



Directory of Wetlands of Nauru- 2016

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Contents

Acknowledgments	ii
1 Introduction	3
2 Nauru Overview	4
2.1 Compilers and scope of update	4
2.2 Geographical summary	4
2.3 Geological and geomorphic setting	4
2.4 Climate and natural disasters	5
2.5 Biogeographic regions	5
2.6 Vegetation	6
2.7 Wetlands of Nauru	6
2.8 Wetland fauna	7
2.9 Human population	7
2.10 Land tenure system	7
2.11 Economy	7
2.12 Pressures and threats to wetlands	8
2.13 Threatened wetland species	9
2.14 Conservation measures	9
2.15 Wetland area legislation	10
2.16 References	14
2.17 Location maps of the inventoried wetlands of Nauru	16
3 Wetland Accounts	17
3.1 Buada Lagoon	17
3.2 Ijuw/Anabar Wetlands and forest PCA	22
3.3 Anibare Bay PCA and PMMA	27
3.4 Meneng reef flats and ocean front PMMA	32
3.5 Ijuw/Anabar reef flats and ocean front PMMA	36
4 List of Figures	
Fig.1 Location of wetland sites covered in this inventory	16
5 Appendices	
Appendix 1 - Ramsar Classification System for Wetland Type	41

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1. Introduction

The Secretariat of the Pacific Regional Environment Programme (SPREP) is an intergovernmental organisation charged with promoting cooperation among Pacific islands countries and territories to protect and improve their environment and ensure sustainable development for present and future generations. For more information, see: www.sprep.org.

Wetlands are among the world's most productive (and threatened) ecosystems and the services that they provide to humanity are significant. In order to effectively conserve and manage wetlands, a first step is to document and understand their distribution and status through conducting detailed baseline wetland inventories. Across the Pacific region, The Directory of Wetlands in Oceania 1993 documented available information on the distribution, status and values of wetlands in Pacific Island Countries and Territories, however, much of this existing information needs updating.

A number of Pacific Island Countries are contracting parties to the Ramsar Convention on Wetlands and as such are obligated to formulate and implement national planning to promote the conservation of their Ramsar Sites and other wetlands within their jurisdiction. Such planning relies very much on the availability of comprehensive data on wetlands.

The aim of this project was to update the wetland inventory for Nauru (Scott 1993) as a means of strengthening the baseline state of knowledge of wetlands in this country. Such baseline information would be valuable for informing conservation decisions, raising awareness of the importance of wetlands, influencing public perception of wetlands, creating ongoing monitoring, revealing trends over time, identifying priority sites for conservation management (e.g. for designating Ramsar Sites or other types of Protected Areas) and as a tool for planning and implementing effective conservation interventions for wetlands, especially in light of the impacts of climate change.

The information collated through the inventory process will be centralised in SPREP, which acts as the central depository and dissemination point for such data.

Updating wetland inventories is a priority under the SPREP Regional Wetlands Action Plan 2011-2013.

2. Nauru Overview

2.1 Compilers and scope of update

The introduction and overview for Nauru for the 1993 edition of *A Directory of Wetlands in Oceania* was compiled by Scott (1993). This updated version was prepared by Vainuupo Jungblut and Berrick Dowiyogo in 2016.

This update retains information from the 1993 edition that is deemed still current and largely incorporates new data gathered through the recent Nauru Rapid Biodiversity Assessment (BIORAP, 2013). The updated inventory has stand-alone status and includes maps of the extent of each site.

Based on the Nauru BIORAP results, a further 4 sites have been added to the directory and updated accounts for important sites that were included in the 1993 edition follow this introduction and overview. References cited in the following sections or in the accounts are listed together.

For the 2016 update of Nauru's wetland directory, the boundary of each site was defined based primarily on the results and recommendations of the Nauru BIORAP which identified and recommended these areas as priorities for conservation action. They have no legal status until such time the responsible government agency decides to initiate the process to officially declare and gazette these areas as protected areas. .

2.2 Geographical summary

Area: Land, 21.2 km²; Economic Exclusion Zone, over 430,000 km².

The Republic of Nauru comprises a small single raised limestone island in the Central Western Pacific at 0°31'S, 166°56'E. Nauru is located 300km west of Kiribati's Banaba island, 2000 km east-northeast of Papua New Guinea, 4450 km south-southeast of the Philippines (Mckenna et. al, 2015) and about equal distances to Hawaii in the northeast and Australia in the southwest (the Commonwealth, 2016).

2.3 Geological and geomorphic setting

Geological studies demonstrated that Nauru is a raised atoll capping a volcanic seamount rising from the ocean floor depth of 4300 metres which formed from about the mid-Eocene to the late Miocene periods (Hill & Jacobson, 1989).

The land area is about 22 square kilometres (Mckenna et. al, 2015) and has a coast line circumference of 30km long (The Commonwealth, 2016). The landscape is comprised of a narrow coastal terrace about 50 to 300 metres wide, encircling an upraised central plateau of limestone escarpment which cover about 80% of the total dry land of some 30 metres in elevation to a highest point of 71 metres. There are no rivers or surface freshwater bodies but an inland brackish water lake, the Buada Lagoon, on a fertile depression at the southwest; a few anchialine ponds on the north eastern part of the island and an underground lake at a Moqua Cave in the southeast coastal portions of the island.

The coastal soils of Nauru in general are of thin layers and very poor in the essential minerals for healthy plant growth and agricultural development. Soil fertility therefore

depends highly on organic matter from shrub and forest vegetation cover, for nutrients and water retention (Morrison, 1994). There are only a few areas where fragments of shrub vegetation and a few forests are found - along the edges below the cliffs bordering the coastal areas, the topside upraised plateau and around the Buada Lagoon (Ibid, 2015)

The central plateau soil layers are also extremely thin on top of limestone pinnacles to sandy phosphatic rock of over 2 metres deep between the pinnacles. Undisturbed plateau areas can be generally fertile, though with secondary mining, these will be altered and degraded. In general the soils of Nauru islands are generally poor and require an intensive and committed rehabilitation of vegetation cover to improve organic matter and soil fertility for any agriculture or reforestation programme and consequently for any successful expansion of population settlement on the island in the future (Davis, 2010).

2.4 Climate, Climate Projections and natural disasters

Air temperatures in Nauru are fairly constant throughout the year and so are closely related to sea-surface temperatures. The wet season usually start in November and continues to April of the next calendar year. Drier conditions occur during the months of May to October while rainfall is affected by both the Inter-tropical Convergence Zone and the South Pacific Convergence Zone. The main influence on inter-annual climate variability in Nauru is the El Nino-Southern Oscillation. The sea level rise near Nauru measured by satellite altimeters since 1993 is about 5 mm per year.

The following represents the expected climate future for Nauru (Australian Bureau of Meteorology & CSIRO, 2014):

- Surface air temperatures and sea surface temperatures are projected to continue to increase (very high confidence)
- Annual and seasonal mean rainfall is projected to increase (high confidence)
- The intensity and frequency of days of extreme heat are projected to increase (very high confidence)
- The intensity and frequency of days of extreme rainfall are projected to increase (high confidence)
- The incidence of drought is projected to decrease (moderate confidence)
- Ocean acidification is projected to continue (very high confidence)
- Mean seal level rise is projected to continue (very high confidence)

The main climate extreme experienced by Nauru are drought and extreme storm surges. Droughts have been recorded to be as long as three years whilst storm surges are becoming more frequent. Nauru does not experience tropical cyclones.

2.5 Biogeographic regions

According to the World Wildlife Fund (WWF) Terrestrial Ecoregions of the World (TEOW) classification (Olson et. al, 2001) Nauru is situated in the “Eastern Micronesian tropical moist forests” Ecoregion of the “Oceania” biogeographic realm. Nauru is not included in the Marine Ecoregions of the World (MEOW, Spalding et.al, 2007) nor are they included in the Freshwater Ecoregions of the World (FEOW, WWF/TNC).

2.6 Vegetation

The flora for Nauru comprises about 56 native species and 125 naturalized species with none of the native species being endemic and many being extirpated or on the verge of being extirpated from the island. Many of the weeds found in previous assessments were absent but new weed species with a yet to be identified species of grass were recorded. Most of the island especially the large central plateau is covered with secondary scrub.

Three plant communities present on Nauru can be classified as wetland vegetation:

- 1) *Littoral strand*;
- 2) *Mangrove forest*;
- 3) *Freshwater marsh*;

The Nauru BIORAP (2013) found that almost no native forest remains on Nauru. However, 42 native plant species were recorded and most of these are of critical importance, both ecologically and culturally.

2.7 Wetlands of Nauru

There is very little surface water on Nauru's highly permeable terrain, much of the largest permanent water body being Buada Lagoon. This is a brackish sunken lagoon, some 3-4 hectares in extent, surrounded by an area of marsh. It is situated near the centre of the limestone plateau.

Many of the ponds and the two lagoons were used for the rearing of milkfish (*Chanos chanos*). Growth rates however, were slow partly because of competition with Tilapia and partly because of the insufficiency of natural food and overcrowding (Ranoemihardjo, 1981). The Mozambique tilapia (*Oreochromis mossambicus*) was introduced into the island in about 1960 to feed on mosquito larvae, and rapidly became abundant in the lagoons and ponds. At the request of the Republic of Nauru, a Tilapia eradication programme was implemented by FAO in 1979 and 1980. This involved poisoning the lagoons and ponds with the highly toxic fish poison rotenone (Ranoemihardjo, 1981).

