REPUBLIC OF PALAU

CURRENT AND PROJECTED IMPACTS OF

CLIMATE CHANGE

Office of Environmental Response and Coordination
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INTRODUCTION

Prior to its independence in 1994, the Republic of Palau was a United Nations Trusteeship under the administration of the United States. Palau successfully completed negotiations with the United States for a Compact of Free Association in 1993. The Compact of Free Association establishing Palau as an independent Republic entered into force in 1994. The Republic of Palau is one of the youngest and smallest independent countries in the World. The total land area of Palau is approximately 363 square kilometers spread across some 450 islands. Due to Palau's position in the Pacific, about 800 kilometers east of the Philippines and 800 kilometers north of Papua New Guinea, Palau has the greatest marine biodiversity among all the islands in the Oceania group.

Ngerukewid Islands Wildlife Preserve, also known as "Seventy Islands"

Palau's natural terrain varies geologically from the mountainous high island of Babeldaob to coral atolls typically fringed by large barrier reefs. Palau's highest point is Mount Ngerchelchauus located in Ngardmau State on Babeldaob, the largest island in the Palau chain.

The peak of Mount Ngerchelchauus is 242 meters above sea level. Palau's natural resources consist of one of the largest rainforests in Micronesia, minerals (especially gold), oil and natural gas deposits, marine products, and deep-seabed minerals.

Biodiversity

Palau hosts one of the most biologically diverse habitats in the Micronesian region. The biological significance of Palau's habitats include:

- More than 400 species of hard corals and 300 species of soft corals;
- More than 1,400 species of reef fish;
- Seven of the World's nine known species of giant clams;
- Micronesia's only crocodile and dugong (seacow) populations;
- The largest undisturbed tropical rainforest in Micronesia;
- And sixteen bird species found nowhere else in the world.

A snapshot of one of Palau's spectacular coral reefs

Palau is also home to six identified endangered species; the Hawksbill turtle, the dugong, the Micronesian Megapode, the saltwater crocodile, the Rock Island Palm, and the Palau Palm.

Saltwater Crocodile

Scattered throughout the famous rock islands are numerous geolocially, chemically, and biologically unique marine lakes. These marine lakes are home to many enemic species and several also host non-stinging Mastigias and Moon Jellyfish. Separated thousands of years from their natural predators, the jellyfish long ago lost their ability to sting.

Palau is internationally renown for its biological significance to the earth's natural environment. In addition to write-ups and features in top dive and eco-travel publications, the *National Geographic Society* chose Palau as the first "Underwater Wonder of the World". Palau's unique terrestrial and marine diversity gained additional international recognition as one of the world's living "Edens" by *Discovery Channel/Reader's Digest*.

Although Palau may not be considered one of the most bio diverse countries in the world in terms of sheer number of species, Palau is home to a substantial number of species in terms of exclusivity. Numerous domestic and international studies have determined that Palau has one of the largest portions of species that occur nowhere else (endemics) in the world.

CURRENT AND PROJECTED IMPACTS OF CLIMATE CHANGE

Over the past century, average annual temperatures in the Pacific islands have increased by about 0.25C[1]. Globally, sea level has risen by 10 to 20 centimeters in the past 100 years with significant local variation[2]. Although absolute sea level is rising in the Pacific, trends vary greatly from island to island due to the fact that some islands are rising.

Scientific studies have indicated that Palau's northern seabed is sinking and southern Palau's seabed

[1] Overview: Islands in the Caribbean and the Pacific, US Global Research Program, pub. 2000
[2] Intergovernmental Planel on Climate Change: Report to the United Nations Framework Convention on Climate Change, 2001

is rising. However, the degrees in which the natural fluctuations in the seabed are shifting are not enough to offset sea level rise.

Palau's economic stability is based primarily on the management and sustainable development of its tourism, fisheries, and agricultural sectors[3]. Therefore, the stability of Palau's economy is highly dependent on the health of the nation's natural resources, all of which are sensitive to climate change.

