful when coastal residents are reliant on healthy marine ecosystems for food and livelihoods, and hence will be more willing to accept local marine management rules and regulations (McClanahan *et al.*, 2007; McClanahan and Graham, 2005).

All human activities, including fishing, impact marine biological systems and the provision of ecosystem goods and services to varying degrees, depending on the magnitude and frequency of such activities (Worm *et al.*, 2006; Queiros *et al.*, 2013). Marine environments, however, are not uniform and experience natural disturbances over various spatial and temporal scales (Dinmore *et al.*, 2003; Kaiser *et al.*, 2011). Ecological responses to anthropogenic impacts can be gauged according to the recovery of marine habitats and associated ecosystem functions – and the resilience of marine species – to natural disturbances that differ in intensity (Collie *et al.*, 2000; Hiddink *et al.*, 2006a). The complex and dynamic nature of marine systems can therefore affect the outcomes delivered by an MPA (Hiddink *et al.*, 2006b; Dinmore *et al.*, 2003).

MPAs can be established to (i) conserve marine biodiversity, (ii) manage local fisheries, and (iii) safeguard areas from the predicted threats of anthropogenic climate change and other human activities. A review by Fernandes *et al.* (2012) recommended physical and biological principles for protecting marine biodiversity, sustainably managing inshore fisheries, and improving local resilience to climate change, which include:

- Representing different marine and coastal habitats within the marine protected area;
- Replicating the number of marine protected areas to increase resilience to potential risks and threats;
- Protecting key critical habitats and sites of special interest, including fish spawning aggregation sites and areas of cultural significance;
- Integrating connectivity between the designated marine protected areas;
- Reducing land-based threats, such as agricultural runoff and pollution; and
- Promoting sustainable marine resource usage.

Early MPA design and implementation attempts typically consisted of one large area. During recent years, marine managers have witnessed the benefits of establishing networks of MPAs, encompassing a variety of marine habitats (Aswani and Hamilton, 2004). MPAs can range from marine reserves, where all human activities are prohibited, through to zones that restrict certain fishing gear or allowable catch rates. MPA networks consist of several areas connected through physical and biological processes, such as water currents or ocean upwelling, which can deliver larval organisms and nutrients from one protected area to another. Studies in Manus Province, Papua New Guinea (PNG), found that fish larvae belonging to the Family Serranidae* move within ten to fifteen kilometres of their original spawning site, indicating the benefits of establishing an MPA network within close proximity to each other (Almany *et al.*, 2013). A network of MPAs can also be more cost-effective than a large individual protected area, due to the diversity and flexibility of the network, with variations in the shapes, sizes and locations of the protected areas. Thus, a carefully planned and legally enforced MPA network, which uses an ecosystem-based approach to management, has the potential to achieve biodiversity, fisheries and climate change management objectives.

* The Family Serranidae includes groupers and rock cods.

Papua New Guinea: An overview

Occupying the eastern half of the island of New Guinea and over 600 adjacent islands, the Independent State of Papua New Guinea (PNG) is located in the Southwest Pacific Ocean between South East Asia and Australia (Figure 1). Archaeological evidence indicates that humans first settled New Guinea at least 45,000 years ago (Allen and O'Connell, 2003). In the late-19th century, Germany colonised the north-eastern region of New Guinea and adjacent islands (collectively known as German New Guinea), the United Kingdom (UK) administered south-eastern New Guinea (British Papua), and the Netherlands controlled western New Guinea*. German rule lasted from 1884 to 1914 and the onset of World War I, when Australian allied forces occupied German New Guinea. In 1918, the League of Nations authorised Australia to administer New Guinea, which was known as the Territory of New Guinea (Logan, 2015). The UK colonised British New Guinea from 1884 until the Papua Act of 1905, when the British transferred the Territory of Papua to Australia for administration. Following World War II, the two Australian administered New Guinea territories were combined forming the Territory of Papua and New Guinea, which was subsequently shortened to Papua New Guinea. During the post-war years, PNG's residents appealed to the United Nations for independence (Logan, 2015). On 16 September 1975, PNG gained independence from Australia to become a Commonwealth realm. The PNG political system is based on the Westminster System of Great Britain, with the UK monarch, currently Queen Elizabeth II, as head of state. PNG has a decentralised government system with national, provincial, district, local and ward levels of government and administration. PNG is divided into four regions, 22 provinces (including the National Capital District and Autonomous Region of Bougainville), 89 districts, and 319 local level government (LLG) jurisdictions.

At the end of the last glacial period, approximately 11,500 years ago, rising sea levels formed the Torres Strait, separating New Guinea from the continent of Australia (Groube *et al.*, 1986).[†] Unlike Australia, New Guinea is mountainous, with Mt. Wilhelm ascending 4,509 metres above sea level. Lowland regions flank PNG's mountainous interior, which support tropical rainforests, savannahs, flood plains, swamplands and large river systems. New Guinea has more plant species (13,500 species) than any island on earth (Cámara-Leret *et al.*, 2020), with PNG harbouring a large number of endemic terrestrial and freshwater species.[‡] The inshore waters of PNG support some the world's most floristically rich mangrove ecosystems, extensive seagrass meadows, and coral reefs that support around 76% of all described hard coral species (Green and Mous, 2008) and over 2,200 reef fish species (Allen and Swainston, 1993). Approximately 13,840 squared-kilometres of PNG's coral reefs lie within the Coral Triangle ecoregion, the world's focal point for marine biodiversity (Spalding *et al.*, 2001). Beyond the shelf seas, PNG's combined territorial waters and exclusive economic zone (EEZ), which borders Indonesia, Australia, Solomon Islands, and the Federated States of Micronesia, encompasses 3,120,000 squared-kilometres of sea-space (Govan *et al.*, 2013). The biogeographic diversity of PNG reflects the nation's ethnic diversity. PNG is the world's most heterogeneous nation, with over 830 living languages (Gordon, 2008) and at least a thousand tribal

* In the mid-20th century, after lengthy negotiations, Dutch New Guinea was placed under United Nations administration until 1963, when the region was transferred to Indonesian rule. In 1969, the Act of Free Choice referendum was held, in which 1,025 representatives from the Indonesian military unanimously voted for Indonesian control of western New Guinea. Originally known as Irian Jaya, in 2002 Indonesian New Guinea was split into the Indonesian provinces of Papua and West Papua.

[†] In the Pleistocene epoch, New Guinea and Australia were joined, collectively forming the continent of Sahul.

[‡] Endemic species in PNG include 82 species of freshwater fishes, 328 species of amphibians and reptiles, 77 species of birds, and 69 species of mammals (Convention on Biological Diversity, 2020)

cultures. Clans and communities in PNG maintain customary ownership over land and inshore areas through traditional tenure rights that may have been in place for generations*. Traditional and cultural practices still prevail in PNG; however, since Christian missions arrived in the mid-19th century, the Christian Church has permeated modern society. The national economy is based on natural resource extraction, including gold, silver, copper, and other minerals, as well as timber and forestry products, fish, shellfish, and cash crops. During recent decades, mineral extraction led to steady economic growth; however, PNG's dependence on natural resources, coupled with low levels of governance and limited socioeconomic development, has led some economists to view PNG as a nation experiencing the resource curse[†]

Papua New Guinea is a developing nation with low levels of welfare for the majority of citizens. Since the early 1960s, the population of PNG has increased four-fold, from around 2 million in 1960 to 8.59 million in 2019. In the early 2020s, over 40% of the national population was less than 14 years old (World Bank Data, 2019), indicating further population increase. Since the mid-1970s, there has been little increase in per capita gross-domestic product (GDP), a situation unlikely to change due to population growth. Around 87% of PNG's population is rural, with some regions experiencing poor infrastructure and limited access to water, sanitation, healthcare, education and other amenities (World Bank data, 2020). Apart from faith-based groups, there are few civic-society organisations in the country. Church groups have become a key driving force in PNG, and often assist with the management of education and healthcare services. The PNG political system increasingly relies on electing independent members of parliament, which has led to nepotism, corruption and failure to implement long-term policies. Since the 1990s, a rise in institutionalised corruption has seen a decline in the role of the state, despite many nationals viewing the state as a provider of goods and services. Although PNG experienced recent economic growth, Asian Development Bank data indicates that in 2017, 38% of the population was living under the international poverty line. PNG has one of the world's highest domestic violence rates, and women are less likely to gain formal employment than male counterparts. According to the World Health Organisation, there has been a rise in HIV, malaria and drug-resistant strains of tuberculosis during recent years, and the country currently has one of the lowest health care expenditures in Oceania, which in 2014 was 4.3% of the total GDP.

Although mining and forestry are key land-based primary industries in PNG, the marine environment provides important livelihood options for coastal communities. Fisheries range from large-scale industrial fleets to community-based subsistence and artisanal practices in inshore areas (Bell *et al.*, 2013). According to PNG National Fisheries Authority data, commercial fisheries have a total market value of PGK[‡] 350 to 400 million per year, approximately half of which derives from the national tuna fleet. PNG's commercial tuna fishery is one of the world's most productive, catching some 500,000 metric tonnes of tuna per year (Logan, 2015). Small-scale fisheries support traditions and customs and provide protein sustenance, micronutrients, and incomes for families and villages. Since the 1980s, East Asian demand for PNG sea cucumbers has increased, which led to a moratorium on the fishery from 2009 to 2017 (Hair *et al.*, 2016). Mounting illegal, unreported and unregulated fishing and fisheries actions are threatening the sustainable management of PNG's inshore and offshore fisheries.

* Roughly 97% of all land area in PNG remains under traditional customary tenure (Lam, 1998; Ruddle *et al.*, 1992)

[†] The resource curse refers to a resource-rich country that fails to benefit from their natural resource wealth.

[‡] The kina is the national currency of PNG. In October 2021, 1 PNG kina equalled 0.28 United States dollars.



PAPUA NEW GUINEA: FAST FACTS

**THE WATERS OF PAPUA NEW GUINEA
LIE IN THE CORAL TRIANGLE ECO-
REGION, AND HARBOUR AT LEAST:**

- 500 hard coral species
- 2,200 reef fish species
- 8 species of tuna
- 132 species of sharks and rays
- 6 marine turtle species
- 19 species of sea snake
- 1 marine crocodile species
- 23 marine mammal species
- 33 species of mangrove flora

**PEOPLE HAVE INHABITED PAPUA NEW
GUINEA FOR AT LEAST 45,000 YEARS.
TODAY THERE ARE:**

- 8.59 million residents
- 22 provinces
- Over 830 living languages
- Customary land and sea tenure rights
- Myriad tribal cultures and customs

Figure 1: Comprising the eastern half of the island of New Guinea and adjacent islands, Papua New Guinea lies in the equatorial waters of the South-west Pacific Ocean. Situated between the Indian and Pacific Oceans – and Asia and Australia – the national waters of Papua New Guinea form part of the Coral Triangle ecoregion, the global focal point for marine biodiversity. Archaeological evidence indicates that the first human settlers arrived in Papua New Guinea at least 45,000 years ago and have since established customary land sea tenure rights that are managed through clan-based societal systems. Today, communities in Papua New Guinea maintain customary marine tenure rights that may have been in place for generations.

