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MARSH Project

Mangrove Rehabilitation for Sustainably-Managed Healthy Forests

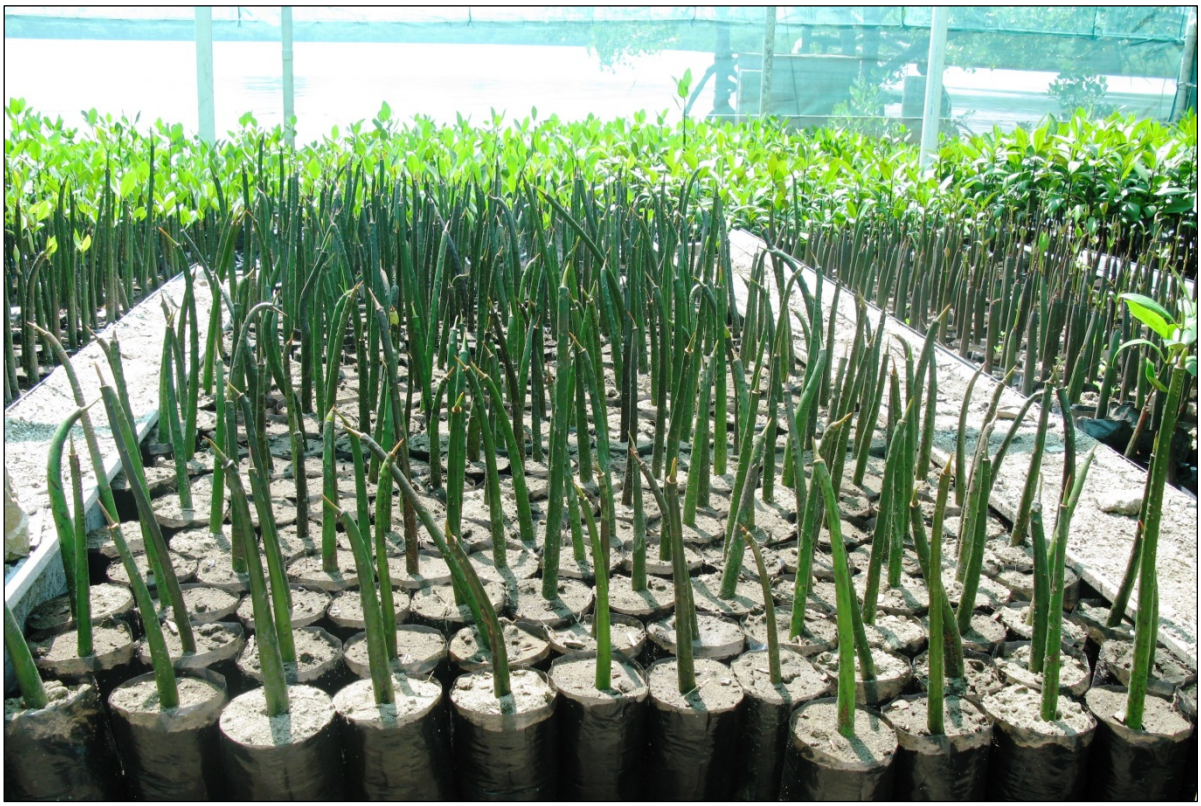
IUCN

MANGROVE REHABILITATION FOR SUSTAINABLY-MANAGED HEALTHY FORESTS (MARSH)

FINAL REPORT

REPORTING ON WORK BETWEEN

OCTOBER 1, 2012 AND SEPTEMBER 30, 2015



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Cover photo: A mangrove nursery in the Central Province established by the MARSH project

Photo: © MARSH PMU

Mangrove Rehabilitation for Sustainably-Managed Healthy Forests
Final Report

Prepared for Cooperative Agreement to a Public International Organization No. AID-492-A-12-00010, USAID, Philippines

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Acronyms and Abbreviations

AMP	Award Monitoring Plan
AoI	Areas of Interest
CBO	Community Based Organization
CELCOR	Center for Environmental Law and Community Rights Inc
CI	Custom Indicator
CLMA	Center for Locally Managed Areas
DEC	Department of Environment and Conservation
DPO	Disability Provincial Officer
DQA	Data Quality Assessment
ENSO	El Niño–Southern Oscillation
IPCC	International Panel for Climate Change
IUCN	International Union for Conservation of Nature
LEAF	Lowering Emissions in Asia's Forests
LLG	Local Level Government
MARSH	Mangrove Rehabilitation for Sustainably-Managed Healthy Forests
MECCN	Manus Environmental Conservation Community Network
MESCAL	Mangrove Ecosystems for Climate Change Adaptation and Livelihoods
MIRC	Motupore Island Research Centre
NARI	National Agricultural Research Institute
NBPOL	New Britain Palm Oil Limited
NCD	National Capital District (PNG)
NFA	National Fisheries Authority
NGO	Non-Government Organization
NUPAS	Non-US Pre-Award Survey
OCCD	Office of Climate Change and Development
ORO	Oceania Regional Office
PDF	Pacific Disability Forum
PMP	Performance Monitoring Plan
PMU	Project Management Unit
PNG	Papua New Guinea
PNG ADP	Papua New Guinea Assembly of Disabled People
PNG CLMA	Papua New Guinea Center for Locally Managed Areas
PNGFA	Papua New Guinea Forestry Authority
PPP	Private Public Partnership
PWM	Partners With Melanesia
RCF	Research & Conservation Foundation
RIG	Regional Inspector General
SI	Solomon Islands

SLR	Sea Level Rise
SPREP	Secretariat of the Pacific Region Environment Programme
TNC	The Nature Conservancy
UPNG	University of Papua New Guinea
USAID	United States Agency for International Development
USG	United States Government
WCS	Wildlife Conservation Society
WNB	West New Britain (Province PNG)
WWF	World Wide Fund for Nature

Executive Summary

The project Mangrove Rehabilitation for Sustainably Managed Healthy Forests (MARSH) commenced on October 1st 2012 and ended on September 30th 2015. The project was initially supposed to be implemented over five years in Papua New Guinea (PNG), Solomon Islands and Vanuatu. In the first quarter of Year 3 the donor decided to change the focus from community based to national interventions for greater impact and to limit the rest of the activities of the third year to PNG alone. The project life span was thus shortened and there was nothing started in Solomon Islands and Vanuatu.

The project was implemented at 23 sites in five provinces in Papua New Guinea: National Capital District, Central, Manus, West New Britain and New Ireland.

The main goal of the project was to empower communities and increase capacities of national institutions in the rehabilitation and management of mangrove forests to increase resilience to the impacts of climate change.

To implement the project across the five provinces, IUCN partnered with a number of national and international NGOs. These were The Nature Conservancy (TNC); Wildlife Conservation Society (WCS); PNG Centre for Locally Managed Marine Areas (PNGCLMA); Partners with Melanesians (PWM), PNG Assembly of Disabled Persons (PNGADP); and University of PNG (UPNG).

A mangrove use survey of 1268 households in 52 villages, 12 Local Level Governments (LLG) and three provinces revealed a very high dependence on mangrove ecosystems for food, firewood and construction materials. The survey results spurred communities to incorporate mangrove management in their community resource plans. The results of the surveys also fed into policy formulation and management plans by LLGs in Manus and West New Britain. The economic value of mangrove fishery products was estimated at PGK600, 000 per annum for Kimbe urban market alone further highlighting the economic and food security provided by mangroves. Mangrove health assessments were conducted in six villages in New Ireland that showed healthy mangrove forests overall.

There were 13,186 mangrove seedlings planted in 40 villages in 11 LLGs in the five provinces. Such was the strong community leadership and support for this activity. There were some 66 formal and informal training courses held and there was reasonable gender balance with some 40% of the participants being women. There were two national events held in the final year that ended the project on a high note. There was the national mangrove carbon accounting training workshop and the second was the Mangoro Bung which brought all stakeholders working on mangrove conservation in PNG together, to strategize on the formulation of a national

mangrove policy. There were key knowledge products produced which included a Disability Inclusion Training Manual produced by PNGADP, a first for the country.

The implementation of activities only really started in year 2 of the project due to lengthy contractual deliberations with sub-awardees and in securing community buy-in in year 1. The ambitious project targets, the remoteness of sites, high costs and local partners that were under-resourced were few of the challenges to timely implementation of project activities. Despite the challenges and setbacks experienced in this project, there were many lessons learnt and the legacy of the MARSH project is a very strong network of agencies and communities committed to furthering mangrove conservation in PNG. There was also a groundswell in community support for mangrove conservation in the five provinces that will hopefully extend to the other maritime provinces that have mangroves.

1 Introduction

Marine and coastal resources provide livelihoods for more than 100 million people living in the coastal areas of the Coral Triangle and Melanesian countries–Malaysia, the Philippines, Indonesia, Papua New Guinea (PNG), Solomon Islands, Timor Leste, and Vanuatu. These countries are already experiencing the effects of climate change, such as an increase in water temperature and acidity stressing the coral reefs and causing bleaching; sea-level rise eroding coastlines, especially of low-lying islands, affecting critical nursery grounds for local fisheries; and increased frequency and severity of tropical storms results in flooding of coastal villages and nearby agricultural lands.

Sensitive coastal ecosystems like mangroves, salt marshes, and coral reefs face an even more rapid destruction worldwide than tropical forests. Climate change impacts are exacerbating the already urgent threats of unsustainable use and destructive land-use and fishing practices in these regions. Furthermore, coastal and marine ecosystems are of great relevance - though sometimes still underestimated - for carbon storage and, if intact, may offer further protection against effects of climate change. In order to counteract these negative impacts the countries of the Coral Triangle region have declared their commitment to the sustainable use and conservation of marine and coastal resources, and to address the impacts of climate change at the highest level, through the recent Coral Triangle Initiative[1], Coral Triangle Ministerial Communiqué on Climate Change[2] and various national policies and programs in each country reflected in the regional and national plans of action.

1.1 General climate change impacts in Melanesia and the broader Pacific region

Islands and low-lying coastal areas are particularly vulnerable to climate change due to their small size, isolation, and generally low income levels and relatively low level physical infrastructure. All Mangrove Rehabilitation for Sustainably-Managed Healthy Forests (MARSH) target sites are bracing for the impacts of climate change, and in some cases, impacts are already occurring (coastal erosion and saltwater intrusion in Manus, Kavieng, New Britain). Many coastal areas of PNG have very high population densities (thus large numbers of people potentially exposed to hazards/climate events).