Current Climate Change Trends

Of all the Pacific Islands, Palau was internationally identified as one of the top four most vulnerable Pacific Island Countries, according to the Green Peace "*Pacific in Peril*" 2001 report. Palau currently faces increasing vulnerability to natural disasters and degradation of natural resources.

Factors

The noted fragmentation of Palau's natural habitats are attributed to several factors. Durng the past decade, population growth has not contributed greatly to Palau's terrestrial habitat loss. This is due to the fact that Palau's growth in population has remained relatively constant over the past 10 years (2.1%). The current population in Palau numbers approximately 18,000 residents.

A second, more noted, factor contributing to Palau's natural habitat fragmentation is attributed to a boom in economic development associated with the Compact of Free Association.

Aerial view of mangroves under threat
Babeldaob Island

[3] Republic of Palau Economic Report, Bank of Hawaii, February 2000

Several hotels and tourist related developments have occured in the Koror area over the past decade. In anticipation of the completion of the Compact road, several proposed golf course projects, hotels and resorts, and other private sector developments are slotted for the big island of Babeldaob.

However, global warming induced changes are the primary culprit in the growing fragmentation of Palau's natural habitats. The noted rise in sea level and associated coastal erosion; increased intensity and freqency of drought and associated land degradation, storms and associated flooding and infrastructure loss, saltwater intrusion and associated food supply loss; and sea surface temperature rise and associated coral bleaching, are major concerns for the Republic.

Landslide caused by increased frequency and intensity of storm activity

Climate change induced phenomena are directly attributed to the loss of agricultural food supply production, reduction and/or contamination of Palau's watersheds, and is seen as a contributing factor to the noted rise in vector borne diseases within the Republic.

Many traditional farming practices are no longer viable because of the changing weather patterns and the climates' affects on Palau's farming areas. Since the first severe drought in 1982, Palau has continued to see an increase in drought events and a noted increase in the types and number of outbreaks of introduced diseases that are not common to Palau's environment.

Ngirikiil Watershed
One of Palau's major watersheds

These global warming changes are currently affecting the health of Palau's natural habitats and, if no action is taken at the global level to reduce greenhouse gases in the atmosphere, these climatic changes will negatively contribute to Palau's sustainability over the long-term.

Droughts & Floods

Droughts and floods are among the climate extremes of most concern as they affect the quality of the water supplies in the communities and thus can have significant health consequences. A prime example of this trend is the 1997/98 El Niño and coral bleaching events. Palau experienced a nine-month drought during the 1997/98 El Niño event. In March of 1998, Palau had the lowest rainfall on record for the past 100 years. Water inventories of that period indicated that Palau would not have been able to sustain an additional three months. Taro patches (traditional food supply) dried up and crops withered and died. Fires, most of them uncontrolled, occurred almost daily during the peak of the drought.

The National Oceanographic Atmospheric Agency (NOAA) has predicted another El Niño for early 2002. Climate models indicate that, due to global warming, El Niño and related natural phenomena will increase in frequency, duration, and intensity over the next 50 to 100 years. This trend has the potential to intensify should the world communities not take the necessary measures to curb the global consumption of greenhouse gases.

The predicted 2002 El Niño event is expected to be more severe and last longer than the 1997/98 El Niño event. With the growth of Palau's population since the 1997/98 El Niño event and the projected intensity of the 2002/03 event, Palau's current water resources may not be adequate to supply the entire nation for the duration of the drought[4].

Before the 1997/98 Coral Bleaching event

After the 1997/98 Coral Bleaching event

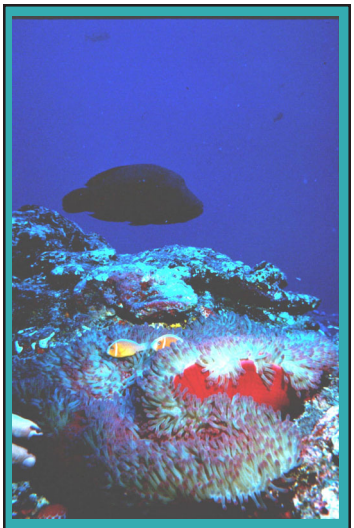
[4] Republic of Palau El Nino National Action Plan, El Nino Mitigation Committee, 2001

Sea Surface Temperature

Palau has experienced a variation of 3°C in sea surface temperature over the past five years[5]. This significant variation in sea surface temperature is directly attributed to global warming. Most corals and marine life are sensitive to even the slightest variation in water temperature and a large percent of marine organisms are already living at their threshold. The high fluctuations in seawater temperature caused Palau's massive coral bleaching event in 1997/98.

