



PACIFIC ADAPTATION TO CLIMATE CHANGE

PALAU PROJECT PROPOSAL

Developed in collaboration with the Office of Environmental
Response and Coordination, Palau

TABLE OF CONTENT

PROJECT SUMMARY-----	3
I. INTRODUCTION -----	6
1.1 The need for Adaptation to Climate Change -----	6
1.2 Objective of Pacific Adaptation to Climate Change (PACC) -----	7
1.3 Scope of the Proposal -----	8
II. GENERAL OVERVIEW -----	8
2.1 Situation Analysis -----	8
2.2 Climate change vulnerabilities -----	11
2.3 General background -----	11
III. Baseline Scenario and PACC Intervention -----	16
3.1 Current and Future Vulnerability-----	16
3.2 Current development efforts-----	17
3.3 Gaps-----	17
3.4 PACC Intervention-----	18
PART IV. PALAU PACC PROJECT-----	20
4.1 Project Purpose-----	20
4.2 Project Outcomes-----	20
4.3 Project Outputs-----	20
4.4 Implementation Arrangements for PACC-----	25
4.5 Project Management Unit-----	26
4.6 Budget and Co-financing Sources-----	26
4.7 Monitoring and Evaluation-----	26
Figure 1.0	
Figure 2.0	
Figure 3.0	
Figure 4.0	
Figure 5.0	
Annex 1.0.	
References	

PACC PROJECT SUMMARY

- I. Country – Palau
- II. Title – Palau's 'Land-to-Sea' Approach to Climate Change Adaptation Project
- III. National Executing Body – The Office of Environmental Response and Coordination, Office of the President of the Republic of Palau
- IV. Cost of Project – USD 800,000 Co-Financing – USD 2,400,000
- V. Funding Agency – Global Environment Facility (GEF)
- VI. Implementing Agency – United Nations Development Programme (UNDP)
- VII. Background to the Consultation

Palau became the thirteenth country to be part of the Pacific Adaptation to Climate Change project on the 10th of December 2007. As a result of this development, an in-country consultation was carried out with government agencies, quasi-government organizations, and non-state actors as well as members of State governments and the Ngatpang community in Palau on the 28th of January to the 8th of February 2008.

This project proposal is a result of the consultation and it details the climate change vulnerabilities faced by Marshall Islands and proposes a way forward in terms of addressing the issues using national and PACC project resources to build current and future resilience. The consultation was facilitated by the Secretariat of the Pacific Regional Environment (SPREP), the implementation partner of the UNDP-GEF PACC project. Prior to the consultation, SPREP was informed by Palau through the Office of the Environmental Response and Coordination that Palau would be focusing on food production and food security as the focal sector to be addressed by PACC. It was reported that other donor support were already flowing towards water and integrated coastal management, the other two focal sectors of the PACC project.

The consultation was largely based on two critical questions; i) what are the baseline adaptation activities in the food production and food security sector that Palau have already undertaken on climate change adaptation; and ii) what further activities should be addressed by the PACC project that would assist Palau increase its resilience to current and future changes in climate.

This proposal is divided into two main parts. Part 1 looks at the background information particularly the climate change vulnerabilities that Palau is currently facing and rationale to the proposed course of action and Part 2 looks at the detail project proposal for Palau to be implemented by the PACC project.

VIII. The Pacific Adaptation to Climate Change (PACC) project

The principal objective of the PACC is to facilitate the implementation of long-term adaptation measures to increase the resilience of a number of key development sectors in the Pacific island countries to the adverse impacts of climate change. A framework for PACC (PACC framework) will be developed through a consultative process involving all relevant stakeholders (including national governments and their respective agencies, institutions, departments and ministries, and non-government organizations, where appropriate, CROP agencies, donor partners, private sector, where appropriate, and others deemed necessary). The PACC framework will guide the implementation of the PACC at the national (including community and/or village) and regional levels.

IX. Eligibility to the GEF

The Republic of Palau will be part of 12 other Pacific Island countries that would be accessing the Special Climate Change Fund (SCCF) of the GEF. Palau has ratified the United Nations Framework Convention on Climate Change (UNFCCC) in March 2000 and the Kyoto Protocol (KP). It is therefore, eligible under the guidance and procedures of the GEF to access GEF resources and financing for its adaptation programmes. The PACC project for Palau is also consistent with the Palau Master Plan 1999 and the policies and plans of the Ministry of Resources and Development and the Bureau of Agriculture. The PACC project has been endorsed by the GEF operational focal point and a letter to that effect has been sent to the GEF and SPREP.

X. Linkages to regional/national sustainable development priorities

The PACC project is very closely aligned to the Palau Master Plan, which details the policy direction for Palau in terms of development. A key component of the plan is environment sustainability to ensure development is sustainable. Other key documents include the Bureau of Agriculture's action plan on food production and food security, the State of Ngatpang's aquaculture policy and development plans etc. At the regional level, the work of the PACC fits in very well with the Pacific Islands Framework Convention on Climate Change which is a regional document detailing priorities of Pacific Island countries on climate change.

There is also a clear complementarity between the PACC and two GEF projects that are also being implemented through UNDP in Palau. One is the Integrated Water Resources Management (IWRM) that looks at promoting proper watershed management practices. The promotion of proper watershed practices will reduce land degradation while preserving ecosystem stability, functions, and services such as soil and watershed protection, water purification and nutrient retention. The project proposes to demonstrate proper maintenance and management of a critical water source through re-introduction of native plant species to help stabilize the soil, use of bioindicators as low-cost monitoring tools, and proper

mitigation of road drainage, with outcomes to be replicated within the Republic and the region. The demonstration project will be in the Ngerikiil Watershed in the State of Airai, Republic of Palau.

The second GEF project is the Oceanic Fisheries project, which deals with deep ocean fisheries management.

I. INTRODUCTION

1.1 The need for adaptation to climate change

1. It is recognized by the International Panel on Climate Change (IPCC) that developing countries particularly Small Island Developing States are particularly vulnerable to climate change (IPCC AR4, 2007). The future of many Pacific Island nations is already being shaped by climate change events. According to McKenzie et al (2005), the total replacement costs for Cyclone Heta in Niue were estimated to be almost 200 percent of the annual GDP. The effects of climate change, and the need for concerted and coordinated action to address its effects, are no longer a matter of political debate. For some Pacific Island countries, it is a question of survival.

2. Pacific island countries are among the most vulnerable nations in the world to the impacts of extreme weather events. The most substantial impacts of climate change include losses of coastal infrastructure and land, more intense cyclones and droughts, failure of subsistence crops and coastal fisheries, losses of coral reefs and mangroves, and the spread of certain diseases. Climate change will affect the Pacific way of life and the sustainable development of many islands in profound ways unless an effort is made to start planning on how adaptation to these changes need to be addressed.

3. Generally for the Pacific region, climate changes are expected to include:

i) Increased average air and ocean temperatures – which will have impacts on precipitation, sea levels, winds, tides and other key climate conditions.

ii) Increases in sea-surface temperature – which have been linked to increases in the frequency and severity of tropical cyclones.

iii) Sea-level rise – as ocean temperatures rise, thermal expansion of ocean waters leads to a rise in sea levels causing loss of land, coastal erosion and increased salt intrusion.

iv) Greater climate extremes – e.g. droughts, storms and floods.

v) Changes in rainfall – the effect will vary across different island countries, and will impact on water resource management, particularly in areas dependent on shallow aquifers and rainwater harvesting.

4. The impact of climate change in the Pacific Islands region is likely to be more severe than in other areas because of the unique geographical, socio-cultural and economic characteristics of PICTs. These impacts are likely to include the following:

4.1 Agriculture sector – Food insecurity concerns resulting from reduced food production due to salt-water intrusion and soil salinity; excessive rainfall;

increased flooding; soil erosion; and shift of habitat for certain crops that will grow only in cooler mountain environments, which will shift gardens further away from human settlements.

- 4.2 *Fisheries sector* – Tuna Fisheries: While tuna are adaptable to climate variability, changing sea temperatures will influence total stocks and migratory patterns, shifting tuna away from current migratory routes. This will have serious consequences for tuna fisheries in most of the member PICTs. Coastal Fisheries: the combination of increasing sea-temperatures and sea-level rise will result in changes to coastal circulation patterns, thereby affecting nutrient supply, lagoon flushing, coastal erosion, and possibly ocean acidity and coral bleaching. These will affect both the reef building capacity of corals as well as the spawning cycles of reef fishes and invertebrates. Increased incidence of coral bleaching and ciguatera fish poisoning will also be seen.
- 4.3 *Human settlements* – the majority of population settlement and critical infrastructure in most PICTs is located in coastal areas. Villages, towns, cities, and key infrastructure such as hospitals, schools, power plants and distribution systems, etc. are mostly located in coastal areas. In an increasingly urbanized Pacific, with many people residing in informal settlements, under very crowded conditions, poor housing and limited access to basic amenities, climate change is expected to place major burden on already stressed urban management.
- 4.4 *Health sector* – climate change and environmental factors constitute a major determinant of health, either directly by causing an increasing incidence of vector-borne and environment-linked diseases, lack of available clean water or indirectly by preventing access to, or destroying, health facilities.
- 4.5 *Potential extinction of sovereign states* – some of the Pacific’s most beautiful countries, in particular atoll countries, are at grave risk in the long term if the current trends observed in extreme weather conditions and sea-level rise continue along the projected path within the next century.