Globally, estimates for projections of sea surface warming by 2100 range from ~2-6°C, more intense tropical storms are anticipated, and sea level is projected to increase by 1-2m by 2100 (IPCC 2007). Regionally, modest declines in annual

[1]The Coral Triangle is the global centre of coral biodiversity (Malaysia, Indonesia, the Philippines, Timor Leste, Solomon Islands & PNG) and the CT Initiative was adopted by the Heads of Government for these countries in Manado, May 2009.

[2]Adopted by Ministers of the six Coral Triangle countries in Gizo, Solomon Islands (November, 2009)

precipitation in the Pacific are anticipated, along with heavier rainfall intensity. Regional sea level patterns in the Pacific over the past century suggest that sea-level is subject to large inter-annual variations driven by ENSO cycles. Overlaying these short term changes is a long-term sea level rise of about 1.6mm per year, however considerable regional variation exists. Evidence suggests that sea-level rise (SLR) is accelerating throughout the tropical Pacific.

In most islands and coastal areas of PNG, Solomon Islands and Vanuatu the majority of the population and infrastructure are located within a few hundred meters of the coast; therefore, they are highly vulnerable to the impacts of climate change, specifically sea-level rise. Flood risk is projected to be 200 times greater than present for Pacific countries by 2080.

1.2 Pacific mangroves and climate change impacts across MARSH geographies

In PNG and other island nations, mangroves are critical for coastal communities who depend on them for income generation and basic needs such as fuel, fibers, food, and protection from storm surges. This project will support sustainable management of these ecosystems to maintain the range of co-benefits they provide to the thousands of people who live in the communities and countries where we will work and who will be most impacted by their degradation.

Mangrove forests are among the world's most economically valuable ecosystems in terms of providing multiple ecosystem services, including climate regulation, but are among the most threatened ecosystems due to pressures from increasing populations and their need for food, construction materials, medicines and other traditional uses. Large tracts of mangroves are being converted for industrial development, tourism infrastructure, aquaculture and the subsequent market and regulatory failures have contributed to their decline.

Coastal ecosystems such as mangroves cover only 1-2% of the total area occupied by forest ecosystems, but may have an annual climate change mitigation potential of 7-20% of the annual emissions from global deforestation and forest degradation. The latest estimates of mangrove forests areas in the three Melanesian countries are: Papua New Guinea 480,121 Ha, Solomon Islands 47,099.66 Ha, and Vanuatu 1,378.17 Ha[3].

Island nations, such as Papua New Guinea, Solomon Islands and Vanuatu, are among the most vulnerable countries to climate change and contain extensive mangrove forests that may be very important for global climate change mitigation, as well as, for providing other ecosystem services that are important for local

[3] Bhattarai B. & C. Giri, 2011. Assessment of mangrove forests in the Pacific Region using Landsat imagery. Journal of applied Remote Sensing, (5): pp. 11.

livelihoods, national economies and climate change adaptation. In these countries, mangroves provide timber, shoreline protection, and support food fisheries. Taken together, holistic ecosystem service assessments and economic valuations can inform environment and development planning and policies that integrate cost-effective approaches to climate change mitigation and climate change adaptation.

Globally, the implied rates of loss for mangroves are faster than of tropical rainforests or coral reefs, but generally receive far less attention. The rate of mangrove deforestation was 1.7 percent a year from 1980 to 1990 and 1.0 percent a year from 1990 to 2000 (FAO, 2003), slowing to 0.66 percent in the five years before 2005. In Papua New Guinea and the other Melanesian countries the following direct human impacts on mangroves lead to habitat degradation and deteriorating water quality:

- conversion to aquaculture
- conversion to agriculture
- overharvesting for timber
- unsustainable fishing and other extractive uses
- conversion to development, tourism and coastal infrastructure
- pollution

Climate change has begun to compound the effects of many of these threats. Degradation and loss of these coastal systems due to climate change and direct human impacts negates the protection they provide during extreme events and reduces their adaptive capacity, with significant environmental, social and economic consequences for coastal communities. It has been substantially demonstrated that mangroves are affected by climate change (Nicholls et al., 2007). Temperature increases and the direct effects of CO_2 increases are likely to be mostly beneficial, increasing mangrove productivity and biodiversity. Rainfall changes are of greater significance to mangroves, particularly reduced rainfall, which decreases productivity and biodiversity. However, the effects of relative sea level rise are the primary impact of concern, with a number of severely detrimental effects on mangroves[4] (Nicholls et al. 2007).

1.3 Scope and objectives of the project

In order to achieve the scope of the project described above, the MARSH project focused on the following objectives:

[4] Nicholls, R.J., P.P. Wong, V.R. Burkett, J.O. Codignotto, J.E. Hay, R.F. McLean, S. Ragoonaden and C.D. Woodroffe, 2007: Coastal systems and low-lying areas. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 315-356.

1.1.1.1 To build the capacity of PNG Universities, National and sub-national institutions, including mangrove carbon monitoring, reporting and verification

1.1.1.2a To strengthen the organisational capacities of civil society to support sustainable development through community-based mangrove forest management

1.1.1.2b To strengthen community capacity on sustainable mangrove forest management

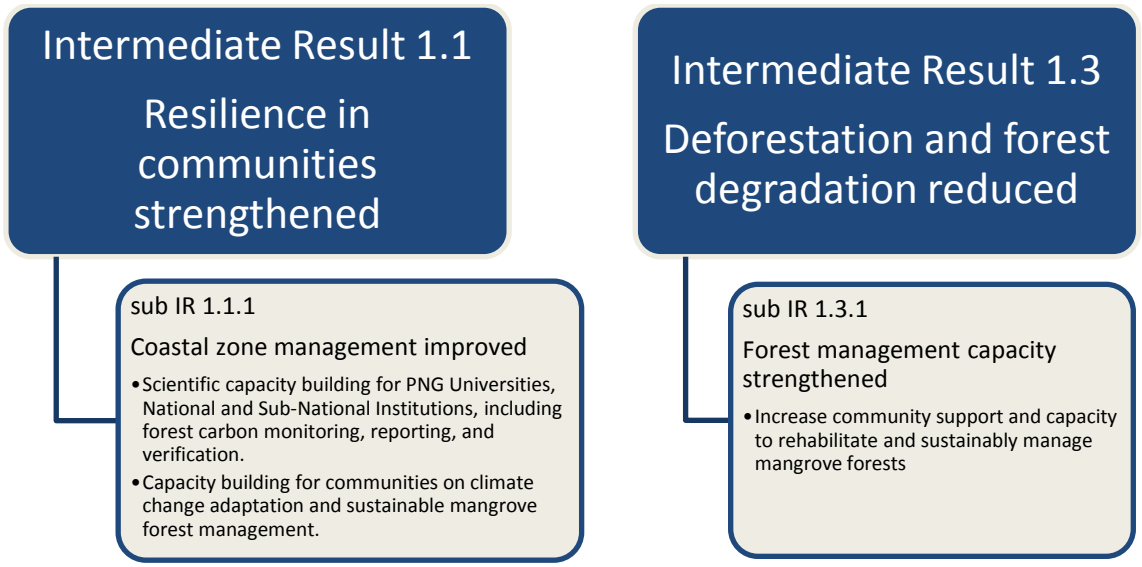
1.1.1.4 To strengthen the adaptive capacity of coastal communities through community-based mangrove forest management

1.3.1.1 To support community rehabilitation and sustainable management of mangrove forests

1.3.1.2 To explore sustainable finance models and mechanisms that support long-term community-based mangrove forest management, including;

- adaptation funding (Adaptation stream)
- REDD + / mangrove carbon finance (Sustainable Landscapes stream)

The MARSH project contributed to two intermediate results under USAID's Pacific Islands Results Framework Development Objective "Negative Impacts of Climate Change Addressed" (see Section VII, Annex VII for Results Framework) specifically sub-IR 1.3.1 "Forest Management Capacity Strengthened" under IR 1.3 "Deforestation and Forest Degradation Reduced" and sub-IR 1.1.1 "Coastal Zone Management Improved" under Intermediate Result 1.1 "Resilience in Communities Strengthened."



The audit conducted by the Office of the Regional Inspector General (RIG) of the MARSH project in October/November 2014 found the project making little progress in restoring degraded mangrove forests and in strengthening community-based, sustainable mangrove forest management and reforestation. This led to the initial objectives being revised to focus on national level activities in the final year of MARSH, whose life span was subsequently reduced from five to three years.

1.4 Achieving MARSH objectives through partnership

The MARSH project proposal represented an innovative and unique partnership. The regional office of the International Union for the Conservation of Nature (IUCN Oceania), convened member organizations with experience and expertise related to mangroves and coastal zone management. These organizations, both Governmental and non-Governmental, discussed and defined an approach to implement MARSH as a partnership, capitalising on the strengths, presence, resources and added-value of each organization. In addition to the IUCN members, each partner was to use their networks and contacts to identify national and local institutions, who could best contribute to, and benefit from, the MARSH project process and results.

The partnership for MARSH, therefore, had strong support from the Governments of Papua New Guinea, Solomon Islands and Vanuatu and was implemented under the supervision of three international environmental organisations with considerable experience in Melanesia, namely:

- IUCN (MARSH lead agency)
- The Nature Conservancy
- Wildlife Conservation Society

IUCN also held discussions with national partners in PNG, and entered a partnership with four leading national non-governmental organisations (NGOs). Each of these partners joined the MARSH consortium based on their experience and match to organisational priorities. Each of these national civil society groups proposed a number of capacity-building needs based on a rapid gap assessment linked to MARSH project objectives and activities. As such, these national partners were engaged both through implementation of key MARSH objectives and received specific training and organisational development through MARSH capacity-building activities – especially given the depth of international support and experience provided by the core MARSH partners. The three main national NGO partners in Papua New Guinea were:

- Partners With Melanesians (PWM)
- PNG Centre for Locally Managed Areas (PNG CLMA)
- PNG Assembly for Disabled Persons (PNG ADP)

Other Academic and research institution partners included:

- PNG Forest Research Institute
- University of PNG (Centre for Climate Change and Sustainable Development)

At the provincial level, in each site, MARSH engaged with Government administration offices and departments. All MARSH activities were implemented in the context of Provincial Government plans and priorities. MARSH was implemented in five provinces, including Manus, West New Britain, New Ireland, Central Province, and National Capital District (NCD). Provinces such as Manus, West New Britain and New Ireland have dedicated civil society networks, for example, the Manus Civil Society Forum and public-private Manus Environment and Climate Change Council. Community-based organisation (CBO) networks were crucial MARSH partners at the site-level. MARSH worked with these CBOs and strengthened their networking capacities as a key vehicle for long-term sustainability of MARSH project efforts.

