

WHITE PAPER
THE NATIONAL OCEAN POLICY OF PAPUA NEW GUINEA WITH A FOCUS ON
MARINE PROTECTED AREAS (MPAs): THE CASE OF KIMBE BAY MARINE
PROTECTED AREA

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ABSTRACT

The ocean is our life support system because it drives climate and weather, generates most of the oxygen that we breathe and drives the water cycle. Societies have depended on marine resources for their livelihood and sustenance. In Papua New Guinea (PNG) the ocean has become an integral part of the very people that depend on it. But in recent years the sustainable capacity of PNG's marine ecosystems and habitats has come under enormous threat as PNG's rapidly growing population and the demand from overseas markets impose greater strains on these marine resources. In 2015, the Government of PNG (GoPNG) passed the Maritime Zones Act (MZA) 2015, a legislation to regulate and coordinate the usage of ocean space within its waters. With coordination of ocean use, resources can be utilised more sustainably by authorities that have jurisdictions within the different ocean zones. A National Ocean Policy will implement the MZA, hence, an ocean policy is currently being developed for that purpose. Marine Protected Areas (MPAs) will be featured or included in this policy document. Therefore, the objective of this study is to develop a White Paper based on the National Ocean Policy for PNG. The aim is to evaluate Kimbe Bay MPA and identify governance issues and challenges. The findings will provide policy recommendations to key decision makers.

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1. INTRODUCTION

According to the Convention on Biological Diversity, there is a global commitment that by 2020 at least 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes (Secretariat of the Convention on Biological Diversity, 2014).

Papua New Guinea (PNG) is developing its first national ocean policy to protect its ocean resources as part of an attempt to advance governance of marine resources. It has already completed its maritime boundary delimitation project and corrected its ocean boundaries and has also enacted the Maritime Zones Act (MZA) 2015. After the MZA was passed it was required that an ocean policy should be formulated.

Marine conservation efforts and initiatives must be supported and implemented by workable, effective, and knowledge-based policies. Policies must be designed and drafted after suitable evaluation and studies are carried out on proposed conservation areas or sites. Hence the need for knowledge-based policy grows as the issues tackled become increasingly complex. The concept of Marine Protected Areas (MPAs) will be featured in a chapter in the first national ocean policy for Papua New Guinea.

This study objective is to develop a White Paper based on the National Ocean Policy for Papua New Guinea, that puts forward policy for Marine Protected Areas and takes the case of Kimbe Bay MPA (KBMPA). The aim is to evaluate KBMPA and identify the governance challenges it will face. It also intends to provide policy recommendations from the findings to key decision makers. Evaluation is done by stakeholder analysis.

Interviews and questionnaires were utilised as tools to source information from various stakeholder representatives. Findings in this white paper will assist in developing a better plan for future MPAs for PNG in the national ocean policy. This white paper also identifies and outlines what type of instruments or laws and regulations will be required to implement and drive proper and successful MPAs in PNG.

2. CONCEPTS AND DEFINITIONS

2.1 Marine Protected Areas or MPAs

The International Union for Conservation of Nature (IUCN) defines Marine Protected Areas as;

“Any area of the intertidal or subtidal terrain, together with its overlaying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment.”

MPAs are simply zones or portions of sea area where fishing and other resource use is restricted or in some cases eliminated altogether. Two of the primary reasons for establishing MPAs are for nature conservation of the marine ecosystem and for sustainable fisheries management. Many MPAs also serve as areas for scientific research and discoveries that benefit humankind. By managing human activity in defined areas, MPAs can offer an opportunity to address the threats to ocean health including overfishing, pollution, vessel traffic and noise, and oil and mineral extraction (Bender, 2017).

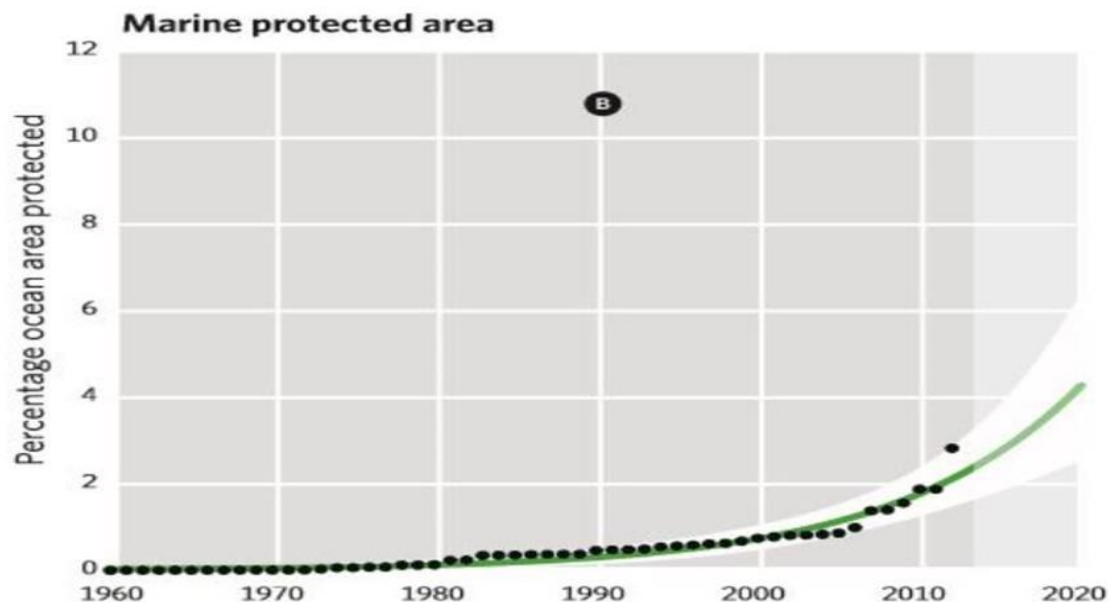


Figure 1: Area covered by protected areas suggesting a continued and significant increase in the underlying trend for marine protected areas increasing. (*Secretariat of the Convention on Biological Diversity, 2014*)

This ambitious goal is put forward as there is an increasing awareness over the deepening biodiversity extinction crisis and growing demands to take a more systematic approach to conserving the world’s biological resources (Green, 2009).

2.2 Ocean Policy White Paper

An ocean policy can briefly be described as having or containing a variety of means to govern human activities at sea (The University of Rhode Island, 2019). While the term white paper refers to a more commanding and informative official government document or a report it can be a communication document or a fact publishing document. It is in essence a report or guide that can aid understanding of an issue, solve a problem, provide policy recommendations, and put forward decisions.

A white paper can be a highly valuable, educational, and informative policy document to a reader (Dibenedetto, 2012). Most often, a white paper is written with the purpose to support the premise that a certain position is the best way to go or that a certain policy option is best for a particular problem. These propositions could lead to influencing the decision-making process of the relevant stakeholders.

3. BACKGROUND

3.1 PNG's Exclusive Economic Zone (EEZ) & Ocean Environment

As prescribed by the United Nations Convention on the Law of the Sea (UNCLOS) an Exclusive Economic Zone (EEZ) is a sea zone over which a state has special rights regarding the exploration and use of marine resources, including energy production from water and wind.

PNG has a 2.5 million square kilometer area of EEZ, and this ocean environment accommodates an extensive and valuable marine resource and biodiversity (see Figure 1 below). Its jurisdiction or control includes 40,000 square kilometers of barrier coral reefs, marine ecosystem and extensive mangroves (Kailola, 2003).

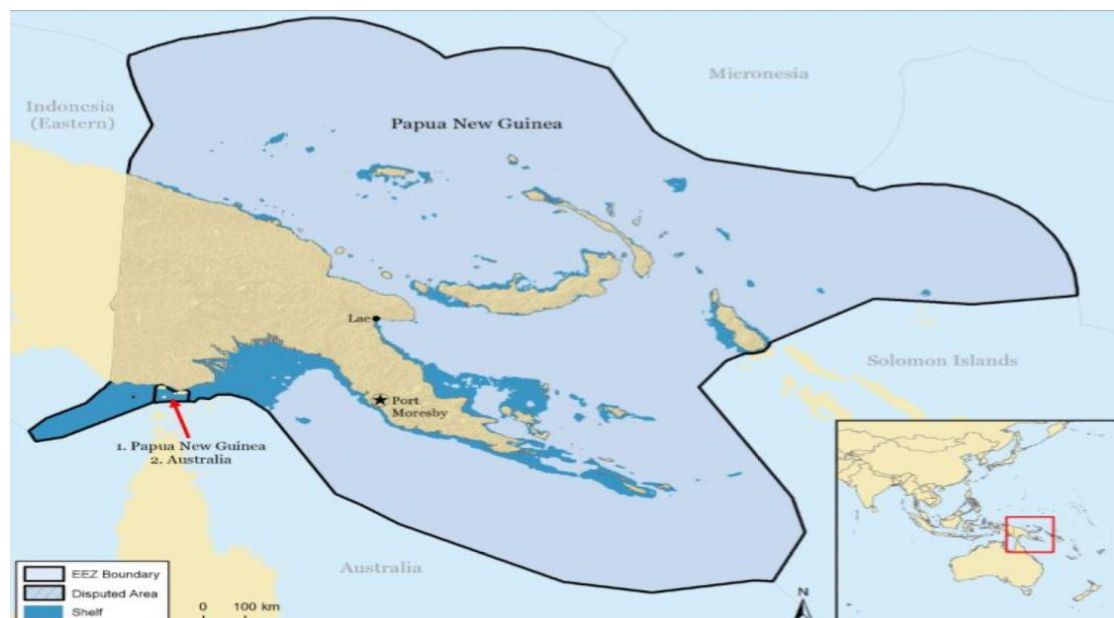


Figure 2: Exclusive Economic Zone (EEZ) and Shelf Waters to 200m depth for Papua New Guinea (Teh, 2014).