1.2 Objective of the PACC

5. Given the foregoing urgency for the need for adaptation to climate change in the Pacific island countries, a Pacific Adaptation to Climate Change (PACC) has been developed to assist with the implementation of adaptation measures in 13 countries of the region. Palau, as one of the participant countries will participate in the PACC to implement adaptation measures to enhance its resilience to the adverse impacts of climate change in the longer term.

6. The principal objective of the PACC is to facilitate the implementation of long-term adaptation measures to increase the resilience of a number of key development sectors in the Pacific island countries to the adverse impacts of climate change. A framework for PACC (PACC framework) will be developed through a consultative process involving all relevant stakeholders (including national governments and their respective agencies, institutions, departments and ministries, and non-government organizations, where

appropriate, CROP agencies, donor partners, private sector, where appropriate, and others deemed necessary). The PACC framework will guide the implementation of the PACC at the national (including community and/or village) and regional levels.

1.3 Scope of proposal

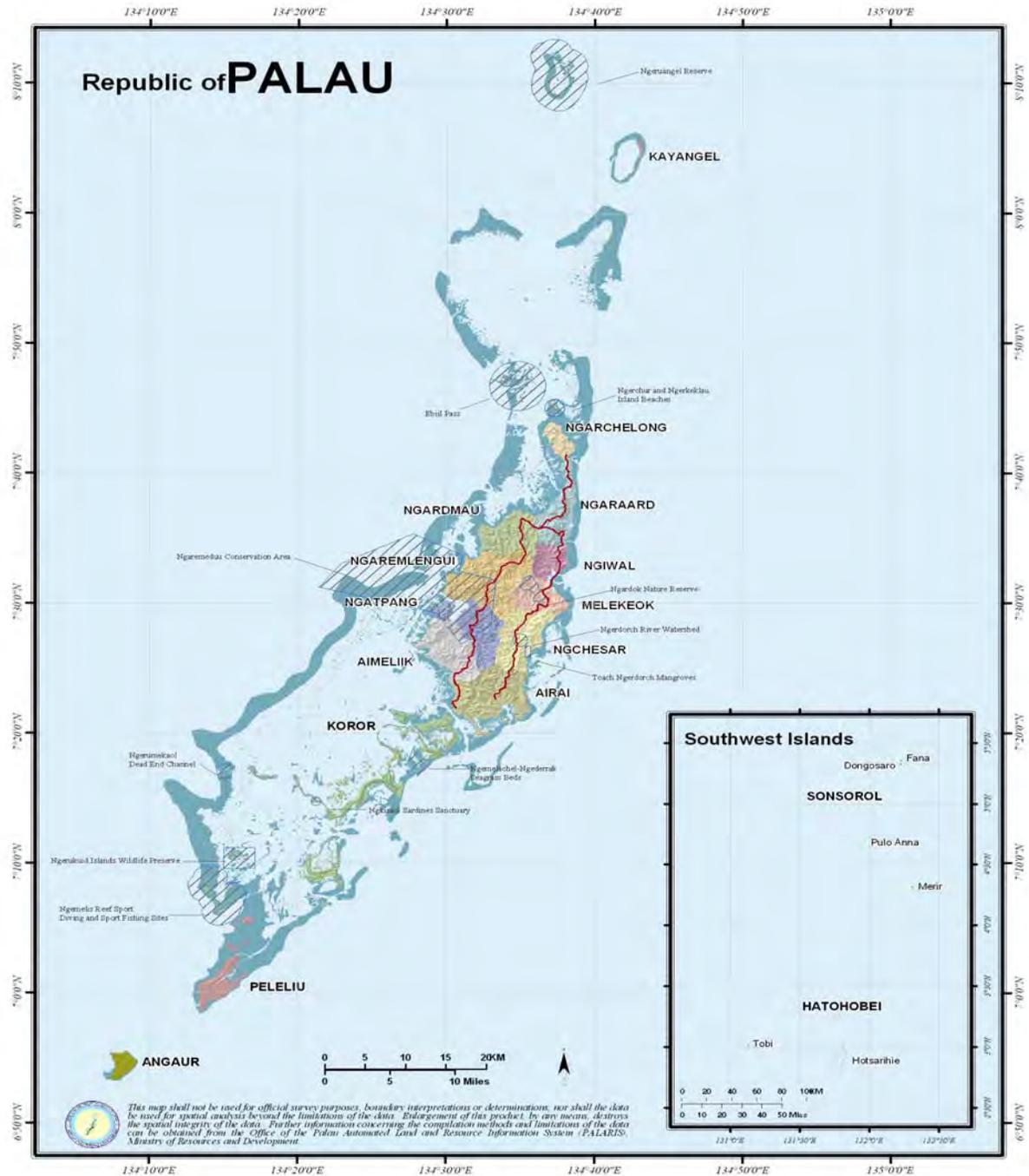
7. As one the of the key outcomes of the in-country consultations is to determine detailed adaptation activities and baselines in each country, this report provides the outcomes of the Palau in-country consultations on PACC which were held from the 28th of January to 08th February, 2008. The report is divided into two main sections: section I outlines the urgency for adaptation to climate change in SIDS, building on the IPCC fourth assessment report; section 2 provides a general overview of the climate change and development situation (situation analysis) in Palau covering issues relating to assessment of impacts of climate change on the biophysical and human systems and stakeholder analysis; section 3 covers sectoral analysis with regard to a methodology and/or a criteria used to select a priority sector for adaptation intervention, institutional and development baselines within the priority sector as well as the analysis of the impacts of climate change within the priority sector; section 4 provides information of the delivery mechanism for full-sized project implementation of PACC-Palau and section 5 covers the project goals, outcomes, outputs and activities. The letter of endorsement for co-financing and list of individuals/experts and their respective institutions consulted during the in-country consultation are appended as annexes in section 6.

II. GENERAL OVERVIEW

2.1 Situation Analysis

8. The Republic of Palau is an archipelago in the Western Pacific located between 70 North latitude and 134° East longitude. Palau consists of over 500 islands covering a land area of 535 sq km. Out of the hundreds of islands in the Republic, only 9 are currently inhabited (Figure 1.0).

Figure 1.0 MAP OF PALAU



9. In Palau, as is the case for most Pacific Island countries, the climate is influenced by a number of factors such as trade wind regimes, the paired Hadley cells and Walker circulation, seasonally varying convergence zones such as the South Pacific Convergence Zone (SPCZ), semi-permanent subtropical high-pressure belts, and zonal westerlies to the south, with the El Niño Southern Oscillation (ENSO) as the dominant mode of year to year variability (Fitzharris, 2001; Folland et al., 2002; Griffiths et al., 2003). The Madden-Julian Oscillation (MJO) also is a major mode of variability of the tropical atmosphere-ocean system of the Pacific on times scales of 30 to 70 days (Revell, 2004), while the leading mode with decadal time-scale is the Interdecadal Pacific Oscillation (IPO) (Salinger et al., 2001). A number of studies suggest the influence of global warming could be a major factor in accentuating the current climate regimes and the changes from normal that come with ENSO events (Hay et al., 2003; Folland et al., 2003).

10. Recent studies in the southern Pacific region show that the annual and seasonal ocean surface and island air temperatures have increased by 0.6 to 1.0oC since 1910 throughout a large part of the South Pacific, southwest of the South Pacific Convergence Zone (SPCZ) where as decadal increases of 0.3 to 0.5oC in annual temperatures are only widely seen since the 1970, preceded by some cooling after the 1940, which is the beginning of the record, to the northeast of the SPCZ (Salinger, 2001; Folland *et al.*, 2003).

11. Palau's climate is tropical with a mean annual rainfall of around 370 centimeters. The heaviest rains are due to monsoonal storms that generally occur between the middle of June through August. The highest daily rainfall occurred in April 1979 with 43 centimeters. There averages 263 days with rainfall greater than 0.025 centimeter. The average monthly rainfall for July is 45.8 centimeters. Pre-WWII Japanese Forestry rainfall records show a slightly higher rainfall amount than the 30 years of Koror records.