There are two other wetland systems of note in Nauru. The first is a series of tiny wetlands (0.25-0.33 ha in extent) along the inner edge of the reef lagoon at the base of the limestone escarpment. These are small brackish marshes which sometimes dry out completely. The second system is a small patch of mangroves consisting of *Bruguiera gymnorrhiza* probably less than two hectares in extent, on the island's northeast coast. *Rhizophora stylosa* was first recorded in 1996 and photographed again in 2007 (Mckenna et. al, 2015). The mangrove fruits were apparently once used as a food by the Nauruans.

The only significant water resources available for human consumption lie underground. Traditionally, the inhabitants used groundwater accessible in wells and caves in the karst. However, these supplies are dwindling, apparently as an indirect result of the mining activities (SPREP, 1989). During prolonged droughts, fresh water is shipped to the island in empty phosphate ships.

Nauru's marine systems have been described by UNEP/IUCN (1988). There is no true reef and no lagoon; rather, the island is surrounded by an intertidal reef platform, some 150-200 m wide, cut into the original limestone of the island and typified by the presence of numerous emergent coral pinnacles. The platform is dominated by large yellow-brown algae and little

or no coral growth occurs on the reef intertidal flat. Coastal waters are relatively unpolluted, although there may have been one or two instances of silt accumulating on some parts of the reef flat.

2.8 Wetland fauna

Nauru is an isolated seamount. Because of its remoteness and rare geology, Nauru's terrestrial and marine wetland ecosystems have limited diversity, however, the presence of globally rare and endemic species have been confirmed (Mckenna et. al, 2015). The endemic Nauru tidal rock bug (*Corallocoris nauruensis*) was re-discovered at Anibare bay and two new seabird species were recorded for the first time, the masked booby (*Sula dactylatra*) and Audubon's shearwater (*Puffinus iherminieri*). Nauru's reefs have among the highest percentage cover by corals on the planet, they contain the endangered humphead wrasse (*Cheilinus undulatus*) the near threatened white tip reef shark (*Triaenodon obesus*) and the endangered coral (*Pocillopora fungiformis*). Furthermore, the abundance of reef fish in Nauru is high relative to other nations. Nauru's wetlands provide significant habitat for invertebrates and lizards such as the newly discovered skink (*Emoia* spp.) which is considered endemic to Nauru.

2.9 Human population

The total resident population of Nauru was 10,048 in 2011 made up of 5,105 males and 4,979 females, which is a 9% increase from 2006 (Nauru Bureau of Statistics, 2013). Nauru's population is a young and fast growing population with the majority concentrated along the coast with many settlements along the coastline resulting in a population density of over 1,500 persons per square kilometre (Nauru Bureau of Statistics, 2013). Other important environmental population statistics include: 68% receiving freshwater from a dispatcher or a desalination plant, 29% used rain catchment with the remainder from a well and 99% connected to the national electricity grid. About 13% of households maintain vegetable gardening and simple food cropping, and about half of all households are engaged in fishing activities on the reef flats and in the 12-mile zone for coastal fishing activities (SPREP, 2012).

2.10 Land tenure system

All Nauruans have certain rights to all land on the island, which is owned by individuals and family groups. Government and corporate entities do not own any land and they must enter into a lease arrangement with landowners to use land. Non-Nauruans cannot own land on the island. Land issues and land disputes are the cause of many delays in achieving development progress and issues related to land rights also discourages foreign investment (Government of Nauru, 2013). More attention and community awareness are needed together with a sound legal and regulatory framework (Government of Nauru, 2009).

2.11 Economy

Since gaining independence in 1968, the social and economic development of the Nauruan society was largely shaped by its phosphate mining industry which during its peak brought immense wealth and opportunities to the populations. At the time, Nauru's population was dominated by foreign mine workers. At its height, the mining workforce comprised a ratio of 70% foreigners to 30% indigenous Nauruan in 1992. This ratio declined steeply to 6%

foreigners in 2006 (Nauru Bureau of Statistics, 2011) when migrant workers returned to their home countries at the closure of the mine.

The closing down of mining operations at the turn of the 21st century together with significant reverses in a series of investments abroad occasioned severe financial crises with serious adverse impacts on the functioning of government and the population's morale and wellbeing (The Economist, 2001). Current prospecting for a Secondary Mining Industry based on high quality phosphate (Mckenna et. al, 2015) and in particular the Australian government's Regional Processing Centre for Asylum Seekers have reinvigorated active economic life for the country in recent years. More than half of those who worked in the public service have migrated to jobs in the Regional Processing Centre; flights have increased from once a week to almost twice daily, and the flow of Australian and other foreign workers and imported goods into the country seems to increase steadily every month as the Processing Centre workforce continues to increase.

2.12 Pressures and threats to wetlands

Mining, Population & Climate Change

The mining industry is the single most powerful agent of change to the country's terrestrial biodiversity. With the mining of "topside", Nauru has had a severe negative impact on the islands ecosystems and resources (UNDP, 2014) and has cleared native forestry on the central plateau that comprised of about 80% of the island's total land area. The current secondary mining operations will hamper any process of rehabilitating this landscape both through human intervention and natural processes. Secondary mining will also hinder the growth of secondary scrub vegetation on formerly mined lands. Furthermore, the current mining and export of limestone pinnacles to the Marshall Islands and possible commencement of a limestone cutting industry may reduce available boulders and aggregates for constructing the rock bases of the land rehabilitation program (Davis, 2010).

The situation could be exacerbated in the future with the migration of the rapidly growing population up into the central plateau as they run out of space on the low lying coastal terrace due to overcrowding and flooding by rising seas as the climate change deepens in the century.

The government's rehabilitation programme is based on a practical engineering and replanting that facilitate the natural processes of re-vegetation. However constraints in funding and human resources have delayed the rehabilitation programme. The 2013 Nauru BIORAP suggested a combination of rehabilitation and protected sites on the fields of limestone pinnacles both to restore forests for the conservation of native biodiversity and to provide for the possible development of unique ecosystems based on limestone pinnacle landscape (Mckenna et. al, 2015)

The threat of invasive species was also noted as increasing such as the yellow crazy ants, rats and domestic animals (Ibid, 2015). Nauru is highly vulnerable to the introductions of any of the damaging invasive species that are now common in its neighbouring island nations due to the constraints in capacity and resources to combat such invasions.

Limitations in water availability essential to the needs of the population and the rehabilitation programme added further setbacks to the success of efforts to restore land and terrestrial biodiversity. Nauru's climate and weather pattern includes prolonged periods of droughts. The potentials for rainwater harvesting to alleviate water shortages and the revival of effective traditional practices that have enabled the survival of the populations in the past under strained pressures on their environment are yet to be fully appreciated and exploited.

Over-exploitation, Invasive Species and Pollution

The Nauru BIORAP gave a very positive outlook for the status and trends of marine biodiversity. Nauru's reefs are considered very healthy and high in the abundance of species stocks although they have low diversity of corals, vertebrate and invertebrate species, owing to the geology of the island. There is evidence of an emerging trend of overfishing and pollution threats were identified that would require urgent actions by the national government and the local communities (Ibid, 2015).

The establishment of locally managed marine areas and marine reserves; the promotion of education and awareness on sustainable fishing practices and the improvement of capacities for the monitoring and enforcement of fishing regulations are recommended for immediate implementation to ensure the maintenance and the continuing improvement of the good conditions of the marine ecosystems that are seen today (Ibid, 2015).

The natural ecosystems of Nauru have been altered and degraded from a variety of anthropogenic sources. The removal of vegetation in Nauru has resulted in an increase in surface water runoff, soil erosion, nutrient loading and pollutants being deposited into ground and coastal waters. There is a direct impact on natural systems. Further degradation and contamination of the land and groundwater has resulted from both poor land use practices and solid waste management (UNDP, 2014).

2.13 Threatened wetland species

The BIORAP found that three endemic species occur in and are supported by Nauru's wetlands. A skink, the endemic Micronesian black (*Emoia arnoensis nauru*), an insect, the endemic Nauru tidal rock bug (*Corallocoris nauruensis*) and a newly discovered endemic moth.

Furthermore, the BIORAP recorded the following globally threatened species known to occur in Nauru:

- giant clams – maxima clam (*Tridacna maxima*)
- corals – *Pocillopora fungiformis*, *Montipora caliculata*
- sea turtles – Hawksbill Turtle (*Eretmochelys imbricata*),
- fishes - humphead wrasse (*Cheilinus undulatus*) and the white tip reef shark (*Triaenodon obesus*).
- Birds – Frigate bird (*Fregata* spp.) and black noddy (*Anous minutus*).

With regards to flora, the following rare wetland plant species were identified during the BIORAP, Dog Bane (*Cerbera manghas*), Oriental Mangrove (*Bruguiera gymnorrhiza*), Chinese lantern tree (*Hernandia nymphaeopholia*) and the Tree Heliotrope (*Tournefortia argentea*).