3.2 The Fisheries Industry in Papua New Guinea

Papua New Guinea has an extensive and valuable fisheries sector ranging from inland river fisheries, aquaculture, coastal beche-de-mer and reef fisheries to the prawn trawl and large-scale deep-water tuna fisheries. The national landings statistics which have been documented since 2000 are dominated by Tuna catches. It has to be noted that PNG's Fisheries statistics should be considered incomplete and under-reported because of the omission of small-scale sector catches (Kuk, 2012). The range of participants covers artisanal community to medium sized domestic prawn and tuna longline operators to large international purse seine fleets in the deep-water tuna fishery. The primary export destinations for PNG seafood include Hong Kong, Japan, Australia and the European Union (EU) (Papua New Guinea National Fisheries Authority, 2013).

As the largest fishery zone in the South Pacific, PNG waters are some of the most productive and diverse in the world with a range of valuable operations ranging from small-scale artisanal communities to locally based small and medium-sized enterprises (SMEs), with a few larger vessels all the way up to large-scale international purse seine operations (Papua New Guinea National Fisheries Authority, 2013).

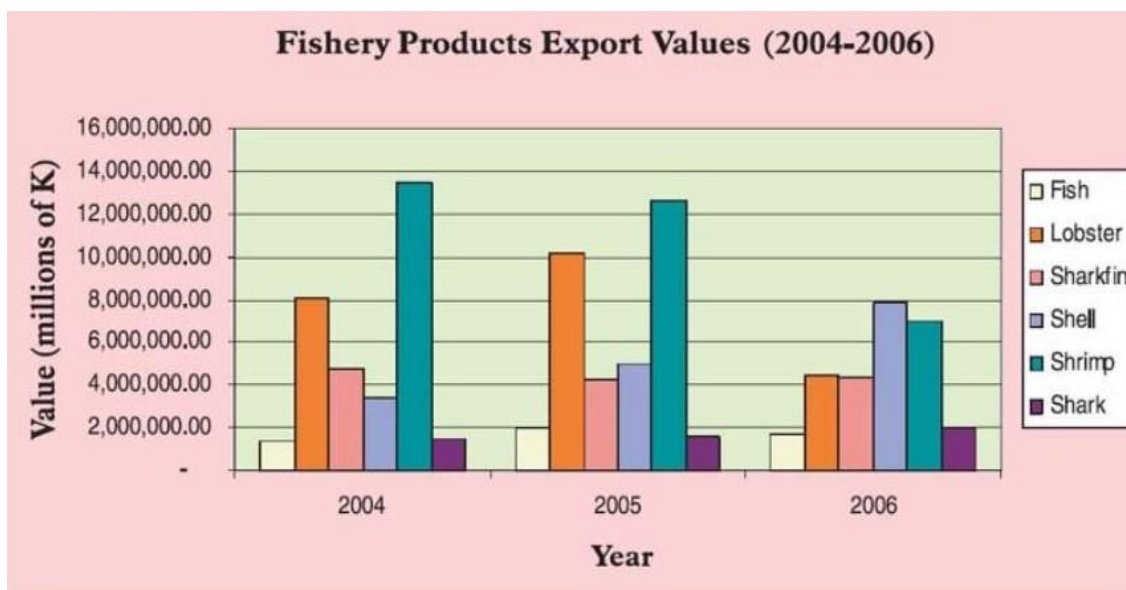


Figure 3: Overall fishery products export values (*Papua New Guinea National Fisheries Authority, 2013*).

At the regional level, PNG is a member of the Western and Central Pacific Fisheries Commission (WCPFC) established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks, mainly tuna (Commission, 2009).

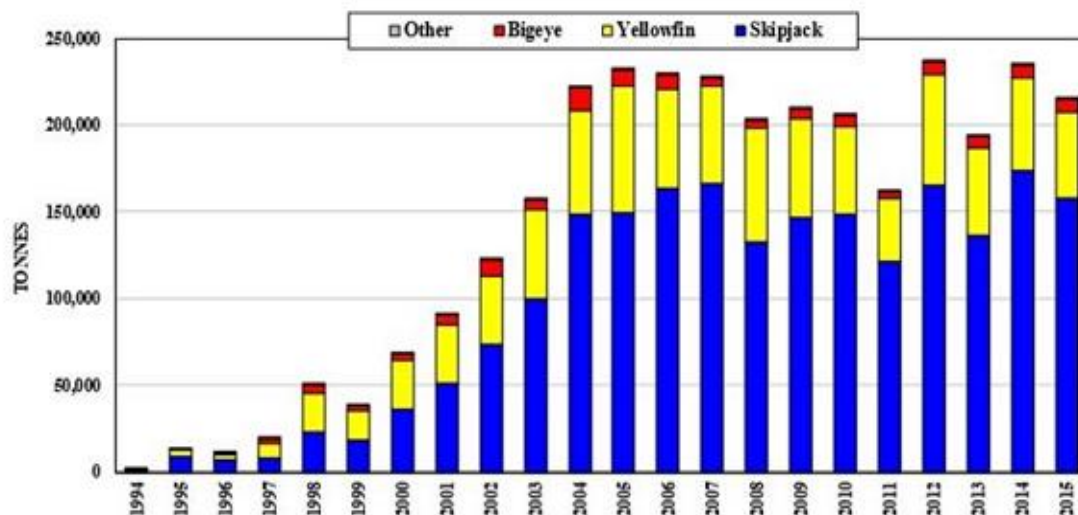


Figure 4: Catches by Papua New Guinea Purse Seiners (*Commission, 2009*)

3.3 Marine Protected Areas in PNG

PNG has a number of legally designated protected areas that contain coastal and marine habitats within their boundaries. However, insufficient resources for management and enforcement of regulations means the effectiveness of these areas is usually questionable. In most cases, the management of integrated conservation development projects have relied heavily on the presence of NGOs.

There are, however, demonstrated successes in the small-scale, community-based protected areas in a number of locations (Munday, 2012). These community based protected areas and conservation initiatives that link with social and economic development may be most appropriate to the needs and land tenure realities of PNG. In a report by Munday (2012), it is stated that currently the most effective MPA in the country is in Kimbe Bay. Kimbe Bay Marine Protected Area (KBMPA) provides a model of how other small protected areas can be established and managed.

3.4 Governance and Marine Protected Areas

Marine Protected Areas have grown in popularity as conservation tools in recent years because of their attractive range of management possibilities including conserving biodiversity, protecting sensitive habitats, eco-tourism, refuge for intensively fished target species and even enhancement of fisheries (Edward H. Allison, 2009). Marine Protected Areas are crucial to improve the health of oceans and deliver benefits for people and ecosystems.

To manage MPAs well, an adequate provision of resources is needed to maintain them. To achieve a long-term preservation of nature requires putting conservation first, and defining goals and objectives, as well as finding a suitable size, location, and design.

But what happens when there is failure to meet the standards and then we call any form of ocean management an MPA? This can mean that nothing is provided more than meaningless labels creating the illusion of protection when in fact there is none. Governments can create well managed protected areas in the ocean to truly save and restore the ocean if they are committed to do so. While the coverage of MPAs is increasing, not all of them are effectively managed. This also raises questions about the governance and management of MPAs, which may include the vital issue of incentives and the distribution of benefits.

There is a wide of diversity to Marine Protected Areas and multiple issues to consider. If fish are allowed to recover within an MPA, the increase in population of fish will move from the protected area, outward or spillover to the non-protected areas where they can be accessible by fisherman. With MPAs and trying and help the fishing industry, the idea is to create a marine area where fish are not exploited but free to breed and grow in numbers. As fish population or biomass increases, it will spill over into the fishable areas and increase the fishermen's catch and revenue. But it has to be noted that MPAs take away fishing areas or marine fishable areas, that is its creation creates a direct competition with its desired effects (Di Lorenzo, 2016).

Traditional knowledge must be incorporated into Marine Protected Areas. The Pacific Islands Marine Protected Area Community (PIMPAC) began in 2005 as a pilot program to identify and address the unique set of challenges faced by MPA managers in the region. The Pacific Islands have a wealth of knowledge and traditional approaches. MPA managers can balance on these traditional approaches while adapting to modern technology and practices. To play a successful role in MPA management, traditional and local approaches must be actively fostered, developed, and integrated into current MPA systems (PIMPAC, 2005).

4. MARINE GOVERNANCE IN PNG

There is some form of governance in place every time a decision is made, and power is exercised. This is generally a fact for natural resources management and also for protected areas. Power and the capacity to take decisions can have a major influence on the achievement of protected area objectives; the sharing of responsibilities, rights, costs and benefits, and the generation and maintenance of support – be it financial, political, or from the communities in and around the protected areas in question. The process of understanding and, where necessary, improving governance is as the heart of effective conservation (Feyerabend, n.d.)