12. Prevailing winds are the northeastern trade winds, with a mean wind speed of 9.65 kilometer per hour. The average annual temperature is 27.6 degrees Celsius. The average annual maximum temperature is 30.9 degrees Celsius and the average annual minimum temperature is 24.2 degrees Celsius. The lowest temperature occurred in January 1998 at 20.6 degrees Celsius and the highest was 35 degrees Celsius on June 1976. There are approximately 72 days where the temperature goes above 32.2 degrees Celsius (90°F). Palau has moderate levels of sunshine. The normal relative humidity averages 85 percent. June is slightly higher with 86 percent and April being the driest with 83 percent.

13. Palau lies outside of the "Typhoon belt" of the northern equatorial Pacific. However, winds pick-up speed during typhoon events that veer close to the islands. Maximum winds recorded were during typhoon events that approached within 150 kilometers of Babeldaob. The major typhoons include: Gelda, December 15, 1959 with 140-knot winds (260 km/h); Louise, November 16, 1964, with 100-knot winds (185 km/h); Opal, December 11, 1964, with 140-knot winds (260 km/h); and Mike, November 10, 1990, with 135 knot winds (250 km/h) (NOAA National Weather Service, Guam).

14. In 2001, Tropical Storm Utor, with wind speeds of up to 120 km/hr, caused minor damage to infrastructure, mainly due to minor landslides caused by excessive rains. El Niño of 1998 bleached 30% of Palau's coral reefs in some areas and in extreme cases 100% of the corals were bleached. During this time, the lowest amount of rainfall was recorded and streams dried up while larger rivers had low flow. Water hours were applied to public water supply systems due to lower intake rates from rivers.

2.2 Climate change vulnerabilities

15. According to a draft Second National Communication report provided to the PACC Team, Palau is outside of the main tropical cyclone track of the northwestern Pacific, however it was directly affected by Tropical Storm Utor in 2001. Also, the effect of EL Nino brings drought to Palau and according to some estimates, it extends the dry season from its usual 1.5 months to 2-3 months. In such cases, crops are seriously affected and livelihood in general. The period after this, which is the La Nina, higher than average rainfall is expected along with more intense and more frequent storms.

16. According to the 2nd NATCOM assessment results, saltwater inundation is a serious problem that is plaguing farmers in Palau. Even though agriculture in Palau has been relative small in scale, contributing only 6.2% of the GDP, there are a lot of small-scale taro farms dispersed around the main island of Babeldaob. Cultivation of taro is critical to Palau's socio-economic development and cultural as well as religious obligations. It is usually cultivated very close to the sea and faces the threat of saltwater inundation and wave overtopping.

17. During field visit discussions, the Chairman of Ngatpang Maritime Authority Mr. Selestino Otong (Pers Com, 2008) he pointed out that over the years, farmers have also experienced bleaching in clams they are breeding out in the reefs. This may be caused by changes in sea surface temperature as well as salinity of the salt water. According to Mr. Selestino this may have impacted on growth rate of clams, mud crabs and grouper fish they are farming in the area. These projects are directly subjected to ocean current changes, sea surface temperature change as well as salinity changes. The milkfish on the other hand is sheltered in land in man-made ponds. It is well established that marine environments are vulnerable to climate change because sea-level rise and seawater temperature increase could cause massive impact to the marine ecosystem. If seawater temperature increases by 1⁰C, as was the case for the 1997/1998 El Nino event, it could cause the average sea surface temperature of Palau (which is normally around 29⁰C to increase to 30⁰C level which is the threshold point for coral bleaching in Palau (Patrick, Pers Comm.) lead to further marine environmental effects as the marine food chain is connected. The impact would become worse by climate change.

2.3 General background

Palau

18. The Republic of Palau is made up of about 350 islands in the far western Pacific Ocean. It stretches between 2 and 8 degrees north of the equator, with the main island

group lying between 6 and 8 degrees north latitude and 134° and 135° east longitude. It is approximately 3220 kilometers south of Tokyo and 1600 east southeast of Manila. Palau has a total land mass of 487 square kilometers. The largest island is Babeldaob, with an area of 334 sq. km. Ten of Palau's 16 states lie on this island. The capital is Ngerelmud, located in Melekeok, on the central east side of Babeldaob. South of Babeldaob is the island of Koror, which is the central commercial site and former capital of the Republic. Stretching south of Koror for 45 km are hundreds of tiny mushroom-shaped islands, the world renowned "Rock Islands". At the southern boundary of the Rock Islands is the low island of Peleliu and 11 km south of Peleliu is another inhabited island low island, Angaur. 360 km southwest of Koror are two more of Palau's states, Hatohebei and Sonsorol, which are composed of groups of tiny atolls. Though relatively small in total land area, Palau has a coastline of 1,519 km.

Ngatpang State: the PACC Pilot Site

19. Ngatpang state is located on the western side of Babeldaob Island. Its neighbors include Aimlek state to the south, Ngaremiengui state to the north and Ngchaser to the east. The state is approximately 3900 ha (9700 acres) in size with the state capital located at Ngatpang village. Ngeremeduu bay and its associated features dominate Ngatpang state; the bay and the watershed are the largest in the republic. Portions of the land have been designated as the Ngeremeduu conservation area and are co-managed by Aimelik, Ngatpang and Ngaremlengui.

20. Much of Ngatpang's coastal area is fringed with mangroves. Ngatpang is the only state to have non-contiguous state lands. State lands are located on the Ngerekimadel peninsula and inland from Ngeremeduu bay. Its two main settlement areas are Ngatpang village and Ibobang village with Ibobang being a relatively recent settlement. Ngatpang relies on roads within Aimelik to reach the extension of Ngatpang's state lands on the Ngerekimadel peninsula. Ibobang is accessible via a branch road from the existing north-south road running from Airai to Ngaremlengui. Principal land uses in Ngatpang include residential, subsistence agriculture and some small-scale commercial agriculture and mari-culture.

21. There are a total of 156 ha (389 ac) of wetland habitat in Ngatpang, occurring for the most part along the low-lying areas of the Ngkebeduul river drainage and inland of the mangroves at Ngeremeduu Bay. There are a total of 476 ha (1190 ac) of mangrove forests in Ngatpang, ringing Ngeremeduu bay a large (14 ha/ 33ac) mangrove stand near ngatpang village was degraded in the early 1990s as the result of road and small boat harbor construction. The state has proposed a development of an aqua culture facility in the degraded area. Both wetlands and mangroves are considered an island-wide resource, warranting coordinated management planning among the states.

22. Ngatpang has rich and diverse marine resources due to Ngeremeduu bay and the associated outer and inner reef. Rabbit fish, sea cucumbers and mangrove crabs are examples of prevalent species. The offshore and near shore areas are considered a major fishery on the island. Catch data collected by division of marine fishery resources in 1992

indicate that Ngatpang ranks fifth in the commercial finfish production. Ngeremeduu bay is responsible for over half of all mangrove crab collected and sold. Toachel mlengui is an important spawning site for a number of important species and the endangered dugong and green and hawksbill turtles frequent the waters off the southern half of the states west coast. Due to its proximity to Toachel Melgui, Ngatpang has ready access to a number of the dive spots located along the outer reef, including Wild West Coral Garden, Satan Corner and Devils Playground. The sea grass beds near Ngerkeal, which are frequent by dugongs, are degraded (heavily silted) due to the impacts from the power plants construction nearby in Aimelik.

23. Ngatpang, like most states on Babeldaob, consist on relatively flat ridge top, steep stream valleys and flatter lands near the coast. The near-coastal lands adjacent to Ngatpang village and some of the ridge top land near the compact road alignment are the most appropriate areas for development. Slope gradient data for Ngatpang is shown below:

Percent	Area, HA	Area, Ac	Percent of total
0% to 12%	490	1211	12%
12% to 30%	1110	2743	28%
>30%	2330	5757	60%
Total land	3930	9711	100%

Office National Planner, Office of the President

24. 53% of soils in Natpang are rated as moderately or highly erodible or a actively eroding. Soils with potential to support agriculture are predominantly found on the Ngatpang peninsula area, north of the Tabecheding Falls and along the Nkebeduul drainage. Soils capable of supporting agro forestry generally occur in large tracts eastward from the mangrove areas; such soils are only sparsely found on the peninsula area.

25. Agriculture is considered to be on the states primary economic development priorities. Coconut plantations ring the village of Ngatpang. Within the villages of Ngatpang and Ibobang, family gardens are common, with more variety and sophisticated agricultural methods being conducted in the area. The area by the north dock at Ngatpang village is covered in mixed coconut plantation. Abandoned coconut plantations are found on the peninsula east of Lauroro. Extensive areas around Ibobang and the drainages of the Tabecheding, Ngatpang and Ngimet rivers were in cultivation during the Japanese era; copra, pineapple and other row crops were prevalent. Most of these plantation areas face saltwater intrusion given their close proximity to the sea.

26. With the opening of the Compact Road the central portion of the state will be easily accessible from the new road and from the coast. This will create new opportunities for development in the highland areas. The state dock is located at Ngatpang village.