Snorkeling through the famous Rock Islands

Palau's exceptional marine diversity has enabled the tourism sector to develop into the largest private sector industry for the Republic. However, due to the 1997/98 coral bleaching event, Palau experienced a devastating 9% drop in annual tourism revenues. The coral bleaching phenomena killed one third of Palau's reefs, which is estimated at $91 million dollars (based upon 30% damage to 450 square kilometers of inner/outer reef)[6]. Although this is a large monetary loss to the nation, no amount of money can adequately reflect the irreparable loss to Palau's society and natural environment.



One of Palau's many coral reefs

Global climate change phenomena such as coral bleaching and drought are now predicted for every three to five years. Palau's tourism industry cannot persevere without creating other sources of eco-friendly activities that are not reliant on Palau's coral reefs.

Additionally, the continued health of Palau's biodiverse marine habitats are of great concern to the national government. These specie abundant reef habitats have traditionally supplied Palau with is fish food supply. However, a large percent of these marine habitats are either dead or severely damaged due to the extreme fluctuations in sea surface temperature.

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[5] 2001 Environmental Vulnerability Index, Ministry of Administration, Republic of Palau

[6] Constanza et al, 1997 Nature, reefs are valued at $6,000/ha/yr.

Sea Level Rise

Twenty percent of Palau's landmass is below 10 meters above sea level, which is significant due to sea level rise and the considerable potential for coastal erosion[7]. Most of Palau's infrastructure and economic development activities are located near the coast making them acutely vulnerable to storm events and sea level rise.

The Green Peace "*Islands in Peril*" report determines that several of Palau's inhabited islands may dissapear within the next 100 years. Already, some of Palau's Rock Islands have succomb to sea level rise. The inhabited areas of high concern are the islands of Kayangel, Angaur, Peleliu, and the Southwest Islands.

During the 1997/98 El Nino and coral bleaching events, one third of Palau's population was also affected by the 100 percent loss of their taro crops due to saltwater intrusion and sea level rise[8]. Taro gardens on three of the outer islands of Palau have yet to recover and another El Nino event is predicted for early 2002.

Preventing erosion through the replanting of trees in an attempt to bind the soil

Mangrove forest under threat of dying Babeldaob Island

[7] 2001 Environmental Vulnerability Index, Ministry of Administration, Republic of Palau.
[8] 1997/98 El Nino Crop Report, Palau Community Action Agency - Informal Employment and Sustainable Livelihood, 1999.

To date, 28 inches of beach erosion at Negemelis Lagoon
Climate change enduced sea level rise has and will continue to put Palau's coastal vegetation severely at risk.

Habitat Loss

Climate Change also poses additional threats to Palau's biological diversity. A prime example is the noted sea surface temperature rise that caused the 1997/98 coral bleaching event which lead to the thirty percent mortality rate of Palau's reef systems. Sea level rise also threatens Palau's mangroves environments, beaches, and coastal communities. Furthermore, Palau is and will increasing see noted fragmentation of its forest and reef ecosystems.

Palau's terrestrial habitats are experiencing significant degradation due to severe floods and intense and prolonged drought conditions. With the increasing fragmentation of Palau's terrestrial ecosystems, especially forest degradation, Palau's tourism and agricultural sectors has and will increasing experience significant pressure and economic loss.

Waste Management

Less than 1% of Palau's sewage is treated[9]. This is significant because 99% of the sewage pumped into Palau's waters is raw. The high nutrient content of raw sewage causes algae blooms that kill coral life in and around the dumping site. Marine organisms also eat the raw sewage, which creates two significant hazards; 1) potentially serious health risks may arise from the human consumption of contaminated marine species; and 2) the marine organisms may become sick and die.