4.1 National Ocean Policy for Papua New Guinea

Within the delimited boundaries of PNG, there are many cross-cutting issues that arise in respect of management of the oceans and a rounded government approach is needed. Over several years' conflicts have risen regarding disputes in ocean use and the management of PNG marine ecosystem. The Papua New Guinea Government (GoPNG) recognised the fact that a cooperative arrangement must be in place to minimise conflicts and that the various competing interests in the oceans are managed equally and therefore cooperation is essential to ensure no conflicts arise.

PNG needs an ocean policy because apart from traditional ways of conserving marine resources, the country has not developed any formal ocean policy to manage the usage of its oceans. There are many uncoordinated users of the ocean and coordination is therefore required to manage all their activities sustainably. The zones have been confirmed and given legal effect, under the MZA. The ocean policy will create a strategic marine planning system that will clarify PNG marine objectives and priorities for the future, directing decision-makers and users towards more efficient, sustainable use and protection of our marine resources.

4.2 Jurisdictional Rights and Responsibilities and Delimitation of Papua New Guinea's Maritime Boundaries

The establishment of the Maritime Boundary Delimitation Project by the Government of PNG came about following the Commonwealth Secretariat agreement to provide technical assistance to correct its ocean boundaries in 2002. There are three areas of focus in the project and the completion of an ocean policy for PNG is one area. The UNCLOS sets the criteria to establish limits and boundaries of coastal states and also introduces rights of navigation, transit of passage, right to exploration of natural resources in the sea and its continental shelf, protection of the marine environment, conduct of marine scientific research including settlement of disputes. This project is of great significance for PNG in terms of fisheries, national security, deep sea mining and marine scientific research.

Delimitation is the very first step in establishing the jurisdictional boundary of a country. Without delimitation, a country cannot exercise any of its enforcement powers or exercise its rights or responsibilities of its sea area. In that sense it was crucial for PNG to undertake this exercise through the Maritime Delimitation Project. This project required PNG to enact a new legislation, the MZA which repealed the old Seas Act.

The MZA 2015 provides the main legal framework to administer ocean governance in PNG and this legislation caters for all aspects of ocean use and management and ensures compliance with the requirements of UNCLOS. The MZA establishes a strategic system of ocean zoning, usage and management through coordination of the different state agencies that are overlapping into each other's jurisdictions in ocean resource use and management. Another area of focus is the extension of the continental shelf by another 150 kilometers from the current 200-mile EEZ. This project is nearing completion and will indeed extend PNG's fishing grounds and the high seas for our commercial fishing operations.

4.3 Fisheries Management Act, 1998

The Fisheries Management Act, 1998 (FMA) is the principal legislation allowing for the management and sustainable development of fisheries in PNG. It is also an act that contributes to the implementation of the National Goals and Directive Principles, specifically to promote the management and sustainable development of fisheries. The FMA is the most relevant and appropriate legislation providing for the framework to manage fisheries and their associated ecosystems. Section 28 provides for the formulation of Fishery Management Plans giving support and empowering the National Fisheries Authority (NFA) to manage fisheries and the ecosystems that support those fisheries. FMA specifically obligates the NFA to protect the ecosystem and obligates NFA to preserve biodiversity and protect the ecosystem (Kwa, 2004).

4.4 The Maritime Zones Act 2015 (MZA)

The MZA promotes MPAs in PNG and specifically requires the minister responsible for environment and conservation matters and in consultation with the minister responsible for fisheries matters, by notice published in the National Gazette, to declare:

- (a) an area of the waters of Papua New Guinea, including the seabed underlying such waters;*
- (b) any land associated with the waters of Papua New Guinea; or*
- (c) any wetland, to be a Marine Protected Area.*

The Act further states that a Marine Protected Area may be designated as a fishing reserve, a marine park, a marine reserve or consistent with its designation by the competent international organisation, a Particularly Sensitive Sea Area. The minister responsible for environment and conservation matters, in consultation with the minister responsible for fisheries matters, may, by notice published in the National Gazette, prescribe measures for the conservation and management of a Marine Protected Area, including the prohibition of certain activities and the carrying out of certain activities subject to certain conditions.

5. METHODOLOGY

In a series of interviews, very pertinent and interconnected information and insights were extracted from the individuals interviewed that reveal obvious challenges that are not being addressed by the relevant authorities in relation to KBMPA. The feedback from the stakeholders was analysed using the 4Rs tool. This tool clarifies the roles played by different stakeholders and the nature of relationships between them. The whole plan was organised into the following:

Firstly, after selecting Kimbe Bay as the site for this case study, the different stakeholders involved in Kimbe Bay MPA were identified. After that dissimilar sets of questionnaires were formulated for each of the identified stakeholders. The questions were formulated to analyse their role in the governance system in Kimbe Bay and to assess their rights, responsibilities, returns and relations. The questionnaires were then emailed to my colleagues in PNG who volunteered to assist in this project. Before they disseminated the questionnaires my two colleagues had to identify the relevant individuals and seek their approval for the interview. The stakeholders in the provinces and local-level governments and communities at Kimbe Bay were engaged through selected individuals that were tasked to assist in this project.

All the qualitative data collected from these interviews and questionnaire answers were drafted in a table which will be included in this project as an appendix. Online resources and websites were also utilised and most of information for this white paper was collected through reviewing other country's ocean policy white papers, relevant legislations, ocean policies and various reports on Marine Protected Areas both published and unpublished. Resources found online and examples of similar projects and white papers of other countries were also sourced. The table of Stakeholders and questionnaires can be found in appendix 1.

6. ANALYSING THE GOVERNANCE OF KIMBE BAY MPA

6.1 The Kimbe Bay Marine Protected Area and its Marine Life

Kimbe Bay is located off West New Britain, Papua New Guinea. It is dominated by rainforest-covered volcanic peaks rising steeply from the water, some to over 2,000 meters but it is its wealth of marine habitats that make it unique.

The Nature Conservancy (TNC), is an NGO that first became interested in Kimbe Bay, as a long-term marine conservation project site in 1992. Aside from the spectacular volcanic landscape, the ever-changing moods of the bay, the magnificence of the coral reefs and abundance of marine life, the decision to invest in Kimbe Bay was influenced by the relative health of these systems and a sense that TNC could work to decrease the immediate threats posed by destructive fishing and land use practices (The Nature Conservancy, 2004).

It is said that much has been accomplished by many people and TNC and its partners have now built the strong conservation foundation needed to support work towards a resilient and effectively managed Marine Protected Area network for the Bay, which will help sustain the livelihoods of the communities and people of Kimbe Bay.



Figure 5: Map of Kimbe Bay Marine Protected Area showing location of shallow (coral reefs, mangroves and seagrasses) and deep-water habitats in Kimbe Bay and the proposed boundaries for the MPA Network: the outer boundary is delineated by the dotted line, and the inner boundary is the highest astronomic tide on the coast (*The Nature Conservancy, 2004*)

Kimbe Bay lies within the Coral Triangle, an area referred to as the global center of marine biodiversity. The Coral Triangle contains 76 percent of the world's coral species and is home to many rare and threatened species. In addition, it provides livelihoods for coastal communities and protection from storm surges. Communities rely on its resources for basic needs and income, and their cultural identity is rooted in the marine environment.

However, the reefs of Kimbe Bay are at risk from coral bleaching, sedimentation, and overfishing of commercially-important invertebrates (The Nature Conservancy, 2004)

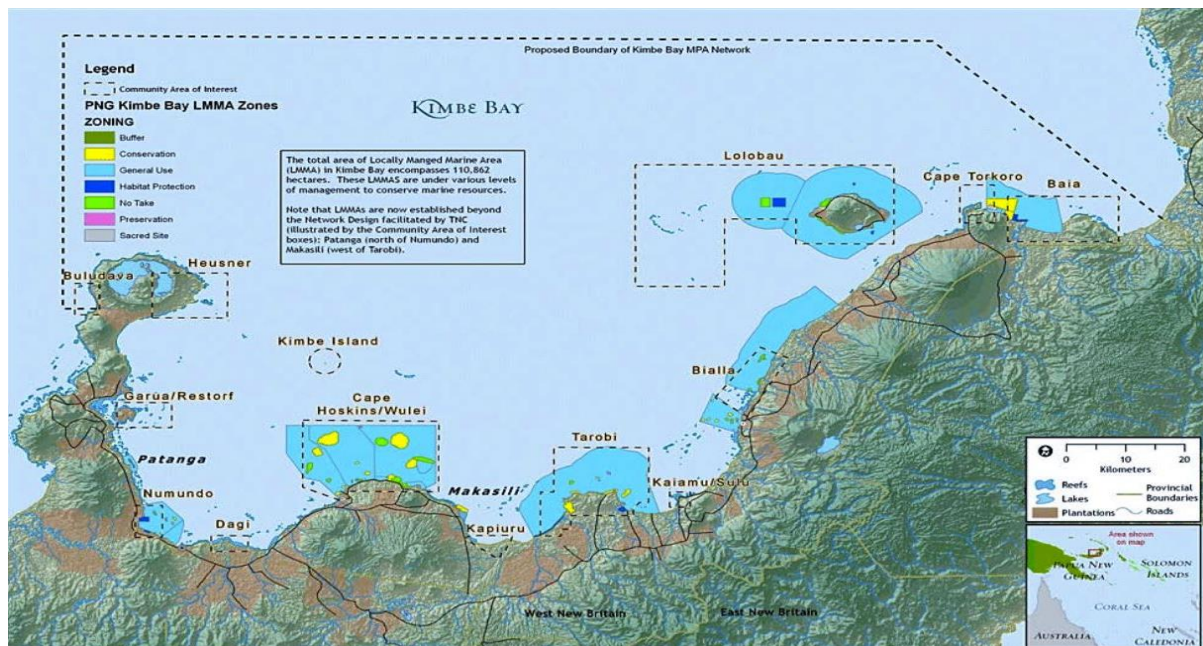


Figure 6: Map of Kimbe Bay showing the network of MPAs (*The Nature Conservancy, 2004*)