27. Water is supplied to Ngatpang from a diversion on the Ngekebeduul river east of the village. This water is stored in tanks and supplies Ibobang and outlying areas. Water is

supplied to Ngatpang village from the diversion on the Engas stream located west of the road into the villager at Aimelik state boarder. The watershed for this diversion lies entirely in Aimelik state. Supplemental water is supplied by rooftop rainwater catchments systems at individuals home.

Ngatpang State development programmes

28. The Ngatpang State development programme is linked very closely to the National Master Plan, which provides a nation wide guidance to development at the national and state level. It emphasizes the following themes:

- Sustainability and land use compatibility in all new development.
- Protecting the traditional way of life and quality of life for the citizens of the state.
- Establishing the states desired “carry-capacity” for new growth and development and ensuring that [A] growth does not happen in an uncontrolled manner and [B] public services, facilities and infrastructure are not stressed beyond their capacity.
- Protecting Natural and Cultural resources in the context of economic development and population growth.

29. For the Ngatpang State development plan, the upland areas within Ngatpang are good expansion areas for agriculture due to their amendable soils and abundant water supply from the Tabecheding, Ngatpang and Ngimet rivers. The move to the uplands would address the issue of salt-water inundation that is already plaguing the current farmers at present however, widespread clearing of forests would be unsustainable in the long-term and should be strongly prohibited. Therefore, if there are practices or technologies that can be used in the current low lying areas to address saltwater inundation, every attempt should be made to address them to avoid encroaching into higher topographies or forest-lands.

30. Aquaculture according to the Master Plan should be considered only for mangrove areas already degraded. If the project fails, negative repercussions would not be that great as the mangrove area was already degraded.

31. Most land use and development planning guidelines applicable to Ngatpang are contained within the Nationwide Goals, Objectives and Management Guidelines presented in chapter 3, along with the supplement to these presented in Babeldaob island-wide discussion in section 4.2 and Ngatpang-specific goals and objectives presented above. Of particular importance in Ngatpang are the following that address.

- Completion of the state master plan, including all recommended components (i.e., eco-tourist historic preservation, roadways, ports and docks, water supply. Wastewater management, solid waste management, electrical power, etc.).
- Prioritizing the preservation of agriculture potential (section 4.9,2.2) as much as possible when this potential overlaps that for community, tourism, or other developed land uses.

- Identifying and planning for tourism development at locations and in tensities supported by the citizens of the state.
- Evaluating cultural resources within the state and nominating additional sites to the national register in order to ensure their preservation.
- Minimising development in steep areas and within water supply watersheds.
- Developing better data on marine resource yields and utilizing these data in the form of fishing moratoriums, catch limits, etc. to ensure against over-harvesting in the near and off shore areas as the result of subsistence, commercial and/or sport fishing.
- Expand present knowledge regarding environmentally sound methods levels and locations of potential coastal aquaculture.
- Maintaining mangrove and stream course buffers to protect sensitive mangrove communities and drinking water supply.
- Consider designating more mangrove area as protected areas as per recommendations made by Metz (2000) and others.
- Caution in proposing or considering development in remote areas, where infrastructure costs would be high and unnecessary fragmentation of natural vegetation/habitat would result.

III. Baseline Scenario and PACC Intervention

3.1 Current and Future Vulnerability

32. The Second National Communication to the UNFCCC for Palau has just been completed (2nd NATCOM, 2007). Findings point to three main issues of critical importance at the national and local level scale. The first is the issue of drought, second intense rainfall and frequent storms and third, sea level rise. The first and second issues are directly linked to the El Nino and La Nina events; the third can be a result of melting ice and thermal expansion of the ocean a result of global warming or tectonic activities.

33. According to the 2nd NATCOM findings, El Nino brings drought like conditions to Palau and La Nina higher than average rainfall with more intense and more frequent storms. Also, in an El Nino situation, sea surface temperature do change which could impact negatively on corals and other mari-culture activities being carried out in the ocean at such a time. During the 1997-1998 EL Nino event, the very dry season in Palau according to estimates extended from its usual 1.5 months to 2-3 months. In such cases, crops are seriously affected and consequently, livelihoods of the general populace. It was also highlighted in the report that even though Palau is outside of the main tropical cyclone track of the northwestern Pacific, it was directly affected by Tropical Storm Utor in 2001.

34. According to the 2nd NATCOM assessment results, as a result of sea level rise, saltwater inundation is a serious problem that is plaguing farmers in Palau particularly taro farmers that use the low lands close to the coastal areas. Even though agriculture in Palau is relatively small-scale, contributing only 6.2% of the GDP, there are a lot of small-scale taro farms dispersed around the main island of Babeldaob, which includes the PACC pilot area, Ngatpang State. Cultivation of taro is critical to Palau's socio-economic development and cultural as well as religious obligations. It is usually cultivated very close to the sea and faces the threat of saltwater inundation and wave overtopping. Due to temperature changes in the ocean as a result of El Nino events, mari-culture activities such as clam, crab and grouper fish farming may be impacted upon. Anecdotal information from Mr. Selestino Otong (Pers Com, 2008), Chairman of the Ngatpang State Marine Authority, indicated that farmers have reported clam-bleaching when sea surface temperatures increase. Although more studies need to be undertaken, some effort needs to be done now to address the issue.

35. The 4th IPCC Assessment Report (2007) is projecting warming of about 0.2°C per decade for a range of SRES emission scenarios. Best estimates and likely ranges for globally average surface air warming for six SRES emissions marker scenarios are given. For example, the best estimate for the low scenario (B1) is 1.8°C (likely range is 1.1°C to 2.9°C), and the best estimate for the high scenario (A1FI) is 4.0°C (likely range is 2.4°C to 6.4°C). This could mean an increase in El Nino and La Nina situations for Palau, which could exacerbate current vulnerabilities people are already facing. Observations show that the average temperature of the global ocean has also increased to depths of at least 3000 m and that the ocean has been absorbing more than 80% of the heat added to

the climate system. This means that the air temperature rise could lead to sea surface temperature rise. Such scenarios do not augur well for land and mari-culture farmers who depend on the land and ocean resources to eke out a living. With additional stressors added onto the current vulnerable situations of farmers and their farming systems, land and the sea based farmers will be forced to look for alternative livelihoods which could include relocating to Koror the commercial district of Palau to look for job opportunities.

3.2 Current Development Efforts

36. The State of Ngatpang has embarked on a programme of agricultural and mari-culture farming over the years. With assistance from the Ngatpang State and National Government, farmers are encouraged to go into rabbit fish farming, sea cucumbers, clam, crabs and other forms of mari-culture farming. The offshore and near shore areas are considered a major fishery on the island. Catch data collected by division of marine fishery resources in 1992 indicate that Ngatpang ranks fifth in the commercial finfish production. However, over the years they have experienced major set-backs due to the impacts of warming waters, changes in salinity, and other stressors which include thievery of seedlings of clams and crabs. Also, due to the large amounts of mangrove areas those are already degraded, farmers are now utilizing them in a productive way.

37. On the land, farmers are encouraged to go into taro production in a big way. In the current State Plan for Ngatpang, the upland areas are good expansion areas for agriculture due to their amendable soils and abundant water supply from the Tabecheding, Ngatpang and Ngimet rivers. The move to the uplands would address the issue of salt-water inundation that is already plaguing the current farmers at present however, widespread clearing of forests would be unsustainable in the long-term. Therefore, if there are practices or technologies that can be used in the current low lying areas to address saltwater inundation, every attempt should be made to address them to avoid encroaching into higher topographies or forest-lands.

3.3. Gaps

All the development efforts described above had not take current and future climate change in their development planning. A review of the existing legislations for Ngatpang State reveals that no effort has been made in the past to address any climate change issues in the State plans, policies and budgets. This could stem from the fact that State Officials even though they receive concerns from farmers and also are able to witness impacts of changes in climate in their current development programmes, often they do not necessarily attribute this to climate change but some weather change or storms etc. This is a general observation that is true for most Pacific Islands, therefore, it is important also to address the issue of awareness and capacity development in the Sate of Ngatpang to better equip them to address the issue of changes in climate now and in their future planning programmes. It is assumed that this is a scenario common for all the 12 Palau States and any effort to address this would provide a very important lesson that other States in the Republic will learn from.