This project expanded on the outputs and results of the Mangrove Ecosystems for Climate Change Adaptation and Livelihoods (MESCAL) project that was implemented by IUCN in five other regional countries including Solomon Islands and Vanuatu.

In PNG, the project closely linked with mangrove initiatives implemented by the Office of Climate Change and Development (OCCD), especially those aimed at mangrove protection. Planting activities were undertaken in partnership with several of the project partners such as the National Fisheries Authority (NFA) who generously supplied seedlings to demonstration sites in the National Capital District. The PNG Forest Authority (PNGFA) worked closely with the MARSH PMU in the carbon monitoring, reporting and verification component of the project. The Conservation Environment Protection Authority (CEPA) chaired the Steering Committee meetings of the MARSH project.

During the development of the RFA, with limited time and in the context of a national election period, IUCN and lead MARSH partners made deliberate efforts to engage private sector partners in dialogue towards collaboration. A number of corporate interests in PNG and Melanesia expressed initial interest to be engaged in MARSH implementation both as a direct partner and to explore their leverage potential. These include PNG Sustainable Development Program (PNGSDP), Bank of South Pacific (BSP), Oil Search and Nasfund. None of these, however, came to fruition.

1.5 MARSH sites and priority provinces

Four MARSH sites were identified by the donor, USAID, in the RFA as priority sites, i.e. priority provinces. These four sites were Central, Manus, West New Britain, and

New Ireland provinces. The selection of the fifth MARSH site was at the discretion of the implementation agency, IUCN, although approval from the donor was required. After a long consultation process, it was mutually agreed that National Capital District would be the fifth MARSH site. To focus activities and resources and align with government priorities, MARSH partners consulted with the government of PNG, Provincial and Local Level Governments, counterparts and stakeholders to identify Areas of Interest in the five MARSH provinces for MARSH support. This consultation process took into consideration:

- Presence of MARSH Partners members working in the area versus cost of new start-ups;
- Relative conservation values of potential locations;
- Existing or potential partners;
- Level of threat versus condition of resources;
- Political will;
- Potential for leveraging additional non-USAID resources; and
- Overall implementation feasibility and probability of success.

In total, 33 areas of interest (AoI) were identified at the end of Year 1 of the project. These are indicated on the maps in Annex 1. This was reduced to 23 sites by the end of Year 2 at the recommendation of the donor.

The main reasons for this recommendation were 1) the remoteness of the Sites and 2) the associated limitations for the MARSH partners and the Project Management Unit (PMU) to effectively monitor the implementation at these sites.

The reduction of the number of MARSH Sites was one of the key points on the agenda of the PNG Work Planning and Budgeting meeting for Year 3 of the MARSH project at March Girls Resort, 21 & 22 July 2014.

Table 1 provides an overview of the 23 MARSH Sites in PNG.

Province	MARSH Site	MARSH Partner
West New Britain Province 1	Kimbe Bay (Dagi/Kapiuru/Baia)	TNC
West New Britain Province 2	Kaliai Kove	TNC
West New Britain Province 3	Bali Witu	TNC
New Ireland Province 1	Ward 4 Lavongai: Ungakum, Kavulik	WCS
New Ireland Province 2	Ward 17 Lavongai: Patitab	WCS
New Ireland Province 3	Ward 16 Lavongai: Angat, Unbukul, Metetui, Taun	WCS
New Ireland Province 4	Ward 3 Tikana: Tapak, Salapiu	WCS
New Ireland Province 5	Ward 3 Tikana: Enang	WCS

Province	MARSH Site	MARSH Partner
New Ireland Province 6	Ward 5 Tikana:Nonovaul	WCS
New Ireland Province 7	Ward 2 Tikana: Bangatere, Tugalop	WCS
New Ireland Province 8	Ward 1 Tikana: Enuk	WCS
New Ireland Province 9	Ward 1 Tikana: Nusailas	WCS
National Capital District 1	Pari	PwM
National Capital District 2	Taurama	PwM
Manus Province 1	Zone 1 Lawes - DrumDrum	TNC
Manus Province 2	Zone 2 Rapatona - Balopa	TNC
Manus Province 3	Zone 3 Wenai - Sapolai	TNC
Central Province 1	Manumanu East	PwM
Central Province 2	Manumanu West	PwM
Central Province 3	Tubuserea	CLMA
Central Province 4	Guarume Mase	CLMA
Central Province 5	Delena, Nabua Paka, Poukama	CLMA
Central Province 6	Tahira	PCLMA & UPNG

Table 1: Overview of the 23 MARSH sites in PNG as agreed upon during the Year Planning Meeting

For Vanuatu and Solomon Islands, sites selected were in Malakula and Malaita respectively. Both sites had been used by the MESCAL project and the stakeholders from both countries selected them for the MARSH project to maintain the momentum of the initiative. Unfortunately no progress was made at either site due to the premature closure of MARSH.

Monitoring of the project was conducted at three levels:

1. **Standard indicator level:** These are indicators at the overall MARSH project target level and are directly linked to the USAID Strategy. At this level, five indicators were monitored to measure the progress towards the MARSH project targets.
   The Standard Indicators were reported semi-annually or annually to USAID.

2. **Custom indicator level:** These are indicators at the MARSH Project objective level, where the project performance was measured against the overall project objectives.

3. **MARSH site level:** At this level, the project monitored the progress of the individual activities of the MARSH partners against the annual milestones and the three-year outcome at the site level.

Monitoring at the higher level, at both the Standard Indicator and the Custom Indicator levels, was in line with the Award Monitoring Plan (AMP), and was mostly performed on a semi-annual or annual basis.

The visit to the IUCN Oceania office in late March 2014 by the USAID Director, Gloria Steele, accompanied by Winston Bowman and Michelle Wittenberger, included discussions regarding the remote locations of the MARSH sites and the subsequent monitoring complexity. The PMU was thereafter advised to discuss reducing the number of MARSH sites without compromising on the outcomes of the project, with the partners and stakeholders. This necessitated a revision of the AMP as a lot of the indicators, both Standard and Custom, used the number of sites as the measurement for indicators.

In August 2014, the PMU was asked to revise the AMP and reformat it into a Monitoring and Evaluation Plan. A final approval for the Monitoring and Evaluation Plan was obtained from the AOR on 17th September 2014.

2 Description of activities under the cooperative agreement

2.1 Capacity building

The capacity building activities can be grouped into four main categories:

i. Capacity building of communities in the establishment of mangrove nurseries and rehabilitation of degraded areas, basic mangrove ecology and taxonomy, mangrove mapping and management, mangrove monitoring, household survey skills, human rights and disability inclusion;

ii. Capacity building of staff of national and subnational agencies and students of academic institutions in marine resource management, mangrove restoration and nursery development, vulnerability assessment training, carbon stock assessment, monitoring and reporting;

iii. Capacity building of civil society groups in proposal writing and financial management; and

iv. Capacity building of national agencies and civil society groups in human rights and disability inclusion.

The training of community members in mangrove nursery establishment, mangrove growth monitoring and rehabilitation of degraded areas created a groundswell of support for mangrove conservation in the five provinces. In Manus, communities in the LLG areas of Balopa and Rapatona requested further assistance from MARSH partner, TNC, in establishing mangrove nurseries after planting seedlings of their own initiative to combat coastal erosion. They had not had much success due to a

lack of technical expertise. As a result of the assistance provided by MARSH, the members of Pere village replanted 4,000 mangrove seedlings. Community members in Liap had tried rearing seedlings in backyard nurseries but enjoyed greater success after attending one of the training courses in mangrove rehabilitation conducted by the MARSH project partner, PWM. A church leader in Liap reared 200 seedlings in his backyard nursery and successfully transplanted them in the wild. An individual in West New Britain was so inspired by the MARSH activities in 2014 that he went on to plant 5,000 seedlings of his own initiative in 2015. Villages in the Hoskins LLG area established a mangrove nursery with over 2,000 seedlings. Similar responses were recorded from the other provinces.

A critical partnership was developed with the PNG National Fisheries Authority which supplied seedlings to the sites in NCD. Active involvement by traditional leaders and community groups like the Pari Women's Development Association contributed to the enthusiastic support by the communities. The mangrove planting activity in Pari held in August 2015 was even reported in the papers: The National on Aug. 11 (http://www.thenational.com.pg/?q=node/92789) and Post-Courier on Aug. 17 (http://www.postcourier.com.pg/Stories/pari-needs-more-mangroves/).

Pic 1: Trainees, including community members, during the mangrove carbon assessment, Tahira. © MARSH PMU

Pic 2: WCS team and members of the community lay transect lines during surveys of mangrove forests near Kavieng, New Ireland. © Modi Pontio

A significant achievement of the project was the graduation of four Bachelor of Science (Honors) students from UPNG whose research on different aspects of mangrove carbon was funded by MARSH. The students and their research topics are as follows:

- Nicholas Wari (*Comparing peat carbon content between juvenile and mature mangrove forests*)
- Charlie Yak (*Variations in aboveground carbon stocks between mangrove communities of Tahira Bay of Central Province, Papua New Guinea*)
- Winnie Rasaka (*Variation in wood density along salinity gradients*)
- Lilian Olgaie (*The identification of the root causes of ineffective community participation in community-based mangrove conservation in the Central province of Papua New Guinea*)

All but Lilian Olgaie graduated with their degrees on April 10th 2015. Lilian resubmitted her thesis and will graduate in April 2016. One of the students was offered a 6-month training attachment with USFS upon graduation. Two of the students served as field assistants in a subsequent training workshop for Government personnel on the methodologies of assessing carbon stocks in forests.