Criteria for establishing marine protected areas in Papua New Guinea

With a total land area of 462,243 squared-kilometres (Logan, 2015), PNG is a large and culturally complex nation that supports a wealth of marine and coastal ecosystems. Around 80% of PNG's coastal villages rely on their local marine environment for supporting subsistence and artisanal fisheries (NFA, 2017), indicating the importance of implementing long-term, community-focused marine management initiatives. To assist future marine managers with the development and implementation of MPAs in PNG* – especially considering the cultural diversity of PNG society – the following twelve criteria[†] have been developed for consideration:

1. Siting the MPA in areas important for marine and coastal biodiversity

An MPA should be located in an area that supports a high local biodiversity of marine and coastal species, as well as a range of habitats such as mangroves, mud flats, estuaries, coral reefs, sea grass meadows, algal beds, sand flats and open and deep-water environments. Focus should also be on endemic and critically endangered species. Much of PNG lies in the Coral Triangle ecoregion with national waters harbouring at least 33 species of mangrove flora (Sheaman, 2010), over 500 hard coral species (Green and Mous, 2008), and around 3,000 species of marine fishes (Kailola, 1991; Allen and Swainston, 1993), which includes 132 shark and ray species (White *et al.*, 2017), demonstrating a wealth of marine ecosystems worth managing.

2. Locating the MPA in areas that support small-scale fisheries and coastal livelihoods

Around 80% of all fishing and edible invertebrate extraction in PNG derives from subsistence and artisanal fishing practices that occurs at the community level (NFA, 2017). In the early 1960s, PNG had a population of around 2 million people; in 2019, the national population was 8.59 million residents. High population increase in the coastal zone is placing increased pressure on marine resources. As such, an MPA should be located in an area that can both benefit local fishers and increase future food security.

3. Harmonising the selection of MPA location with existing cultural practice

Over 830 living languages are spoken in PNG (Gordon, 2008), coupled by myriad tribal customs. From personal observation, an array of customs are practiced in coastal regions across PNG, which vary from specified stretches of shoreline where ancestral spirits are believed to reside through

* Although there are several legal tools available for enforcing MPAs in PNG, advice from two legal experts recommended the use of Local Level Government (LLG) laws, which are under the Organic Law for Provincial and Local Level Governments, 1998, for MPA formalisation. The twelve-point criteria presented in this report were also developed according to LLG law requirements.

[†] The twelve-point criteria listed in this report were inspired by:

Ostrom, E. 1990. *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press, New York.

Clarke, P., Jupiter, S.D. 2010. *Principles and practice of ecosystem-based management: A guide for conservation practitioners in the tropical Western Pacific*. Wildlife Conservation Society, Bronx, USA.

to villages where local residents can communicate with spirits embodied within sharks or sea snakes. Customary spatial-temporal marine closures, known as *tambu* areas, also exist. Thus, the location of an MPA should take into consideration local traditions and customs (Foale, 2002; Foale *et al.*, 2016).

4. Appropriate community engagement undertaken during the establishment and implementation phases of the MPA

Around 97% of all land and coastal waters in PNG are held under customary ownership (Klopf, 2004) through traditional tenure rights. Prior to conducting conservation or marine management work in PNG, appropriate community outreach and engagement should take place – through the free, prior and informed consent (FPIC) process – with suitable grievance mechanisms in place. Communities must be aware of the advantages and disadvantages of MPAs, and be keen for an MPA to be established and enforced in their region. In return, MPA managers can learn from communities about the local marine environment, traditional fishing practices, and customary marine management measures.

5. Appropriate education and awareness undertaken during the MPA establishment process

An interactive education and awareness programme should be provided to local community residents, school students, church leaders, and other stakeholders, providing participants with an understanding of how marine systems function and the importance of managing marine resources. The education and awareness programme should focus on (i) basic marine ecology (including food webs, the life history characteristics of target species, and the connectivity between different marine ecosystems), (ii) the threats to marine and coastal resources (both natural and anthropogenic), (iii) marine management options (including MPAs and their advantages and disadvantages), and (iv) marine policy and legal tool options for MPA enforcement (such as Local Level Government laws). Examples of successful community-based MPAs in other parts of Melanesia or Oceania should also be included in the education programme.

6. Relevant consultations with government, the private sector and other stakeholders occur concerning the MPA establishment and implementation process

Regular and updated stakeholder consultations should take place with key representatives from national, provincial and district governments, including the Conservation and Environment Protection Authority (CEPA), National Fisheries Authority (NFA), National Oceans Office (NOO), the Provincial Fisheries Office (PFO), private sector, education institutions, law and order, and local non-governmental organisations (NGOs). Key stakeholder representatives should form a technical working group or steering committee in order to steer the development of the MPA, provide consensus on decisions made during the MPA establishment and implementation phases, and ensure conflict resolution mechanisms are in place.

7. Adequate rules and penalties are in place to meet the MPA's objectives, and the MPA's external boundaries are defined

Feasible and pragmatic MPA rules, regulations and penalties should be in place that recognise local community rights, including customary land and sea tenure, while also allowing the MPA to meet biodiversity and fisheries management objectives. In general, the simpler the rules the better. The rules need to be approved by the communities and other stakeholders and should ideally be selected by the community residents, fishers and resource owners themselves (with the inclusion of women and youth during the decision-making processes). All penalties for non-compliance should be fair and realistic deterrents. Similarly, the MPA boundary should be defined and agreed upon by the community residents and other stakeholders. Once agreed upon, the MPA rules, penalties and boundaries should be listed in the draft LLG law, which then needs to be approved by the LLG.

8. Management plans are developed and implemented and a clear governance structure is established for MPA management

Once an MPA has been established, appropriate marine management, monitoring and enforcement plans should be developed and implemented, with each plan reviewed and updated every five to ten years. A clear governance structure should also be established, which is representative of the region encompassing the MPA, including women and youth; where possible, the governing body should be built on existing governance structures. The governing body should be responsible for (i) enforcing the MPA rules, (ii) ensuring offenders that breach the rules are penalised, and (iii) ensuring MPA monitoring and surveillance takes place. To establish an LLG law for MPA formalisation, an LLG marine management plan is required and a Marine Environment Management and Conservation Committee (MEMCC) needs to be established, which comprises representatives from the LLG as well as male and female resource owners, church leaders, and other stakeholders from the LLG.

9. Suitable legal mechanisms are developed and endorsed for MPA formalisation and enforcement

The MPA rules, penalties, boundaries, and limits of any zoning scheme that may exist within the MPA or MPA network need to be formalised through either strong customary governance (in areas that support strong community leadership or clan leadership) or with appropriate legal tools. In PNG, several legal reviews have recommended the use of LLG laws – part of the Organic Law on Provincial and Local-level Governments, 1998 – for formalising MPAs (Brunton, 2018; Dom, 2020). For an LLG law to be enacted for MPA formalisation and enforcement, it is necessary to follow the correct legal procedures and channels required for drafting and submitting the law for ministerial approval*.

* The necessary procedure required for developing and submitting an LLG law for ministerial approval have been outlined on page 16.

10. Capacity, resources and funding need to be available for MPA monitoring, control and surveillance

To be effective, an MPA should be monitored and controlled during its lifespan, which could be for several years or decades. Examples of MPA monitoring include assessments of fish and benthic* species abundance and diversity (a higher level of hard coral cover, for example, is typically associated with healthier coral reefs), as well as household socioeconomic surveys and fisheries assessments (which could, for instance, determine whether the MPA has improved household incomes through increased fish catch yields). Control and surveillance procedures should also be in place with appropriate, long-term funding. Without active monitoring and compliance to ensure the MPA rules are being adhered to the MPA will fail to meet its objectives.

11. Offenders receive designated punishment for rule breaking

For an MPA to be successful, the management rules and regulations need to be enforced and rule breakers need to receive appropriate punishments that are pre-determined. All law enforcement personnel, including village peace officers, village police, village court magistrates, and community leaders and elders, should be aware of the MPA rules, penalties and boundaries to ensure rule breakers face the consequences for their actions. As well as paying fines or conducting community work, MPA rule breakers – especially repeat offenders – can be referred to traditional village courts or more formal district or national courts. An LLG law should also make provisions for the distribution of any fines that are collected.

12. Measurable benefits of the MPA have been achieved for both nature and human well-being

If an MPA does not allow marine biological systems to recover from previous disturbances, or enable target species to increase in abundance, it has likely failed. An MPA should also be viewed as a form of sustainable development for managing natural resources with long-term benefits for human residents. Assessments of human well-being can be included in an MPA's biological monitoring plan, which should be conducted when the MPA is established (to provide baseline data) and on a regular basis during the MPA's implementation (enabling temporal comparisons to be made). Assessing human well-being will gauge the benefits of the MPA to local people. The biological monitoring plan will assess how the MPA benefits the natural world. A communications strategy should also be in place to disseminate information regarding the benefits of the MPA and to inform local residents about the MPA's rules, penalties and boundaries.

* Benthic organisms live on the seafloor or within seafloor sediments. Algae, sponges, corals, worms, clams and starfish are examples of benthic lifeforms, which are collectively known as the benthos.

Legal options for formalising marine protected areas in Papua New Guinea

The communities of PNG have customary ownership over their land and inshore areas and associated resources through traditional tenure rights. National Acts of Parliament – or statutes – enable the state to have access to the national seas within the limit of PNG’s Exclusive Economic Zone (EEZ), while also acknowledging community fishing rights and ownership of inshore marine resources. A number of statutes have been passed by PNG Parliament that can allow for the enforced protection or management of marine and coastal resources, such as MPAs or other forms of spatial marine management, which include:

- Climate Change Act, 2015
- Environment Act, 2000
- Fisheries Management Act, 1998 (amended in 2015)
- Lands Act, 1996
- Maritime Zones Act, 2015
- Mining Act, 1992
- Oil and Gas Act, 1998
- Organic Law on Provincial and Local-level Governments, 1998
- Unconventional Hydrocarbons Act, 2015

A Protected Areas bill* was developed and submitted to PNG Parliament; however, at the time of writing was the bill was pending enactment.

The Maritime Zones Act, 2015, Fisheries Management Act, 1998, and Organic Law on Provincial and Local Level Governments, 1998 (herein, *Organic Law*) include some of the most feasible options for spatial marine management in PNG.

The **Maritime Zones Act** allows for the establishment of spatial marine management measures, such as MPAs, including (i) fisheries reserves, (ii) marine parks, (iii) marine conservation reserves, and (iv) sensitive marine areas (Section 40(2)(3)). The Maritime Zones Act also states that the “Minister responsible for environmental and conservation matters, in consultation with the minister responsible for fisheries matters, may declare (i) an area of the water of PNG including the seabed underlying such waters, (ii) any land associated with the waters of PNG, and (iii) any wetland, to be a marine protected area” (Brunton, 2018). As of October 2021, no MPA or other spatial marine management measure had been formalised in PNG under the Maritimes Zones Act.