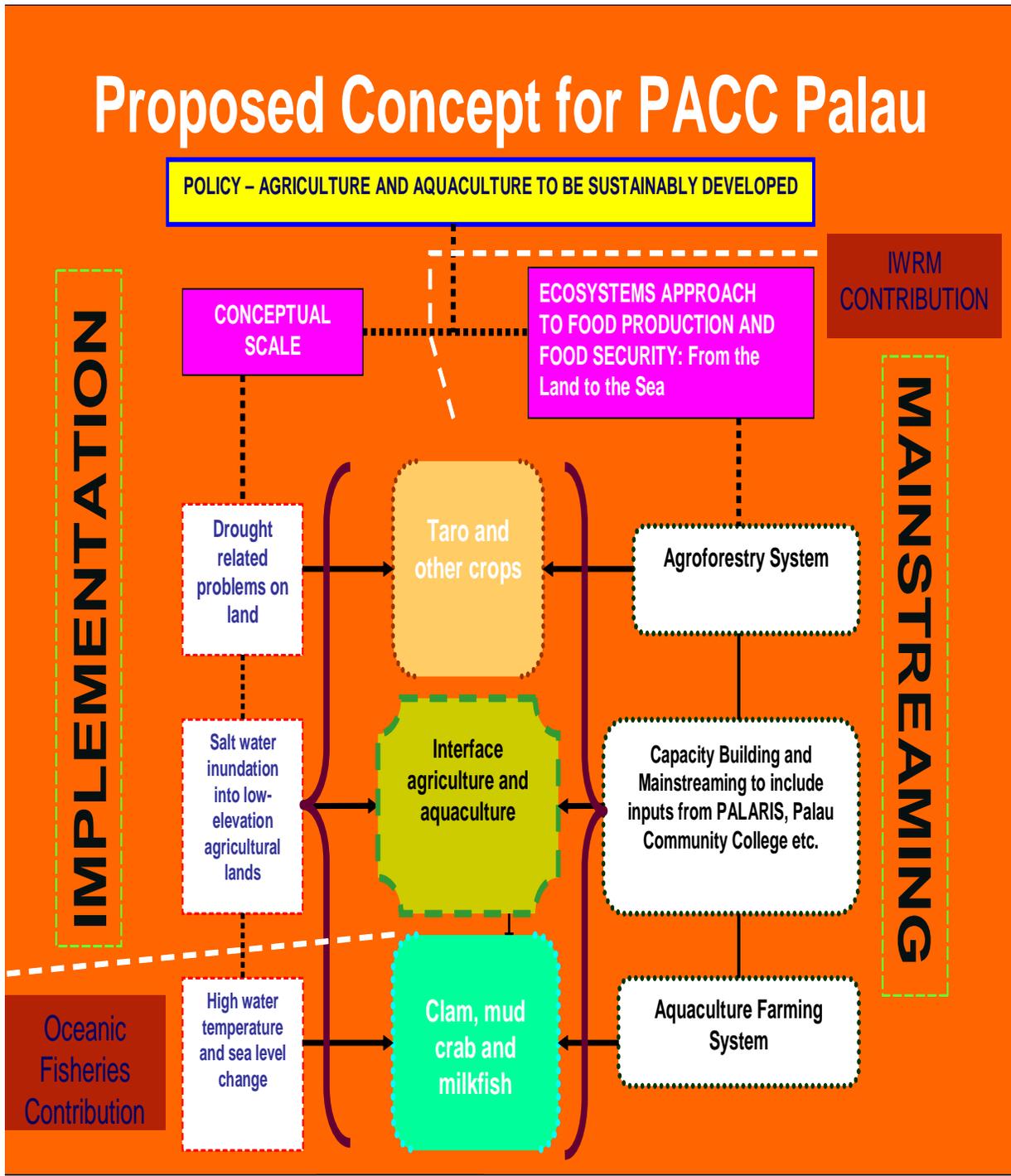
3.4 PACC Intervention

The PACC climate change adaptation activities for Ngatpang State would assist by providing alternative solutions to real problems faced by farmers which include salt water inundation on taro patches close to the sea and also the impacts of warming waters and changes in salinity to the grouper fish, rabbit fish, clams and crab culture programmes currently implemented in Ngatpang State. The PACC intervention as indicated in the next section of this report takes into consideration a vision by the government and non-state actors consulted during the PACC consultation process that food security for Palau means a holistic approach to addressing food security issues from the land to the sea. The PACC project therefore takes the conceptual approach of addressing vulnerability of development programmes that are in the interface between the land and the sea (see figure 3.0).

38. The ‘land to sea’ concept is not new. Similar concepts have been promoted in the development arena around the globe, which include the ‘white-and-blue’ and ‘from-ridge-to-reef’ concepts. The main driver of the ‘land to sea’ concept as proposed for Palau is that development programmes implemented on the land will impact on the sea and vice versa. It takes a more holistic ecosystems approach to development as opposed to current piece-meal development programmes currently undertaken by the Ngatpang State. This connectivity will assure that future development programmes at the State level would have a longer term vision and understanding of impacts that will happen particularly in a world where climate change will largely change for the worse.

39. An important innovation as well for PACC is that it provides a clear link between two GEF projects; one already being implemented (Oceanic Fisheries Project) and the other in the GEF pipeline to be implemented soon (Integrated Water Resource Management (IWRM)). IWRM will provide useful lessons from a watershed perspective and this would certainly help in addressing the issue of saltwater inundation currently faced by farmers’. The Oceanic Fisheries Project will provide lessons on the interface between near-shore fisheries and deep-sea fisheries issues. Lessons from the two GEF projects would be incorporated as part of the PACC package to be implemented in the State of Ngatpang.

Figure 2.0 Proposed Concept for Palau



40. There are also plans to disseminate lessons from the PACC project interventions in Ngatpang State to two other States of the Republic of Palau.

PART IV. PALAU PACC PROJECT

4.1 Project Purpose

41. The purpose of this project is to promote a systems approach to climate change adaptation that takes a holistic view of climate change issues that are adversely impacting development programmes that are situated on the interface between the land and the sea. A better understanding of the risks involved and how people have adapted over the years will provide valuable insight to improving the current and future adaptive capacity of communities at the pilot site, Palau in general and other countries of the pacific region.

4.2 Project Outcomes

42. There are two main outcomes that would be addressed under PACC Palau. The first deals with direct implementation of adaptation options and the second deals with mainstreaming. The two outcomes compliment and inform each other.

Outcome One: Resilience of the food production & security sector to climate change in Palau enhanced.

43. This outcome will assist Palau to implement long-term adaptation measures to increase the resilience of its food production and security sector to the adverse impacts of climate change.

Outcome Two: State policies and programmes in the food production & security sector integrate climate change adaptation priorities.

44. This outcome will assist Palau to implement long-term adaptation measures to increase the resilience of its food production and security sector to the adverse impacts of climate change.

4.3 Project Outputs

Output 1.1 Guidelines to improve resilience of coastal food production systems to the impacts of climate change developed.

Output 1.2 Measures identified in the Guideline (2.6.1a) to improve resilience of coastal food production systems implemented in a pilot demonstration (with co-financing support).

This output will assist the Ngatpang Maritime Authority in the State of Ngatpang to develop their capacity to design guidelines and technologies to enhance resilience of their coastal food production systems to the impacts of climate change. The State of Ngatpang largely uses the coast and land interface to develop their agriculture and aquaculture programmes for subsistence and commercial purposes. This interface is now under threat from changes in sea level as well as sea surface temperature. According to preliminary results of the 2nd National Communication vulnerability and adaptation assessments,

saltwater inundation is a serious problem that is plaguing farmers in the low lying areas of Ngatpang State and other states of Palau. Even though agriculture in Palau is relatively small-scale, contributing only 6.2% of the GDP, there are a lot of small-scale taro farms dispersed around the main island of Babeldaob, which includes Ngatpang State. Cultivation of taro is critical to Palau's socio-economic development and cultural as well as religious obligations. It is usually cultivated very close to the sea and faces the threat of saltwater inundation and wave overtopping. In the near shore area, aquaculture and mariculture activities such as clam, crab and grouper fish farming are already being affected by changes in sea surface temperature particularly during an El Nino. Ngatpang State Marine Authorities reported that farmers have reported clam bleaching when sea surface temperatures increase. The IPCC Fourth Assessment Report notes that due to the warming of the globe, it is likely that more El Nino like events would be happening and this could have serious consequences for the people and their livelihoods. Cofinancing support would be provided from several sources which include the Palau Community College Extension and Research, Palau Community Agency and Government departments that would be supporting the project at various stages. The Ngatpang State Government is also committing space and in-kind support for the project at the State level to ensure that work is carried out accordingly. Activities to be undertaken would include:

Activity 1: Salt tolerant taro varieties utilized in taro patches affected by salt water intrusion.

45. This activity would address the issue of salt water inundation into taro patches through the use of salt water tolerant taro varieties. Taro (*Colocasia esculanta*) is an economic crop and of major cultural significance to Palauans. One of the solutions that would be implemented is the testing and introduction of salt water tolerant taro varieties into Ngatpang State. The current baseline notes that there are no taro salt water tolerant varieties in the whole of Palau. Therefore, there is a need to search regionally particularly to other States of the Federated States of Micronesia and other countries in the South Pacific to see if such salt tolerant varieties are available in their countries for use in Palau.

46. The tasks identified below will be implemented during the course of the project:

- i) Identification and collection of salt water tolerant taro varieties;
- ii) Evaluation and selection of salt water tolerant taro varieties;
- iii) Propagation and distribution of salt water tolerant taro varieties in Ngatpang State;
- iv) Monitoring on site performance; and
- v) Share lessons, information and experiences to other States of Palau and other PACC countries.