Another significant achievement of the project was the National Mangrove Carbon Accounting Training Course held on September 21-25, 2015. It was attended by some 30 participants from key Government agencies that included OCCD, NFA, CEPA and PNGFA. The training course was co-organized by the

PMU, OCCD and the United States Forest Service (USFS). The course comprised classroom instruction for the first two days followed by data collection in the field on the third and fourth days at one of the MARSH sites in NCD. Analysis of field data was conducted on the last day. The mangrove carbon accounting training was reported in Post-Courier on Sep. 23 (http://www.postcourier.com.pg/Stories/us-trains-png-fiji-in-climate-change-roles/), The National on Oct. 5 (US trains carbon managers, p. 15), and the U.S. Embassy Port Moresby website (http://portmoresby.usembassy.gov/mr-092215.html).

Presentations on the first two days included topics such as ecosystem services provided by mangroves, mangroves and the global carbon cycle, linkages between REDD+, climate change and green carbon, PNG national forest inventory and the methods used to assess above ground and below ground carbon stocks. The main method promoted by USFS is the Sustainable Wetlands Adaptation and Mitigation Program (SWAMP), a protocol approved by the Intergovernmental Panel on Climate Change (IPCC). The two days in the field allowed the participants *hands-on* experience in the use of the field equipment, data collection and soil sampling. The last day involved field data entry in spreadsheets and the use of allometric equations for the estimation of biomass and carbon stocks. The participants were presented with certificates at the end of the training.

A separate report of this exercise has been produced by the PMU. The building of national capacity in this particular field has been very timely given that PNG is about to embark on its very first National Forest Inventory, a mammoth task given the size of the country's forest resources.

Local NGOs in Pacific Island countries are inherently under-resourced and PNG is no exception. The financial management training provided by both USAID and IUCN during the course of the project assisted in getting financial records in order so that disbursements could be made in a timely manner.

The training in disability inclusion on June 29-30, 2015 was a significant achievement of the MARSH project and PNG ADP was a key project partner in this. It allowed the inclusion of persons normally marginalized in communities to participate in training opportunities and to be trainers themselves in making able bodied persons more aware of the challenges faced by persons living with disabilities and to be more inclusive in engaging such ones in project activities. The need for inclusive development was expressed by the Coordinator of Technical and Vocational Education and Training (TVET), PNG National Training Council, who attended one of the training courses. She acknowledged that the National Training Council had no assessment criteria in place for persons and/or organisations that train people with disabilities. This in effect constitutes an institutional barrier as it prevents their certification and recognition by the relevant Government authorities.

After attending the workshop, she readily acknowledged that it was an issue that needed to be urgently addressed by her agency.

The policy-level activities were led by TNC in West New Britain and Manus. The approach by TNC was to actively engage the provincial government so that they would "own" the policy and mangrove management plan and allocate some of their annual budget to the implementation of the policy and plans. The results of household use surveys conducted by TNC highlighted the importance of mangroves to the communities in terms of both economic and food security. The survey results fed into the policy formulation and management plans developed by the local level governments (LLGs) of both provinces. The provincial plans and policies were then submitted to the Provincial Executive Committee for formal endorsement. This is as far as the MARSH project got with the policies and plans developed for both provinces but it was heartening that the Governor of West New Britain was well aware of the project and assured endorsement of the policy. Only after formal endorsement by the PEC can the policy and management plan then be instituted as part of LLG laws and Community Integrated Resource Management plans. **The draft provincial mangrove policies for West New Britain and Manus are a first for PNG and a significant achievement for the project.** The two provincial policies were important background documents for the final national event, the Mangrove Forum (*Mangoro Bung*), held on September 29, 2015, where six key policy recommendations were extensively discussed including the formulation of a national mangrove policy for PNG.

For New Ireland the story was rather different. WCS had worked with the Ungakum community in the Lavongai Local Level Government to develop a Resource Management Plan that was implemented in 2008. The RMP, however, had neglected to include their mangrove forests. In 2013 with the implementation of the MARSH project, the community reviewed their RMP and limited the harvesting of mangroves. The RMP also stipulated that for every tree cut, two seedlings were to be planted thus establishing their own biodiversity offset program. The community also committed to building a community mangrove nursery and the revised RMP was officially endorsed at a special ceremony in November 2013 with the President of the Lavongai LLG a co-signatory thereby acknowledging the RMP under the newly passed Lavongai Environment Law.

TNC similarly worked with communities in Manus and West New Britain who had pre-existing RMPs to incorporate mangrove management in their plans with the implementation of MARSH.

There were a number of knowledge products generated by the project. These include infographics, posters, training manuals, a mangrove teachers' resource book for primary school teachers, technical reports and a scientific paper. A mangrove course was developed by UPNG for undergraduate students and was still being

reviewed and refined when the project came to an end. A set of the key knowledge products was presented to each of the key Government agencies involved in mangrove conservation at the *Mangoro Bung*. **The *Training Manual for Disability Social Inclusion and Equal Opportunity for Gender Balance* produced by PNGADP is another first for the country and is a significant achievement for the project.** It was tested at a stakeholders' workshop prior to its publication. PNGADP constantly acknowledged that the MARSH project was the first climate change project that made a concerted effort to include persons living with disabilities in project activities.

Another key knowledge product was *A Community Guide to Mangrove Planting and Restoration*, a handbook produced by WCS which was also translated into Tok Pisin. This was a simplified version of the *Community-Based Mangrove Planting Handbook*, which was published by OCCD in 2013. Government officials were impressed with the fact that key products were developed in time.

Pic 3: MARSH knowledge products that were launched at the Mangoro Bung © MARSH PMU

2.2 Awareness-raising

In the first two years of the project, the partners spent much time raising awareness on the importance of mangroves and the MARSH project in the different communities. For instance, in New Ireland province, WCS visited eighteen communities to introduce MARSH and the activities that they would implement. Workshops were conducted during which key contacts and community leaders were identified. In West New Britain Province, TNC, through the mangrove use household survey was able to build awareness on the role of mangroves in coastal protection. PWM conducted Community Mangrove Awareness in Manumanu.

There were two national activities implemented as part of the exit strategy that would be best described as awareness-raising activities. One was the Governors Dinner which was downgraded from the Governors Forum that was originally planned. The dinner was organized to allow the project partners to promote the findings and accomplishments of the project to the Governors of the five MARSH provinces and those from the other provinces where there are significant mangrove forests. It was to lobby support from the Governors for mangrove conservation in their respective provinces and to seek their endorsement to fund mangrove conservation after the switch in focus of USAID from community-level to national-level actions. Governors from three of the five MARSH provinces attended along with the Governor of Oro Province. USAID, IUCN and the partners were also in attendance. It remains to be seen whether any additional funding will be secured from the Governors offices for mangrove conservation in the years to come.

The last event for the project was the Mangoro Bung which convened some forty Government personnel and community representatives to allow the MARSH partners to share their project results, best practice approaches, lessons learnt and knowledge products with key government agencies and stakeholders.

The meeting had two main parts: formal presentations in the morning and break-out groups in the afternoon. The formal talks were preceded by the presentation of sets of key MARSH knowledge products (see picture 3) OCCD, NFA, PNGFA and CEPA who are the key Government agencies involved in mangrove conservation. Each agency then explained their mandate, their mangrove conservation activities carried out to date, future mangrove work and policy recommendations. The MARSH partners then presented by means of pull-up banners the main outcomes of the project. These included the results of the community mangrove use surveys, the economic valuation of mangrove goods, the mangrove health assessments, the mangrove planting activities, the provincial policy work, the different training courses and the number of people trained during the course of the project.

The break-out groups in the afternoon were tasked with discussing the six key policy recommendations made in a briefing paper to the Minister for Environment and Climate Change.

Pic 4: Participants of the Mangoro Bung held at Laguna Resort, Port Moresby © MARSH PMU

The main outcomes of the Bung were as follows:

- An interim National Mangrove Committee to be formed comprising Government agencies and partners. This committee will develop a Mangroves Framework that will seek to conduct a legislative review to assist in the formulation of a National Mangrove Policy.
- Greater awareness of the MARSH project outcomes.
- The convening of government agencies, community representatives and project partners to openly discuss challenges and solutions with respect to the conservation of mangroves in PNG.
- Communities and stakeholders have resolved to work together towards a common goal of mangrove conservation. In light of this, an internal agreement will be drawn up.

The Mangoro Bung was hailed a success by all in attendance and a separate report on the meeting has been produced by the PMU. Given that the Bung was the final event for the project, the partners were extremely pleased to have ended it on such a high note and IUCN was acknowledged for completing the project under difficult circumstances. There was much media attention generated by the event.

- http://www.thenational.com.pg/?q=node/95468
- http://www.thenational.com.pg/?q=node/95569

- http://www.thenational.com.pg/?q=node/95703
- http://postcourier.com.pg/Stories/meeting-held-to-discuss-mangrove/
- PACNEWS Third Edition, September 30, 2015, pp. 5-6
- http://www.iucn.org/news_homepage/all_news_by_theme/ecosystem_news/?22053/Mangoro-Bung-Tok-Pisin-for-Mangrove-meeting-Papua-New-Guinea
- http://www.emtv.com.pg/article.aspx?slug=Agencies-Push-For-National-Mangrove-Policy&subcategory=Top-Stories

3 Methods of assistance used and their pros and cons

The question of assistance can be interpreted in two ways. There is the assistance that contributed to the main outputs of the project and then there is the assistance that IUCN gave the implementing partners. In the absence of any clarification as to which interpretation is the correct one, this report will touch on both types of assistance.

Assistance in the form of sub-awards were granted to six implementing partners; TNC, WCS, UPNG, PNGCLMA, PNGADP and PWM. The partners were chosen because they already had a presence in PNG, they had a proven track record and established networks, none of which IUCN had in PNG three years ago. IUCN had, however, recently successfully completed the MESCAL project in five countries that included Solomon Islands and Vanuatu and which was funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB).

IUCN prides itself on its convening ability and this was confirmed by its ability to bring these partners together to work on MARSH in a six-week proposal preparation period that coincided with the PNG elections in 2012. To have pulled it off in such a tight timeframe and extremely busy period on the domestic political scene was no mean feat. The realities, however, of working as a consortium quickly became apparent in the first year. Negotiations with the large US-based NGOs took an inordinately long time and this contributed to the slow start in year 1 of the project. The local NGOs had varying capacities and IUCN knew from the outset that getting them to Non-U.S. organization Pre-Award Survey (NUPAS) standards by year 3 would pose a challenge.