2.14 Conservation measures

A number of initiatives and actions have been taken by the Government of Nauru that have contributed and will contribute to better outcomes for wetlands. Some notable examples are described below (Government of Nauru, 2013):

Nauru's Rapid Biodiversity Assessment Project (Nauru BIORAP 2013)

The “overall goal of the Nauru BIORAP 2013 was to merge several biodiversity and State-of-Environment (SOE) elements in order to provide resource owners and communities with a coherent and integrated case for conservation”.

The exercise produced a comprehensive understanding of the state of Nauru’s terrestrial and marine biodiversity assembled a wealth of baseline data and information for future management planning and monitoring purposes, and made recommendations for immediate actions to promote and establish a strong culture of conservation, protected areas and sustainable use of biodiversity resources in the island.

The project also achieved the active participation and training of a core group of government staff and local community leaders and gained a high level of support from the national government and district communities. The full project report is now available. CIE is the main contact and coordinating agency of the project.

The ‘Grow and Green’ Project (GGP)

Improving organic matter and improving soil fertility is essential to any efforts to restore green cover and consequently assist the re-establishment of forest cover and its associated native flora and fauna on the island of Nauru. Any initiative therefore to promote a culture of tree planting and soil improvement in Nauru will contribute a long way to achieving these ends. Grow and Green is one such initiative.

The project is a government-funded initiative to promote the planting of local fruit trees in the communities for food security, soil fertility improvement and building local capacity in tree planting. Target tree species include lime, breadfruit, soursop and coconut. The project was successful in the production of planting materials; the setting up of family fruit tree plots; collaboration with the TTM Horticulture and raising awareness and providing training and technical support to individual households and schools in the planting and care of fruit trees. CIE is the coordinating agency and main contact for this project.

The ‘Clean and Green’ Programme (CGP)

Poor waste management and uncontrolled pollution can exacerbate the degradation and hamper the restoration of both inland and coastal ecosystems on Nauru. Very few efforts have been carried out by local communities to address the issues of waste and pollution. Although a national waste collection system exists a huge percentage of wastes in Nauru does not make its way into the Public Dumpsite and ends up around homes in the coastal areas and invading the inshore reefs. The program Clean and Green which is government funded and community driven has proven highly successful at educating the public and facilitating the proper management and disposal of household wastes.

The ‘Clean and Green’ Programme engage and train a contingent of about 140 of young workers who are fully employed selected from the 14 districts to help promote awareness and education on waste management and provide support services to facilitate the effective collection and disposal of household wastes by district communities. Nauru’s Department of Community Affairs hosted this project.

The Sustainable Land Management Project (SLM)

The restoration of mine lands and the sustainable use of limited space and land resources of the settled narrow coastal areas of Nauru is very essential to the regeneration of biodiversity and ecosystem services that underpins the survival of the island’s population in the medium to long term (10- 50 years and beyond). All efforts therefore to promote knowledge, raise awareness and build capacities for sustainable land management is very important in achieving this noble end. The SLM project therefore was developed as a government and community initiative for addressing issues of land degradation and droughts in Nauru in relation to the UN Convention to Combat Desertification, Land Degradation and Drought.

The purpose of Nauru's GEF funded SLM project was to create an enabling environment for improving ecosystem stability, integrity, functions and services while enhancing sustainable livelihoods. It was implemented from 2008 to 2012. It succeeded in providing further guidelines for land restoration, funded various capacity building trainings of government and non-governmental staff on Environmental Impact Assessments EIA, GIS and Beach Profiling, and produced a draft National Action Plan or NAP the overarching policy framework for financing future national and local sustainable land management actions. CIE is the coordinating agency for this.

The Integrated Water Resources Management Project (IWRM)

Water is a major limiting factor to the success of land restoration, agriculture and ecosystem rehabilitation on Nauru. Water is essentially scarce due to normal weather patterns of droughts and the lack of both natural and social means in Nauru to harvest and store rainwater. It brackish water lens is largely unsuitable for drinking. Due to these factors most of Nauru's water supply comes from water desalination plants. Nauru's IWRM was designed to establish an enabling environment for effective water resource planning that will achieve a sustainable and reliable supply of safe and clean water for Nauru into the future.

The goals of Nauru's IWRM included community awareness raising and education on the conservation and wise use of limited water resources, increasing the means for rainwater harvesting and water storage, improving sanitation and reducing of waste water pollution. As an enabling project it succeeded at producing various studies on the state and outlook of Nauru water resources and sanitation the first Water and Sanitation Outlook for Nauru; the formulation of strategies for improving the availability of a clean, safe and reliable water supply; co-financing household water tanks and other water conservation measures and promoting a trial of affordable and environmentally friendly compost toilets that do not require water. CIE was the coordinating agency for this project.

The National Rehabilitation Programme (NRC)

The establishment of the NRC signals Nauru's commitment to make its mined land liveable for the needs of its future generations and the survival of their nation.

The program has established a nursery for the production of planting materials and started the development of the first rehabilitation site and has started developing a core staff of committed young locals for the programme. Currently it's very far from achieving its set goals due to various reasons. However it has taken some important steps to alleviate funding and capacity constraints that has seriously slowed down the program. The National Rehabilitation Corporation is the contracting agency that manages and implements the program under the national government. It is also the contractor for the Secondary Mining Industry.

The Community Based Fisheries Management Program (CBFMP)

The CBFMP is a major grassroots fisheries management initiative that is supported by the Nauru Fisheries and Marine Resources Authority (NFMRA) on behalf of the national government. Its overall aim is to empower local community populations to build their capacity towards sustaining their coastline and inshore fishing resources. This is undertaken with the support of NFMRA and its national and international partners like SPC and FAO. NFMRA and its partners providing the information resources, the technical advisory services and some co-financing towards assisting local communities, while local communities own and drive the policy and planning processes for the management of coastal fisheries.

Some of these policy and planning processes includes the implementation of policy measures for setting limits and controls on the use of inshore fisheries resources along their districts coastlines; and the setting up institutional arrangements to mobilize the flow of

financial and information resources to increase awareness and build the capacities of their populations on sustainable fishing practices and successful fisheries restocking and habitat restoration approaches. The frameworks for implementing this program are community based fisheries management plans which are gradually being explored and developed by the leaders of district communities. At the time of writing of this report, two draft district management plans were already completed and are undergoing revisions.

This initiative is at its early stages of development but it could not have come at a very opportune time. As the populations have gone back to intensive inshore fishing for sustenance and earnings, when the country went through an economic crisis, this led to the emergence of a pattern of unsustainable fishing and over exploitation which fortunately, the current resurgence of the country's economy assisted to alleviate this pressure on these unsustainable coastal practices. However, the decade's experience have shown that such a cycle of adverse patterns could repeat itself and maybe even on a greater scale of negative impacts on the marine environment if the economy of the country falters again in the future

It is encouraging then to note the increasing number of district communities who have expressed their interests to participate in the program. Their willingness allowed for them to increase their capacities, understanding and commitment to positive actions and behaviours that will in the long term help to strengthen the healthy conditions and productivity of their inshore fisheries and marine environments. This commitment was reflected during the Nauru BIORAP in 2013.

Implementing a "Ridge to Reef" approach to protect biodiversity and ecosystem functions in Nauru (R2R Nauru).

The UNDP-GEF Nauru Ridge to Reef (R2R) GEF Project (2015-2019) is a four-year project designed to develop, establish and implement a government and community partnership approach to increase knowledge for better management of natural resources and ecosystem services for five districts in Nauru through innovative integrated land, water, biodiversity, coastal and marine management approaches thereby protecting and increasing livelihoods opportunities, food security, and enhancing climate resilience. These goals will be achieved by building Nauru's capacity to implement a comprehensive cross sectorial regime for sustainable land, freshwater water, solid waste, coastal and marine area management and ensuring the initiatives are mainstreamed and established into all levels of decision making including government policy, laws and regulations and community plans.

The project is part of the broader Pacific Regional Program on "Pacific Islands Ridge-to-Reef National Priorities – Integrated Water, Land, and Coastal Management to Preserve Biodiversity, Ecosystem Services, Store Carbon, Improve Climate Resilience and Sustain Livelihoods". This program is designed to build stronger linkages between sustainable development and management of freshwater ecosystems (e.g. ground water systems for Nauru) and coastal/marine areas and promotes the implementation of holistic, integrated management of natural resources.

The goals of this Nauru R2R Project will be achieved through four specific project level outcomes interventions that are directly interconnected at national and site based community (district) levels. These include (i) Improved management effectiveness of new marine conservation areas, (ii) Integrated landscape management practices adopted by local communities living within the 'bottom-side' and applicable 'ridge', and 'topside' areas not covered by mining, (iii) Biodiversity conservation and Sustainable Land Management (SLM) mainstreamed in policy and regulatory frameworks, and (iv) Knowledge Management.

2.15 Wetland area legislation

There is currently no specific national legislation covering the conservation of wetlands in Nauru. A draft Environmental Management Bill (2011) exists but it is still in draft form. Other relevant legislation includes the Nauru Fisheries Act 1997 which calls for the management, protection, development and conservation of the fisheries and marine resources of Nauru, however, this Act was not adequate to address conservation programmes or issues in detail (Jacobs, 2000). The Nauru Fisheries Act 1997 is currently under review to strengthen provisions relating to inshore marine resource management. The Nauru Fisheries and Marine Resources Authority are working to get the new version of this Act finalised and approved.