Primary agency: Palau Community College – CRE

Secondary agency: Bureau of Agriculture and Palau Community Action Agency, Secretariat of the Pacific Community, FAO, Taiwan Technical Mission, ROC, Micronesia region.

Possible Activity Indicators:

- i) By year three, at least twenty varieties have been collected and evaluated for salt water tolerance;
- ii) By the fourth year, those varieties which were identified, propagated and distributed to taro farmers in the pilot site;
- iii) Monitoring and evaluation of the identified taro varieties in the pilot site; and
- iv) Most successful taro varieties identified to be propagated and distributed to other taro farmers.

Activity 2: Salt-water intrusion into taro patches prevented.

47. This activity would address the issue of salt water inundation into taro patches through the use of appropriate traditional and contemporary technologies to completely stop salt water inundation of taro patches. Through the assessment of traditional practices and current practices, the best adaptation implementation option would then be implemented to address the problem. The baseline scenario is that at present, once salt water seeps into or displaces the fresh water in the taro patches, farmers abandon the taro plots and move in-land or completely shift to other crops. In the process, more deforestation takes place, people encroach to steeper slopes to plant therefore creating further problems such as soil erosion, silting of water ways and in the long-term destroying the biodiversity of downstream marine population.

48. The tasks identified below will be implemented during the course of the project:

- i) Identify and assess appropriate prevention measures;
- ii) Apply the appropriate prevention measure;
- iii) Monitor and evaluation of activity;
- iv) Mapping of affected taro areas; and
- v) Share lessons, information and experience to other PACC countries.

Primary agency: Bureau of Agriculture

Secondary agency: EQPB, PCAA, PALARIS

Possible Activity Indicators:

- i) By the end of year one, the MAPPING of the areas affected by salt water intrusion have been identified and mapped;
- ii) Baseline data of salt intrusion collected from identified taro areas (salinity and temperature);
- iii) By the end of second year, appropriate prevention measures have been identified and put into practice; and
- iv) Monitoring and evaluation of prevention measures to identify appropriate prevention measures.

Activity 3: Water management to address extreme weather events in taro production areas.

49. This activity would address the issue of salt water inundation into taro patches through the use of appropriate water management practices to completely stop salt water inundation of taro patches. Water management is critical in taro cultivation for Palau as most farmers' utilize low lands for cultivation. Given that most taro plots are in low lying areas where the soil layers are deeper and richer, if compared to higher elevation soils, water if not carefully managed can cause water logging, leading to comb-rot and also salt-water can displace fresh water leading to higher soil salinity.

50. The tasks identified below will be implemented during the course of the project:

- i) Identify traditional and contemporary water management practices in taro production areas;
- ii) Assess and identify best adaptation option and document; and
- iii) Implement the adaptation option whether it is rehabilitate, modification and/or implementation of new practice or systems

Primary agency: PCAA

Secondary agency: EQPB, OERC, CIP, BOA, SOPAC

Possible Indicators:

- i) By end of second year, at least two traditional practices are located and documented; and
- ii) By end of fourth year, at least one traditional practice is being implemented successfully

Activity 4: Availability of raw and processed food products in case of extreme weather events.

51. This activity would address the issue of food security through the development of taro and other agricultural and aquaculture produce into a diversified range of food products. Post harvest preparation is important in terms of ensuring that food is available during extreme weather events. Work will be carried out to teach the Ngatpang communities to work on improving their knowledge base as well as their skills in post harvest food preparation. Through the assistance of key stakeholders, the community will also be assisted to seek income generating opportunities which will augur well in terms or resilience building.

52. The tasks identified below will be implemented during the course of the project:

- i) Utilizing appropriate post harvest technology taking into consideration shelf life, new products and income generation;
- ii) Diversifying range of food crops resilient to extreme weather events; and
- iii) Piloting alternate food products at community level

Primary agency: Palau Community College – CRE

Secondary agency: BOA, FAO, USP, SPC DSAP

Possible Indicators:

- i) By the end of year one, a food technology class conducted for farmers' (women);
- ii) By end of year three, shelf life of taro products identified and evaluated; and
- iii) By year four, at least two farmers from Ngatpang have commercialized and marketed new taro products.

Activity 5: Aquaculture practices enhanced to accommodate sea surface temperature and sea level change.

53. This activity would address the issue of food security through the enhancement of current aquaculture programmes involving clam, grouper fish and crab farming to take into consideration current and future changes in climate. It is already reported by farmers dealing with clam farming that bleaching of clam shells do happen when sea surface temperatures increase. Such phenomenon affects the growth rate of clams and fish leading to higher rate of mortality. The El Nino of 1997-1997 seriously affected aquaculture farmers in Palau.

54. The tasks identified below will be implemented during the course of the project:

- i) Document current practice and experience;
- ii) Monitor twice a week basis sea surface temperature, salinity and sea level change in aquaculture system and how it impacts on growth rate of clams and crabs, bleaching and survival rates;
- iii) Review and refine current practice taking into account results of monitoring; and
- iv) Increase number of farmers undertaking improved clam and crab farming techniques/practices

Primary agency: Ngatpang Marine Authority

Secondary agency: Bureau of Marine Resources, FAO, SPC

Possible Indicators:

- i) Surface temperature, salinity and sea level change recorded, analyzed and reported by end of every year;
- ii) By year three, some modifications have been developed based on results pf monitoring; and
- iii) By year four, at least five farmers have adopted improved clam and crab farming techniques.

Activity 6: State policies and guidelines put in place to accommodate sea surface temperature and sea level change in clam, crab, and milkfish farming production.

55. This activity deals with mainstreaming climate change into the Ngatpang State policies and guidelines. Current development activities at Ngatpang State, which includes clam, grouper fish and crab farming, have not taken current and future changes in climate into consideration. Therefore, it is incumbent for these development initiatives to anticipate current and future changes in climate as reported by the IPCC Fourth Assessment Report (AR4) and act accordingly through appropriate policies and guidelines. In such a scenario, the issue of climate change consideration takes a longer term perspective beyond the life of the PACC project.

56. The tasks identified below will be implemented during the course of the project:

- i) Develop policies and guidelines for the above using the bottom-up approach
- ii) Work with the State to demarcate clam/crab/milkfish farming areas

Primary agency: Ngatpang State Government

Secondary agency: BMR, FAO, SPC, EQPB,

Possible Indicators:

- i) By year four, aquaculture policies that take into consideration climate change are developed and adopted by the Ngatpang State;
- ii) By year three, aquaculture farming areas identified, demarcated and mapped;

Activity 7: Capacity development on climate change and food security enhanced

57. This activity would address the issue of capacity enhancement and development involving technical officers from the national and state governments, quasi-government agencies, non-state actors and members of communities. The output would involve the development of a training module on climate change that touches on the various issues, climate change impacts already felt in Ngatpang State and how adaptation could be implemented. It would also provide opportunities for training and other awareness programmes to be developed and implemented that would assist in the overall resilience enhancement of the government's manpower and systems and members of the community.

58. The tasks identified below will be implemented during the course of the project:

- i) Develop communication strategy for the PACC project based on lessons from each output (including television programmes)
- iii) Draft Training Module
- iv) Provide training on climate change adaptation & food security using above module to communities and technical officers
- v) Participate and assist agriculture awareness programmes on food security

Primary agency: OERC – Joe Aitaro

Secondary agency: PACC CORE Group

Possible Indicators:

- i) By end of year two, a communication strategy is developed;
- ii) By end of year three, training module that incorporates lessons from the outputs is developed;
- iii) By year four, training and other capacity development activities identified in the communication strategy is implemented.

PROJECT LOG FRAMES AND INDICATORS

Project Log Frame and indicators for Palau would be finalized during the inception meeting of the PACC project.

4.4 Implementation Arrangements for PACC

59. The PACC project will be coordinated through the Office of Environmental Response and Coordination, which is part of the Office of the President of the Republic of Palau. A National Climate Change Country Team exists in Palau and currently provides overall guidance and coordination of all climate change projects in Palau (see figure 4.0).

60. The following organizations are members of the Palau NCCCT and will also contribute to the PACC project implementation:

- OERC – Office of Environmental Response and Coordination
- Palau Community College
- Palau Community Action Agency
- Bureau of Agriculture, Ministry of Resources & Development
- Bureau of Marine Resources, Ministry of Resources & Development
- Palau Environmental Quality Protection Board
- Palau Automated Land and Resource Information Systems (PALARIS)
- Ngatpang State Government
- Ngatpang Maritime Authority

61. The implementation of project activities at the national level will be based on the “country team” approach and it will continue to provide an overall guidance and coordination role for the PACC project at the national level. As part of its activities, the Palau NCCCT, will provide oversight and approve work programmes and budgets for the implementation of project activities at the national level (see figure 4.0).