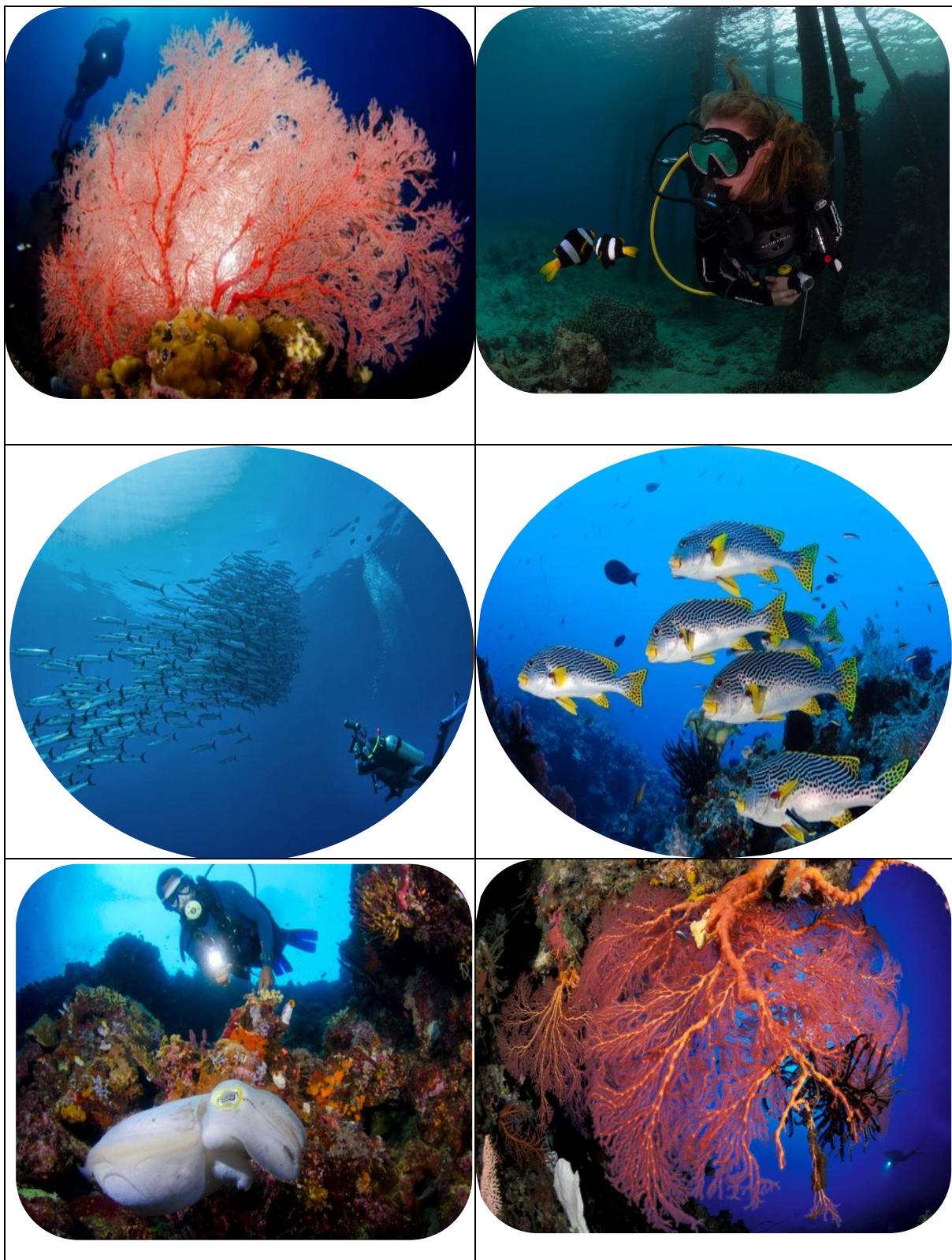
An evaluation was carried out beginning with the location itself and the importance of the marine ecosystem being protected, the communities involved in the MPA and the institutions and stakeholders heading the MPA in Kimbe Bay (The Nature Conservancy, 2004). No doubt there is an abundance of steep-sided coral reefs, which form pinnacles, saddles, and patch reefs, providing homes for a staggering 860 species of fish which attracts tourists (Global Greengrants Fund, 2005).

There are several species of sharks and endangered sea turtles which make their home in Kimbe Bay, as do fish species such as panda clown fish, gobies, damselfish, and parrotfish. Orca, bottle-nosed dolphins, spinner dolphins, pilot whales, sperm whales, and other toothed whales migrate through the bay year-round. These marine resources are worth more when seen alive by tourists than as food on plates.

Engagement with local communities through education and awareness programmes has helped to reduce the impact of once widespread destructive fishing practices and resulted in partnerships which are now being translated into community inspired conservation action through the establishment of Locally Managed Marine Areas (LMMAs). Similarly, promising new partnerships are being developed with private enterprise to find solutions to the impact of land-based impacts on the Bay's Marine Diversity.

However, in recent years Kimbe Bay, like many other coral reef regions in the world, has felt the impact of coral bleaching and global climate change. For its goal to be sustainable TNC and partners must also address this issue by ensuring to build resilience to global change into the Kimbe Bay network.

Table 1: Marine Life at Kimbe Bay Marine Protected Area (*The Nature Conservancy, 2004*)



6.2 Some Governance Challenges for Kimbe Bay

To conserve and protect sites in PNG for their biological diversity can be a lengthy process that requires consents and agreements with the resource owners and many other prolonged processes. The nature of fisheries and communities, complicated by the limited capacity of government to design and implement management and enforcement measures, means that successful resource management and conservation will usually rely on the communities themselves.

Efforts to establish marine protected areas need to facilitate and support community-based management, where the communities themselves take the lead in designing and implementing all aspects of the management regime. This involves an approach that requires special attention given to the community in terms of funding, capacity building and awareness of resource management practices.

a) Climate Change

Climate change is potentially a high threat to the marine species and their habitats in PNG through the potential disruption of ocean circulations, changes in the amount and distribution of fish populations, changes in salinity, temperature and acidity, and other parameters. Current climate change models include a wide range of potential scenarios. Climate Change and sea level rise is a major threat to Marine Protected Areas around the world (National Fisheries Authority, PNG. Department of Environment & Conservation, PNG., 2010).

For example, the warming of the oceans as a result of climate change can cause fish species to move out of the protected areas to unprotected areas. And then what if the MPA is devoid of the fish species in the next coming years, that MPA becomes less effective as a management measure compared to what it used to be. So, when creating current MPAs the impacts of climate change must be considered and modelled in ways that the current MPAs being created under legislations and policies will not become useless in the years to come as fish are forced to migrate due to climate change impacts.

b) Lack of Cooperation and Coordination among Stakeholders

Coordination and collaboration among stakeholders are of utmost importance in the success of MPAs. Institutional roles and responsibilities of stakeholders mean sharing information, keeping up to date with current status updates of the progress of the MPA or if there is any scientific research being carried out and the data collected about the whole ecosystem whether there are changes taking place. Most of time information is not shared among stakeholders and most often communities are left out in discussion because most of the meetings are conducted in the towns or urban centres where the high costs of travel make it unfortunate for rural communities to attend these discussions.

c) Insufficient Resources for Management

Shortcomings in marine resource management also derive from inadequate coordination among agencies charged with very important roles and responsibilities to manage projects. It is evident in KBMPA that insufficient resources management is becoming a problem after TNC left in 2013 and leaving the management of the program under the West New Britain Provincial Government (WNBPG). Landowners and fisherman have raised issues about the current management of KBMPA by WNBPG. It is not confirmed but people accept as true that funds

committed to KBMPA have been diverted to other areas. Trained and skilled human resources to monitor and manage Kimbe Bay MPA are also lacking.

d) Capacity Building

While the environment monitoring, regulations and management are the function of the state agencies, we must understand that implementation of the majority of these functions occur at the provincial, district and community level. Capacity and skills are needed at the local level where communities can utilise the management and monitoring of MPAs locally. Government departments with responsibilities for the maintenance of diverse and healthy reef systems are severely hampered by a lack of qualified and experienced staff and severe funding cutbacks.

Much of the capacity for biodiversity assessment, the establishment and management of marine protected areas, and the development of community education programs now lie with NGOs. There are currently two dedicated marine research facilities in PNG. They provide some of the best infrastructure for scientific investigation by national and international scientists and for the field training of future marine scientists.

6.3 Stakeholder Analysis in Kimbe Bay

In order to analyse how the governance challenges manifest in Kimbe Bay, a stakeholder analysis was conducted, assessing the roles of the different stakeholders according to the 4Rs methodology.