The Republic of Nauru National Sustainable Development Strategy (NSDS) 2005-2025, revised in 2009 is as also particularly relevant to wetland conservation, including through links with the following goal and strategies of the NSDS:

Goal:

“Environment: Sustainable use and management of the environment and natural resources for present and future generations”.

Strategies:

“Establish a regulatory framework for the sustainable use and management of the environment and natural resources”

“Enhance development and management of biodiversity and ecosystem services to provide sustainable livelihoods while maintaining the biodiversity and ecosystems”

“Enhance resilience to climate change impacts”

The Republic of Nauru Framework for Climate Change Adaptation and Disaster Risk Reduction (RONAdapt, 2015) has as one of its priority strategies “to designate areas for conservation of Biodiversity” two relevant activities have been prioritized under this strategy:

“Land use planning to identify and protect areas of high biodiversity value”

“Establish conservation areas in partnership with the community”

Other relevant national legislation and frameworks

Legislation:

- Nauruan Antiquities Ordinance, 1935
- Wild Birds Preservation Ordinance, 1937
- Public Health Ordinance, 1925, amended 1967
- Lands Act, 1976
- Marine Resource Act, 1978
- Animals Act, 1982
- Litter Prohibition Act, 1983
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- Agriculture and Quarantine Act, 1999
- Education Act, 2011

Policy Documents & plans:

- Disaster Risk Management Plan, 2008
- National Health Strategic Plan, 2010

- Water, sanitation and hygiene policy, 2012
- Solid Waste Policy, 2013 (draft)
- National Biodiversity Strategy & Action Plan (NBSAP, 2014 - revised draft)
- Republic of Nauru Framework for Climate Change Adaptation and Disaster Risk Reduction. (RONAdapt), 2015

Multi-lateral Environment Agreements International Conventions:

- The International Plant Protection Convention, 1951
- Treaty on the Non-Proliferation of Nuclear Weapons, 1970
- Convention on the Prevention of Marine Pollution by dumping of Waste and other Matter, 1972
- United Nations Convention on the Law of the Sea, 1982
- Convention for the Protection of the Ozone Layer, 1985
- Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, 1987
- United Nations Framework Convention on Climate Change, 1992
- Convention on Conservation of Biological Diversity, 1992

Regional Conventions

- Convention on the Conservation of Nature in the South Pacific (Apia Convention) 1976
- South Pacific Forum Fisheries Agency Convention, 1979
- South Pacific Nuclear Free Zone Treaty, 1985
- Protocol for the Prevention of Pollution of the South Pacific Region by Dumping, 1986
- Protocol Concerning Cooperation in Combating Pollution Emergencies in the South Pacific Region, 1987
- Convention for the Prohibition of Fishing and Long Driftnets in the South Pacific, 1989
- Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (SPREP/Noumea Convention), 1990
- Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to control the Trans boundary Movement and Management of Hazardous Wastes in the South Pacific Region, 1995

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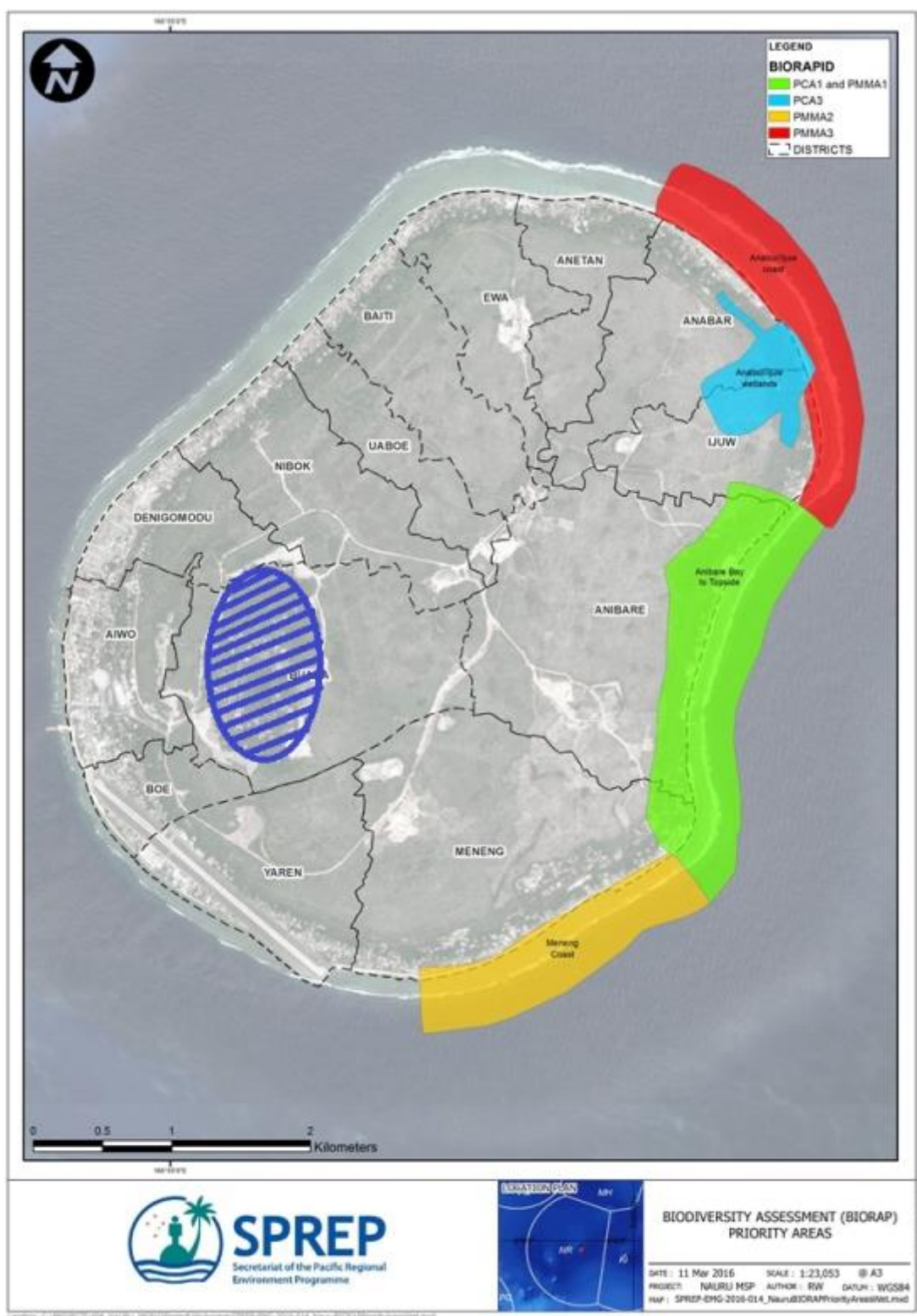
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2.17 Location map of the inventoried wetlands of Nauru

Fig.1 - Location of wetland sites covered in this inventory (Image: SPREP, 2016)



3. Wetland Accounts

For clarification on Ramsar wetland types for the following wetland accounts (section E), please refer to the Ramsar Classification System for Wetland Type at Appendix 1.

3.1 Buada Lagoon

A. Overview:

The lagoon is a landlocked, slightly brackish freshwater lagoon in the interior of a raised coral limestone island. It has an associated fertile perimeter about 12 hectares in area (Wallis & Russ, 2007) and is actually a small lake rather than a lagoon (Mckenna et. al, 2015).

B. Area and boundary:

Area: The area of the lagoon itself is approximately 3-4 hectares. However, the proposed boundary of the site described below is approximately 79 hectares.

Boundary: The proposed boundary is intended to capture the full suite of habitats within the basin of the lagoon. However, this boundary has no legal status and would be subject to consultations with the Buada Community if intended to be legalised in future.

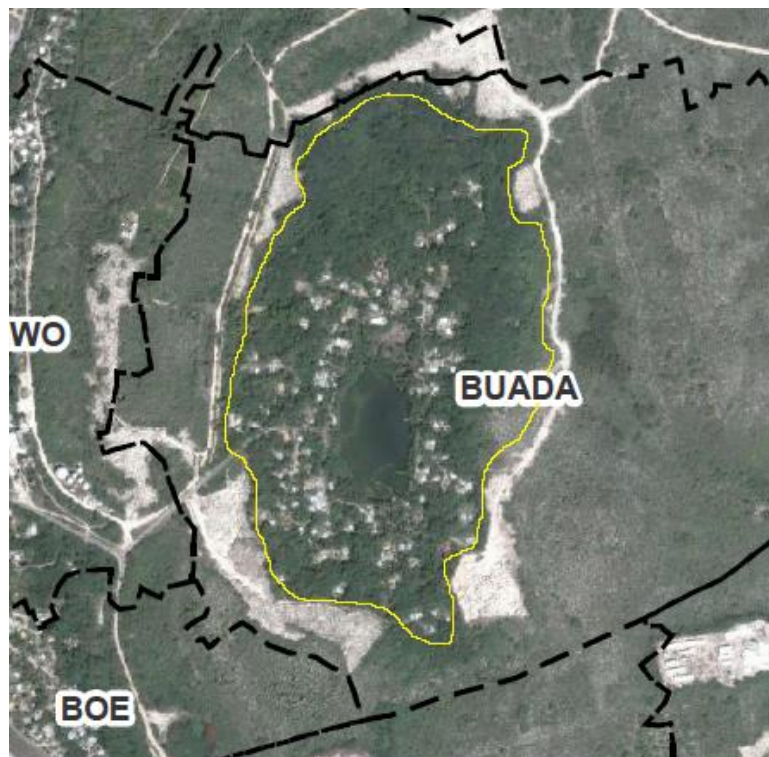
C. Location

General statement: the lagoon is situated on a fertile depression near the southwestern end of the island of Nauru, approximately 1.3km from the coast.