Section 28 of the **Fisheries Management Act** allows for the development of provincial fisheries management plans, with provisions that include: (i) identifying the fishery and its state of exploitation; (ii)

* Developed by the Government of PNG to support the development and management of a National Protected Area Network across the country, the Protected Areas bill aims to guide communities, organisations, agencies and other stakeholders to the sustainability and development of terrestrial and marine spatial management initiatives in PNG, including marine protected areas. The accompanying National Protected Areas Policy has five pillars: (i) protected areas, governance and management; (ii) sustainable livelihoods for communities; (iii) effective and adaptive biodiversity management; (iv) management of the protected areas network; and (v) sustainable and equitable financing.

listing all objectives necessary for the management of the fishery; (iii) identifying environmental impacts of the fishery operation; and (iv) identifying customary fishing practices or rights (Brunton, 2018). All marine conservation and management areas enforced at the national level should be established in consultation with the National Fisheries Authority (NFA) and the Conservation and Environment Protection Authority (CEPA).

The Fisheries Management Act states the roles and responsibilities of the NFA for managing and regulating PNG's fisheries in both the inshore and offshore waters that lie within the limits of PNG's EEZ. The Fisheries Management Act focuses on the commercial and industrial fishing sectors – and in particular the national tuna fishery – rather than small-scale artisanal and subsistence fisheries, which in 2007 comprised approximately 80% of all PNG's fishing activities (NFA, 2017). Although the Fisheries Management Act acknowledges and respects coastal community customary tenure rights and ownership of marine resources, it does not grant power to provincial, district or local level government jurisdictions to manage coastal fishery resources.

The **Organic Law** provides a mandate to provincial and local level governments (LLGs) to develop laws based on local custom and other circumstances (Brunton, 2018). The Organic Law can empower provincial governments to manage and regulate fisheries and other marine resources within provincial jurisdictional boundaries through provincial level government laws. Provincial governments can propose rules restricting potential threats to fisheries or other marine resources at the provincial level, and thus enforce spatial management provided that no existing national laws of a similar nature are in place. Local level governments can make laws for local environmental purposes under Section 44(1) of the Organic Law (Brunton, 2018), which can be implemented to protect the local environment and traditional sights, as well as for managing customary-based fishing practices. Local level governments can enforce fines for any breach of an LLG law, allowing for the implementation of legal compliance mechanisms. If, however, a provincial or local level government law counteracts or contradicts national legislation, the national law will override the specific provincial or local level government law, which may then become null and void (Brunton, 2018).

Provincial-based laws concerning conservation matters are included in Section 42 of the Organic Law. Some of the key points listed in Section 42 that are relevant to provincial-level marine spatial management include:

- (e) culture and cultural centres
- (f) museums and libraries
- (h) tourism
- (i) village, urban and community courts
- (k) agriculture
- (l) fishing and fisheries
- (m) trade and industry within the province
- (r) land and land-use developments
- (s) forestry and agro-forestry
- (t) renewable and non-renewable resources
- (u) mediation and arbitration
- (y) parks, reserves, gardens, scenic and scientific centres

Section 44 of the Organic Law outlines LLG law-making powers, which include the following points relevant for local-level spatial marine management and conservation initiatives:

- (i) dispute settlement
- (p) local environment
- (z) protection of traditional and sacred sites
- (ab) the imposition of fines for breaches of any of its laws

According to Brunton (2018), for an LLG bill to be enacted the following steps should be taken during the planning and development phases:

- i) Develop and sign a memorandum of understanding (MoU) with the LLG.
- ii) Form a functioning MEMCC,* which acts as an advisory committee to the LLG.
- iii) Draft the bill, including offenses, penalties and area boundaries.
- iv) Initiate a formal consultation process with the provincial government, CEPA, NFA and NOO to allow objections and alterations to be addressed.
- v) Follow-up and amend the bill according to feedback and suggestions from the government consultations.
- vi) Introduce the draft bill to senior LLG and provincial personnel, accompanied by a formal letter that includes an explanation of how the Organic Law prevents overlap with national laws or other statutes.
- vii) Track the draft LLG bill through the Secretariat of the Provincial Assembly until it has been passed.
- viii) Deliver the LLG bill to the Secretary of the Department of Provincial and Local Level Government Affairs (DPLGA) in Port Moresby for ministerial approval. If there are no objections, the bill will be passed as an LLG law after 60 days.

* All members of the Marine Environment Management and Conservation Committee (MEMCC) should be living or working within the proposed marine management area and be appointed by the LLG President. Members should include: (i) a local ward councillor; (ii) three community-based marine resource owner representatives; (iii) two female community-based marine resource managers; (iv) a church-group representative; (v) a representative nominated by the LLG; and (vi) an NGO representative that specialises in community-based marine resource management.

Current Local Level Government laws for marine management in Papua New Guinea

A limited number of LLG laws have been developed for enforcing marine management in PNG (Figure 2), which includes the following examples:

Talasea, Bialla and Hoskins Marine Environment Management Local Level Government laws, for Talasea Rural, Bialla Rural and Hoskins Rural Local Level Governments, West New Britain Province

In 2004, The Nature Conservancy (TNC) – an international conservation NGO – initiated the establishment of a network of MPAs in Kimbe Bay, West New Britain Province. Kimbe Bay is flanked by three LLGs: Talasea Rural, Bialla Rural and Hoskins Rural LLG jurisdictions. With the assistance of TNC, separate Marine Environment Management LLG laws were drafted for the three LLGs to enforce the MPA network. However, to date, it remains unclear as to whether the LLG laws were enacted or have been implemented.

Lovongai Marine Environment Management Local Level Government law, 2013, Lovongai Rural Local Level Government jurisdiction, New Ireland Province

The Lovongai Marine Environment Management bill was developed in 2013 and enacted the same year by the Lovongai Rural LLG. The bill was developed by John Aini (the Lovongai LLG President during the early to mid-2010s and the founder of Ailan Awareness Inc., a local NGO) and the Wildlife Conservation Society (WCS). The LLG law was submitted in 2014 to the Minister for Intergovernmental Relations for approval as per the requirement stated in the Organic Law. The Organic Law provides that if the minister has not given formal approval of a law within 60 days, the law will be deemed to have been approved. Formally approved in 2019, the Lovongai Marine Environment Management law contains nine offences that are accompanied with penalty fines. From 2021 to 2022, WCS provided support and advice to enable the Lovongai Marine Environment law to be amended in order to enforce an MPA in Lovongai LLG.

Louisiade Rural Local Level Government Environment bill (produced in 2000) and Maramatana Rural Local Environment bill, Maramatana Rural Local Level Government, Milne Bay Province

Developed in 2000, with assistance from the NGO Conservation International (CI), the Louisiade Rural LLG Environment bill includes marine management regulations for communities in Louisiade Rural LLG in Milne Bay Province. In addition, a draft LLG bill was developed in 2009 for Maramatana Rural LLG in Milne Bay Province, which contains (i) general rules for protecting the local environment, (ii) rules for prohibiting harmful or poisonous substance usage, and (iii) penalties for non-compliance. However, at the time of writing, both bills were awaiting approval from the Milne Bay Provincial Executive Council (PEC).

Nali Sopat Penabu Rural Environment and Conservation law, 2007, for the Pere community in Nali Sopat Penabu Rural Local Level Government, Manus Province

With support from TNC, residents from Pere community in Nali Sopat Penabu Rural LLG, located in south-eastern Manus Province, passed the Nali Sopat Penabu Environment and Conservation law in 2007. The law allows for the protection and preservation of the marine environment and sites of cultural significance within 75 squared-kilometres of sea-space, comprising the customary tenure area for Pere community. Within the Pere tenure area, the law allows for the (i) declaration of spatial management areas and (ii) the setting of prohibitions and penalties for non-compliance (Pere Environment and Conservation Area Management Plan, 2009). To date, it remains unclear whether the law has been implemented.

SPATIAL MARINE MANAGEMENT INITIATIVES IN PAPUA NEW GUINEA



A. WEST NEW BRITAIN PROVINCE

In 2004, TNC established an MPA network in Kimbe Bay across three LLGs: Talasea, Bialla and Hoskins. Three Marine Environment Management LLG Laws were drafted to enforce the MPAs; it is unknown whether the laws were enacted or implemented.

B. NEW IRELAND PROVINCE

The Lovongai Marine Environment Management LLG law was enacted into law in 2013, and submitted to the Department of Provincial and Local Level Government Affairs (DPLGA) in 2014 for ministerial approval. The act was formally approved in July 2019.

C. MILNE BAY PROVINCE

In 2000, with support from the NGO Conservation International, the Louisiade LLG Environment bill was drafted. A draft Environment LLG bill was also developed in 2009 for Maramatana LLG. However, the two bills are still awaiting approval from the LLG.

D. MANUS PROVINCE

The Nali Sopat Penabu Rural LLG law was developed in 2007 by TNC and the residents of Pere community. The law covers 75 squared-kilometres of sea-space held under tenure by the Pere community. It remains unknown whether the law has been implemented.

Figure 2: The approximate locations of local level marine management initiatives in Papua New Guinea. The two main case studies examined in this report are (A) Kimbe Bay in West New Britain Province, where three local level government laws were developed for enforcing a network of marine protected areas, and (B) the Marine Environment Management Local Level Government law in Lovongai Local Level Government jurisdiction, New Ireland Province, which was enacted in 2013. Other spatial marine management bills and laws have been developed although it remains unclear whether they have been enacted or implemented, including (C) local level government bills in Milne Bay Province and (D) a community-focused local level government law for Pere community in south-eastern Manus Province. The Autonomous Region of Bougainville (AROB) has not been depicted on this map.

Establishing marine protected areas in Papua New Guinea using Local Level Government laws: an analysis

The five-point scoring system presented in Table 1 was formulated to assess how the spatial marine management measures, which were developed to be enforced with LLG laws, were planned, established and implemented in PNG. The five colour-coded scores were assigned to each of the twelve MPA assessment criteria*, which are listed on pages 10 to 13. Due to insufficient information concerning the enactment and implementation of the marine management bills and laws developed in Milne Bay Province and Manus Province (Figure 2), only the Talasea, Bialla and Hoskins Marine Environment Management LLG laws, which were collectively developed to enforce the network of MPAs in Kimbe Bay, West New Britain Province, and the Lovongai Rural Marine Environment Management LLG law, enacted in 2013 in Lovongai Rural LLG jurisdiction, New Ireland Province, were assessed with the five-point colour-coded scoring system.

NOTE: Three marine management LLG laws were developed to collectively enforce the Kimbe Bay Network of MPAs, while in Lovongai LLG, the Marine Environment Management LLG law was enacted to enforce a potential future MPA. As such, a direct comparison between the two marine management approaches cannot be made. This report, therefore, frequently uses the term *marine management initiative* to refer to the two marine management measures that were established in both Kimbe Bay and Lovongai LLG jurisdiction.

Table 1: A colour-coded five-point scoring system was devised to assess the two marine management initiatives that were formalised with local level government laws in Papua New Guinea. The five-point scoring system was assigned to twelve key MPA assessment criteria (listed on pages 10 to 13) to enable a systematic analysis of the two marine management initiatives.