At present, the national government is assisting Koror State construct a sewage ponding system. Koror State is currently the economic hub of the Republic. The majority of the population, including tourists, resides in Koror State. Therefore, the majority of Palau's population, in addition to a high percentage of tourists, will use the ponding system.

This system will use fresh water to naturally filter waste prior to its final release into the ocean. The ponding system is based on freshwater filtration and during times of drought, the supply of freshwater to the waste facility will become a major issue of concern for the Republic. With the intensifying affects of climate change events combined with the additional stresses to the environment from population growth and economic development, Palau will increasingly face limited water resource issues in the future.

[9] 2001 Environmental Vulnerability Index, Ministry of Administration, Republic of Palau.

Future Climate Change Trends

Palau will likely experience changes in patterns of natural climate variability such as El Niño Southern Oscillation (ENSO); changes in the frequency, intensity, and tracks of tropical storms, and changes in ocean currents. Palau may possibly be affected by increasing air and ocean temperatures and the sustained rise in sea level.

The El Niño and La Niña are primarily generated by the noted shifts in sea surface temperature fluctuations in tropical and subtropical regions[10]. Scientists have determined that since the industrial revolution in the late 1800's, there has been a discernable increase in atmospheric greenhouse gas emissions. This in turn causes the mean sea surface temperature to warm. Scientific evidence goes on to suggest a direct link between human influence and global climate change. There is new and stronger evidence that most of the warming observed over the past 50 years is directly attributable to human activities[11]. Some recent climate change studies also project that ENSO extremes are likely to increase with increasing greenhouse gas concentrations. Should Palau experience increasing persistence of events such as El Niño-like conditions, its natural resources would be under severe pressure. Of key importance is the potential reduction of Palau's freshwater resources.

Ngaremeduu Estuary
Babeldaob Island

RESOURCE MANAGEMENT

In an effort to mitigate and/or adapt to climate change trends, President Tommy E. Remengesau, Jr., initiated an aggressive programmatic approach to the integration of global warming phenomena into Palau's planning process. Global warming activities critical to Palau's long-term social, economic, and environment sustainability are areas of high priority to the Administration. Issues relating to sea level rise, sea surface temperature fluctuations, and natural phenomena such as frequent drought and flood activity are being addressed in various ways.

[10] Climate of the 21st Century: Changes and Risks, 3rd edition, Wissenchaftliche Auswertungen, Global Climate Protection, 2001

[11] the Intergovernmental Panel on Climate Change, 3rd Assessment Report to the UNFCCC, 2001

Freshwater Resources

Adequate water supplies are critical for the social, economic, and environmental security of Palau. Palau is one of the most freshwater rich islands in Micronesia. However, even without climate change trends, Palau would still face an increasing demand on its limited freshwater resources from population growth and economic development. To address the affects of drought, Palau is in the process of developing a drought management infrastructure to effectively manage Palau's water resources during prolonged dry conditions.

The Vice President, as Chairwoman of the National Emergency Committee, created the El Niño Mitigation Committee to assess Palau's national water supply, national food supply, and national health capabilities to manage the anticipated 2002/03 El Niño event. Taking climate change predications into consideration, the El Niño Mitigation Committee also assessed and made recommendations for the development of a long-term drought management infrastructure.

Vice President Sandra Pierantozzi with the National El Nino Mitigation Committee

The following agencies are currently working with the Association of Governor's, traditional leaders, and the various communities to incorporate freshwater management systems in all of the states in the Republic.

Programs and Activities

The Ministry of Resources and Development is coordinating with the appropriate agencies to develop an incentive program to allow citizens to purchase residential water catchment tanks. By developing residential based water supplies, citizens will be able to collect and use their own freshwater, thereby alleviating pressure on the national water supplies. The tanks will also allow for household water deliveries and storage during severe drought periods.