Table 2: Stakeholder analysis for Kimbe Bay MPA, analysing the roles (4Rs) of the main stakeholders identified in the area

Stakeholders	Stakeholder Roles (4Rs)			
	Returns	Relationship	Rights	Responsibility
TNC	Conservation of Resources	No Conflict	None	To preserve the plants, animals to survive. Maintain KBMPA/support
CEPA	Development of protection areas in PNG	Conflict with LOs/Fisherman	To conserve the environment	Protect and conserve the natural environment
OCCDA	REDD+ implementation	No conflict	None but mandated to protect such areas	Protect KBMPA from climate change/support
NFA	Revenue from Fisheries	Conflict with OCCDA	To protect the fisheries from depletion	Develop PNGs fisheries industry
WNBPG	Revenue from Tourism	Conflict with LOs	Maintaining KBMPA	Fund/Implement/support
Mahonia Na Dari	Funding for implementation & awareness	No Conflict	Benefits/Research/Awareness programs	Maintain & Promote KBMPA through awareness programs
Walindi Resort	Income/Tourists	No Conflict	Use as Tourism site/benefits/income	Maintain KBMPA & Promote as tourism site/support
Kimbe Bay Communities	Income/Jobs/Protected Marine life	Conflict with WNBPG&LOs	Benefits/Jobs	Compliance/adhere to rules/support
Kimbe Bay Landowners	Income/Jobs/Protected Marine life/food security	Conflict with WNBPG	Traditional/cultural/benefits	Adhere to rules/compliance/support
The Fishermen	Income/abundant fish stock/food security	Conflict with WNBPG	Benefits/traditional/cultural	Adhere to rules/compliance/support

In this section the stakeholders involved in Kimbe Bay Marine Protected Area are presented in terms of their different roles in Kimbe Bay MPA. The following table shows different the stakeholders and the reason why they were selected to be part of this research paper.

Table 3: Roles and Why the Stakeholders were selected for the research.

Stakeholders	Roles	Reason for Selected
TNC	The Lead Non-Government Organisation in the establishment of Kimbe Bay Marine Protected Area (KBMPA).	They initiated the Kimbe Bay MPA program in Kimbe Bay before handing the management to WNBPG
CEPA	The state agency mandated to protect the physical environment and	ensures the protection and sustainability of PNGs biodiversity through relevant legislative provisions contained in several laws and policies
OCCDA	Oversee climate change mitigation, vulnerability assessment and adaptation within PNG	They currently have projects REDD+ and mitigation projects at Kimbe Bay
NFA	Mandated to implement government policies for managing and developing fisheries as a national asset.	Develops the fisheries resources
WNBPG	Manages Kimbe Bay MPA	Questions been raised about WNBPG management of KBMPA
Mahonia Na Dari (NGO)	Provides Marine Environment Education Program (MEEP) to the local population in West New Britain Province and implements LMMAs	Currently at Kimbe Bay doing monitoring and awareness of the MPA through LMMAs
Walindi Resort	This Resort also played an important role in the establishment of KBMPA. Promotes KBMPA through tourism activities.	Benefits from the MPA by promoting tourist dive sites at the bay.
Kimbe Bay Communities	People living within the Kimbe Bay Area	Most of them are involved in the LMMAs in the network of MPAs
Kimbe Bay Landowners	They have customary rights to Kimbe Bay Area	They are involved in the MPA through LMMAs
The Fisherman	The people that live within and around Kimbe Bay and have been using Kimbe Bay as their fishing ground.	The people affected by the MPA and involved in the LMMAs

Stakeholders

a) The Nature Conservancy (TNC)

TNC has no role to play at KBMPA since handing the project over to the West New Britain Provincial Government (WNBPG). As one of its responsibilities, here is what the TNC representative interviewed mentioned:

“TNC developed a budget code for the program so that funding would be made available to implement the program. Some of the major setbacks include the commitment from government to support with funding and appropriate legislation to really strengthen compliance at Kimbe Bay” (personal communication, February 20, 2019).

The locals as the rightful resource owners and users should work in partnership with Government who has the mandate to provide enforcement of the area, simply by establishing local policing and surveillance around the network of MPAs. TNC and other stakeholders can assist if the request comes from the communities and the government. People still feel that TNC should go back and keep managing KBMPA. Since TNC left in 2013, no research work has been conducted by TNC.

Kimbe Bay has the potential to improve people’s livelihoods through eco-tourism. The design, the community-based monitoring, the establishment of the governance structure, and the fact that a budget code was developed for this shows that Kimbe Bay has been well set. These are some of the successful factors that can be scaled up to other MPA areas in PNG. KBMPA was a success in the sense that TNC managed to create the governance structure and handed over the program to the provincial government, and that about ten (10) Locally Managed Marine Areas (LMMAs) had their management plans completed.

But the challenge has been ownership by the Provincial government, funding and assigning appropriate human resource to run the program. To really prove with solid data comparison whether KBMPA is progressing well, one has to do an in-depth review of the whole network and the current structure to provide a relevant and practical response to this question.

b) Conservation & Environment Protection Area (CEPA)

CEPA views the value of collaboration to reflect the wider ecosystems, including humans and human societal networks and systems of using and managing the coastal and ocean resources. As the state agency, CEPA was consulted and worked together with TNC to establish KBMPA. CEPA’s role is mainly to conserve the natural environment both terrestrial and marine. KBMPA evidently needs government support not only in funding but also in improving and protecting Kimbe Bay since some of very unique fish have been using Kimbe Bay as a sanctuary.

In terms of data sharing, CEPA does not have much data on the fishery in KBMPA. In some of the LMMAs, coral reef and fish have really recovered compared to some years back. CEPA does not benefit from KBMPA but as an agency responsible for the conservation of the environment CEPA is obligated to assist and maintain Kimbe Bay as an MPA. The best to encourage more MPAs is more training for the communities and get them involved more in the LMMAs and open ways for them to benefit from those LMMAs.

c) Office of Climate Change & Development Authority (OCCDA)

OCCDA was involved in establishing KBMPA and it played a major role in negotiating with the local communities, landowners, and other stakeholders to set up KBMPA. The collaboration between CEPA and TNC has put more effort into working together with the local community to address climate change issues and closely assessing the climate change activities which are currently affecting the Marine ecosystem. Most data is yet to be updated, the progress of the KBMPA needed to be reassessed and proper data reporting and recording will be done by the Mitigation and Adaptation technical working group. In describing the implications of climate change in KBMPA in terms of sea-level rise as identified by the OCCDA technical working group the climate change representative mentioned the following point:

“saltwater intrusion spoiling cash crops, sea-level rise, acceleration rate of coral bleaching, breeding of harmful insects due to water log/water table triggering harmful disease” (personal communication, February 21, 2019).

Climate Change observed the ability of the fishermen to meet marine conservation commitments in terms of maintaining local food security by providing awareness through regional consultation with the local community (fisherman) and other relevant stakeholders. OCCDA in the past used the safest method of identifying, educating and advocating fishermen and industries for safe fishing mechanism. For instance, awareness and educating them about not to use dynamite/chemicals for fishing (harmful ways of fishing must be stopped).

There are plans to establish Provincial Climate Change Committee network to coordinate the cross-cutting climate change issues. However, food security including marine ecosystem in general is one of the very fundamental components the government is focusing on and Climate Change responded and mentioned that:

“OCCDA has a bigger vision to be the leader in promoting climate resilience, low carbon growth and sustainable development which aligned with government vision 2050, Medium Term Development Plan III (MTDP 3) to help ensure that the reefs of Kimbe Bay and other protected areas are governed and managed properly” (personal communication, February 21, 2019).

The Climate Change Office believes that MPAs have the potential as a natural tool for mitigation and adaptation to climate change because it acts as a Carbon Sink element/Reservoir to absorb GHGs. MPAs play a major role by minimising the emission of Green House Gases to diffuse through the Atmosphere to cause ozone depletion so that all living and non-living things receive an equal amount of sun heat and rays. Natural disaster is unstoppable, but it can be minimised through mitigation mechanism. On the question of whether OCCDA has included MPAs in their climate change plans, the response was:

“OCCDA has seen the importance of marine protected area as best mechanism or approach for coastal protection of wave surge and energy, that’s where both the project division steps are encouraging and advocating the local community to plant more mangrove trees (various species of trees), build stone walls, build nets for trap rubbish especially biodegradable substance so the wave surge and energy will be reduced and no further damage is done along the coastline and reefs” (personal communication, February 21, 2019).

d) National Fisheries Authority (NFA)

Protection of ocean marine ecosystems requires teamwork involving a broad range of partners to achieve shared goals and actions. Having a system in which all stakeholders are involved, with clear goals and responsibilities would result in ensuring ocean management becomes vital to everybody who depends on it. It would also ensure everyone takes responsibility in managing the coastal and ocean ecosystems from different interest groups and users and managers.

e) West New Britain Provincial Government (WNBPG)

TNC handed the program over to the West New Britain provincial administration in 2013. WNBPG is managing the MPA currently and has responsibilities to maintain KBMPA as a protected area. TNC worked with the Provincial Government to develop a budget code as well for the program so that funding would be made available to implement the program. However, the government has not really been committed. In terms of compliance the WNBPG representative mentioned that:

“We do maintain compliance by the communities to the rules” (personal communication, February 18, 2019).