1	2	3	4	5
The criterion was not attempted during the marine management initiative design, establishment and implementation phases	The criterion was not achieved during the marine management initiative design, establishment and implementation phases	Mechanisms were in place to achieve the criterion, yet the outcomes were not suitable for the marine management initiative	The criterion was achieved, although better alternatives exist, and further planning could have strengthened the final choices that were made	The criterion was achieved during the marine management initiative design, establishment and implementation phases

* Not all of the twelve assessment criteria could be assigned to the Lovongai LLG marine management initiative, despite the enactment of the Lovongai Rural Marine Environment Management LLG law in 2013. This is because – at the time of writing – no MPA or other spatial marine management approach has yet been formalised through the Lovongai LLG law. Therefore, the last three assessment criteria, listed on pages 10 to 13, could not be used to assess the Lovongai LLG law.

Kimbe Bay Network of Marine Protected Areas, West New Britain Province

Located in the Bismarck Sea, Kimbe Bay comprises 9,800 squared-kilometres of sea-space off the northern coast of West New Britain Province (Figure 2). The volcanic terrain of the New Britain mainland forms the eastern and southern shores of Kimbe Bay; the Willaumez Peninsula, which juts northwards from New Britain Island, comprises the bay's western flank. Situated within the Coral Triangle ecoregion, Kimbe Bay's marine and coastal habitats have a high biodiversity status. The bay also supports a regional tuna fishery (Langley *et al.*, 2006) and is an important area for endangered turtles, sea birds and marine mammals (WWF, 2003). Many of the 100,000 residents inhabiting Kimbe Bay's coastal zone rely on the local marine environment for seafood, livelihoods and traditional practices, and maintain customary ownership over their local marine resources through traditional tenure rights. During recent decades, regional population growth, the modernisation of traditional village systems, more efficient and destructive fishing methods*, and anthropogenic climate change have impacted Kimbe Bay's marine ecosystems and the human population that rely on marine ecosystem goods and services (Green *et al.*, 2007; Foale, 2009).

The Nature Conservancy (TNC) had been working in West New Britain Province since the mid-1990s. TNC's work included conducting marine ecological monitoring and rapid biological assessments of the Kimbe Bay region in collaboration with scientists from James Cook University (JCU), based in Queensland, Australia. TNC also established locally-managed marine areas (LMMAs) and developed an education and awareness programme, which was delivered to local communities in partnership with Mahonia Na Dari (MND), an NGO focused on marine conservation education in West New Britain Province. From 2004 to 2007, TNC conducted marine ecological assessments and arranged technical workshops, the outcomes from which were used to establish conservation targets and objectives that would provide guiding principles for establishing the Kimbe Bay Network of MPAs. The aim of the MPA network was to protect certain areas of biological and ecological interest, including fish aggregating sites and turtle nesting areas.

In 2004, during the first technical workshop, thirty scientists, partners, TNC staff and local representatives met to decide on the conservation targets, objectives, boundaries and design principles for the MPA network. Conservation targets included: (i) shallow water habitats; (ii) deep water habitats; (iii) islands; (iv) rare and threatened species; (v) species with limited distributions; (vi) commercially-important reef species; and (vii) large pelagic fishes. The objectives were (i) to conserve the marine biodiversity and natural resources of Kimbe Bay and (ii) to address local marine resource management needs. Design principles for the MPA network were also established, which encompassed both local biophysical and socioeconomic factors. The biophysical design principles included (i) risk spreading (through representation and replication), (ii) protecting key species, (iii) incorporating patterns of connectivity within and among marine ecosystems, and (iv) the effective management of natural systems. The socioeconomic design principles comprised (i) general socioeconomic factors, (ii) fisheries factors, (iii) nature-based ecotourism, and (iv) shipping. Once the MPA network design principles had been established, emphasis was placed on identifying and conducting high priority research, which included (i) identifying special and unique marine and coastal ecosystems, (ii) obtaining physical oceanographic

* Destructive fishing methods include the use of chemicals and derris root.

information concerning ocean currents and bathymetry, and (iii) socioeconomic information, which ranged from how community residents use and value their marine resources through to assessing local marine biological knowledge and understanding (Green *et al.*, 2007).

When designing the Kimbe Bay MPA network, emphasis was placed on assessing the marine habitats and biological communities in the bay. Community outreach and engagement was initially carried out by MND (in partnership with TNC) and focused on conducting awareness on environmental issues, including harmful fishing methods. TNC also undertook community engagement while collecting biological data and information concerning areas of cultural significance. In addition, socioeconomic surveys were conducted in six coastal communities (Koczberski *et al.*, 2006). Socioeconomic principles formed part of the MPA network design process, which aimed to address the interests and needs of local communities. TNC considered several options for involving communities in the MPA network design and developmental stages, which included (i) full community engagement in the design process, (ii) limited community engagement on certain issues considered strategically important, and (iii) engagement following the completion of the scientific design and research processes (Green *et al.*, 2007). TNC decided to conduct community engagement once the scientific design process had been finalised for the following reasons:

- Concerns regarding high expectations at the community level, especially concerning the preconceived benefits of the MPA network and the potentially large number of communities that may push for their customary marine areas to be included within the MPA network, which would have surpassed the resources of TNC;
- Potential sources of conflict that may arise within or between communities if local expectations were not met during the MPA network design process;
- The possibility of community support for marine conservation beyond the areas that were deemed to be biologically significant;
- The cultural diversity of Kimbe Bay, and the complex and often overlapping customary tenure rights to marine resources, which could have caused difficulties when attempting to capture community views and opinions during the scientific design process; and
- The technical complexity of the scientific design process, which was considered impractical for community participation.

The Nature Conservancy engaged with communities located in the priority areas of biological significance (which were identified during the scientific design phase) through a community-based planning process. Biological and socioeconomic data were assessed using MARXAN marine reserve design software, which uses hexagonal planning units to consider and compare ecological and socioeconomic standards listed in the design principles. The design principles focused on the biodiversity goals and socioeconomic costs within each planning unit, enabling a selection process to occur based on different scenarios. The software spatially organised the design principles, resulting in an optimal MPA network for the Kimbe Bay region, with maximum benefits to biodiversity protection and minimum socioeconomic costs to coastal communities. Following the MARXAN data analysis, fifteen* areas of biological interest were identified as

* One of the fifteen areas of biological interest, named 52 Fathoms, was later removed due to insufficient biological data obtained from the area.

appropriate choices for conservation. TNC worked with communities that have customary marine tenure rights in each of the fifteen areas of interest through the community-based planning process. Efforts were made by TNC to ensure the areas of biological interest did not encompass more than two customary marine tenure limits to reduce potential sources of community conflict. (Green *et al.*, 2007). The community-based planning process developed by TNC comprised the following components:

- i) Community engagement: To introduce the planning process to communities, as well as the concepts of MPAs and MPA networks;
- ii) Community visions: To identify locally managed marine area (LMMA) boundaries and to develop consensus concerning a realistic vision for managing local marine resources;
- iii) Participatory conservation planning: To identify ecosystems or areas of biological significance that are considered priorities for communities to protect, and to refine such information based on local knowledge;
- iv) Community development of LMMA plans and their agreement: To help communities achieve their visions for the long-term management of their marine resources;
- v) Preparation of draft LMMA plans and their agreement;
- vi) Stakeholder consultation and finalisation of the LMMA plans and their agreement by the communities.

The Nature Conservancy aimed to obtain full community agreement on the LMMA plans in each of the fifteen areas of biological interest identified during the scientific design process (Koczberski *et al.*, 2006).

In 2004, TNC assisted with the development of three LLG bills, which became the Talasea, Bialla and Hoskins Marine Environment Management laws.* Together, the three LLG laws were developed to enforce the proposed MPA network. The three LLG laws also formed the basis for the community LMMA management plans in each LLG jurisdiction (Weeks *et al.*, 2014). A steering committee comprising government, private sector and NGO stakeholders was established to take ownership of the MPA implementation process. A memorandum of understanding (MoU) was signed between TNC and the West New Britain Provincial Government to establish the Kimbe Bay Marine Management Area governance structure, which included a governing secretariat. The Kimbe Bay LMMA communities also became part of the PNG Learning and Training Network, which aimed to showcase community resource management and conservation tools being implemented by community residents, which could be shared through learning exchange networks (Weeks *et al.*, 2014). However, following the 2008 global financial crisis, TNC reduced work levels in PNG, and in 2013 TNC had left the Kimbe Bay region. During the 2010s, limited information was made available as to whether the three LLG laws were actively enforcing the MPA network. Since 2013, MND continued the education and awareness programme within the priority areas, which had been converted into locally-managed marine areas (LMMAs), and certain reef and fish monitoring studies were conducted by JCU (see page 31 for more details).

An assessment of the development and implementation processes that occurred in order to establish the Kimbe Bay Network of MPAs has been presented in Table 2, according to the twelve MPA assessment criteria listed on pages 10 to 13 and the five-point colour-coded scoring system on page 19.

* Talasea, Bialla and Hoskins LLGs are all located in West New Britain Province and form the coastline of Kimbe Bay.

Table 2: Justification and rating scores for the twelve assessment criteria developed to assess the network of MPAs established across three Local Level Government (LLG) jurisdictions in Kimbe Bay, West New Britain Province. Although three LLG laws were developed to enforce the Kimbe Bay MPA Network, it is unclear whether the LLG laws were implemented or remain active. Because of the uncertainties regarding the current status of the MPA network, the term *management initiative* has been used throughout the assessment to refer to the Kimbe Bay marine management measures. Information for the twelve assessment criteria has been listed on pages 10 to 13, and the five-point colour-coded score categories have been presented on page 19.

TALASEA, BIALLA AND HOSKINS (KIMBE BAY) MARINE ENVIRONMENT MANAGEMENT LOCAL LEVEL GOVERNMENT LAWS				
Assessment criteria	Score	Justification for assessment rating	Details	
1. Siting the management initiative in areas important for marine biodiversity	5	Kimbe Bay encompasses important marine and coastal habitats	Located in the Bismarck Sea, Kimbe Bay supports key fish aggregation sites	
2. Locating the management initiative in areas that support small-scale fisheries	5	Over 100,000 residents live in the coastal zone; many rely on marine resources	Fishing and invertebrate collection provides important livelihoods	
3. Harmonising the management initiative location with existing cultural practice	4	Socioeconomic costs were considered during the MPA design process	Attention was given to customary marine tenure and sites of traditional importance	
4. Community engagement conducted during the development and implementation phases	3	Community engagement was initially conducted in sites of biological interest	Emphasis placed on communities with key marine systems after design process	
5. Education and awareness undertaken during the development and implementation phases	4	An outreach, education and awareness programme was initiated by MND	Education activities occurred only in the selected sites of biological interest	
6. Stakeholder consultations occurred during the development and implementation phases	3	Stakeholder consultations occurred during the design and development process	Consultations largely involved scientists rather than other stakeholders	
7. Boundaries, rules and penalties defined to meet the management initiative's objectives	2	Boundary, rules and penalties set by scientists, not by community consensus	Residents were approached after design process; not a participatory approach	
8. A clear governance structure is in place for managing the management initiative	2	A steering committee was initially established, yet did not continue	LMMA management plans developed, yet unclear as to whether they remain in use	
9. Suitable legal mechanisms are enacted for formalising the management initiative	2	Three LLG laws were developed for enforcing the MPA network	Limited information exists as to whether the laws have been fully implemented	
10. Capacity, resources and funding are available for monitoring, control and surveillance	2	JCU fish and reef monitoring occurred; no control and surveillance programme exists	Unclear whether long-term funding for compliance and surveillance exists	
11. Offenders that breach the management rules received designated punishment	1	Uncertainties concerning the enactment of the LLG laws, which restricts enforcement	No records exist of penalties being issued for non-compliance	
12. Both people and nature have benefited from the marine management initiative	1	Assessments of biological recovery and socioeconomic well-being did not occur	No known records of measurable benefits to people or nature exist	