Coordinates: 0°32'07.2"S 166°55'20.1"E

Administrative region/s: Buada District

D. Site Maps:



E. Ramsar Wetland Types:

Dominant types:

Tp - Permanent freshwater marshes/pools; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season.

Types also present:

1 - Aquaculture (e.g., fish/shrimp) ponds

F. Geomorphic setting:

Geology: Prior to phosphate mining, the original topography of the island had been modified by karstic erosion. The island rim surrounds four interior depressions, one of which contains the Buada lagoon.

Elevation: Approximately 5 metres above sea level

G. Biogeographical region:

“Eastern Micronesian tropical moist forests” Ecoregion of the “Oceania” biogeographic realm, WWF Terrestrial Ecoregions of the World (TEOW) classification (Olson et. al, 2001)

H. Climate:

Air temperatures in Nauru are fairly constant throughout the year and so are closely related to sea-surface temperatures. The wet season usually start in November and continues to April of the next calendar year. Drier conditions occur during the months of May to October while rainfall is affected by both the Inter-tropical Convergence Zone and the South Pacific Convergence Zone. The main influence on inter-annual climate variability in Nauru is the El Nino-Southern Oscillation (Australian Bureau of Meteorology & CSIRO, 2014).

I. Soil:

The soils around Buada Lagoon are poorly developed but relatively fertile wet soils (Morrison, 1994).

J. Water regime:

The lagoon is classified as an endorheic lake, in which it has no outflow to the ocean. The average depth of the lagoon is 78 feet (24 metres) and the maximum depth is 256 feet (78 metres).

K. Water chemistry:

The lagoon is perched above the regional water table, on impermeable phosphatic alluvium. Measurements of the lagoon water levels in October 1987 indicated that it is not tidal but its level is affected by rainfall and evaporation. The lagoon is believed to become brackish with evaporation in long dry periods. The lagoon has a salinity of 2 ppt and a pH of 8 (Ranoemihardjo, 1981) and is fed by local run-off primarily during Nauru’s wet season from November to April.

L. Biota:

There is an area of marsh around the margins of the lagoon. The herbaceous vegetation is made up mostly of the native sedge (*Mariscus javanicus*), water spinach (*Ipomoea aquatica*) And in a few places, the two native littoral vines, beach morning glory (*Ipomoea pes-caprae*) and beach pea (*Vigna marina*). The invasive weed, creeping oxeye (*Sphagneticola trilobata*)

sometimes forms dense patches along with willow primrose (*Ludwiga octovalvis*). The shrub (*Clerodendrum inerme*) is also common in places as well as *Pandanus* sp. and coconut trees (*Cocos nucifera*).

The endemic Nauru reed warbler (*Acrocephalus rehsei*) was recorded during the Nauru BIORAP at the site. The Brown Noddy (*Anous stolidus*) and Black Noddy (*Anous minutus*) are an important traditional food source for locals and are caught throughout the year. The BIORAP found that these seabirds breed in trees near the lagoon, however, that their nests have been increasingly lost to mining activities near the lagoon.

M. Land use:

The lagoon was formerly used for rearing of milkfish (*Chanos chanos*). The fry were collected from the reef at low tide and released into the lagoon. There is some small scale cultivation of fruit trees, pandanus, breadfruit, bananas and vegetables in the swampy area bordering the lagoon. The land surrounding Buada Lagoon supports crops such as bananas, coconuts, breadfruit, mangoes, papaya, sour-sop, Indian mulberry, vegetables, pandanus and indigenous hardwoods such as the tomano tree (Fa'anunu, 2012). Phosphate mining activities occur around the area.

N. Pressures and trends:

In 1961 Mozambique tilapia (*Oreochromis mossambicus*) was introduced to the lagoon, however, was not accepted as a food source by the locals. It later infested traditional fish farming ponds and caused many farmers to abandon their traditional practice of raising milkfish. The FAO launched a tilapia eradication program in the lagoon in 1978 and was unsuccessful due to the physical characteristics of the lagoon. Since then there have been various other eradication programs in Buada lagoon, none of which have been successful. The lagoon has been used as a dumping ground for rubbish. Long term potential threats to the water quality of the site include contamination by cadmium (from phosphate processing), leachate from the rubbish dump and sewage from the asylum seeker processing centre (on Topside) (Wallis & Russ, 2007). Nauru is particularly prone to droughts and given the hydrological characteristics of the site, drought conditions pose a great threat to the site.

O. Land tenure and administrative authority:

Land tenure: Customary ownership

Administrative authority: Department of Commerce, Industry and Environment (DCIE)

P. Ramsar listed? No.

Q. Ramsar Criteria met:

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

R. Justification for Ramsar Criteria met:

The Buada lagoon is unique in that it is the only permanent natural freshwater lake found within the 'Eastern Micronesian tropical moist forests' biogeographic region and is therefore representative of these wetlands types within this particular biogeographic region.

S. Conservation and management status of the wetland: Not known. However, the site has been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from management-related interventions under that project, which will run from 2015-2019.

T. Current recreation and tourism: Not known

U. Existing scientific research:

Some work had been carried out on the development of fish culture in the lagoon in the past decades although it is not known whether any existing research is ongoing at the site. The IRWM diagnostic report for Nauru (Ibid, 2007) proposed comprehensive investigations of all current groundwater sources, including those near the Buada lagoon, again it is not clear whether these proposed investigations were conducted or not.

V. Management plans and monitoring programs:

There is neither a management plan nor monitoring programs in place for the lagoon at present. The site has been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from management and monitoring-related interventions under that project (2015-2019).

W. Current communication and public education programs:

The Department of Commerce, Industry and Environment is directly involved in all communications, education and public awareness activities related to or benefiting the site. The site has been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from awareness-related interventions under that project (2015-2019).

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Y. Compiler(s):

Original compiler (for 1993 edition): D. Scott

Updated by: Vainuupo Jungblut and Berrick Dowiyogo (2016).

3.2 Ijuw/Anabar Wetlands and forest PCA

A. Overview:

The site consists of open water anchialine ponds that comprise the most valuable habitats for birdlife, significant areas of mangroves and supports the richest vegetation mix of the coastal plain. It also has high scenic values and supports native vascular plants.

B. Area and boundary:

Area: the area of the site is approximately 46.1 hectares

Boundary: The boundary is a proposed boundary recommended by the 2013 Nauru BIORAP and has no legal status. Consultations with the districts of Ijuw and Anabar will be needed if proposed boundary is intended to be legalised in future.

C. Location

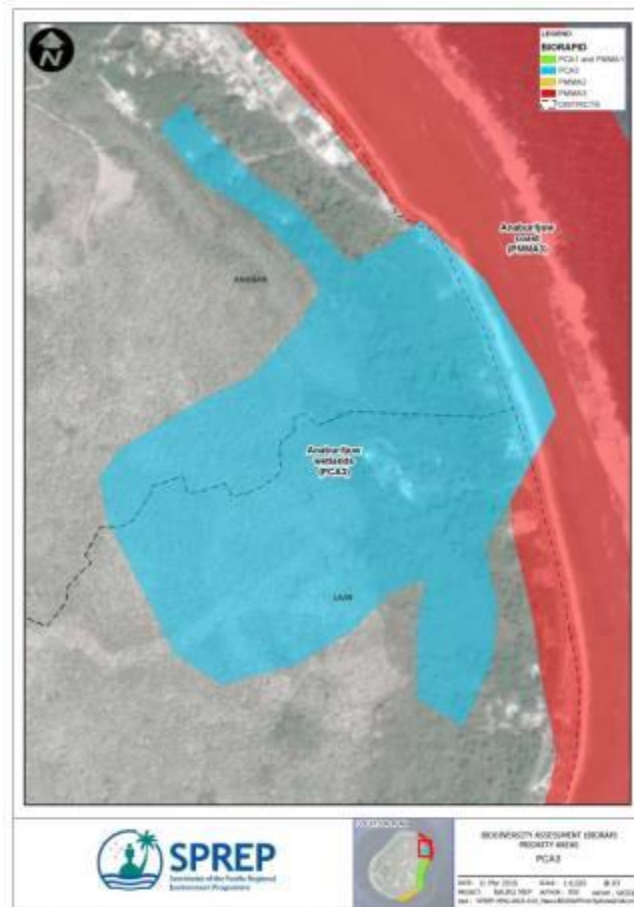
General statement:

The site lies on the north-east of the island within the two districts of Anabar and Ijuw.

Coordinates: 0°30'43.6"S 166°57'20.7"E

Administrative region/s: Ijuw and Anabar districts

D. Site Maps:



E. Ramsar Wetland Types:

Dominant types:

- I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.
- J -- Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea.

Types also present:

- E -- Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.

F. Geomorphic setting:

Geology: the geology of the site includes an extensive system of low-lying depressions or small landlocked brackish lagoons where the surface level is below the water table. The surrounding area comprises a zone of sandy or rocky beach on the seaward edge, a beach ridge or foredune, behind which is flat ground.