The project was housed firstly inside the Division of Fisheries, the Division of Forestry and then Climate Change in the provincial government. To date there is an environment unit headed by WNBPG that houses the Kimbe Bay LMMA program and WNBPG fully supports this project. Mahonia Na Dari, a local NGO that focuses on raising awareness of the importance of the marine environment continues to work out of the Walindi Nature Centre. TNC invested a lot of funding into the establishment of the Kimbe Bay LMMA network and WNBPG has been trying its best to maintain KBMPA despite funding issues. Funding has been a major problem that has led to some conflict between WNBPG and the communities involved in the LMMAs.

d) Mahonia Na Dari

Mahonia Na Dari, “Guardians of the Sea” work closely with leaders of Tamare-Kilu Locally Managed Marine Areas (LMMA), Walindi Dive Resort, James Cook University and the communities to manage the network of MPAs at Kimbe Bay. To improve KBMPA, ensure funding for Non-Government Organizations (NGOs) such as Mahonia to monitor, survey and report on LMMA status and increase awareness with communities.

Mahonia does not benefit from the KBMPA but would like to be more involved but needs funding so that resources can be devoted to monitoring, surveying, and reporting to LMMA leaders and members. For example, Mahonia used USAID grant funds to supply and install signs on protected reefs of the LMMA in 2018 to 2019. On the question of the current status of the Kimbe Bay marine ecosystem as an MPA compared to before when it was not yet declared as an MPA, Mahonia mentioned the following point:

“Current status of some areas of KBMPA is poor, pelagic fish numbers and dolphin and shark numbers have decreased dramatically most likely to commercial fishing activities. Reefs have deteriorated due to bleaching and other diseases although some show signs of slow recovery. Reefs, coral and fish improved initially after LMMA were established but over the past 6 years

the inshore reefs have been significantly degraded by human activity, overharvesting and by sedimentation runoff from agricultural projects” (personal communication, March 06, 2019).

Inshore reefs are now facing invasive species (*sponges and ascidians*) due to lack of herbivore fish populations. Local communities are not respecting their own LMMA; for example, in 2018, during Beche De Mer (Sea Cucumber) season, there was uncontrolled harvesting of all species irrespective of size and there was much damage done by human activity on the reefs. In 10-20 years from now, unless direct intervention is implemented to stop or reduce commercial fishing, overharvesting and harmful subsidence activities the future for the LMMA reef is bleak.

The critical message to the communities is to respect their own LMMA protected reefs. Practice resource management on those reefs where harvesting is allowed. Attend information sessions conducted about the LMMA, for example, Mahonia conducted LMMA awareness sessions in August 2018. In terms of skills development, monitoring and security of LMMAs especially protected reefs by community members and leaders is needed. Mahonia encourages communities to attend its awareness sessions. In terms of data access, research and monitoring Mahonia responded that they rely on:

“on annual surveys and information from James Cook University, Queensland Australia. It is very vital for communities to know the importance of the marine ecosystem and how it contributes to sustain life and they must start now to protect and sustainably utilise the resources” (personal communication, March 6, 2019).

Funding is a major issue because of lack of government commitments, but Mahonia has been raising its own funds and also depended on donor agencies. There have also been some instances where a lack of cooperation from the other partner agencies have become obvious. Mahonia promotes the conservation of Kimbe Bay’s natural marine environment, through awareness mostly in schools. Mahonia believes educating and engaging school children at an early age in activities about protecting the marine resources is very crucial. Local communities must also be empowered and trained with skills that can enable them to monitor their own LMMAs.

e) Walindi Resort

KBMPA has brought good benefits to Walindi resort in terms of tourism and income. Numbers of tourists have increased, and they love diving at Kimbe Bay to experience the coral and fish while they stay at the resort. The resort has been involved in the MPA since it started; it is maintained to make it work and grow because more tourism means more jobs for locals around Kimbe Bay. The resort has good relationship with the stakeholders but sometimes faces a bit of conflict with communities in terms of employment.

The KBMPA is definitely a stimulus to the economic and social development of the area. Currently the resort employs workers from around Kimbe Bay that assist tourists in snorkeling or diving in the MPA. There are strict rules to follow by tourists when diving in the area and the most attractive viewing targets are the corals and fish. The resort also encourages the tourists to respect the marine ecosystem before they go diving. The status of the coral reefs has improved since KBMPA was established and implemented.

f) Kimbe Bay Communities

Community support and participation in the design and implementation of local MPAs may be enhanced through the identification and support of locals who are outstanding in their LMMAs. Conservation champions may be people chosen from the village or wider local community who are respected and trusted in their respective communities and who will work to promote the conservation of marine environments and resources.

In addition, there is a need to involve other stakeholder groups such as people from the informal settlements, plantation compounds, oil palm companies, logging companies, other private sector enterprises and church groups. This would help make conservation issues in the bay a priority for the whole community, not just the coastal villagers and resource owners. It would also validate the conservation efforts of villagers, by highlighting its importance to all members of the broader Kimbe Bay community.

g) Kimbe Bay Landowners

Landowners believe that establishing an MPA in their marine area has saved Kimbe Bay from losing fish and coral that were being destroyed by harmful types of fishing. Benefits may not be much in monetary terms but the recovery of coral reefs and replenishing of fish stocks is currently more important. Most of the landowners are engaged by Mahonia Na Dari in the protection of the Marine areas through LLMAs. There has been some engagement by climate change but that is yet to fully realized. But what is lacking is more training on skills upgrading for the locals so they can be able to do the management the LMMAs themselves instead of waiting for other people doing it for them.

This is where the other state agencies like CEPA should really step in to assist at KBMPA. Since TNC left, the provincial government has not honored parts of its commitment to help KBMPA. They accepted the MPA because they needed their depleting marine resources to recover and they have been working together with local managers to make sure the LMMAs are working. Benefits are not important; what is important is that the ocean and the coral reefs recover and have plenty of fish as before. Since its establishment KBMPA has progressed well.

But Walindi resort has been getting lots of tourists who come to dive at Kimbe Bay which is a good thing for us in terms of jobs and earning some income. There was proper awareness done which really helped most of us understand the importance of MPAs. Yes, we still maintain our traditional sites and those sites covered by the MPA and we comply, and do not fish in those areas. MPAs are good, but it is very important for government support from the beginning to help it progress and improve.

h) The Fisherman

After the establishment of KBMPA, most fisherman have to travel far from the fishing grounds, but that does not matter as long as fish are protected. In some of the LMMAs, the amount of fish in the protected areas have become plentiful and the sea grass has also started growing and some coral reefs have recovered. Most of the fish and other resources were already disappearing when TNC came in and started designing the MPA. They involved most of the communities and promoted awareness around the Kimbe Bay area, educating people about MPAs and their importance.

Since TNC left, Mahonia Na Dari has been doing most of the implementation work by trying to encourage more communities to be part of the LMMAs. The fishermen agree that if the marine resources are not managed well with regulations and prohibitions, the fish available for future generations will progressively decrease. In terms of the question on benefits, this fisherman responded that:

“I really don’t care about the benefits, but all I want is the recovery of the coral reefs and increase of fish stock in Kimbe Bay” (personal communication, February 18, 2019).

The fishermen’s responsibilities are to make sure there is compliance and they adhere to the rules of the MPAs. One of the benefits is that fish will increase within the MPA and they can be caught outside of the MPA. One of the positive things is that their children are taught the values and importance of the corals and fish that live in the MPA and this is very positive for the younger generation. Some of the negative effects of the MPA is that they can no longer fish in their old fishing grounds. They also lack basic skills to monitor and record fish data in their own LMMAs and this has to be addressed.

6.4 Implications and Lessons learnt for Effective MPA Governance in Kimbe Bay

Despite local successes of well-designed and well-managed protected areas proving effective in stopping biodiversity loss, there are significant shortcomings in the usual process of implementation of protected areas that prevent the reliance on them as a global solution to this problem. The shortcomings include technical problems, funding, noncompliance that are associated with the overall failure of such areas to protect against the broad range of threats affecting ecosystems (Mora, 2011). Here follows a discussion of these shortcomings:

a) Funding Constraints

The reason why most of the individuals that were interviewed talked against the WNBPG is because of funding issues. WNBPG is said to be having financial constraints in relation to running and maintaining the program properly and one of the landowners mentioned that;

“Since WNBPG took over the project from TNC, the funding commitments have been lacking” (personal communication, February 19, 2019).

Government commitments to support with funding for Kimbe Bay has been a major issue which is having a negative impact on the communities and their LMMAs. This has led to communities not trusting the government and the WNBPG. Continued funding is needed for successful marine protected areas.

b) Lack of skilled individuals

Capacity building and training is lacking for local LMMAs in communities establishing a representative system of community-based marine protected areas. Continued monitoring and community support in conjunction with the marine protected areas in LMMAs is very important. Specialised individuals have to be on site to monitor, collect data and measure the progress of the MPAs and train more of the communities so additional people will be involved in the LMMAs.

c) Compliance with the Rules

Compliance of the rules imposed on MPAs must be adhered to by everyone including the landowners and the fisherman. Some fishermen have suspected poaching by people mainly at night in the restricted areas. Based on the results the LMMAs are still too large to monitor for the local communities. Proper monitoring is needed for the LMMAs which would include proper policing activities in and around the protected areas. Some fishermen have not been adhering to the protection rules imposed by the LMMAs.