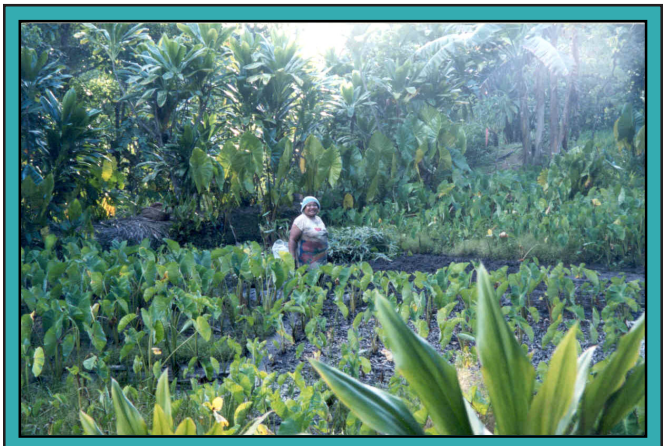
The Ministry of Resources and Development is also working with the various States to identify water pipe leakages and water tank damage in the existing water systems, identify additional water

resources to be secured for severe drought conditions, and create awareness on the importance of water conservation.

Currently, only residents of Koror State and Airai State are paying for public water. The Ministry of Resources and Development plans to introduce a nationwide water metering system that will require all residential, commercial, and government buildings throughout Palau that uses the public water system to pay for the use. The Ministry's hope is that the fees introduced by the public water system will encourage water conservation practices.

Agricultural Resources

Climate change possess significant and potentially permanent stressess to Palau's food supply. Drought and saltwater intrusion in the past several years has caused significant damage to Palau's taro patches and farming areas. Additionally, the changing migratory patterns of species have caused severe damage to Palau's habitats and traditional farming areas.



Taro Patch
one of Palau's main traditional food supply

To address potential food supply shortages due to climate change induced phenomena such as El Niño, the Ministry of Resources and Development – Division of Agriculture, Palau Community Action Agency – Informal Employment and Sustainable Livelihood (PCAA-IESL), and the Palau Community College – Cooperative Research and Extension (PCC-CRE) are conducting practical workshops and follow-up activities in all of Palau's communities.

Tapioca Plant
a staple in the Palauan diet

Programs and Activities

The Ministry of Resources and Development, PCAA-IESL, and PCC-CRE have identified crop species that are resistive to drought conditions, techniques for identifying appropriate areas for planting,

and the proper planting and harvesting practices to ensure continued food supplies during drought conditions. PCAA-IESL and PCC-CRE are also assisting the more critical states of Angaur, Peleliu, Kayangel, and the Southwest Islands identify and develop community agriculture sites that are at a high enough elevation to reduce the potential of saltwater intrusion.

PCC-CRE has also developed and implemented a Resources and Development Station that is dedicated to the collection and propagation of Palau's species of food plants. The Resources and Development Station is capable of taking one root or plant and, through graphing techniques, produce more than a dozen baby plant specimens. Through scientific techniques, PCC-CRE is assisting Palau's sixteen States ensure adequate food supplies through foreseeable climate change phenomena.

Sponge gourd *Giant Taro*

Public Health and Safety

Palau's coastal and inland communities and infrastructure are already at risk to climate change extremes. In the past three years Palau has experienced record breaking flooding from severe storms caused by La Niña, and severe drought from the 1997/98 El Niño with another drought event predicted for early 2002.

Programs and Activities

To address the growing health and sanitation issues associated with climate change events, the Environmental Quality Protection Board and the Ministry of Health are conducting aggressive public awareness campaigns that focus on freshwater sanitation concerns and potential diseases that may arise due to unsafe water supplies. The public awareness campaigns consist of practical community workshops that provide hands-on knowledge on the proper techniques for preparation, treatment, and storage of residential drinking water. Additionally, the campaigns utilize the media to reach all audiences in the Republic with on-going public announcements regarding health and sanitation issues relating to climate change events.

Environmental Conservation and Protection

Although Palau did not contribute to global warming, Palau must now contend with the environmental changes that global warming is causing to the natural environment. Palau is a small island nation with limited financial and human resources to combat all the environmental issues associated with global warming. However, with limited resources on-hand, Palau has developed and implemented the following agency activities to address climate change trends.