Elevation: sea level

G. Biogeographical region:

“Eastern Micronesian tropical moist forests” Ecoregion of the “Oceania” biogeographic realm, WWF Terrestrial Ecoregions of the World (TEOW) classification (Olson et. al, 2001)

H. Climate:

Air temperatures in Nauru are fairly constant throughout the year and so are closely related to sea-surface temperatures. The wet season usually start in November and continues to April of the next calendar year. Drier conditions occur during the months of May to October while rainfall is affected by both the Inter-tropical Convergence Zone and the South Pacific Convergence Zone. The main influence on inter-annual climate variability in Nauru is the El Nino-Southern Oscillation (Australian Bureau of Meteorology & CSIRO, 2014).

I. Soil:

The soils at the site are constantly waterlogged and are dark, rich in organic material and low in oxygen concentration.

J. Water regime:

There is a substantial amount of groundwater flows through the Nauru groundwater system which discharges around the circumference of the island. The site receives some of this groundwater discharge.

K. Water chemistry:

The site has a salinity of 10 ppt (Ranoemihardjo, 1981) with about 5,000 mg/L total dissolved solids (Jacobson and Hill, 1988).

L. Biota:

The 2013 Nauru BIORAP identified the site as having significant areas of mangroves (both *Bruguiera* and *Rhizophora* spp.) and supports the richest mix of vegetation of the coastal plain and holds native vascular plants that are amongst the most culturally useful and ecologically important (Mckenna et. al, 2015).

The BIORAP confirmed that the PCA contained stands of the oriental mangrove (*Bruguiera gymnorrhiza*) and this species was recommended by the BIORAP for conservation because of its ecological contribution to the productivity of the wetlands through the production of leaf litter and its role in purifying water. Other woody tree species commonly associated with *Bruguiera gymnorrhiza* and present within the site include *Thespesia populnea* (Portia tree, itira) and the shrubby *Clerodendrum inerme* (eamwije). Species less common in the site include the vine *Derris trifolia*, the shrub *Vitex trifolia* (derris, dagaidu), and the sedge *Mariscus javanicus* (reynbangabangā). The associated species are typical littoral strand and freshwater marsh species. The spotted mangrove (*Rhizophora stylosa*) was recorded at the site by Thaman et. al (2009), however, was not seen during the BIORAP survey.

There is currently no record of invasive flora found within the wetlands and so remains an information gap to be addressed for the site. Invasive fauna that occur within the site is the Mozambique tilapia (*Oreochromis mozambicus*), which was introduced to the wetlands in the 1960s and has since multiplied there.

M. Land use:

Land use consists mostly of residential dwellings. A vegetable and animal farm funded by the Taiwan Government operates in the area. The upper part of the site has been subject to phosphate mining for many decades and is heavily disturbed.

N. Pressures and trends:

The site has been constantly used for the illegal dumping of solid waste and discharge of sewage has also been reported to have occurred in the past although may still be occurring. Runoff from the animal farm poses a threat to the site. Mozambique Tilapia (*Oreochromis mossambicus*) was introduced in about the 1960s to control mosquito larvae and rapidly multiplied in the wetlands leading to the decline and eventual disappearance of milkfish from the wetlands. The vulnerability of Nauru to droughts means that this is another threat to the site.

Long term potential threats to the water quality of the site include contamination by cadmium (from phosphate processing), leachate from the rubbish dump and sewage from the asylum seeker processing centre (on Topside) and residences on Bottomside (Wallis & Russ, 2007).

O. Land tenure and administrative authority:

Land tenure: Customary ownership

Administrative authority: Department of Commerce, Industry and Environment (DCIE)

P. Ramsar listed? No**Q. Ramsar Criteria met:**

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

R. Justification for Ramsar Criteria met:

Criterion 1: The site is unique in that it contains the only brackish anchialine ponds within the 'Eastern Micronesian tropical moist forests' biogeographic region. The *Bruguiera* forest within the site is representative of these wetlands types within the particular biogeographic region.

S. Conservation and management status of the wetland:

The site was identified and recommended by the Nauru BIORAP as a Proposed Conservation Area/Proposed Marine Managed Area requiring conservation action. It has also been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from management and monitoring-related interventions under that project (2015-2019).

T. Current recreation and tourism:

There are currently no recreational or tourism activities occurring at the site, although the draft site management plan recommends that the feasibility of ecotourism activities at the site be assessed.

U. Existing scientific research:

The 2013 Nauru BIORAP is the most recent scientific assessment conducted at the site.

V. Management plans and monitoring programs:

A draft management plan exists for the site and is currently being finalised. There are no known monitoring programs at the site although regular water quality monitoring is recommended in the draft site management plan. The Nauru BIORAP recommended restoration and maintenance activities for the site so that it can continue to function as an important seabird breeding area. The site has been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from management and monitoring-related interventions under that project (2015-2019). It is expected that the R2R project will play a significant role in implementing the site management plan, once finalised.

W. Current communication and public education programs:

The Department of Commerce, Industry and Environment (DCIE) is directly involved in all communications, education and public awareness activities related to or benefiting the site. The site has been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from awareness-related interventions under that project (2015-2019).

X. References cited:

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Y. Compiler(s):

Vainuupo Jungblut and Berrick Dowiyogo (2016)

3.3 Anibare Bay PCA & PMMA

A. Overview:

The site comprises of both a landward and seaward part. The landward part of the site incorporates coastal coral pinnacles and forests that support rare tree species. This area contains escarpment bluffs important for taller vegetation and bird roosts. On the topside margin are original un-mined pinnacles that are critical for seabird breeding. This part of the site also supports a bird species endemic to Nauru. The seaward part consists of reef flats and uplifted coral pinnacles that are habitat for a species of insect endemic to Nauru, globally threatened coral species and a globally threatened, CITES-listed species of mollusc. The site recorded the highest species richness values of finfish of all sites surveyed during the Nauru BIORAP.

B. Area and boundary:

Area: 187.7 hectares

Boundary: The boundary is a proposed boundary recommended by the 2013 Nauru BIORAP and has no legal status. Community consultations will be needed if the proposed boundary is intended to be legalised in future.

C. Location

General statement: the site is situated on the east coast of the island of Nauru. The site is bordered by capes to the north and south, in Ijuw and Meneng districts respectively.

Coordinates: 0°31'49.5"S 166°57'03.7"E

Administrative region/s: Anibare District

D. Site Maps:



E. Ramsar Wetland Types:

Dominant types:

- A -- Permanent shallow marine waters in most cases less than six metres deep at low tide; includes sea bays and straits.
- C -- Coral reefs.

Types also present:

- E -- Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.
- D -- Rocky marine shores; includes rocky offshore islands, sea cliffs.

F. Geomorphic setting:

Geology: Anibare Bay was formed by the underwater collapse of the east side of the volcano that underlies Nauru. Analysis of bathymetric data for the island, show a well-defined, concave and arcuate failed slope, which forms an amphitheatre on the underlying seamount which supports Nauru Island. A large arc shaped block slid away from the side of Nauru and rotated out. This block extends to about 1100 m below sea level, with rough bulging landslide deposits down to 2000 metres below sea level (Maharaj, 2003).

Elevation:

Seaward part: 3m above sea level

Landward part: 30m above sea level

G. Biogeographical region:

“Eastern Micronesian tropical moist forests” Ecoregion of the “Oceania” biogeographic realm, WWF Terrestrial Ecoregions of the World (TEOW) classification (Olson et. al, 2001)

H. Climate:

Air temperatures in Nauru are fairly constant throughout the year and so are closely related to sea-surface temperatures. The wet season usually start in November and continues to April of the next calendar year. Drier conditions occur during the months of May to October while rainfall is affected by both the Inter-tropical Convergence Zone and the South Pacific Convergence Zone. The main influence on inter-annual climate variability in Nauru is the El Nino-Southern Oscillation (Australian Bureau of Meteorology & CSIRO, 2014).

I. Soil:

Soils of the seaward part of the site comprise a shallow alkaline coarse textured layer or organic material, coral sand and limestone that overlay a limestone platform. Soils of the landward side vary from shallow layers on top of limestone pinnacles composed primarily of organic material and sand or dolomite with very little phosphate to deep phosphatic soils and sandy phosphatic rock up to 2 metres deep between the pinnacles (Morrison, 1994).

J. Water regime: not known

K. Water chemistry: not known

L. Biota:

The site contains escarpment bluffs important for taller vegetation and bird roosts. On the topside margin are original un-mined pinnacles that are critical for seabird breeding. This part of the site also supports the endemic Nauru reed warbler (*Acrocephalus rehsei*). The reef flats and uplifted coral pinnacles of the site are habitat for the Nauru endemic tidal rock bug (*Coralloporis nauruensis*). The site recorded the greatest number of coral species for Nauru (27 species), three species of which are globally threatened: *Pocillopora fungiformis* (EN), *Montipora caliculata* (VU) and *Heliopora coerulea* (VU). Two individuals of the CITES appendix II-listed small giant clam (*Tridacna maxima*) were 'rediscovered' at the site during the Nauru BIORAP after having thought they were locally extinct. The white tip reef shark (*Triaenodon obesus*), listed as 'near threatened' on the IUCN redlist was also recorded at the site.