4.5 Project Management Unit

62. In addition to the NCCCT and as per the requirement of UNDP, a Project Management Unit (PMU) will be established within the Office of Environmental Response and Coordination. There will be a Project Manager/National Coordinator (PM/NC) for PACC to be recruited and will work full time on the project and paid by the project. The PM/NC, among others, will be responsible for the day-to-day management and implementation of all national project activities.

BUDGET

Responsible	ERP/Atlas	Budget Description							Total
	Budget Code			Year 1/08	Year 2/09	Year 3/10	Year 4/11	Year 5/12	Budget
Outcome 1	71200	International Consultants (including national regional staffing)	10,000	10,000	0	0	0	0	10,000
	71300	Local Consultants (including national staffing)	30,000	5,000	5,000	10,000	5,000	5,000	30,000
	71400	Contractual Services - Ind	20,000	5,000	5,000	5,000	5,000	0	20,000
	71600	Travel	20,000	0	5,000	5,000	5,000	5,000	20,000
	72100	Contractual Services - Co	40,000	10,000	10,000	10,000	10,000	0	40,000
	72200	Equipment & Furniture	10,000	5,000	1,000	3,000	1,000	0	10,000
	72400	Communication & Audio Visual equipment	4,000	2,000	500	500	500	500	4,000
	72500	Supplies	1,000	500	100	100	200	100	1,000
	72800	Information technology and Outreach	3,000	500	1,000	500	1,000	0	3,000
	74200	Printing, Publishing & Production	2,000	0	500	500	500	500	2,000
Subtotal			140,000	38,000	28,100	34,600	28,200	11,100	140,000
Outcome 2									
	71200	International Consultation	10,000	10,000	0	0	0	0	10,000
	71300	Local Consultants	60,000	10,000	20,000	20,000	5,000	5,000	60,000
	71400	Service Contracts - Ind	150,000	30,000	50,000	50,000	10,000	10,000	150,000
	71600	Travel	20,000	2,000	5,000	5,000	5,000	3,000	20,000
	72100	Contractual services - Co	320,000	55,000	105,000	55,000	55,000	50,000	320,000
	72200	Equipment & Furniture	10,000	0	5,000	5,000	0	0	10,000
	72500	Supplies	50,000	10,000	10,000	10,000	10,000	10,000	50,000
	72400	Audio Visual Equipment and Communication	20,000	5,000	5,000	5,000	2,500	2,500	20,000
	72800	Information Technology Equipment and Outreach	15,000	5,000	4,000	3,000	2,000	1,000	15,000
	74200	Printing and Publications	15,000	5,000	4,000	3,000	2,000	1,000	15,000
Subtotal			670,000	132,000	208,000	156,000	91,500	82,500	670,000
Outcome 3									
	71200	International Consultants							
	71300	Local Consultants							0

	71600	Travel	20,000	4000	4000	4000	4000	4000	20,000
	72100	Contractual Services - Co							0
Subtotal			20,000	4000	4000	4000	4000	4000	20,000
Outcome 4	71300	Local Consultants	88,758	17752	17752	17752	17752	17750	88,758
Subtotal			88,758	17752	17752	17752	17752	17750	88,758
Total			918,758	191,752	257,852	212,352	141,452	115,350	918,758

4.7 Monitoring and Evaluation

Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the project team and UNDP Samoa MCO with support from UNDP/GEF. The Logical Framework Matrix in Section II provides performance and impact indicators for project implementation along with their corresponding means of verification. These will form the basis on which the project's Monitoring and Evaluation system will be built.

The following sections outline the principle components of the Monitoring and Evaluation Plan and indicative cost estimates related to M&E activities. The project's Monitoring and Evaluation Plan will be presented and finalized at an Inception Report following a collective fine-tuning of indicators, means of verification, and the full definition of project staff M&E responsibilities.

4.7.1 Monitoring Responsibilities and Events

A detailed schedule of project reviews meetings will be developed by the PMO, in consultation with project implementation partners and stakeholder representatives and incorporated in the Project Inception Report. Such a schedule will include: (i) tentative time frames for Tripartite Reviews (TPR), PEG Meetings and relevant advisory and/or coordination mechanisms at national levels and (ii) project related Monitoring and Evaluation activities.

Day to day monitoring of implementation progress will be the responsibility of the PMO in consultation with the UNDP Samoa MCO based on the project's AWP and its indicators. The PMO will inform UNDP Samoa MCO of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely and remedial fashion.

The RPM and the responsible UNDP-GEF RTA will fine-tune the progress and performance/impact indicators of the project in consultation with the full project team at the IW and assisted by UNDP Samoa and UNDP-GEF HQ, as appropriate. Specific targets for the first year implementation progress indicators together with their means of verification will be developed at the IW. These will be used to assess whether implementation is proceeding at the intended pace and in the right direction and will form part of the AWP. The local implementing agencies will also take part in the Inception Workshop in which a common vision of overall project goals will be established.

Targets and indicators for subsequent years would be defined annually as part of the internal evaluation and planning processes undertaken by the project team. The measurement impact indicators will be undertaken through subcontracts or retainers with relevant institutions or through specific studies that are to form part of the projects activities.

Periodic monitoring of implementation progress will be undertaken by the UNDP Samoa MCO through quarterly meetings with the project staff; or more frequently as deemed necessary. This will allow parties to take stock and to troubleshoot any problems pertaining to the project in a timely fashion to ensure smooth implementation of project activities.

UNDP Samoa MCO and UNDP-GEF RCU, as appropriate, will conduct yearly field visits to pilot implementation sites, or more often based on an agreed upon schedule to be detailed in the project's Inception Report/AWP to assess first hand project progress. Any other member of the PEG can also accompany, as decided by the PEG. A Field Visit Report will be prepared by UNDP Samoa MCO and circulated no less than one month after the visit to the project team, all PEG members, and UNDP-GEF.

Annual Monitoring will occur through the Tripartite Review (TPR). This is the highest policy level meeting of the parties directly involved in the implementation of a project. The project will be subject to a TPR at least once every year. The first such meeting will be held within the first twelve months of the start of full implementation. The Executing Agency will prepare an Annual Project Report (APR) and submit it to UNDP Samoa MCO and the UNDP-GEF RCU at least two weeks prior to the TPR for review and comments.

4.7.2 Annual Project Report (APR)

Palau will be required to produce APRs as a UNDP requirement to SPREP. This is part of SPREP's oversight, monitoring and project management procedures at national level. It is a self-assessment report by project management to SPREP which it will synthesis with other APRs from other countries and will be presenting the APR to UNDP Samoa. An APR will be prepared on an annual basis prior to the Tripartite Project Review, to reflect progress achieved in meeting the project's AWP and assess performance of the project in contributing to the intended outcomes through outputs and partnership work. The format of the APR is flexible but should include the following:

- An analysis of project performance over the reporting period, including outputs produced and, where possible, information on the status of the outcome;
- The constraints experienced in the progress towards results and the reasons for these;
- The three (at most) major constraints to achievement of results;
- AWP, CAE and other expenditure reports (ERP generated);
- Lessons learned; and
- Clear recommendations for future orientation in addressing key problems in lack of progress.