Unfortunately, there is little government capacity for enforcement of laws and regulations. Local communities could play a greater role in enforcement of fisheries regulations and marine protected areas, through the expansion of community-based management programmes. However, at this stage the ability to enforce regulations lags far behind the ability to formulate them.

d) Climate Change

Like many coastal areas throughout the world, Kimbe Bay's rich marine biodiversity is at risk from local threats such as overfishing, sedimentation, pollution, and increasing human populations. Additionally, global threats such as rising sea temperatures associated with climate change have already led to coral bleaching in the bay. Sea levels are also rising, threatening critical coastal habitats such as mangroves and turtle nesting areas. The implications of climate change in KBMPA in terms of sea-level rise as identified by the OCCDA technical working group are: saltwater intrusion, sea-level rise, acceleration rate of coral bleaching.

7. CONCLUSION AND POLICY RECOMMENDATION

This research may supply policy makers with useful information to support the management and improvement of MPAs. Based on the findings from the research I would recommend improving the management of future MPAs in PNG and these recommendations should be included in the ocean policy for future MPAs in the region to avoid similar conditions. The recommendations are as follows:

- Local support & community education

Community education in conjunction with the marine conservation project; small protected areas and facilitating ease of surveillance, must be considered especially in the LMMAs. The establishment of networks of MPAs and locally managed as modelled in Kimbe Bay should be pursued in future MPAs in PNG. A regular monitoring program with community involvement is very important. Such community based protected areas and conservation initiatives that link with social and economic development may be most appropriate to the needs and realities of PNG. For long term capacity building, appropriate arrangements with specific organisations may be developed to undertake marine scientific research collection and storage to guide the LMMAs in PNG. Cooperation with other regional marine research centres for specific training and work attachments for PNG scientific and technical officials may be pursued. Partnerships have to be established with relevant NGOs through all levels of government down to the local coastal communities.

- Collaboration and coordination among Stakeholders must be strengthened

Lack of cooperation and stakeholders not working together. Information sharing among the stakeholders in terms of MPAs must be addressed in the policy. Research and monitoring fish populations, coral reef conditions, and socio-economic dynamics should be a priority for the leading agencies in ocean management. The fact remains that despite the cross cutting legal issues that restrict government organisations from carrying out their roles and responsibilities the entire government system for the fisheries sector remains unstructured which leads to a mechanism that is ineffective to deliver and cater for the people's needs. Stakeholders are key in ensuring the sustainable management and development of ocean resources.

- Climate Change impacts must be addressed

Climate Change must be addressed immediately, more government intervention is needed to monitor the impacts in conservation areas. The OCCDA need to be working more with communities, NGOs, and the government to design and implement one of the first climate-resilient Marine Protected Area (MPA) networks. The goal is to conserve the bay's biodiversity, natural resources, and address local marine resource management which needs to minimise the effect caused by human and natural activities.

- Funding Issues

Practical issues include budget constraints, lack of skilled individuals, conflicts with human development and not enough training. Sustained financial support from the government is vital in a manner that does not marginalise local communities. This must be addressed in the ocean policy. Most of the recommendations for improved conservation of coral reefs in PNG are interlinked. For example, the development of marine protected areas will be most successful if

linked with community awareness programs, which in turn can help decrease destructive fishing practices and increase the potential for community level enforcement of rules and regulations.

It is difficult to allocate distinct priorities and the list above does not indicate a suggested order of implementation. Many of the threats facing coral reefs and other marine resources in PNG are likely to come from human and terrestrial activities such as large-scale plantations. Therefore, links with terrestrial conservation and management activities should be strong.

In terms of legislations, there appear to be adequate laws for the conservation and management of coral reefs and marine resources in PNG. However, most legislation does not specifically refer to marine systems and this has caused uncertainty about how it should be applied to ocean resources. Also, the laws relevant to different sectors (e.g. fisheries, mining, environmental protection) are not fully integrated, which has led to confusion over which laws have priority, who is responsible for management, and the rights of the various interest groups in ocean use.

Finally, it should be recognised that many of the recommendations in this report are essentially focused on the community or local level. There is also an urgent need for greater capacity within government departments responsible for marine resource protection utilisation and for an integrated approach to management. Finding ways to increase the importance of environmental issues at higher policy levels will clearly bring substantial rewards to conservation efforts in PNG.

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9. REFERENCES

- Bender, M. (2017). *Adopting a holistic, Systems and Rights-Based Approach to Ocean Governance*. Earth Law Centre.
- Commission, W. a. (2009). *Western and Central Pacific Tuna Fishery Yearbook* . Noumea: Secretariat of the Pacific Community.
- Di Lorenzo, M. C. (2016). Spillover from Marine Protected Areas to Adjacent Fisheries has an Ecological and a Fishery component. *Journal for Nature Conservancy*, 62-66.
- Dibenedetto, L. (2012, October 11). *What is a White Paper*. Retrieved January 28, 2019, from Vision-Advertising: <https://www.vision-advertising.com/2012/10/11/what-is-a-white-paper/>
- Edward H. Allison, A. L.-C. (2009). Vulnerability of national economies to the impacts of climate. *FISH and FISHERIES*, 176-177.
- Feyerabend, .. B. (n.d.). *Governance of Protected Areas*. Switzerland: INTERNATIONAL UNION FOR CONSERVATION OF NATURE.
- Global Greengrants Fund. (2005, December 2). *Papua New Guinea: Kimbe Bay Community Sets Aside Marine Protection Areas*. Retrieved February 11, 2019, from Greengrants: <https://www.greengrants.org/2005/12/02/papua-new-guinea-kimbe-bay-community-sets-aside-marine-protection-areas>
- Green, A. S. (2009). *Designing a Resilient Network of Marine Protected Areas for Kimbe Bay, Papua New Guinea*. London: Fauna & Flora International.
- Hoegh-Guldberg, O. &.-G. (2009). *THE CORAL TRIANGLE AND CLIMATE CHANGE: ECOSYSTEMS, PEOPLE AND SOCIETIES AT RISK*. Sydney: WWF Australia.
- Independent State of Papua New Guinea. (2014). *Papua New Guinea Policy on Protected Areas*. Port Moresby, National Capital District.: Conservation & Environment Protection Authority.
- Kailola, P. (2003). *Aquatic Resources Bibliography of Papua New Guinea*. Noumea, New Caledonia: Secretariat of the Pacific Community.
- Kuk, R. T. (2012). *Fisheries Policy and Management in Papua New Guinea*. Boroko, Port Moresby: National Research Institute.
- Kwa, E. L. (2004). *Biodiversity Law and Policy in Papua New Guinea*. Auckland: Faculty of Law The University of Auckland.
- Mora, C. F. (2011). Ongoing global biodiversity loss and the need to move beyond protected areas. *Marine Ecology Progress Series*, 251–266.
- Munday, L. P. (2012). *The Staus of Coral Reefs in Papua New Guinea*. Australian Institute of Marine Science.

- National Fisheries Authority, PNG. Department of Environment & Conservation, PNG. (2010). *Papua New Guinea Marine Program on Coral Reefs, Fisheries and Food Security-National Plan of Action 2010-2013*. DEC & NFA.
- Our Ocean. (2016). *Our Ocean, Washington DC*. Retrieved February 01, 2019, from Our Ocean 2016: <http://ourocean2016.org/marine-protected-areas>
- Papua New Guinea National Fisheries Authority. (2013). *NFA, Papua New Guinea*. Retrieved January 23, 2019, from Fisheries: <http://www.fisheries.gov.pg/>
- PIMPAC. (2005). *The Pacific Islands Managed and Protected Areas Community*. Retrieved January 4, 2019, from PIMPAC: <http://www.pimpac.org/>
- Secretariat of the Convention on Biological Diversity. (2014). *Global Biodiversity Outlook 4 - A mid-term assessment of progress towards the implementation of the Strategic Plan for Biodiversity 2011-2020*. Montreal: ICAO.
- Teh, L. K. (2014). *Reconstructing Papua New Guinea's Marine Fisheries Catch, 1950-2010*. Vancouver: Fisheries Centre-The University of British Columbia.
- The Nature Conservancy. (2004). *Designing a Resilient Network of Marine Protected Areas in Kimbe Bay, West New Britain, Papua New Guinea*. Townsville: The Nature Conservancy.
- The University of Rhode Island. (2019). *Department of Marine Affairs-College of the Environment and Life Science*. Retrieved February 7, 2019, from University of Rhode Island: <https://web.uri.edu/maf/ocean-policy/>

10. APPENDIX

List of Stakeholders and Questionnaires

STAKEHOLDERS	THEIR ROLES	INDIVIDUALS INTERVIEWED	QUESTIONS (30 mins interview)
LEAD ORGANIZATION			
The Nature Conservancy (TNC) Kimbe Bay Project Office	The Lead Non-Government Organization in the establishment of Kimbe Bay Marine Protected Area (KBMPA).	1	<ol style="list-style-type: none"> 1. As the lead organization, what are your responsibilities in terms of governance, enforcement and maintaining of KBMPA? 2. In terms of Returns, how does TNC benefit from KBMPA? 3. What are the major challenges and setbacks faced when establishing KBMPA? 4. What rights do you have in terms of enforcement and implementation of KBMPA? 5. Is your relationship with the landowners, the fisherman and partner stakeholders good? Have you experience conflict with any one of the stakeholders? 6. Do you conduct marine research within KBMPA, if yes, how is it performed? And do you share the data collected with the stakeholders? 7. What is the common fisheries species (please name) being protected at the KBMPA, and are they endangered species? (ask for data, table, map if available) 8. Do you believe KBMPA can improve the health of the marine resources and deliver benefits for the people and ecosystems? 9. What elements of KBMPA successes that may be most readily transferable to other marine areas or conservation activities in PNG?
PARTNERS			
Conservation & Environment Protection Authority (CEPA)	The state agency mandated to protect the physical environment and ensure the protection and sustainability of its biodiversity through current relevant legislative provisions contained in several laws.	1	<ol style="list-style-type: none"> 1. Was CEPA consulted and engaged in the process of establishing Kimbe Bay as an MPA? 2. What are your responsibilities as a state agency in terms of enforcement and monitoring of KBMPA? 3. How does CEPA benefit from KBMPA and have you faced any conflict with partner stakeholders in relation to KBMPA? 4. Do you have regular consultations with TNC and other stakeholders on issues affecting KBMPA? 5. What is your opinion about the state of conservation of the coral reefs and fish species at the KBMPA compared to 10 years ago? 6. How would you evaluate the efficiency of enforcement and data sharing among stakeholders on KBMPA?