M. Land use:

Land use comprises mostly residential dwellings. A large settlement compound was erected within the area in 2014 to accommodate ex-patriate Australian workers. The area was used as a fishing facility for many years with a boat harbour, the Anibare community boat harbour constructed in 2000. The main objectives of developing the boat harbour were to provide the local fishing community with a safe and uncongested boat harbor, to provide self-employment opportunities for Nauruans in the fishing industry and to serve as a port for landing cargo during rough conditions (East-West Centre, 2000). The offices of the Nauru Fisheries and Marine Resources Authority (NFMRA) are located opposite the boat harbour.

N. Pressures and trends:

There is potential for impact on the water quality of the site from solid and liquid wastes generated by the workers settlement if not properly managed. Long term potential threats to the water quality of the site include contamination by cadmium (from phosphate processing), leachate from the rubbish dump and sewage from the asylum seeker processing centre (on Topside) and residences on Bottomside (Wallis & Russ, 2007).

O. Land tenure and administrative authority:

Land tenure: Both customary and government ownership

Administrative authority: Department of Commerce, Industry and Environment (DCIE)

P. Ramsar listed? No**Q. Ramsar Criteria met:**

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

R. Justification for Ramsar Criteria met:

Criterion 2 – the site supports 3 species of coral that are globally threatened, *Pocillopora fungiformis* (EN), *Montipora caliculata* (VU) and *Heliopora coerulea* (VU). The white tip reef shark (*Triaenodon obesus*), listed as 'near threatened' on the IUCN redlist, the

internationally 'vulnerable' small giant clam (*Tridacna maxima*), the endemic Nauru reed warbler.

Criterion 3 – the site supports populations of two species endemic to Nauru unique to the biogeographic region: the tidal rock bug (*Corallocoris nauruensis*) and the Nauru reed warbler (*Acrocephalus rehsei*).

S. Conservation and management status of the wetland:

The site was identified and recommended by the Nauru BIORAP as a Proposed Conservation Area/Proposed Marine Managed Area requiring conservation action. The site has been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from management-related interventions under that project (2015-2019).

T. Current recreation and tourism:

The site is popular with tourists and naturalists and a variety of low impact recreational activities occur there. There are no hotels or resorts within the site. An artificial commercial fishing area (Anibare community boat harbour) was constructed in 2000.

U. Existing scientific research:

The 2013 Nauru BIORAP is the most recent scientific assessment conducted at the site. The Nauru Fisheries and Marine Resources Authority (NFMRA) conduct periodic surveys at the site to determine the status and health of populations of inshore fish species, invertebrates and corals.

V. Management plans and monitoring programs:

There is currently no management plan for the site although the Nauru Fisheries Authority conducts periodic monitoring within the inshore area of the site. The site has been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from management-related interventions under that project (2015-2019).

W. Current communication and public education programs:

The Department of Commerce, Industry and Environment (DCIE) is directly involved in all communications, education and public awareness activities related to or benefiting the site. The site will benefit from awareness-related interventions under the UNDP Nauru Ridge to Reef Project (2015-2019).

X. References cited:

Australian Bureau of Meteorology and CSIRO (2014). *Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report*, Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation, Melbourne, Australia.

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Y. Compiler(s):

Vainuupo Jungblut and Berrick Dowiyogo (2016)

3.4 Meneng Reef flats and Ocean front PMMA

A. Overview:

The site combines with and complements the nearshore environments of the adjacent Anibare Bay and northern Ijuw/Anabar PMMA. In addition to the reef flat, the site includes a comparatively high number of coral and fish species.

B. Area and boundary:

Area: 100.2 hectares

Boundary: The boundary is a proposed boundary recommended by the 2013 Nauru BIORAP and has no legal status. Community consultations will be needed if the proposed boundary is intended to be legalised in future.

C. Location

General statement: the site is located on the south east coast of the island and is bordered by the Anibare District to the northeast and the Yaren District to the west.

Coordinates: 0°32'59.6"S 166°56'33.4"E

Administrative region/s: Meneng District

D. Site Maps:



E. Ramsar Wetland Types:

Dominant types:

A -- Permanent shallow marine waters in most cases less than six metres deep at low tide; includes sea bays and straits.

C -- Coral reefs.

Types also present:

E -- Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.

F. Geomorphic setting:

Geology: the site comprises a zone of sandy or rocky beach on the seaward edge, a beach ridge or foredune, behind which is flat ground. The inshore reef platform consists of a number of upraised jagged coral outcrops which are fully exposed at low tide.

Elevation: Sea level

G. Biogeographical region:

“Eastern Micronesian tropical moist forests” Ecoregion of the “Oceania” biogeographic realm, WWF Terrestrial Ecoregions of the World (TEOW) classification (Olson et. al, 2001)

H. Climate:

Air temperatures in Nauru are fairly constant throughout the year and so are closely related to sea-surface temperatures. The wet season usually start in November and continues to April of the next calendar year. Drier conditions occur during the months of May to October while rainfall is affected by both the Inter-tropical Convergence Zone and the South Pacific Convergence Zone. The main influence on inter-annual climate variability in Nauru is the El Nino-Southern Oscillation (Australian Bureau of Meteorology & CSIRO, 2014).

I. Soil:

Soils of the site comprise a shallow (only about 25 cm deep), alkaline, coarse-textured layer of organic matter, coral sand, and limestone fragments that overlay a limestone platform. They contain more coral gravel than sand in the lower horizons. Fertility is, therefore, highly dependent on organic matter for the concentration and recycling of plant nutrients, lowering soil pH, and for soil water retention in the excessively well-drained soils (Morrison 1994).

J. Water regime: not known

K. Water chemistry: not known

L. Biota:

The internationally endangered coral species *Pocillopora fungiformis* and the vulnerable coral species *Heliopora coerulea* were recorded at the site during the 2013 Nauru BIORAP

M. Land use:

Land use comprises mainly residential dwellings. An accommodation compound for expatriate Australian workers was erected within the area in 2014. Nauru's major hotel, the Meneng hotel is located within the site. Small scale artisanal and subsistence fishing and reef gleaning occur within the site.

N. Pressures and trends:

There is potential for impact on the site from solid and liquid wastes generated by the hotel and workers settlement if not properly managed. Long term potential threats to the water quality of the site include contamination by cadmium (from phosphate processing), leachate from the rubbish dump and sewage from the asylum seeker processing centre (on Topside) and residences on Bottomside (Wallis & Russ, 2007).

O. Land tenure and administrative authority:

Land tenure: Both customary and government

Administrative authority: Department of Commerce, Industry and Environment (DCIE)

P. Ramsar listed? No

Q. Ramsar Criteria met:

Criterion 1 - A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

R. Justification for Ramsar Criteria met:

Criterion 1 – two globally threatened coral species occur within the site, *Pocillopora fungiformis* (EN) and *Heliopora coerulea* (VU).

S. Conservation and management status of the wetland:

The site was identified and recommended by the Nauru BIORAP as a Proposed Conservation Area/Proposed Marine Managed Area requiring conservation action. It has also been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from conservation and management-related interventions under that project (2015-2019).

T. Current recreation and tourism:

The area is used for subsistence and artisanal fishing and reef gleaning by members of the community. The Meneng hotel is located within the site and attracts a steady amount of both business travellers and tourists all year round.

U. Existing scientific research:

The 2013 Nauru BIORAP is the most recent scientific assessment conducted at the site. The Nauru Fisheries and Marine Resources Authority (NFMRA) conduct periodic surveys at the site to determine the status and health of populations of inshore fish species, invertebrates and corals.

V. Management plans and monitoring programs:

There is currently no management plan for the site although the Nauru Fisheries Authority conduct periodic monitoring within the inshore area of the site. The site has been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from management and monitoring-related interventions under that project (2015-2019).

W. Current communication and public education programs:

The Department of Commerce, Industry and Environment (DCIE) is directly involved in all communications, education and public awareness activities related to or benefiting the site. It has also been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from awareness-related interventions under that project (2015-2019).

X. References cited:

Australian Bureau of Meteorology and CSIRO (2014). *Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report*, Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation, Melbourne, Australia.

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Thaman, R.R, et. al 2009. Plants of Nauru: guide to the indigenous and introduced plants of particular cultural importance and weeds of potential threat to Nauru – Suva, Fiji: Forests and Trees Programme, Secretariat of the Pacific Community.

Wallis, .I., Russ, .L., (Nov 2007). National Integrated Water Resource Management Diagnostic Report – Nauru (PDF). SOPAX Miscellaneous Report 640.South Pacific Applied Geoscience Commission.

Y. Compiler(s):

Vainuupo Jungblut and Berrick Dowiyogo

3.5 Ijuw/Anabar Reef flats and Ocean front PMMA

A. Overview:

This marine area captures 40 percent of the coastline of Nauru and forms a vital marine management area. The area supports marine invertebrates including snails, clams, sea cucumbers and crustaceans on the reef flat and slope which are considered to be less heavily harvested at this site. The site links inland to the Ijuw/Anabar wetlands and forests PCA.

B. Area and boundary:

Area: 120.6 hectares

Boundary: The boundary is a proposed boundary recommended by the 2013 Nauru BIORAP and has no legal status. Community consultations will be needed if the proposed boundary is intended to be legalised in future.

C. Location

General statement: the site is located on the north east corner of the island bordered by the Anetan district to the west and the Anibare district to the south.