Lovongai Marine Environment Management Local Level Government law, 2013, New Ireland Province

Lovongai Rural LLG is one of the ten LLG jurisdictions that comprise New Ireland Province (Figure 2). Located in the far west of the province, Lovongai LLG encompasses the island of New Hanover, as well as the Tsoi Island chain that lies to the north-east of New Hanover, the Tingwon Island group that lies to the west of New Hanover, and other small islands and atolls. Lovongai LLG jurisdiction is located in the northern Bismarck Sea, a key focal-point for marine biodiversity. To the east of Lovongai LLG lie the Tigak Islands, which in 2016 were identified as a general priority location for marine conservation (PNG Government, 2015). The waters surrounding northern and eastern New Hanover and the adjacent islands support fringing coral reefs, lagoons, sea grass meadows and sand flats, while deep-water drop-offs exist along the shoreline of southern New Hanover. Mangrove systems flank the coast along eastern and western New Hanover and a number of estuaries drain rivers around the New Hanoverian coastline, which also support mangrove ecosystems. According to the most recent National Housing and Population Census, conducted in 2011, 29,000 residents were inhabiting Lovongai LLG. There are 19 wards and between 80 and 90 communities in Lovongai LLG jurisdiction, the majority of which are located within the coastal zone.

In 2013, John Aini* drafted the Lovongai Marine Environment Management LLG bill for the waters of Lovongai LLG. The main objective for developing the LLG bill was to establish and enforce a network of small-scale LMMAs in Lovongai LLG, which local communities could develop and implement in their customary waters. Initial community engagement was conducted by Ailan Awareness Inc. and WCS, which focused on engaging communities at the ward level.[†] An education and awareness component was also included in the community engagement programme, which was centred on the biology of marine ecosystems and the threats to marine resources. The Lovongai Marine Environment Management LLG bill was submitted to the Lovongai LLG Assembly in 2013 for enactment into law. In 2014, the Lovongai LLG law was submitted to the Department of Provincial and Local Level Government Affairs (DPLGA) for ministerial approval. In July 2019, following no response from the Minister for Intergovernmental Relations, the LLG law could be implemented as the Lovongai Marine Environment Management LLG law. According to Section 15 of the law “The Local-level Government may, on recommendation of the [Management] Committee, following an application by a local community, designate an area within the jurisdiction of a local community as a community-based marine management and conservation area”. Section 16 of the law continues by providing details on how an “Application for [the] designation of a community-based marine management and conservation area” can be made within Lovongai LLG jurisdiction.

The objectives of the Lovongai Marine Environment Management LLG law are to:

- i) manage and protect the marine and aquatic environment while allowing for sustainable economic growth;
- ii) sustain potential natural and physical resources for the needs of people and the future generations;

* From 2013 to 2015, John Aini was the Lovongai Rural LLG President. John Aini also founded Ailan Awareness Inc. in 1993, a local NGO that advocates reviving traditional marine resource management methods at the community level.

[†] A ward typically consists of several communities.

- iii) ensure proper weight is given to long-term and short-term social, economic, environmental and equity considerations related to environmental management matters;
- iv) avoid, mitigate or remedy adverse effects on the marine environment; and
- v) regulate activities that may have a harmful effect on the marine environment in an open and transparent manner.

The Lovongai LLG law requires the establishment of a Marine Environment Management and Conservation Committee (MEMCC). The Lovongai LLG MEMCC was appointed by the LLG President and consisted of (i) ward councillors, (ii) three marine resource owners, (iii) two women representatives, (iv) one youth representative, (v) one church group representative, (vi) one LLG administration representative, and (vii) one local NGO representative. The members of the Lovongai LLG MEMCC are permitted to hold office for a five-year term, and may hold office for a maximum of two consecutive terms. The MEMCC aims to coordinate and oversee all activities relating to marine environmental management in Lovongai LLG and to make recommendations to the LLG on (i) the establishment of marine management rules, (ii) the declaration of community-based marine management areas, and (iii) the coordination of compatible development activities. The MEMCC is also tasked with (i) facilitating the preparation of marine and coastal management plans, (ii) negotiating with marine resource owners, (iii) monitoring the area subject to the LLG law, and (iv) enforcing the provisions of the law.

The Lovongai Marine Environment Management LLG law contains the following offences:

- i) Restriction on collecting, taking and killing fish, shellfish and other marine resources
- ii) Restriction on fishing
- iii) Prohibition on destruction to reefs
- iv) Prohibition on the disposal of refuse
- v) Prohibition on swimming and diving
- vi) Prohibition on dynamite fishing
- vii) Prohibition on the possession of derris root
- viii) Prohibition on the use of derris root
- ix) Breaches of the management plans

There is no indication that the rules and prohibitions listed in the Lovongai Marine Environment Management law were agreed upon in consultation with the communities of Lovongai LLG or with the MEMCC and other stakeholders in the region.

According to the law, if a person or corporation commits an offence – without reasonable excuse – they are liable to the following penalties: a fine of up to PGK 200 for a natural person and a fine of up to PGK 5,000 for a corporation. The law states that any fine less than PGK 200 is to be paid directly to the MEMCC to support community-based development in the region. Fines that are greater than PGK 200 should be equally shared between the MEMCC and the Lovongai LLG. The offender may also stand trial at the local village court, unless the offence is beyond village court jurisdiction; in such an instance, the offender will stand trial at the District Court.*

The Lovongai Marine Environment Management LLG law provides the legal framework for establishing an MPA, as well as other marine management initiatives, within Lovongai LLG jurisdiction. Since 2017, WCS

* For a more comprehensive legal assessment of the Lovongai Marine Environment Management LLG law, refer to the legal review authored by Dom (2020).

and Ailan Awareness Inc. have undertaken broad-scale community consultations in Lovongai LLG to build consensus for the establishment and implementation of an MPA within the LLG's jurisdictional boundaries, which will be enforced with the Lovongai LLG law. Consultations with over 73 communities in Lovongai LLG took place to determine community-perceived threats to local marine resources, the outcomes from which were subsequently pooled and converted into a risk matrix. Using the risk matrix, community residents* selected magnitude and frequency scores based on how they perceived each threat, which were combined to provide risk impact rating scores; the risk impact rating scores for each community were then combined for the whole LLG. The communities also recommended rules for each perceived threat. The combined risk impact ratings that scored the highest values were presented back to the communities and to the New Ireland Province Technical Working Group† in late 2020 and early 2021 in order to gain consensus on the importance of each threat and also the rules provided by the communities. At the time of writing, the consultations were ongoing; if community consensus is granted, the community-selected rules will form the MPA rules and regulation, and the Lovongai Marine Environment Management LLG law will be amended to accommodate the new MPA rules and regulations. Similarly, penalties for non-compliance were suggested by residents during the community consultations, feasible versions of which will be used to penalise any infringements to the MPA rules.

The extent of each coastal community's customary marine tenure was recorded during the community consultations. The outer boundary of the MPA will be determined according to the furthest customary marine tenure rights from the coast (thus ensuring the customary marine tenure rights of all coastal communities within the LLG are included).‡ It is anticipated that the Lovongai LLG MPA will be declared and enforced with an amended version of the Lovongai LLG Marine Environment Management LLG law in 2022. The same process also took place in Murat LLG, which lies 165 kilometres north-west of mainland New Ireland, where a second MPA is being established; the Murat MPA will be formalised with the Murat Marine Environment Management LLG law in 2022, which is in the process of being developed.

Justification and rating scores for the twelve MPA assessment criteria (details of which have been presented on pages 10 to 13) that were used to assess the development and implementation of the Lovongai Marine Environment Management LLG law, according to the five-point colour-coded scoring system listed on page 19, has been presented in Table 3.

* The residents in each community were divided into male, female and youth groups during the risk matrix activity; the results from each group were averaged, providing final risk impact rating scores for each perceived threat for the whole community.

† The New Ireland Province Technical Working Group (TWG) includes representatives from the National Government, the New Ireland Provincial Government (NIPG), the New Ireland Provincial Administration (NIPA), the National Fisheries College (NFC), the private sector, local NGOs, community marine resource owners, the law and order sector, and other key stakeholders. The TWG acts as a steering committee for the development, establishment and implementation of MPAs and small-scale fisheries management approaches in New Ireland Province.

‡ In mid-2021, according to the community consultation outcomes that were conducted in 73 communities in Lovongai LLG, the furthest extent of customary marine tenure was 18 kilometres from the coast. As such, the Lovongai MPA boundary will extend 18 kilometres from the shorelines of the landmasses within Lovongai LLG (apart from where the MPA boundary coincides with other LLG jurisdictional boundaries, in which case the MPA boundary will remain within the Lovongai LLG border). The Lovongai LLG MPA will therefore encompass 5,814 squared-kilometres of marine space. The same process occurred in Murat LLG (where all 26 communities were consulted), with the furthest extent of customary marine tenure extending 20 kilometres from the coast, resulting in an MPA that encompasses 11,071 squared-kilometres of marine space.

Table 3: Rating scores for the twelve MPA assessment criteria developed to assess the Lovongai Rural Marine Environment Management LLG law. An MPA has not yet been established in Lovongai LLG; therefore, not all the twelve criteria can be assessed. The term *management initiative* has been used throughout the assessment to refer to the Lovongai LLG marine management measures. Information concerning the twelve assessment criteria has been listed on pages 10 to 13. Refer to page 19 for details regarding the five colour-coded scoring categories.