			<ol style="list-style-type: none"> 7. What are the best methods and tools available that can be used to engage and encourage more local communities in marine conservation? 8. Do you think KBMPA can cope with increasing developments and population pressures and with off-site threats? 9. Do you believe PNG needs more MPAs to protect its marine resources for future generations?
<p>National Fisheries Authority (NFA)</p>	<p>Mandated to implement government policies for managing and developing fisheries as a national asset.</p>	<p>1</p>	<ol style="list-style-type: none"> 1. Is NFA aware of the KBMPA, have you been involved in its establishment as an MPA and have you supported it? 2. Did NFA play a major role in the establishment of KBMPA? 3. In what situations do you think KBMPA can be useful as a Fisheries Management tool to increase fish biomass? 4. How can KBMPA be used to bridge Fisheries Management & Marine Conservation in PNG? 5. Do you think KBMPA is achieving or capable of achieving the desired results on marine resource conservation? 6. Has KBMPA in any way negatively affected the normal function and operations of NFA in terms of fish catch and fishing space? 7. Do you think more MPAs in PNG should be adapted for purposes of fishery recovery to reverse the overall pattern of fisheries decline? 8. Does NFA have plans or new systemic modifications and specific measures to adopt that can sustain PNG fisheries apart from MPAs? 9. How good is your relationship TNC? Have you faced conflicts with TNC or CEPA or other stakeholders regarding KBMPA? 10. Do you believe that KBMPA is a stimulus that NFA can benefit from or an obstacle to fisheries economy development in PNG?
<p>Office of Climate Change & Development Authority (OCCDA)</p>	<p>Oversee climate change mitigation, vulnerability assessment and adaptation within PNG</p>	<p>1</p>	<ol style="list-style-type: none"> 1. Was OCCDA involved in the establishment of KBMPA and did OCCDA play a major role in the negotiations and setting up of KBMPA? 2. How good is OCCDA's relationship with other stakeholders involved in KBMPA. Is OCCDA updated with data regarding the progress of the KBMPA? 3. What are the implications of climate change in KBMPA in terms of sea-level rise and other climate change related threats? 4. How does OCCDA view the ability of the fishermen to meet marine conservation commitments while maintaining local food security? 5. To what degree can no-take zones or protected areas like Kimbe Bay provide resilience or a buffer against ecosystem disruption caused by climate change?

			<ol style="list-style-type: none"> 6. Are there plans or measures in place by OCCDA that need to be implemented to prevent the extinction of constrained fisheries species around our coastal waters that are severely affected by climate change? 7. In your opinion, do you believe MPAs have the potential as natural tools for mitigation and adaptation to climate change? 8. In your mitigation and adaptation projects in PNG, have you included MPA as coastal defences of wave energy?
<p>The West New Britain Provincial Government (WNBPG)</p>		<p>1</p>	<ol style="list-style-type: none"> 1. How is the WNBPG Government involved in the KBMPA? 2. Is WNBPG Govt involved in some of the decision making on issues affecting KBMPA? 3. Does WNBPG government benefit from KBMPA, if yes how? 4. What are your responsibilities as a provincial government towards KBMPA? 5. Does WNBPG take part in the enforcement and monitoring of KBMPA? 6. Has WNBPG in any time faced conflict with TNC and other stakeholders regarding KBMPA? 7. Does WNBPG fully support the implementation of KBMPA? 8. Has WNBPG collaborated fully with the Landowners, the communities and the fishermen of KBMPA?
<p>The Landowners of Kimbe Bay</p>	<p>People who have customary rights to Kimbe Bay Area</p>	<p>1</p>	<ol style="list-style-type: none"> 1. As a landowner do you think KBMPA is good for development or an obstacle to the economic and social development of your area? 2. What benefits or returns has KBMPA brought to your area and what did you expect from KBMPA? 3. Are you fully involved by stakeholders in the enforcement and management of KBMPA? 4. Do you face any conflict with TNC or the other stakeholders with issues relating to KBMPA? 5. Do you think it is important to establish diving areas where fishing is prohibited in any form? 6. Was there proper awareness done to educate you of the importance of the MPA? 7. As a landowner do you have any regrets for putting up Kimbe Bay as an MPA? 8. What lessons have you learnt from KBMPA that can be improved in other MPA areas? 9. Do you still maintain your traditional rights regarding sacred sites within the KBMPA? 10.

<p>The Community living within and around Kimbe Bay Area</p>	<p>People living within the Kimbe Bay Area</p>	<p>4</p>	<ol style="list-style-type: none"> 1. Since the establishment of KBMPA, have you noticed any positive impacts on the communities at Kimbe Bay. 2. Was proper awareness conducted by the stakeholders before the establishment of KBMPA? 3. Do you agree that MPAs are good ways to sustain and replenish marine resources? 4. As a community member living in Kimbe Bay, do you feel responsible towards the success of KBMPA and what rights do you have over the KBMPA? 5. Do you have conflicts with TNC and other stakeholders that have interest in the KBMPA? 6. What is the most important aspect of KBMPA that you value? 7. What is your opinion on the necessity of marine protection and ocean resource management at KBMPA? 8. Fisherman have a unique knowledge of their fishing grounds and they can inform the MPA process by helping to provide knowledge on local marine wildlife around Kimbe Bay. Do you think the fisherman were fully utilized in the development of KBMPA?
<p>Mahonia Na Dari (Guardians of the Sea)</p>	<p>Formed to provide Marine Environment Education Program (MEEP) to the local population in West New Britain Province.</p>	<p>1</p>	<ol style="list-style-type: none"> 1. Name the stakeholders/organizations with whom you collaborate most frequently regarding KBMPA? 2. What kind of activities do you believe should be undertaken to improve the KBMPA? 3. Are you fully involved with KBMPA and how does Mahonia Na Dari benefit from KBMPA? 4. Rate your relationship with TNC, do you face any type of conflict with TNC, the fisherman and other stakeholders regarding KBMPA? 5. How do you rate the current status of the Kimbe Bay marine ecosystem as an MPA compared to before when it was not yet declared as an MPA? 6. How do you see KBMPA in 10 to 20 years' time? 7. What are the most critical messages and concepts that should be communicated to the local communities to encourage more MPAs? 8. What skills must be developed within the KBMPA to improve societal understanding of marine ecosystem? 9. Do you have access to the KBMPA data from TNC, and are you involved in the monitoring, sampling and collection of data?

<p>The Fishermen</p>	<p>The people that live within and around Kimbe Bay and have been using Kimbe Bay as their fishing ground.</p>	<p>4</p>	<ol style="list-style-type: none"> 1. After establishment of the MPA, did you experience more advantages or more constraints and can you please specify them? 2. Has the quantity of the fish increased or decreased within the MPA and do you now travel far out to sea to fish? 3. And has your revenue from fish sales increased or decreased since the establishment of the KBMPA? 4. Do you and the other fisherman agree that if you do not manage the marine resources well with regulations and prohibitions, the fish available for our future generation will progressively decrease? 5. What are some of the benefits you are getting from the KBMPA, and how has the KBMPA affected your life as a fisherman? 6. What is the main species of fish caught around the area? Is it endangered? 7. What is your responsibility as a fisherman towards the MPA and have you had any conflict with stakeholders regarding the MPA? 8. When KBMPA was implemented some years ago, what serious negative and positive impacts did you observe? 9. What overall effects did you expect the fish sanctuary to have for your household? Please tell me all the effects that you can think of
<p>Walindi Resort</p>	<p>This Resort also played an important role in the establishment of KBMPA. Promotes KBMPA through tourism activities.</p>	<p>1</p>	<ol style="list-style-type: none"> 1. As a resort within Kimbe Bay, what are some of the positive impacts of KBMPA that you have experienced? 2. Were you involved in the establishment of KBMPA and what are your responsibilities regarding the success of KBMPA? 3. Are tourists from Walindi Resort allowed to go diving and snorkeling at KBMPA? 4. Do you have a good relationship with TNC, the landowners, local communities, and other Stakeholders? 5. Did the tourist diving and snorkeling activities at the resort increase after the implementation of the KBMPA? 6. Do you think the KBMPA is a stimulus or an obstacle to the economic and social development of the area? 7. What are the most beautiful things in this area that could be better used as tourist attractions? 8. Do you think it is important to establish diving areas where fishing is prohibited in any form?