Coordinates: 0°30'41.1"S 166°57'25.7"E

Administrative region/s: Ijuw & Anabar Districts

D. Site Maps:



E. Ramsar Wetland Types:

Dominant types:

A -- Permanent shallow marine waters in most cases less than six metres deep at low tide; includes sea bays and straits.

C -- Coral reefs.

Types also present:

E -- Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.

F. Geomorphic setting:

Geology: the geology comprises a zone of sandy or rocky beach on the seaward edge, a beach ridge or foredune, behind which is flat ground.

Elevation: sea level

G. Biogeographical region:

“Eastern Micronesian tropical moist forests” Ecoregion of the “Oceania” biogeographic realm, WWF Terrestrial Ecoregions of the World (TEOW) classification (Olson et. al, 2001)

H. Climate:

Air temperatures in Nauru are fairly constant throughout the year and so are closely related to sea-surface temperatures. The wet season usually start in November and continues to April of the next calendar year. Drier conditions occur during the months of May to October while rainfall is affected by both the Inter-tropical Convergence Zone and the South Pacific Convergence Zone. The main influence on inter-annual climate variability in Nauru is the El Nino-Southern Oscillation (Australian Bureau of Meteorology & CSIRO, 2014).

I. Soil:

Soils of the site comprise a shallow (only about 25 cm deep), alkaline, coarse-textured layer of organic matter, coral sand, and limestone fragments that overlay a limestone platform. They contain more coral gravel than sand in the lower horizons. Fertility is, therefore, highly dependent on organic matter for the concentration and recycling of plant nutrients, lowering soil pH, and for soil water retention in the excessively well-drained soils (Morrison 1994).

J. Water regime: Not known

K. Water chemistry: Not known

L. Biota:

The ‘vulnerable’ coral species *Heliopora coerulea* and the ‘near threatened’ white tip reef shark (*Triaenodon obesus*) are noteworthy species that occur within the site. The ‘near threatened’ Grey-tailed Tattler (*Tringa brevipes*) has also been recorded during high tide at the site.

M. Land use:

Land use consists mostly of residential dwellings. The inshore area is used for subsistence and small scale artisanal fishing and reef gleaning. A vegetable and animal farm funded by the Taiwan Government operates in the area.

N. Pressures and trends:

Runoff from the animal farm poses a significant threat to the site if not properly managed. Long term potential threats to the water quality of the site include contamination by cadmium (from phosphate processing), leachate from the rubbish dump and sewage from the asylum seeker processing centre (on topside) and residences on the bottomside (Wallis & Russ, 2007).

O. Land tenure and administrative authority:

Land tenure: Government owned

Administrative authority: Department of Commerce, Industry and Environment (DCIE).

P. Ramsar listed? No

Q. Ramsar Criteria met:

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

R. Justification for Ramsar Criteria met:

The site supports a number of species that are globally threatened including the 'vulnerable' coral species *Heliopora coerulea*, the 'near threatened' white tip reef shark (*Triaenodon obesus*) and the 'near threatened' Grey-tailed Tattler (*Tringa brevipes*)

S. Conservation and management status of the wetland:

The site was identified and recommended by the Nauru BIORAP as a Proposed Marine Managed Area requiring conservation action recognising that it would benefit from protecting and managing important habitat and species, further enhancing local populations of targeted marine species as well as other targeted species, such as seabird species important for food security of the local population (Brown and Black noddies). It has also been identified as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from conservation and management-related interventions under that project (2015-2019).

T. Current recreation and tourism:

The Meneng hotel is located within the site and attracts a steady amount of both business travellers and tourists all year round.

U. Existing scientific research:

The 2013 Nauru BIORAP is the most recent scientific assessment conducted at the site. The Nauru Fisheries and Marine Resources Authority (NFMRA) conduct periodic surveys at the site to determine the status and health of populations of inshore fish species, invertebrates and corals.

V. Management plans and monitoring programs:

There is currently no management plan for the site although the Nauru Fisheries Authority conducts periodic monitoring within the inshore area of the site. The site has been identified

as a pilot site under the UNDP Nauru Ridge-to-Reef (R2R) project and will benefit from management and monitoring-related interventions under that project (2015-2019).

W. Current communication and public education programs:

The Department of Commerce, Industry and Environment (DCIE) is directly involved in all communications, education and public awareness activities related to or benefiting the site. The site will benefit from awareness-related interventions under the UNDP Nauru Ridge to Reef Project (2015-2019).

Y. References cited:

Australian Bureau of Meteorology and CSIRO (2014). *Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports. Pacific-Australia Climate Change Science and Adaptation Planning Program Technical Report*, Australian Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation, Melbourne, Australia.

Jacobson, G. and Hill, P.J.1988. Hydrogeology and Groundwater Resources of Nauru Island, Central Pacific Ocean. Bureau of Mineral Resources, Government of Australia, Canberra.

McKenna, Sheila. A., et.al 2015. Rapid Biodiversity Assessment of Republic of Nauru, Apia, Samoa SPREP.

Olson, D. M., et. al 2001. *Terrestrial ecoregions of the world: a new map of life on Earth*. Bioscience 51(11):933-938.

Ranoemihardjo, B.S. 1981. Nauru: eradication of Tilapia from fresh and brackish water lagoons and ponds with a view to promoting milkfish culture. Report prepared for the Tilapia Eradication Project. FAO, Rome, Italy.

Thaman, R.R, et. al 2009. Plants of Nauru: guide to the indigenous and introduced plants of particular cultural importance and weeds of potential threat to Nauru – Suva, Fiji: Forests and Trees Programme, Secretariat of the Pacific Community.

Wallis, .I., Russ, .L., (Nov 2007). National Integrated Water Resource Management Diagnostic Report – Nauru (PDF). SOPAC Miscellaneous Report 640. South Pacific Applied Geoscience Commission.

Z. Compiler(s):

Vainuupo Jungblut and Berrick Dowiyogo (2016)

Appendix 1**Ramsar Classification System for Wetland Type**

The codes are based upon the Ramsar Classification System for Wetland Type as approved by Recommendation 4.7 and amended by Resolutions VI.5 and VII.11 of the Conference of the Contracting Parties. The categories listed herein are intended to provide only a very broad framework to aid rapid identification of the main wetland habitats represented at each site.

To assist in identification of the correct Wetland Types to list in section 19 of the RIS, the Secretariat has provided below tabulations for Marine/Coastal Wetlands and Inland Wetlands of some of the characteristics of each Wetland Type.

Marine/Coastal Wetlands

- A -- Permanent shallow marine waters in most cases less than six metres deep at low tide; includes sea bays and straits.
- B -- Marine subtidal aquatic beds; includes kelp beds, sea-grass beds, tropical marine meadows.
- C -- Coral reefs.
- D -- Rocky marine shores; includes rocky offshore islands, sea cliffs.
- E -- Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.
- F -- Estuarine waters; permanent water of estuaries and estuarine systems of deltas.
- G -- Intertidal mud, sand or salt flats.
- H -- Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.
- I -- Intertidal forested wetlands; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.
- J -- Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea.
- K -- Coastal freshwater lagoons; includes freshwater delta lagoons.
- Zk(a) – Karst and other subterranean hydrological systems, marine/coastal

Inland Wetlands

- L -- Permanent inland deltas.
- M -- Permanent rivers/streams/creeks; includes waterfalls.
- N -- Seasonal/intermittent/irregular rivers/streams/creeks.
- O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes.
- P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes.
- Q -- Permanent saline/brackish/alkaline lakes.
- R -- Seasonal/intermittent saline/brackish/alkaline lakes and flats.
- Sp -- Permanent saline/brackish/alkaline marshes/pools.
- Ss -- Seasonal/intermittent saline/brackish/alkaline marshes/pools.
- Tp -- Permanent freshwater marshes/pools; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season.
- Ts -- Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.
- U -- Non-forested peatlands; includes shrub or open bogs, swamps, fens.
- Va -- Alpine wetlands; includes alpine meadows, temporary waters from snowmelt.
- Vt -- Tundra wetlands; includes tundra pools, temporary waters from snowmelt.

- W --Shrub-dominated wetlands; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils.
Xf --Freshwater, tree-dominated wetlands; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils.
Xp --Forested peatlands; peatswamp forests.
Y -- Freshwater springs; oases.
Zg --Geothermal wetlands
Zk(b) – Karst and other subterranean hydrological systems, inland

Note: “floodplain” is a broad term used to refer to one or more wetland types, which may include examples from the R, Ss, Ts, W, Xf, Xp, or other wetland types. Some examples of floodplain wetlands are seasonally inundated grassland (including natural wet meadows), shrublands, woodlands and forests. Floodplain wetlands are not listed as a specific wetland type herein.

Human-made wetlands

- 1 -- Aquaculture (e.g., fish/shrimp) ponds
2 -- Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha).
3 -- Irrigated land; includes irrigation channels and rice fields.
4 -- Seasonally flooded agricultural land (including intensively managed or grazed wet meadow or pasture).
5 -- Salt exploitation sites; salt pans, salines, etc.
6 -- Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha).
7 -- Excavations; gravel/brick/clay pits; borrow pits, mining pools.
8 -- Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.
9 -- Canals and drainage channels, ditches.
Zk(c) – Karst and other subterranean hydrological systems, human-made