LOVONGAI RURAL MARINE ENVIRONMENT MANAGEMENT LAW, 2013				
Assessment criteria	Score	Justification for assessment rating		Details
1. Siting the management initiative in areas important for marine biodiversity	5	Lovongai LLG is located in the Coral Triangle and is a key area for biodiversity		Important marine and coastal habitats exist in the waters of the LLG
2. Locating the management initiative in areas that support small-scale fisheries	5	Over 75% of the communities in the LLG are coastal, most of which rely on fishing		Fishing and invertebrate harvesting provide key livelihoods in coastal regions
3. Harmonising the management initiative location with existing cultural practice	4	A number of traditional practices continue in the LLG's coastal regions		Various cultural practices remain in Lovongai LLG, including <i>vala</i> * and <i>gorgor</i> †
4. Community engagement conducted during the development and implementation phases	3	Initial community engagement conducted at the ward level, not at the community level		Community engagement was limited to the LLG law development phases
5. Education and awareness undertaken during the development and implementation phases	3	An education and outreach programme was in place, yet limited to the ward level		An education programme commenced during the LLG law development stages
6. Stakeholder consultations occurred during the development and implementation phases	3	Initial stakeholder consultations occurred but did not continue after law enactment		Consultations took place during the law establishment phases at the LLG level
7. Boundaries, rules and penalties defined to meet the management initiative's objectives	2	Management rules and penalties were listed in the law, yet some were unrealistic		No MPA was formed so no boundaries were set; no consultation approved rules
8. A clear governance structure is in place for managing the management initiative	2	An initial governance structure was established, but was disbanded		An MEMCC was established, yet did not continue. No law enforcement in place
9. Suitable legal mechanisms are enacted for formalising the management initiative	4	An LLG law was submitted and approved, which can be used to enforce a future MPA		LLG law was enacted in 2013; unclear whether the law was implemented
10. Capacity, resources and funding are available for monitoring, control and surveillance	N/A	Not applicable		No MPA or spatial management initiative was established; MCS not necessary
11. Offenders that breach the management rules received designated punishment	N/A	Not applicable		An MPA was not established; rule-breakers could not be penalised
12. Both people and nature have benefited from the marine management initiative	N/A	Not applicable		No MPA or management initiative was established; benefits could not be gauged

* A Y-shaped branch from a certain tree used to demarcate a customary marine management area

† Roots from certain ginger plants, which have customary significance

Evaluation of the establishment processes of the two marine management initiatives

The paucity of spatial marine management measures enforced with LLG laws in PNG limited the scope of analysis to two marine management initiatives: (i) the Kimbe Bay Network of MPAs in West New Britain Province, where three LLG laws were developed, and (ii) Lovongai LLG in New Ireland Province, where the Marine Environment Management LLG law was enacted. However, the two marine management initiatives cannot be compared directly. This is because the three LLG laws in Kimbe Bay were developed to enforce an MPA network whereas the Lovongai LLG law was developed to formalise future spatial marine management. It is uncertain whether the three LLG laws in Kimbe Bay remain active or whether the implementation of the MPA network has continued. Likewise, because no MPA was established using the Lovongai LLG law, it is uncertain whether the law has been effectively enforced or has been acknowledged by the people of Lovongai LLG. Table 4 provides a comparison of the two marine management initiatives established in Kimbe Bay and Lovongai LLG according to the twelve assessment criteria listed on pages 10 to 13, which were each assigned evaluation scores presented on page 19.

Both management initiatives received high scores for the first three assessment criteria due to their locations in areas of biological significance that support small-scale fisheries (SSF) and traditional cultural practices. Yet the remaining nine assessment criteria scores were somewhat lower. Because of the customary marine tenure rights PNG communities have over their local marine resources, community engagement is critical to ensure residents are committed to marine management in their waters. Communities should have a voice in marine management decision-making processes, including decisions made on establishing management rules and penalties. To achieve successful marine management compliance, all communities must feel a sense of ownership over the management measure; otherwise, the management initiative is likely to fail. In Kimbe Bay, prior to the development of the three LLG laws, scientific data were collected and analysed to identify fifteen areas of biological significance and low socioeconomic cost. The communities living in each identified area were approached following the scientific assessments, with community engagement occurring only within the areas of interest (and not in adjacent communities). An assumption that communities would be willing to embark on the MPA establishment process following the scientific assessments may have been detrimental to the success of the MPA network. Similarly, neglecting communities outside the designated areas of scientific interest could also lead to local contention. In Lovongai LLG, during the development of the LLG law, community engagement was conducted by Ailan Awareness Inc. and WCS. Communities were initially brought together as wards to allow outreach and engagement to be carried out. The law was enacted in 2013; however, further engagement did not occur until 2019 when a community engagement and education programme was implemented by WCS and Ailan Awareness Inc. in 73 communities. Therefore, the passing of the Lovongai LLG law has only had recent influence at the community level.

A community engagement plan should include an education and awareness component that focuses on (i) the biology of marine resources, (ii) the threats that can impact marine resources, (iii) measures for managing marine resources, and (iv) possible legal options for enforcing different management measures. According to available information, an education and awareness programme was conducted by TNC in fourteen of the fifteen priority areas of scientific interest*. When TNC pulled out from Kimbe Bay in 2013,

* The fourteen areas of scientific interest in Kimbe Bay became LMMAs, which collectively formed the MPA network.

Mahonia Na Dari (MND) continued the education and awareness programme within the priority areas, which had been converted into locally-managed marine areas (LMMAs). In Lovongai LLG, an education and awareness programme was conducted at the ward level while the Lovongai LLG law was being drafted. Yet from 2014 to 2019, further education and outreach programmes were restricted to certain communities in Lovongai LLG, and did not focus on the Lovongai LLG law. Since 2019, an extensive community outreach and education programme was initiated across Lovongai LLG, which included legal awareness workshops to inform villagers about the Lovongai LLG law, with emphasis placed on how the law can be used to enforce spatial marine management.

Table 4: A comparison of the two marine management initiatives established with local level government laws in Papua New Guinea, based on scores assigned to twelve assessment criteria listed on pages 10 to 13. For further details concerning the five-point colour coded scores, refer to page 19, and for more information on the two marine management initiatives, refer to page 20 for the Kimbe Bay Network of Marine Protected Areas and page 24 for the Lovongai LLG Marine Environment Management law, 2013.

COMPARISONS BETWEEN THE TWO MARINE MANAGEMENT INITIATIVES			
Assessment criteria	Kimbe Bay MPAs	Lovongai LLG law	Details
1. Siting the management initiative in areas important for marine biodiversity	5	5	Both initiatives were located in areas of biological importance
2. Locating the management initiative in areas that support small-scale fisheries	5	5	The initiatives were located in areas supporting local fishers
3. Harmonising the management initiative location with existing cultural practice	4	4	Both initiatives accommodated traditional practices
4. Community engagement conducted during development and implementation phases	3	3	Initial engagement was conducted yet not continued
5. Education and awareness undertaken during development and implementation	4	3	Awareness provided to Kimbe LMMAs and Lovongai wards
6. Stakeholder consultations occurred during development and implementation	3	3	Scientists involved in Kimbe Bay; LLG support in Lovongai
7. Boundaries, rules and penalties defined to meet management objectives	2	2	Rules not agreed upon by communities in both areas
8. A clear governance structure is in place for managing the management initiative	2	2	Initial steering committee in Kimbe; MEMCC in Lovongai
9. Suitable legal mechanisms are enacted for formalising the management initiative	2	4	Law enacted in Lovongai LLG; uncertain in Kimbe Bay
10. Capacity, resources and funding available for monitoring, control and surveillance	2	N/A	JCU monitoring; no control or surveillance in Kimbe Bay
11. Offenders that breach the management rules received designated punishment	1	N/A	Unknown whether offenders were punished in Kimbe Bay
12. Both people and nature have benefited from the marine management initiative	1	N/A	No measure of direct benefits occurring in Kimbe Bay
TOTAL SCORES OUT OF 60	34	31	

During the community engagement process, consultations with key stakeholders should occur, including representatives from national, provincial and local level government, fisheries, the private sector, law and order, local resource owners and other interested groups. Regular stakeholder consultations can steer the direction and development of an MPA or other marine management initiative and assist with conflict resolution. In Kimbe Bay, during the MPA development phase, stakeholder consultations occurred primarily through scientific workshops, following which the communities living in priority areas of interest, identified during the scientific workshops, were engaged. The Conservation and Environment Protection Authority (CEPA) was also aware of the establishment of the MPA network and a steering committee was initially formed. However, from information made available, it is not apparent that broad-scale stakeholder consultations occurred. In Lovongai LLG, there were consultations with the LLG and an MEMCC was initially formed. However, it remains unclear whether further consultations were conducted following the submission of the LLG law to the LLG Assembly in 2013.

A successful MPA requires defined boundaries, rules and penalties, as well as a clear governance structure. Similarly, a suitable legal mechanism should be enacted to enforce the MPA rules and penalties and to formalise the MPA boundaries. In Kimbe Bay, TNC and other specialists determined clear boundaries for the fourteen LMMAs and wider MPA network. The three LLG laws developed to enforce the MPA network also included rules and penalties. However, there is no record of a long-term governance structure in place for managing the network of MPAs, and although LLG laws were submitted for approval, it is not known whether they were implemented and enforced. Furthermore, the Kimbe Bay LMMA rules were viewed by some community residents as a means for generating money: for example, there are reports that the Kulungi LMMA representative attempted to fine JCU PGK 2,000 because one scientist was completing reef monitoring within the local LMMA, while the Patanga LMMA representative wanted to charge JCU reef monitors PGK 700 per person per annum before reef monitoring could be conducted within the Patanga LMMA.* In Lovongai LLG, the Marine Environment Management law was passed, providing a legal framework for enforcing a potential MPA or other marine management initiative, with rules and penalties listed in the law. However, local communities and other stakeholders did not provide input while the rules were being developed or give consent for the rules to be enacted into law. Thus, some rules appear somewhat unrealistic, such as Section 25 of the law that prohibits swimming and diving.† An MEMCC was initially formed in 2013 to oversee the implementation of the Lovongai LLG law; however, the committee disbanded during the mid- to late-2010s. Since 2017, WCS and Ailan Awareness Inc. have been conducting extensive community consultations in Lovongai LLG in order to develop community-selected rules and penalties for a proposed MPA within the limits of Lovongai LLG jurisdiction. In 2017, the New Ireland Province Technical Working Group (TWG) was also established to steer the development of the proposed MPA and other community-based fisheries management initiatives‡ undertaken in the province.

* Information and personal comments provided by Cecilie Benjamin, based at Mahonia Na Dari in Kimbe Bay, in October 2021.

† According to Section 25 of the Lovongai Marine Environment Management law, 2013, “A person who swims or dives in the [proposed management] Area in contravention of a management plan is guilty of offence”.

‡ In July 2020, the Pacific-European Union Marine Partnership (PEUMP) Programme – in partnership with the Pacific-based LMMA Network and the Secretariat of the Pacific Community (SPC) – was initiated in PNG, which aims to up-scale community-based fisheries management to all coastal communities (approximately 520 communities) in New Ireland Province. The PEUMP initiative was introduced to the New Ireland Province Technical Working Group in August 2021.

The Lovongai LLG marine management initiative could not be assessed against the final three MPA assessment criteria because no MPA or other spatial marine management measure had been implemented under the LLG law. The Kimbe Bay MPA network scored low on the final three assessment criteria, which evaluated (i) the implementation of monitoring, control and surveillance (MCS) programmes, (ii) the punishment of offenders that breach the management rules, and (iii) the measurement of MPA benefits to people and nature. The low assessment criteria scores were due to a lack of control and surveillance occurring once the Kimbe Bay MPA network had been implemented, and therefore an absence of documented MPA management rule violations. TNC did initially train and equip LMMA representatives to conduct biological monitoring and JCU has conducted ecological monitoring and research* in the region†, although there are few records of socioeconomic or fisheries monitoring occurring within the LMMAs. Furthermore, it is not known whether people and nature benefited from the establishment of the MPA network in Kimbe Bay. A youth-focused education and awareness programme has been conducted by MND – which typically provides outreach and marine conservation to some 10,000 residents each year – which has increased local awareness and understanding regarding marine conservation and management issues. JCU has also published academic papers on tropical marine ecology, which included work conducted within the Kimbe Bay region.‡ Despite this, it is unclear whether the residents of Kimbe Bay have directly benefited from the implementation and enforcement of the Network of MPAs. Since the start of the 2010s, the Kimbe Bay MPA network appears to have been somewhat neglected, with only MND continuing the education and awareness programme in the fourteen LMMA sites. In Lovongai LLG, the time lag between law enactment in 2013 and obtaining ministerial approval for the law in 2019 – coupled with changes in LLG political leadership – may have forsaken the Lovongai Marine Environment Management law until legal awareness activities commenced in 2019.