The main methods of USG assistance that produced tangible outputs were through formal and informal training, carbon assessments, community mangrove nurseries, and the publication of training manuals.

In the second year of the project alone, MARSH partners and the PMU conducted 64 formal and informal training courses on a wide range of subjects from mangrove

carbon assessments to disability inclusiveness. Female participants accounted for roughly 40% of the total number of participants. The workshops were designed for participants ranging from communities to personnel from Government agencies, provincial offices, local level governments and NGOs. The main advantages of such assistance are capacity building and awareness-raising. The partners and the PMU were keenly aware of the need for gender parity and the inclusion of marginalized groups among the participants and this was a notable feature of the courses/workshops held.

With a project as large and involving as many partners as MARSH, accommodating the training courses that the partners had to run and those that the PMU had to organise required careful planning and effective communication which were sometimes lacking. The partners were at times frustrated by the requests of the PMU, at short notice, to attend some training event that they were organising at the behest of the donor. Given the premature closure of the project, it will not be possible to evaluate the impact on the ground of the training courses/workshops.

The attendance at such workshops could also be erratic particularly if insufficient notice was provided. Communities have their own calendar of events and project activities must fit around those events and this applies to any project in the Pacific islands. Attendance was sometimes low and/or inconsistent because of a lack of communication and this made some meetings unnecessarily expensive. The instruction at such training exercises needs to be pitched at the right level and the partners excelled at delivering particularly to the communities.

Pic 5: Participants of the Carbon Accounting Training, Holiday Inn, Port Moresby © MARSH PMU

Carbon assessments were carried out in three MARSH sites; one in Central province and two in Manus province. This allowed for more nationals to be trained in the

methodology. The interest in this subject area led to a national workshop in carbon accounting at the end of year 3. The PMU and UPNG personnel received training in the techniques in year 1 of the project in Bangkok and they in turn, trained Government colleagues upon their return.

The determination of carbon stocks in mangroves is critical given that mangroves are known to sequester large volumes of carbon and that they play an important role in climate change mitigation. It would have also served as valuable baseline data in a country and region that has very limited data on carbon stocks and where biodiversity offsets are being considered with the increasing pressure on mangrove conversion for development purposes.

Long-term carbon monitoring is now unlikely given the shift in priority by the donor and that plans to purchase a carbon analyser for UPNG have been shelved. The upside is that there are more PNG nationals trained in the methodology and it may be put to good use with the National Forest Inventory. The sponsorship of the four UPNG students who did projects on mangrove carbon has added to the knowledge base in the country and constitutes an investment in PNG's human resources.

After a comprehensive training course in mangrove nursery and rehabilitation was conducted in all five provinces, nine nurseries were established in year 2. The large number of seedlings reared in nurseries and then transplanted is proof of how popular this form of assistance proved to be. Two communities in Manus actually requested TNC for assistance in setting up nurseries after seeing how successful another community nursery had turned out to be.

Coastal erosion is a serious issue for these communities and some individuals had started planting seedlings on their own initiative and had set up backyard nurseries. After receiving technical advice from the partners, the growth rate of seedlings was seen to improve.

The community nurseries helped to identify local champions and also promoted community spirit as the traditional leaders, men, women and children were all involved in their establishment. It also allowed the communities to take ownership of an initiative that will allow them to benefit in the future from the ecosystem services of a healthy mangrove stand.

The maintenance of these nurseries will be the best measure of success but this will not be gauged now that the project has ended a year after their establishment. The communities may, however, use such assistance to leverage funding for maintenance which is what the Pari Women's Development Association did and who were able to successfully secure some funds from the UNDP Small Grants Program in 2015 (see the program website on https://sgp.undp.org/index.php?option=com_sgpprojects&view=projectdetail&id=22408&Itemid=205).

The publication of the ***Training Manual for Disability Social Inclusion and Equal Opportunity for Gender Balance*** represents a significant milestone for the

PNGADP. They anticipate wide dissemination of the manual so that the inclusion of marginalized groups becomes part and parcel of all programming and is mainstreamed in all development processes.

The project assisted in reprinting the very popular OCCD publication ***Community-based Mangrove Planting Handbook***. The book, however, is very technical and so the WCS publication ***A Community Guide to Mangrove Planting and Restoration*** in both English and Tok Pisin, is a version that a layperson can readily understand.

The household use and market surveys of mangrove goods conducted by TNC in West New Britain and Manus showed that communities were dependent on mangroves primarily for fisheries, construction materials and firewood. The market survey at the Kimbe urban market highlighted the economic importance of the kina or the mud clam, *Polymesoda erosa*. Mangrove crabs, kina shell and lime made from the kina shell are worth PGK 600,000/year in that one location alone.

These mangrove use household survey reports allowed the identification of those communities most dependent on mangroves, those most vulnerable to the impacts of climate change from the removal of mangroves, the identification of degraded sites and those in need of rehabilitation. The surveys stressed the importance of including mangroves in community resource management plans and survey results fed into the draft mangrove policies and management plans developed for Manus and West New Britain.

The work achieved through USG assistance had its share of challenges. The two large international NGOs, WCS and TNC, were the least problematic of the partners. They had the necessary resources to ensure that there were sound financial management processes in place and that deliverables were done in a timely fashion.

The same could not be said of the local institutions. UPNG failed to deliver on the two key knowledge products that they were responsible for; a Mangrove Identification Key for PNG and a Mangrove Course Manual for university undergraduate students.

UPNG seemed to be the logical agency to produce these books given their in-house expertise and the ensuing capacity building of students. Academic institutions like UPNG have staff that are committed but who end up being stretched too thinly because of having to juggle the responsibilities of teaching, research, administrative duties and consultancies. The failure to deliver on the two key knowledge products was disappointing but not surprising given the workload of the project team at UPNG.

It does, however, raise the issue of consultancies awarded by partners to assist their implementation of activities. Consultants hired by the PMU and UPNG did not deliver the carbon assessment scientific paper and the mangrove taxonomic guide

respectively. A more rigorous approach in the tendering of consultancies would help to resolve this issue.

The three local NGOs are under-resourced and existing staff are stretched as they have other projects to implement apart from MARSH. Quarterly reports, both narrative and financial, were sometimes late but such is the reality of working with local NGOs in PNG.

Communication was also an issue with lapses in communication often blamed on the internet not working. In year 3, IUCN finance personnel had to physically visit the offices of PNGCLMA and PNGADP to get their financial records in order. This had to be done before they could receive their tranche of funds for their exit activities.

That said, the local NGOs played a critical role in the implementation of activities at the community level. It would have been very difficult to implement MARSH without them. Their knowledge of the local protocols and values paved the way for community buy-in, a process that takes much time wherever you work in the Pacific Islands.

The PMU and ultimately the Chief of Party (COP) and Deputy Chief of Party (DCOP) have to share some of the blame for the slow delivery by the local partners. Rather than taking a proactive approach in assisting the partners and maintaining regular communication with all partners, the PMU took a hands off approach, which contributed to the slow progress at the start.

This was highlighted by the partners at the Year 3 planning meeting held in July 2014 where they articulated that such a meeting should have taken pace in year 1 of the project so that everyone could be on the same page. They only found out what each partner was doing and what they had to offer each other in terms of complementarity at the end of year 2. This did not reflect well on the PMU.

4 Life of project results

The table below shows the original LOP target that was set over five years for each of the standard indicators.

S1.1 No of hours of training completed in sustainable landscapes	49,000
S1.2 No of stakeholders with increased capacity to adapt to the impacts of climate variability and change	10,000
S1.3 Number of REDD+ field demonstration activities linked to sub-national or national frameworks	36
S1.4 No of institutions with improved capacity to address REDD+ and adaptation issues	14
S1.5 No of metric tons of CO2 GHG emissions reduced or sequestered	245,520

The results in the first two years fell short of the yearly targets for all but one of the indicators. There were several reasons for the shortfall not the least being the amount of time spent in the first year in the drafting and signing of the sub-awards. Getting community buy-in and recognition by Government agencies takes at least a year for any project in the Pacific so little work actually gets done on the ground in the first year. This is the reality of project work in the Pacific, a fact that donors must consider when deciding on the project life span.

In the second year, activities began to roll out but the local partners were also working on getting their financial and administrative structures in place in order to reach NUPAS standards by year 3. Trying to achieve overly ambitious targets in the PNG context while satisfying bureaucratic demands meant that partners were stretched very thin.

The directive issued by USAID in December 2014 to reduce the project from five years to three years duration had a significant impact on the results achieved. The initial AMP had LOP targets for five years which had to be reduced to three years and given that the project only started making some progress on the ground in Year 2, the partners were anticipating significant progress to be made in year 3. Instead a significant portion of Year 3 was squandered in reviewing exit activities, budgets, and amending contracts. By the time the donor gave final approval for the year 3 workplan, the PMU and partners had essentially only seven months from March 2015 to September 2015 for implementation of exit activities.

In reviewing the figures in Tables 1 and 2, it would seem that the project enjoyed some measure of success if one uses the standard indicators as a gauge. The results, however, have been artificially enhanced by the fact that many of the targets for year 3 were revised to zero because of the change in focus by the donor from community- to national-level activities and the directive to scale down all community activities by the new end date of the project. Each of the standard indicators will be discussed in turn on how well they reflect the projects impact on the accomplishment of the programs overall objectives. The reasons for any unmet targets including leveraging will also be discussed.

A summary of the results towards the targets is provided in the table below.

Description of Standard Indicators	Year 1			Year 2			Year 3			LOP Target	Actual
	Target	Actual		Target	Actual		Target	Actual			
S.I. 1: Number of hours of training completed in sustainable landscapes, disaggregated by sex as a result of USG assistance.	8,000	♀	1,568	14,000	♀	6,748	1,750	♀	776	23,750	23,931
		♂	792		♂	12,207		♂	1,496		
S.I. 2: Number of stakeholders with increased capacity to adapt to the impacts of climate variability and change as a result of USG assistance.	1,000	♀	140	2,500	♀	644	100	♀	41	2,100	2,030
		♂	246		♂	896		♂	68		
S.I. 3: Number of REDD+ field demonstration activities linked to sub-national or national frameworks as a result of USG assistance.	6	0		9	3		0	0		3	3
S.I. 4: Number of institutions with improved capacity to address REDD+ and adaptation issues as a result of USG assistance.	0	0		3	3		2	5		3	8
S.I. 5: Number of metric tons of CO_2 greenhouse gas (GHG) emissions, reduced or sequestered as a result of USG assistance.	0	0		10,000	14,197*		5,000	7,677		15,000	22,677

4.1 Overview of progress on standard indicators for MARSH project targets

Standard Indicator 1: Number of hours of training completed in sustainable landscapes, disaggregated by sex as a result of USG assistance.