4.7.3 Quarterly Progress Reports

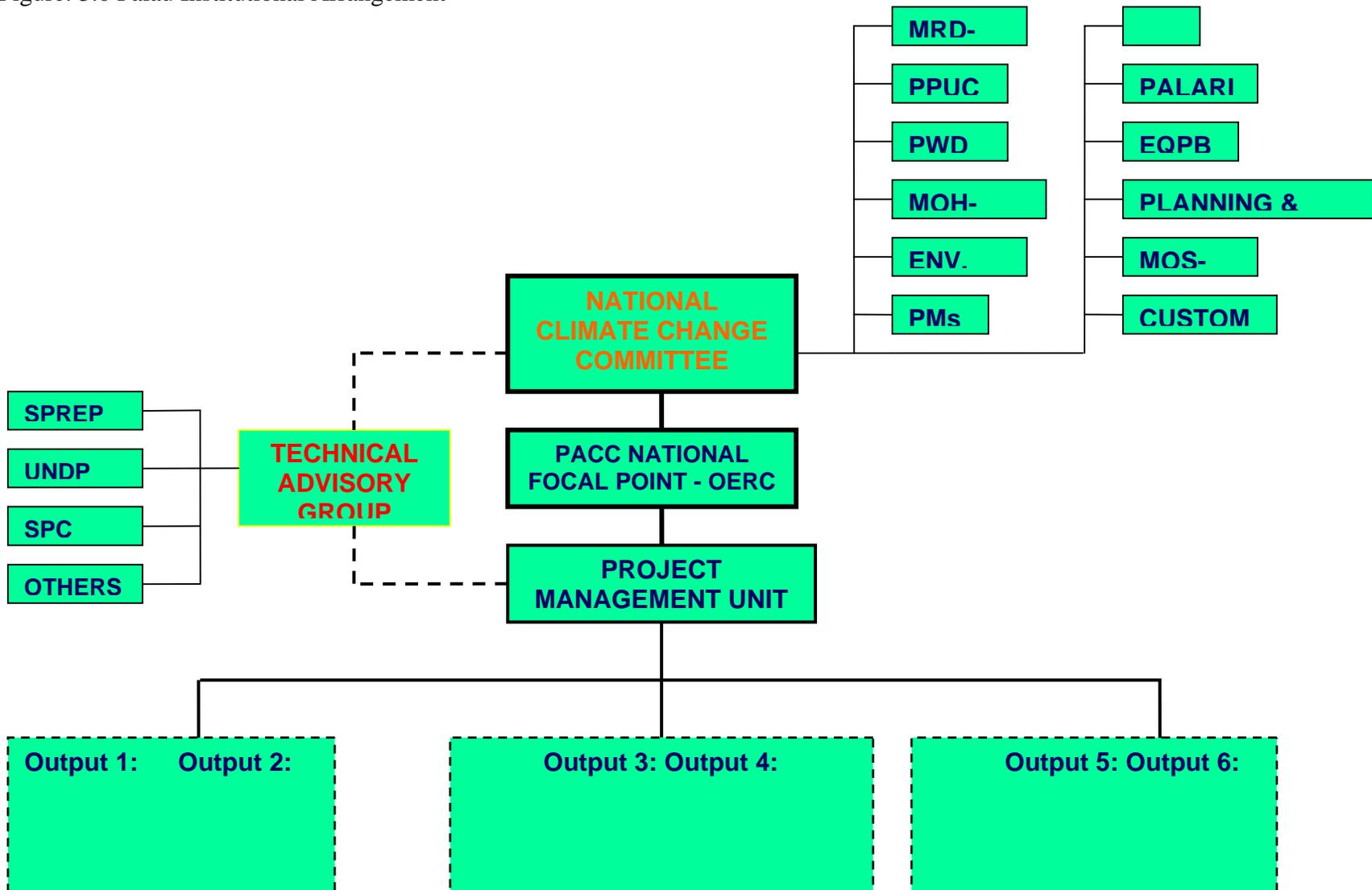
Palau is also required to provide short reports outlining main updates in project progress will be provided quarterly to SPREP the Implementing Partner along with (1) financial

report and advance request for the upcoming quarter (2) workplan and budget for the upcoming quarter.

4.7.4 Project Terminal Report

During the last three months of the project the project team will prepare the Project Terminal Report. This comprehensive report will summarize all activities, achievements and outputs of the Project, lessons learnt, objectives met, or not achieved structures and systems implemented, etc. and will be the definitive statement of the Project's activities during its lifetime. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the Project's activities.

Figure: 3.0 Palau Institutional Arrangement



Reference

- Adger, N., Mace, M.J., Paavola, J., and Razzaque, J., 2003: Justice and equity in adaptation. *Tiempo* 52, 19-22.
- Adger, W. N., S. Huq, K. Brown, D. Conway, M. Hulme, 2003: Adaptation to climate change in the developing world. *Progress in Development Studies*, 3 (3), 179-195.
- Agrawala, S., T. Ota, J. Risbey, M. Hagenstad, J. Smith, M. van Aalst, K. Koshy and B. Prasad., 2003: *Development and Climate Change in Fiji: Focus on Coastal Mangroves*: OECD
- ADB (Asian Development Bank) 2004: *Environmental Pacific Regional Strategy, 2005-2009*, ADB Manila, Philippines, 105 pp
- Barnett, J., 2001: Adapting to climate change in Pacific Island Countries: The problem of uncertainty. *World Development*, 29, 977-993
- Becken, S., 2004: *Climate change and tourism in Fiji: vulnerability, adaptation and mitigation*. University of the South Pacific, Final Report, 70 pp.
- Becken, S., 2005: Harmonising climate change adaptation and mitigation: the case of tourist resorts in Fiji. *Global Environmental Change*, 15, 381-393.
- Brazdil, R., T. Carter, B. Garaganga, A. Henderson-Sellers, P. Jones, T. Carl, T. Knustson, R.K. Kolli, M. Manton, L.J. Mata, L. Mearns, G. Meehl, N. Nicholls, L. Pericchi, T. Peterson, C. Price, C. Senior, Q.C. Zeng, and F. Zwiers, 2002: *IPCC Workshop on changes in extreme weather and climate events*, Workshop Report, Beijing, China, 11-13 July, 2002, 41- 42. Accessed 15.11.2004 at <http://www.ipcc.ch/pub/extremes.pdf>
- Burns, W.C.G., 2002: Pacific island developing country water resources and climate change. In *The World's Water (3rd Edition)*. P. Gleick (ed), pp. 113-132..
- FAO (Food and Agriculture Organization of the United Nations) 2004: *FAO and SIDS: Challenges and Emerging Issues in Agriculture, Forestry and Fisheries*. Paper prepared by the Food and Agriculture Organisation (FAO) on the occasion of the inter-regional conference on small island developing states (SIDS), Bahamas 26-30 January 2004, Bahamas. Rome.
- Folland, C.K., J.A. Renwick, M.J. Salinger, N. Jiang, and N.A. Rayner, 2003: Trends and variations in South Pacific Islands and ocean surface temperatures. *Journal of Climate.*, 16, 2859-2874
- Folland, C.K., J.A. Renwick, M.J. Salinger, and A.B. Mullan, 2002: Relative influences of the Interdecadal Pacific Oscillation and ENSO on the South Pacific Convergence Zone. *Geophysical Research Letters*, 29, 21-1-21-4
- Griffiths, G.M., M.J. Salinger, and I. Leleu, 2003: Trends in extreme daily rainfall across the south pacific and relationship to the South Pacific convergence zone. *J. Climatol.*, 23, 847-869.
- IPCC, 2001: *Climate Change 2001: The Scientific Basis*. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change, J.T. Houghton, Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson (eds.), Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 881 pp.
- Lal, M., 2004: Climate change and small island developing countries of the South Pacific, *Fijian Studies, Special Issue on Sustainable Development*, V2(1), 15-31.

- Lal, M., H. Harasaw and K. Takahashi, 2002: Future climate change and its impacts over small island states, *Climate Research*, 19, 179-192.
- Manton, M.J., P.M. Dellaa-Marta, M.R. Haylock, K.J. Hennessy, N. Nicholls, L.E. Chambers, D.A. Collins, G. Daw, A. Finet, D. Gunawan, K. Inape, H. Isobe, T.S. Kestin, P. Lefale, C.H. Leyu, T. Lwin, L. Maitrepierre, N. Oprasitwong, C.M. Page, J. Pahalad, N. Plummer, M.J. Salinger, R. Suppiah, V.L. Tran, B. Trewin, I. Tibig, and D. Yee, 2001: Trends in extreme daily rainfall and temperature in southeast Asia and the south Pacific: 1961-1998. *J. Climatol.*, 21, 269-284.
- McKenzie, E., Prasad, B, and Kaloumaira, A. 2005. *Economic Impact of Natural Disasters on Development in the Pacific* A SOPAC and USP Report. Suva, Fiji.
- Nurse, L., G. Sem, J.E. Hay, A.G. Suarez, P.P. Wong, L. Briguglio and S. Ragoonaden, 2001: Small island states. . In: *Climate Change 2001: Impacts, Adaptation, and Vulnerability*. J.J. McCarthy, O.F. Canziani, N.A. Leary, D.J. Dokken, and K.S. White (eds.). Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 842-975.
- Nurse, L., and R. Moore, 2005: Adaptation to global climate change: an urgent requirement for Small Island Developing States. *Review of European Community and International Law (RECIEL)*, 14 (2), 100-107.
- Otong, S. 2008. Personal Communication. Chairman Ngatpang Marine Authority.
- Pelling, M., and J.I. Uitto, 2001: Small island developing states: natural disaster vulnerability and global change. *Environmental Hazards*, 3, 49-62.
- UNFCCC Second National Communication. 2008. *A Preparatory Workshop on Vulnerability and Adaptation Assessment for the Republic of Palau*. Office of the Environmental Response and Coordination. Unpublished report.
- U.S. Census Bureau, International Data Base (IDB), Country Summary: Palau. Retrieved 2008. Internet address, <http://www.census.gov/ipc/www/idb/country/psportal.html>
- World Bank, 2000: *Cities, Seas and Storms: Managing Change in Pacific Island Economies. Vol. IV, Adapting to Climate Change*. World Bank, Washington, D.C. 72 pp.
- World Bank, 2002: *Cities, Seas and Storms: Managing Change in Pacific Island Economies*. World Bank, Washington, D.C
- World Bank, 2006: *Not If, But When: Adapting to Natural Hazards in the Pacific islands Region: A Policy Note*. World Bank, Washington, D.C., USA, 60 pp.