In summary, it is unclear whether the Kimbe Bay MPA network is functioning and achieving the biodiversity and marine resource management goals and objectives, and, since enactment, no marine management measure, such as an MPA, has yet been established and enforced with the Lovongai Marine Environment Management law in Lovongai LLG.

* In 1999, the Kobognade LMMA was formed, which was established by TNC, MND and NFA and comprises four reefs that JCU have been monitored since 1998 (see Jones *et al.*, 2004, for further information). Since 2004, JCU scientists have examined reef fish population connectivity through larval dispersal studies in Kimbe Bay, the outcomes from which could inform marine management. The research focused on two live aquarium trade fish species: the orange clownfish (*Amphiprion percula*) and the vagabond butterflyfish (*Chaetodon vagabundus*). See Almany *et al.* (2017) for further information about the study.

† A team from the Australian Commonwealth Scientific and Industrial Research Organisation has been working in New Britain since 2010 in support of the Coral Triangle Initiative, which explored opportunities for sustainable development. This included the potential for nature-based tourism in Kimbe Bay and better management for the regional LMMAs. In 2017, the West New Britain Provincial Administration and the Australian Government arranged a two-day workshop to assess the benefits and costs of nature-based tourism and to review the effectiveness of the LMMAs. A group called HoBiTa (derived from the first syllables of the Hoskins, Bialla and Talasea LLGs the flank Kimbe Bay) was established during the 2010s, the members of which received training from TNC in reef monitoring; however, there is no indication that the group remains active. During the early 2010s, master's students from Macquarie University – located in New South Wales, Australia – visited Kimbe Bay to conduct marine ecological assessments; however, similar visits from Macquarie University did not continue. (Information provided by Maya Srinivasan from James Cook University, Australia, and Cecilie Benjamin, Mahonia Na Dari).

‡ Information and personal comments provided by Cecilie Benjamin, based at Mahonia Na Dari in Kimbe Bay, during October 2021.

Identifying gaps and best practice

According to the assessment of the two PNG marine management initiatives, it is apparent that both approaches received similar scoring outcomes. Regarding location, both marine management initiatives scored high, and future marine managers should endeavour to locate potential MPAs or other marine management initiatives in areas that support a high diversity of marine and coastal ecosystems and small-scale fisheries (SSF), while also acknowledging and accommodating local traditional customs and cultural practices.

Likewise, both marine management initiatives received similar scores for community engagement, education and awareness programmes, and stakeholder consultations. The initial stages of each marine management initiative began with a community engagement and education and awareness programme. However, in Kimbe Bay, apart from occasional outreach conducted by local NGO Mahonia Na Dari, the community engagement and education programme did not continue in the fourteen sites of interest identified by TNC following the implementation of the MPA Network. Similarly, community engagement, education and outreach was conducted at the ward level in Lovongai LLG; however, it is unclear whether such programmes continued following the submission of the LLG bill to the Lovongai LLG Assembly in 2013. Continuing the community engagement and education programmes through the implementation phase of the marine management process requires personnel on the ground, staff capacity building, logistics and financing. An ongoing community engagement programme can help build local capacity to support local monitoring, control and surveillance, while a tailored education programme can further empower community residents to manage their local resources. When establishing an MPA or other spatial marine management initiative, extensive community engagement and active community involvement is required to allow residents to (i) understand the management process, (ii) appreciate the advantages and disadvantages of different marine management measures, (iii) take part in decision-making processes, and (iv) develop a sense of ownership for the management initiative. As well as community consultation, regular stakeholder meetings, comprising key representatives from government agencies, local organisations and other interested groups, are an integral part of the marine management development and implementation process. Technical working groups or steering committees that meet every six months can guide and drive the development and implementation processes required for successful spatial marine management, which includes providing consensus during decision-making stages and assisting with conflict resolution.

An MPA or other marine management initiative requires clear and defined rules, penalties and boundaries, which are agreed upon through consensus by local community residents and other stakeholders. Similarly, an MPA requires a suitable governance structure to ensure the long-term success of the management measure, with appropriate legal mechanisms in place for the enforcement and formalisation of the management initiative. The two marine management initiatives that were assessed were both enforced with LLG laws. The Kimbe Bay LMMAs, which collectively form the MPA network, were established with clear boundaries. In contrast, no MPA or other spatial marine management measure was enforced with the Lovongai LLG law and thus no boundary has yet been defined. The LLG laws developed for both Kimbe Bay and Lovongai LLG include management rules and penalties for non-compliance; however, there is no indication that local communities or other stakeholders were involved during the decision-making processes required for developing the MPA rules and penalties in both regions. Furthermore, it is not clear whether the rules and penalties listed in the three Kimbe Bay LLG laws

were enforced. A steering committee was formed for the Kimbe Bay MPA network; however, the committee did not meet after 2008. Likewise, an MEMCC was initially established in order for the Lovongai LLG law to be approved, although it was disbanded after initial formation*. Recommendations would include setting simple, clearly defined management rules and penalties during the development phases of future spatial marine management initiatives that are agreed upon by local communities, as well as boundaries that define the proposed management area†. For an LLG law to be enacted in order to enforce marine management rules, penalties and boundaries at the LLG level, an MEMCC should be established to oversee the implementation of the MPA and accompanying MPA management plan. The MEMCC should meet regularly before and after the declaration of the MPA or other spatial marine management initiative. The MEMCC should also collaborate with the Ward Development Committees within the LLG‡, which can then link the MPA management plan to the Ward Level Development Plans that have been implemented within the LLG jurisdiction.

Because it is unknown whether the Kimbe Bay Network of MPAs was fully implemented, the last three assessment criteria were not achieved, notably (i) monitoring, control and surveillance, (ii) offenders receiving punishment, and (iii) assessing measurable benefits of the MPA§. These three components are necessary for (i) ensuring the longevity of an MPA, (ii) for indicating the success of the MPA management approach, and (iii) for providing avenues for adaptive marine management. Lessons can be learned from the implementation phase of the Kimbe Bay MPA network, including the need for a robust monitoring programme, focused on biological (including fish abundance and diversity assessments), socioeconomic (through household surveys, focus groups and key informant interviews) and fisheries (such as catch-per-unit-effort studies) components that can be compared to baseline data. Control, surveillance and enforcement procedures should be established and implemented, which are linked to local village courts, peace officers and provincial police personnel. In addition, the documentation of MPA rule infringements and punishments issued for non-compliance should be kept, updated and maintained. A regular assessment of community benefits gained from the MPA following implementation should also be conducted to gauge the public perceptions of the MPA and to provide opportunities for adaptive marine management.

* In 2020, WCS arranged a meeting with the Lovongai LLG leaders and other LLG representatives to appoint a new MEMCC for Lovongai LLG. At the meeting were the LLG administration, ward councillors, local marine resource owners, and women, youth and church group representatives. Following the meeting, an MEMCC was formed, which has since received training focused on the management of marine resources and the implementation and enforcement of the LLG law.

† If an LLG law is to be used to enforce an MPA, the external boundaries of the management area must remain within the jurisdictional boundaries of the LLG.

‡ The Ward Development Committees are responsible for linking an MPA management plan to the five-year Ward Development Plans. The Ward Development Committee can supervise the implementation of an MPA management plan through the Ward Development Plans.

§ The Lovongai LLG marine management initiative could not be assessed against the last three assessment criteria because no MPA or other spatial marine management measure has yet been enforced with the LLG law. In 2022, it is anticipated that a Lovongai MPA will be enacted within Lovongai LLG jurisdiction, which will be enforced with an amended version of the Lovongai LLG law.

Lessons learned from the assessment of the two marine management initiatives

The following points outline key lessons learned from the assessment of the two marine management initiatives established in PNG with LLG laws. Although this is not an exhaustive list, it contains major themes and recommendations that may be of assistance to marine managers and community resource owners, especially when establishing and implementing future spatial marine management initiatives in PNG.

- **Purpose, support and funding:** A clear understanding of the purpose for establishing an MPA or marine management initiative needs to be known, which may include biodiversity protection, fisheries management or improving local climate change resilience. Whether the MPA is a government, community or external group decision – or an objective for an international NGO – the justification for such an undertaking needs to be clear and with sufficient external support and prolonged financing to ensure the long-term lifespan of the management area.
- **Location:** A wealth of marine and coastal habitats are located around the shores of PNG, most of which support small-scale fisheries and are important sites for cultural and customary practices. When establishing an MPA, consideration should be given to how the management initiative will benefit marine biodiversity, while also sustainably increasing local fish yields and enabling traditional practices to continue.
- **Engagement and education:** An extensive community engagement programme should be undertaken in all communities located within the proposed marine management area. The engagement programme should be coupled with a tailored education and awareness strategy to inform community residents about marine management and enforcement options, as well as the direct and indirect benefits and constraints of MPA implementation. Efforts should also be made to ensure local expectations are not raised.
- **Community engagement protocol:** All community engagement should be conducted through the free, prior and informed consent (FPIC) process. Appropriate grievance mechanisms should be in place to allow communities to report any complaints or disservices encountered during the development and implementation phases of the MPA or other marine management initiative.
- **Stakeholder consultation:** Technical working groups and management committees, comprising representatives from national, provincial and local level governments, including the fisheries and environment sectors, as well as education institutes, the private sector, community representatives, law and order, local NGOs and other stakeholders, should be established with regular meetings to provide consensus on the development and implementation processes required for establishing an MPA or other marine management initiative.
- **Rules, regulations, penalties and boundaries:** Proposed marine management boundaries, rules and penalties should be agreed upon – or receive majority consensus support – by the members of the stakeholder working groups and management committees and through the community consultation process. Zones for specific marine management purposes should also be agreed upon prior to implementing an MPA or other marine management initiative.
- **Involvement and ownership:** Community residents – and especially local fishers – should be involved with the development of the marine management rules and penalties and the setting of the MPA boundaries; such an approach can provide communities with a sense of ownership and local pride for the marine management initiative.
- **Representation:** All decision-making activities conducted at the community-level – and with other stakeholders – should include opportunities for both women and men to voice their concerns,

opinions and interests. Youth representatives should also be included in all decision-making activities, especially at the community level. Similarly, when collecting socioeconomic or fisheries data for monitoring purposes, emphasis should be placed on collecting disaggregated data from a broad spectrum of society, including women and youth.