The original targets for each year were as follows: Year 1 had a target of 8,000 hours, year 2, a target of 14,000 hours, year 3 was to achieve 10,000 hours and in year 4 a target of 8,000 hours for PNG and 2,000 hours for Solomon Islands/Vanuatu and Year 5, a target of 5,000 hours for PNG and 2,000 hours for Solomon Islands/Vanuatu. Figures were revised in February 2015 so that the LOP target was reduced from 49,000 hours to 23,750 hours with Solomon Islands and Vanuatu totally excluded.

The project had a very slow start in year 1 due in part to the inordinate amount of time it took for sub-awards to be reviewed and signed by partners. The US based NGOs did not sign their contracts until the third quarter which left only the last quarter of the first year for any implementation to commence. There was also the withdrawal of WWF which meant the reallocation of work and funds and then there were the additional donor requirements that had to be met prior to the drafting of the sub-awards. This meant that only 2,360 hours of the target of 8,000 hours was achieved.

Despite a very slow start in year 1, MARSH partners and the PMU made up for lost ground in year 2 by providing a total of 64 formal and non-formal training courses which resulted in the target for year 2 being exceeded with 18,955 actual hours being achieved. These courses were targeting national Government and partners, Provincial Government, local Government and partners, and communities. The actual LOP number exceeds the revised LOP target only marginally but this was only possible because the original target for year 3 had to be reduced by 25%. If not for the premature end to the project, this indicator may have served as an effective measure of impact in achieving the objectives of the program. Given that target numbers had to be slashed would suggest that the project was making an impact at best, albeit a small one.

Although more males were trained, this may also be attributed to when the training was conducted. Women in the communities are often busy with domestic chores during the day and this will affect their participation. Such was not the case with the participation of women in the national training courses as they were largely professionals in an urban setting. With the formal training courses, males still outnumber females in the technical fields and this is reflected in the participant list.

Standard Indicator 2: Number of stakeholders with increased capacity to adapt to the impacts of climate variability and change as a result of USG assistance.

The original targets for each year were as follows: year 1 had a target of 1,000, year 2 a target of 2,500, year 3 had a target of 2,500, year 4 a target of 2,000 and year 5 a target of 2,000 stakeholders. The original LOP target was reduced in year 3 from 10,000 to 2,100 stakeholders.

Year 1 only saw 39% of the target figure being achieved and year 2 only saw 61% of the target achieved. Although there was better performance in year 2, the results in year 3 should have been close to year 2 totals if progress was being made. Despite the significant reduction in the year 3 target, the actual number of stakeholders at the end of MARSH was still less than the revised LOP target. Behavioural change takes more than three years to effect thus there was little chance of this LOP target being achieved as it is more than just about the numbers.

Standard Indicator 3: Number of REDD+ field demonstration activities linked to sub-national or national frameworks as a result of USG assistance.

The original targets for each year were as follows: year 1, six activities, year 2, nine activities, year 3, nine activities, year 4, five activities in PNG and five in Solomon islands/Vanuatu and year 5, one activity in PNG and one in Solomon Islands/Vanuatu. There was nothing achieved in the first year and the three sites in Manus and Central provinces that had carbon assessments done in year 2 were the only demonstration sites achieved by the project. The organizing and implementation of these activities was time-consuming and the equally long sample analysis meant underperformance with this indicator. With the limited timeframe for fieldwork in year 3, the PMU knew that it was not feasible to add a fourth site in year 3.

Standard Indicator 4: Number of institutions with improved capacity to address REDD+ and adaptation issues as a result of USG assistance.

The original targets for each year were as follows: year 1, no institutions, year 2, three institutions, year 3, five institutions, year 4, four institutions and year 5, two institutions with increased capacity to address REDD+ and adaptation issues. The revised LOP target was reduced from fourteen to three institutions which was the number achieved in year 2. However, the number of institutions rose dramatically in year 3 with their participation in the national carbon accounting training course that was held in September 2015. There were several Government agencies that benefitted from the training and positive feedback was received by the organisers. The training will assist in the National Forest Inventory being implemented by PNGFA.

Standard Indicator 5: Number of metric tons of CO_2 greenhouse gas (GHG) emissions, reduced or sequestered as a result of USG assistance.

The original targets for each year were as follows: year 1 no result due to the planting of seedlings, year 2 was to achieve 10,000 MT, year 3 target was 40,000 MT, year 4 target 50,000MT and year 5 target 145,520 MT. IUCN has always argued that the use of this indicator was premature because of the length of time it would take for the planted seedlings to grow and the tedious methodology of assessing above and below ground carbon. NARI is the only national institute with the capacity to analyse carbon but they are stretched to capacity. The 5,000 MT estimated for year 3 and consequently the actual volume of carbon sequestered is based on several assumptions and is not scientifically robust.

Of the twenty custom indicators, fourteen either achieved the LOP targets or exceeded them (refer to the table below). For a couple of these figures, it may be due to inaccurate reporting in previous years. The previous COP had said that tardiness by the partners in submitting their progress reports meant that their results were not always incorporated in quarterly and annual reports submitted to USAID. Efficiency was at the expense of accuracy. The figures presented in this report were compiled by the PMU and the partners for presentation at the national Mangoro Bung. This is the only way that the significant increase in the following indicators can be reasonably explained:

- Number of communities successfully implementing MARSH activities rose from 9 in year 2 to 40 in year 3.
- Number of seedlings planted rose from 1,137 in year 2 to 13,186 in year 3.

Progress on targets for both standard indicators and custom indicators

Type	Indicators	2012-2013		2013-2014		2014-2015			LOP Target	Actual
		Target	Actual	Target	Actual	Original Target	Revised Target	Actual		
Intermediate Result 1.1: Resilience in communities strengthened										
F	Number hours of training completed in sustainable landscapes, disaggregated by sex as a result of USG assistance.	8,000	♀ 1,568 ♂ 792	10,000	♀ 6,748 ♂ 12,207	8,000	1,750	♀ 776 ♂ 1,496	23,750	23,931
F	Number of stakeholders with increased capacity to adapt to the impacts of climate variability and change as a result of USG assistance.	1,000	♀ 140 ♂ 246	1,500	♀ 639 ♂ 896	1,400	100	♀ 41 ♂ 68	2,600	2,030
C	1.1.1.1a. Mangrove carbon monitoring, reporting & verification system established	0	0	4	3	7	0	0	4	3
C	1.1.1.1b. Number of research & demonstration sites performing mangrove carbon management	0	0	4	3	9	0	0	4	3
C	1.1.1.1c. Number of training courses conducted	1	0	2	2	2	1	1	4	3
C	1.1.1.1d. Number of national & sub-national institutions actively implementing mangrove carbon monitoring, reporting & verification	0	0	1	1	1	0	0	1	1
C	1.1.1.1e. Increase in number of partnerships	6	8	1	1	0	0	1	7	10
C	1.1.1.2a. Number of staff addressing disability & gender related issues in community based mangrove forest management	0	4	3	4	2	0	0	3	8
C	1.1.1.2b. Number of MARSH partners directly supporting communities	5	4	0	2	0	0	0	5	6

Type	Indicators	2012-2013		2013-2014		2014-2015			LOP Target	Actual
		Target	Actual	Target	Actual	Original Target	Revised Target	Actual		
C	1.1.1.2c. Number of communities successfully implementing MARSH activities	0	0	4	9	9	0	31	4	40
C	1.1.1.2d. MARSH targets are achieved	0	0	0	0	1	0	3	1	3
C	1.1.1.3a. Number of community in sites receive training	5	0	10	9	5	0	29		
C	1.1.1.3b. Training materials tested & reviewed	0	0	2	2	3	4	2	6	4
C	1.1.1.3c. Number of communities implementing sustainable mangrove forest management	0	0	3	5	9	0	29	3	5
C	1.1.1.4a. Number of sites identified	33	33	-10	-10	0	0	0	23	23
C	1.1.1.4b. Number of communities showing improved resilience & adaptive management	0	5	4	4	9	0	0	4	9
C	1.1.1.4c. Number of communities show improvement in addressing disability and gender based issues	0	0	4	4	9	0	0	4	4
Intermediate Result 1.3: Deforestation and forest degradation reduced										
F	Number of REDD+ field demonstration activities linked to sub-national or national frameworks as a result of USG assistance.	3	0	5	3	7	0	0	3	3
F	Number of institutions with improved capacity to address REDD+ and adaptation issues as a result of USG assistance.	0	0	3	3	4	0	5	3	8

		2012-2013		2013-2014		2014-2015			LOP Target	Actual
Type	Indicators	Target	Actual	Target	Actual	Original Target	Revised Target	Actual		
F	Number of metric tons of CO2 greenhouse gas (GHG) emissions, reduced or sequestered as a result of USG assistance.	0	0	10,000	14,197	40,000	5,000	7,677	15,000	22,677
C	1.3.1.1a.Number of areas implementing mangrove rehabilitation plans	0	1	4	8	8	4	29	8	11
C	1.3.1.1b. Number of nurseries established and/or managed	1	1	6	8	6	0	15	7	10
C	1.3.1.1c. Number of seedlings planted	0	0	1,500	1,137	2,500	1,500	12,049	3,000	13,186
C	1.3.1.1d. Area of managed coastal mangrove forest	0	0	1,000	3,707	2,500	1,000	0	2,000	3,707
F	1.3.1.2a. Area of degraded mangrove forests rehabilitated	0	0	100	50	250	10	0	110	50
C	1.3.1.2b. Number of Sites sustainably managed mangrove forests	0	0	0	0	1	0	0	0	0

For the targets that were not reached, the simple reason is that the PMU and partners ran out of time. No one expected the project to cease after only three years. The planning of activities had been done with a five-year time frame in mind. Even with the reduced targets set for Year 3, with only a seven-month window for implementation, it was a race against time. The reduction in budget for the third year also meant that the partners had to release staff that were being paid from MARSH funds. This further reduced their human resource capacity which impacted on their delivery.

IUCN had approached different organisations in the private sector during the RFA phase to explore opportunities for collaboration either as partners or for leveraging. Unfortunately none of these potential partnerships came to fruition largely due to a lack of follow-up by the COP and DCOP in the first two years. IUCN tried to follow up with Exxon Mobil in April 2015 for potential co-financing of the national carbon accounting workshop but their budget for 2015 activities had been finalized in 2014.

Despite these challenges there were some significant accomplishments.

- A strong partnership in mangrove conservation has been formed in PNG which is there to stay and that can be used to leverage further funding for mangrove conservation work.
- A groundswell in mangrove conservation has been generated in the communities of the five provinces. Provincial government and Local Level Governments were engaged in the development of provincial mangrove policies and management plans in WNB and Manus. Impetus was provided to disability inclusiveness and best practice tools were developed.
- Extensive mangrove planting was carried out with 13,186 seedlings planted in 40 villages in 5 provinces and 11 LLGs with strong community leadership and support lent to the project. There was timely training provided in carbon assessment, monitoring and reporting. Finally, but by no means insignificant, was the mangrove mapping of the MARSH sites.

5 Problems and lessons learnt

5.1 Problems identified by the RIG audit and response from IUCN

The RIG Audit team visited the MARSH field sites in PNG and IUCN ORO in October-November 2014 and released their findings in the public domain on March 27th 2015. The report highlighted seven areas which they felt needed to be addressed and made ten recommendations to USAID Manila to improve project performance. USAID Manila posted their management comments as Annex 2 to the RIG audit report in which their response to four of the ten recommendations was to close all ongoing MARSH activities by the end of FY2015.

IUCN ORO will address each of the six areas highlighted that pertained to IUCN's performance and will do so in the order in which they were presented in the report.

1. The project significantly underestimated costs of operating in PNG.

- IUCN was bound by the budget stipulated by USAID and knew from the outset that the costs of doing work in PNG would be inhibitive to the effective monitoring of project activities. PNG is notoriously expensive and travel to project sites was restricted by the costs.
- IUCN entered this agreement fully aware that there were no funds to cover management fees but we proceeded with the agreement regardless because of our desire to work in PNG and to establish a presence in the region's largest and most complex country.

2. Some targets were unrealistic and unachievable.

- The targets were very prescriptive in the RFA issued by USAID. Although there was a 60-day grace period in which amendments could be made to the targets after the agreement was signed, there was simply not enough time to assemble the team and hold inception meetings.
- There was also no active promotion by USAID of the 60-day grace period rather a very robust promotion of the program as it is. IUCN and its partners readily acknowledge that the targets set by USAID were extremely ambitious and showed little knowledge of the PNG context. Having said that, once the grant was secured, the onus was on the Chief of Party (COP) to negotiate and shape the terms and conditions of the agreement.
- The project areas and partners were high risk and the role of the COP is critical to the success in early project management and

inception. Unfortunately the COP failed to deliver in this very critical stage of the project.

3. The project did not try hard enough to work with communities. It fell short in conducting baseline surveys, vulnerability assessments and management plans.

- IUCN subcontracted the six partners because of their strong presence on the ground and their record of effective community engagement in their respective provinces.
- IUCN assumed, correctly or incorrectly, that the partners would conduct the necessary baseline surveys and vulnerability assessments. The Project Management Unit (PMU) should have engaged more actively with the partners at the commencement of the project so that the strengths and limitations of the partners were known and appropriate measures taken. This was the responsibility of the Partnerships Coordinator who also served as the Deputy Chief of Party (DCOP) but this was not done.
- Partners planned their activities according to the five years in the initial agreement. The RIG team visited at the end of the second year when things were just beginning to roll out but unfortunately it was all brought to an abrupt end.
- It is widely recognized by practitioners in the Pacific that it takes at least a year to get projects introduced to the communities and authorities before activities begin. The RIG audit was thus very premature in the Pacific context.

4. The project monitoring was not sufficient. It did not have a monitoring and evaluation position, and the award monitoring plan did not address roles, responsibilities and procedures for monitoring sub recipients.

- The RFA issued by USAID limited key personnel to five individuals including the COP. Given the nature of the project we put together the best available technical team in the circumstances and in the timeframe. USAID approved the project with that team.
- Compared to the seasoned consulting firms that USAID regularly engages, IUCN does not have a pool of consultants available nor the ability to attract top notch project-winning CVs at such short notice but what we do have is the ability to engage members and local partners, which carried our bid.
- There was no scope to also hire a M&E person and a Communications person to be part of the PMU, two critical positions of any project implementation team.

- The original Award Monitoring Plan (AMP) was revised twice and approved both times by USAID before the RIG audit.

5. Some reported results were not supported or reliable

- In the absence of an M&E officer in the PMU, the COP should have delegated the responsibility of data collection, verification and reporting to the other members of his team rather than try and do everything on his own. Errors were bound to happen.
- The remaining members of the PMU received M&E training after the release of the RIG audit report and proceeded to have an active share in the collection, verification and reporting of project data.

6. The project did not promote and mark commodities and activities consistently

- The PMU could have been more rigorous in ensuring donor visibility.

Of the ten recommendations of the RIG audit team, four were deemed obsolete given that the project was to close at the end of FY2015. Five recommendations were implemented by IUCN and approved by UDSAID. The last recommendation to of a modified cooperative agreement was signed by IUCN in the first week of August 2015.

Despite the premature closure of MARSH, IUCN has made its presence known in PNG through critical partnerships with international and national NGOs, academic institutions and local champions. New partnerships have also been forged with Government agencies like the PNGFA and NFA. The PNG Assembly for Disabled Persons were engaged in climate change adaptation action for the first time and have expressed their appreciation to IUCN on numerous occasions for allowing them to finally have a voice on such a topical issue. These partnerships will endure and will continue to promote the conservation of mangroves in PNG, the country with the largest mangrove area in the Pacific islands and the eleventh largest in the world.

5.2 Lessons learnt

Although the donor made the decision to change its focus from community-level to national-level activities, stakeholders throughout the region will agree that the assistance is required at the community level. The national level is a crowded playing field with traditional donors and agencies in the Council of Regional Organisations in the Pacific already assisting at that level. In Melanesian countries, the mangroves are owned almost entirely by the

traditional landowners and not the State, thus for any policy recommendations to be implemented, the landowners must agree to it. It is thus important to get the communities onside for projects such as MARSH.

Community buy-in takes at least a year and this must be recognized by donors when recommending time frames for projects in PNG or any other Pacific Island country. Once the trust of the community has been won, project implementation is made much easier. To work in PNG, it is imperative that PNG values and protocols are respected and one has to work with the traditional systems in place.

Working as part of a large consortium is a challenge. It is very important that roles, milestones, and performance indicators are made very clear to all partners at the start of the project. Regular communication is key to a successful partnership.

IUCN should have requested more time in the proposal preparation stage to enable the organization to follow its own procurement policies in recruiting the PMU. All positions should have been advertised with the best possible PMU recruited and perhaps the outcome of the project may have been very different.

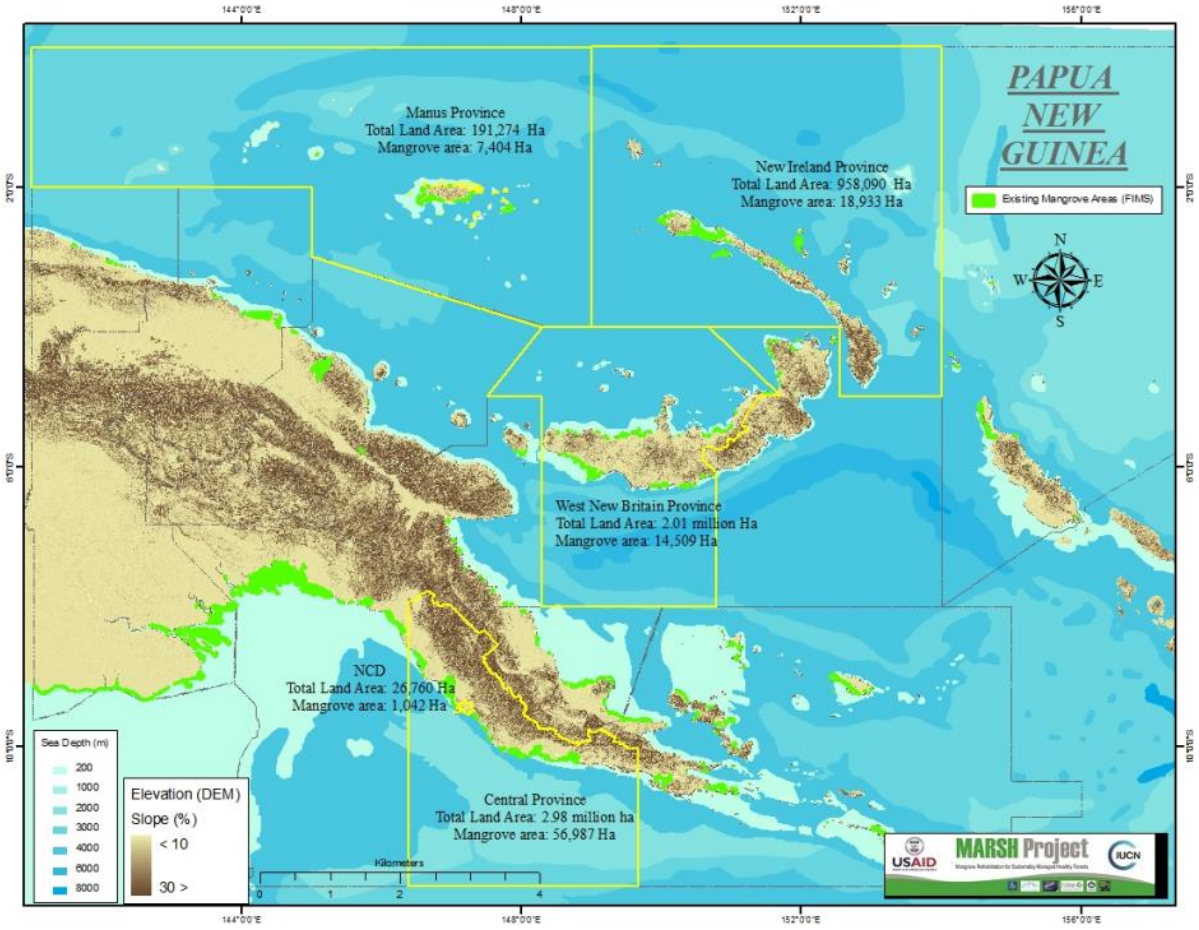
More time should have been allowed for scoping and planning with wider consultation in-country before the objectives were finalized. The project design was overly ambitious and showed little knowledge of the PNG context.