- **Governance structure:** A defined and responsible governance body should be established –which is built on existing traditional governance structures – for managing the implementation phase of the MPA. The governing body should comprise key representatives appointed from the area that is to be managed or protected. An example could be a Marine Environment Management and Conservation Committee (MEMCC), which is a requirement for establishing an LLG marine management law.
- **Policy options:** Situation analyses and legal reviews of potential policy and legislation options should be conducted before the MPA design and development phases, allowing the most suitable legal mechanism to be utilised in order to formalise and enforce the proposed MPA or spatial marine management initiative.
- **Management plan:** A management plan should be developed based on the MPA rules and regulations. The plan should include instructions and guidelines for MPA management, work plans for activity implementation, the roles and responsibilities for the governing body and other stakeholders, options for fund raising, and timelines for reviewing the monitoring plan. The MEMCC is responsible for overseeing the implementation of the management plan. The management plan should also be linked to the Ward Development Committee plans.
- **Enforcement and compliance:** Surveillance plans should be developed to ensure the MPA rules and regulations are adhered to. The surveillance plans should be linked to the village court system, and local village court magistrates and peace officers should receive training on how to enforce the MPA rules and ensure MPA rule-breakers are appropriately penalised. All MPA offenses should be documented for future reference and to assist with adaptive management.
- **Monitoring teams:** Capacity building and appropriate training should be provided to all biological, socioeconomic and fisheries monitoring personnel. Resources and funding should be sourced and allocated to monitoring staff, enabling a robust and feasible monitoring regime to be developed and implemented.
- **Understanding benefits:** A biological, socioeconomic and fisheries monitoring programme should be implemented following the enactment of the MPA, with outcomes compared to baseline data collected before the MPA was established. The monitoring plan should also include annual assessments of how coastal residents perceive the benefits of their MPA. The outcomes from the monitoring programme should provide a basis for local adaptive management.
- **Adaptive management:** The outcomes from the monitoring and enforcement programmes should be assessed every five years or so by the MPA governing body and other stakeholders. The outcomes, together with feedback from local communities and other stakeholders, can be used for adaptive management, enabling the MPA management plan to be reviewed and adjusted accordingly.
- **Communications:** Information concerning the MPA, including the rules, penalties, boundaries, and outcomes from the monitoring and surveillance programmes, should be disseminated back to the communities and publicised through relevant media channels, which may include posters, handouts, pamphlets, radio broadcasts, social media posts, newspaper articles and academic journal entries.
- **Helping others:** Lessons learned reports should be produced concerning the development and implementation challenges and successes encountered during the MPA process, and shared with all stakeholders to assist future marine managers in PNG.

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APPENDIX



Villagers catching fish at sunset from
dug-out canoes, Manus Province

APPENDIX I: List of acronyms

AROB	Autonomous Region of Bougainville
CEPA	Conservation and Environment Protection Authority
CPUE	Catch-per-unit-effort
CI	Conservation International
CTI	Coral Triangle Initiative
DPLGA	Department of Provincial and Local Level Government Affairs
EEZ	Exclusive Economic Zone
FAD	Fish aggregating device
FPIC	Free, prior and informed consent
GDP	Gross domestic product
HIV	Human immunodeficiency virus
JCU	James Cook University
LLG	Local level government
LMMA	Locally managed marine area
MCS	Monitoring, control and surveillance
MEMCC	Marine Environment Management and Conservation Committee
MND	Mahonia Na Dari
MoU	Memorandum of understanding
MPA	Marine protected area
NCD	National Capital District
NFA	National Fisheries Authority
NFC	National Fisheries College
NGO	Non-governmental organisation
NIPA	New Ireland Provincial Administration
NIPG	New Ireland Provincial Government
NOO	National Oceans Office
PEC	Provincial Executive Council
PEUMP	Pacific-European Union Marine Partnership
PFO	Provincial Fisheries Office
PGK	Papua New Guinea kina
PNG	Papua New Guinea
SSF	Small-scale fisheries
SPC	Secretariat of the Pacific Community
TNC	The Nature Conservancy
TWG	Technical Working Group
UK	United Kingdom
USA	United States of America
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

APPENDIX II: Glossary of terms

Act: A bill which has passed through the necessary legislative steps required for it to become law.

Ailan Awareness Inc.: A local non-governmental organisation based in New Ireland Province. Founded by John Aini in 1993, Ailan Awareness Inc. aims to revive traditional knowledge and custom to assist coastal communities in sustainably managing their marine and coastal resources.

Anthropogenic: An event or process that occurs due to human activities and which is usually detrimental to the natural environment.

Artisanal fishing: Small-scale, low-technology and low-capital fishing practices undertaken by individual fishing households.

Bathymetry: The measurement of ocean water depth.

Benthic: Referring to lifeforms that live on or within the seafloor, which are collectively known as the benthos.

Bill: A proposal for a new law – or a proposal to change an existing law – that is presented for debate before government. A bill does not become law until it is passed by legislative and executive bodies. Once a bill has been enacted into law, it is called an act of the legislature or a statute.

Biodiversity: The variety of plants, animals, fungi, microorganisms and other lifeforms – and the genes and hereditary material that such lifeforms contain – in a particular habitat, a high level of which is considered important and desirable.

Clan: A group of people with a common ancestor, which can include a large family or related social groups.

Climate change: A long-term shift in climate over several decades, centuries or millennia, including changes in temperature, rainfall and air pressure, caused by natural events, such as volcanic eruptions, and anthropogenic sources, such as the release of carbon dioxide, methane and other gases generated from the burning of fossil fuels, vehicle exhaust fumes, and agriculture.

Commercial fishing: The activity of catching fish and other living marine resources, typically from wild fisheries, for commercial profit through sale and trade.

Community: The people living in a specific location. In Melanesia a community can include clans, wards or the people that inhabit small islands.

Community-based fisheries management: A management system under which communities take a leading role in managing fisheries and adjacent coastal areas in partnership with, or with support from, a promoting agency or organisation.

Coral Triangle: Referring to the somewhat triangular-shaped region of the tropical marine and coastal waters that lie between the Philippines, Malaysia, Indonesia, Timor-Leste, Papua New Guinea and Solomon Islands, where the Indian Ocean and Pacific Ocean converge. At least 600 reef-building corals and a wealth of other marine life are found in this ecoregion.

Customary: According to the customs or usual practices associated with a particular society, place or set of circumstances.

Customary marine tenure rights: Historically, the inshore waters of Papua New Guinea were under the tenure of coastal clans and were communally managed. Marine tenure rights often comprise (i) the right to catch certain marine species; (ii) the right to use certain fishing techniques; and (iii) the right to fish in certain areas. Recently, traditional tenure rights have been weakened due to contemporary fishing methods that have replaced traditional fishing practices and other modern influences.

Disturbance: A temporary change in environmental conditions – caused by natural or anthropogenic impacts – that causes a pronounced change in an ecosystem. Disturbances can act quickly and with great effect, altering the physical structure or arrangement of biotic (living) and abiotic (non-living) components of an ecosystem.

Ecosystem-based approach to management: An integrated approach to management that considers the entire ecosystem, including humans, and which aims to sustainably manage natural resources and biodiversity by maintaining ecosystem processes, functions and services.

Ecosystem function: The capacity of natural processes and components to provide goods and services that satisfy human needs, either directly or indirectly. Ecosystem functions range from the provision of food and medicines through to climate regulation and tourism attraction.

Exclusive Economic Zone: An area prescribed by the United Nations Convention on the Law of the Sea, 1982, which allows coastal states to assume jurisdiction over the exploration and exploitation of marine resources in adjacent continental shelf seas up to 200 nautical miles from the nation's coastline or territorial sea boundary.

Fishery: The industry of catching, processing and selling fish and edible aquatic invertebrates and the location where this takes place.

Free, prior, informed and consent: The collective right of the people within a community to give or withhold consent to all activities, projects, administrative measures, and policies that take place within a community, or impact the land, resources or livelihoods of customary landholders and communities.

Invertebrate: An animal that lacks a vertebral column or backbone. Invertebrates include sponges, corals, jellyfish, worms, snails, clams, squids, spiders, crabs, centipedes, butterflies, ants, starfish and sea squirts.

Jurisdiction: The territory and extent of territory over which legal authority extends, such as provincial or local level government jurisdictions.

Larvae: The small, active and immature form of a coral, clam, crab or other marine invertebrate – as well as many bony fish – which typically undergo metamorphosis in order to become a sexually mature adult. Many larval animals drift with the plankton – and collectively comprise part of the zooplankton – while feeding on other planktonic lifeforms.

Legislation: The process of making laws, and a collection of laws.

Locally managed marine area: An area of coastal or marine environment that is actively managed by local communities or resource-owning groups. Locally managed marine areas can include different habitats and have different management goals, which may include protecting biodiversity, managing fisheries, or increasing resilience to climate change.

Marine management: The sustainable utilisation of marine resources and the improvement of the marine environment through legislation, policy-making, and organising, and by coordinating with relevant stakeholders.

Marine protected area: A clearly-defined and managed marine or coastal area with pre-determined management objectives that aims to manage or protect marine and coastal resources and ecosystems, and which is usually legally enforced.

Marine resource: The stock and supply of all living and non-living resources found in the marine environment. A fishery is an important example of a marine resource.

Melanesia: An ethno-cultural region of western Oceania including the island of New Guinea, as well as Solomon Islands, Vanuatu, New Caledonia and Fiji.

Oceania: The smallest of the seven continents by land area, encompassing much of the South Pacific Ocean region, including the continental landmass of Australia, the large islands of New Guinea and New Zealand, and the smaller island regions that comprise Melanesia, Polynesia and Micronesia.

Organic Law: The Organic Law on Provincial and Local Level Governments, 1998, is a branch of the Papua New Guinea Constitution that legally recognises customary law.

Policy: A course or principle of action adopted or proposed by government or other organisations.

Quota: A proportion of fish or other living marine resource that is legally allowed to be harvested.

Spawning aggregation: A mass assembly of fish to spawn, usually at a designated area and time. Spawning aggregations are often determined by the lunar cycle and associated tidal regimes.

Statute: A written law passed by a legislative body.

Subsistence fishing: Small-scale fishing practices for personal consumption or for traditional purposes.

Sustainable development: The principle for meeting human development goals while simultaneously sustaining the ability of natural systems to provide the natural resources and ecosystem services on which the economy and society depend.

Tambu area: A customary or neo-traditional spatial-temporal marine closure, or a socio-historically embedded symbol that regulates who can access a given customary sea-space to use resources within that sea-space.

Technical Working Group: An example of a steering committee tasked with the management of small-scale fisheries and other marine resources. Typically, a Technical Working Group includes representatives from the provincial and national government, the private sector, resource owners, law and order, non-governmental organisations and other stakeholders.

Tenure: The ancestral rights to live in an area and to use local land and coastal resources. Over 97% of Papua New Guinean land is held under customary ownership, through traditional tenure rights.

Upwelling: a process in which ocean currents bring deep, cold water to the surface of the ocean, and are generated by the actions of surface winds and the rotation of the Earth.

Yield: To produce or bear, such as an amount produced of a fisheries product.

Youth: A person between childhood and adulthood. Youth usually refers to people under the age of 18, yet can also include young – typically unmarried – adults.

Zone: An area with particular features. Zones within a spatial marine management area can vary in their form of marine management and enforcement.

View of Manus Province from
Mbuke Island, part of a volcanic
island group in the Bismarck Sea
south of the Manus mainland



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