There are limited options in conservation partners in PNG. Due diligence should have been carried out with all partners had there been more time allowed in the RFA phase.

IUCN ORO should have monitored the performance of the MARSH project much more closely in the first year by hiring an M&E officer as a staff member. One was eventually hired late in year 2 of the MARSH project by which time it was too late to change the course of events.

6 Annexes

6.1 Overview map of PNG with MARSH sites highlighted



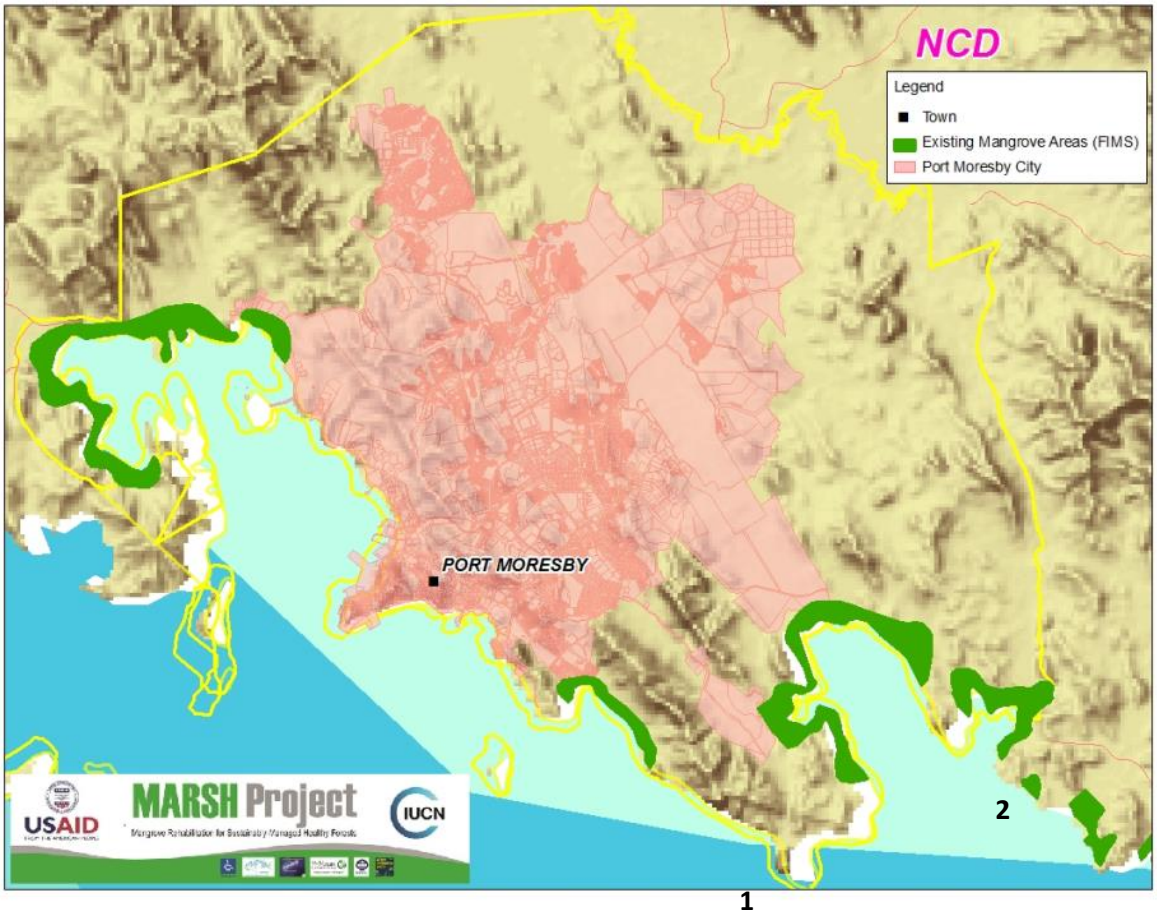
6.2 Detailed map of MARSH site Central Province

Area of Interest	MARSH partner
1. Manumanu East	PwM
2. Manumanu West	PwM
3. Pinu or Kidu	PwM
4. Tubusera	CLMA
5. Guarume Mase	CLMA
6. Delena, Nabua Paka, Poukama	CLMA
7. Abau (Start end year 2)	PwM & CLMA

6.3 Detailed map of MARSH site Manus Province

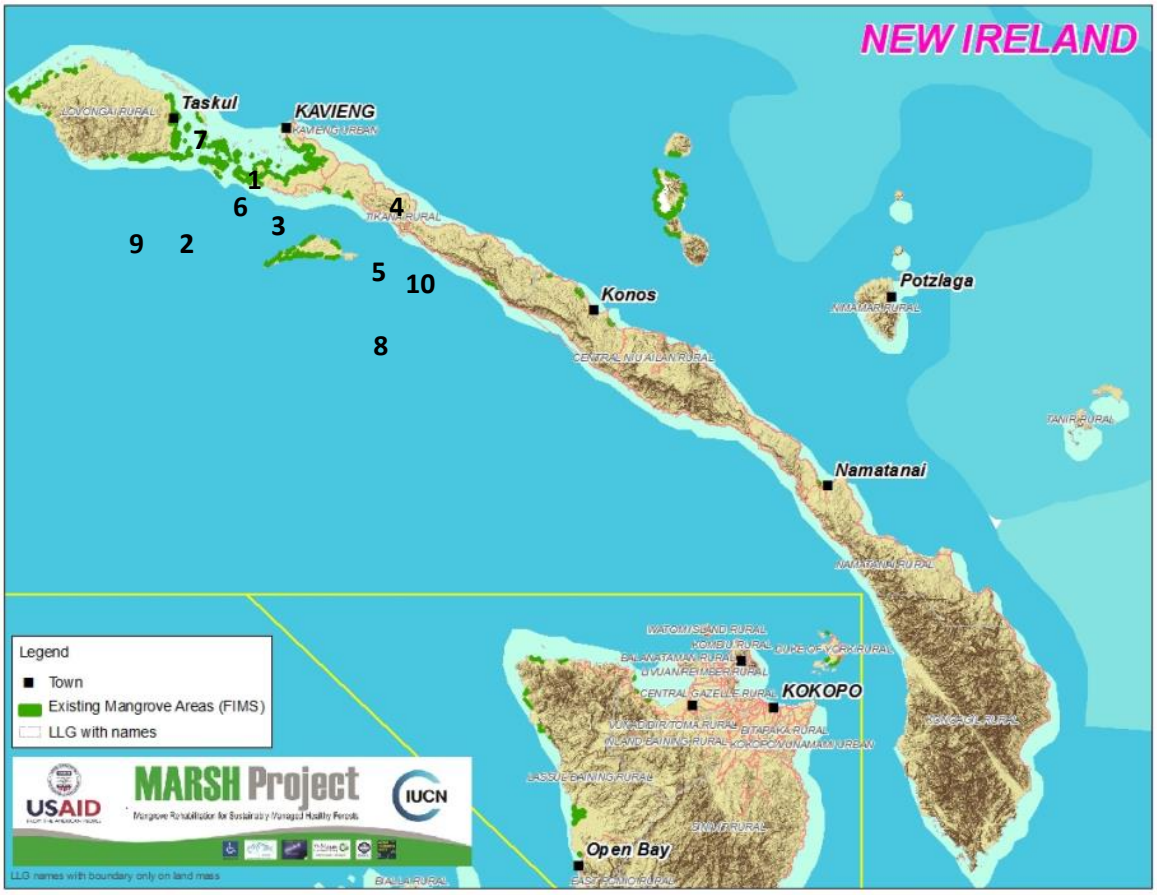
Area of Interest	MARSH partner		Area of Interest	MARSH partner
1. Zone 1 Lawes - DrumDrum	TNC		5. Derimbat	PwM
2. Zone 2 Rapatona - Balopa	TNC		6. Liap	PwM
3. Zone 3 Wenai - Sapolai	TNC		7. Ndromunun	PwM
4. Zone 4 Malapang & Western Islands	TNC			

6.4 Detailed map of MARSH site National Capital District



Area of Interest	MARSH partner
1. Pari	PwM
2. Taurama	PwM

6.5 Detailed map of MARSH site New Ireland Province



Area of Interest	MARSH partner
1. Ward 4 Lavongai: Ungakum, Kavulik	WCS
2. Ward 17 Lavongai: Meterankang, Patitab, Magan, Patikone	WCS
3. Ward 2 Tikana: Burusan, Tapak, Butei, Enuk, Nonovaul, Nusailas, Ugan, Salapiu, Kapatirun, Kanlik/Lissenung	WCS
4. Ward 3 Tikana: Kaplaman, Panapai	WCS
5. Ward 5 Tikana: Kaut, Bangatere, Tome	WCS
6. Ward 1 Tikana: Bungatan, Utukul, Enang, Tugalob/Kulinis, Upuas, Limus	WCS
7. Ward 2 Lavongai: Patiagaga, Sunganpakang, Adla. Kulpetau	WCS
8. Ward 17 Tikana: Sumuna Leon	WCS
9. Ward 12 Lavongai: Angat, Unbukul, Metetui, Taun	WCS
10. Ward 16 Tikana: Lavolai, Lamusmus, Sepsep	WCS

6.6 Detailed map of MARSH site West New Britain Province

Area of Interest	MARSH partner		Area of Interest	MARSH partner
1. Pasiloke	CLMA		4. Kimbe Bay (Dagi/Kapiuru/Baia)	TNC
2. Patanga	CLMA		5. Kaliai Kove	TNC
3. Kilu – Tamare	CLMA		6. Gasmata	TNC
			7. Bali Witu	TNC