National Marine Protected Areas

With Presidential endorsement, the Palau International Coral Reef Center, the Palau Conservation Society, The Nature Conservancy, the Koror State Rangers, the Office of Environmental Response and Coordination, and several MAREPAC members, are in the process of developing a national system of Marine Protected Areas (MPAs). The National MPAs will incorporate climate change monitoring and assessments.

Community Level Marine Conservation and Protection

As part of their operational mandate, the Bureau of Natural Resources and Development, the Palau International Coral Reef Center, the Office of Enviornmental Response and Coordination, the Palau Conservation Society, and the Environmental Quality Protection Board work individually and in tandum to promote marine conservation and protection at both state and national level.

Over the past eight years, the Palau Conservation Society and The Nature Conservancy have worked with the various state communities and traditional leader's to identify and implement marine conservation areas. The Palau Conservation Society (PCS) assisted the various states identify and/or implement management plans for seven marine conservation areas throughout Palau.

Marine Enforcement

At the National level, the Division of Conservation and Entomolgy under the Ministry of Resources and Development and the Marine Enforcement Division under the Ministry if Justice ensure compliance of Palau's laws and regulations as it pertains to marine enforcement.

At the State level, the Koror State Rangers provide enforcement of national and state marine protection laws within Koror State waters. The Koror State Rangers conduct management activities to ensure the sustainability of Palau's marine lakes, Rock Islands, and various world famous dive sites. The Koror State Rangers also provide marine conservation and monitoring assistance to the various outlaying states.

Mikania weed

Kebeas
A native invasive weed

Watershed Monitoring and Protection

The Ministry of Resources and Development has developed and will soon implement a five-year watershed sediment-monitoring program that will provide baseline data on the deterioration of Palau's main watersheds. The outcome of the study will determine Palau's program of action for future freshwater supply issues.

Invasive Weed Program

Palau hosts at least 12 of the 100 worst invasive alien species in the world[12]. Invasive species compete with native plants and animals, displace them, consume them, act as parasites, cut survival rates, and can even cause the extinction of entire species, according to the United Nations Environment Programme.

To address this growing concern, the Ministry of Resources and Development – Division of Agriculture, PCAA-IESL, PCC-CRE, the PCC – Science Program, the Palau Conservation Society, the Natural Resource Conservation Service, the Bureau of Lands and Surveys – Palau Automoated Land and Resource Information System (PALARIS), and the Office of Environmental Response

[12] "100 of the World's Worst Alien Species - A Selection from the Global Invasive Species Database", Invasive Species Specialists Group and IUCN The World Conservation Union, 2001.

and Coordination have developed a one-year invasive weed eradication program to control the growing invasive weed problem in the Republic. The program consists of a practical approach to eradicating three of Palau's invasive weeds that are of economic concern; followed by a massive public awareness program on the identification, methods of eradication, and the importation of invasive species.

Resource GIS Monitoring

The Ministry of Resources and Development – PALARIS Program is developing a National database for GIS relevant to all sectors of the government. Included in the database will be the on-going monitoring and tracking of natural resources, infrastructure development, dengue epidemics, population growth, soil surveys, and vegetation types on a based map of elevation.

Ngaremeduu Conservation Area

The tri-state Ngaremeduu Conservation Area was established in 1999 through various state legislations. The Aimeliik State *Ngaremeduu Conservation Act of 1999*, and the *Ngaremeduu and Compact Road Mitigation and Conservation Area Act of 1999* for the states of Ngatpang and Ngeremlengui officially established Ngaremeduu Conservation Area. The Conservation Area Support Officer (CASO) under the Bureau of National Resources and Development is the lead coordinator for the Conservation Area. The CASO coordinates with the Conservation Area Coordinating Committee to manage the natural habitats within the conservation area's boundary and to identify and promote community based eco- tourism projects.

The Ngaremeduu Conservation Area is on the wesetern coast of Babeldaob island, encompassing 98km^2

Lake Ngardok Nature Reserve

Melekeok State on the island of Babeldaob, with the technical assistance of PCS, established the Lake Ngardok Nature Reserve in 1999. Lake Ngardok is the largest natural freshwater lake in all of Micronesia. The board of directors determines the overall sustainability issues of the lake and surrounding habitats of the reserve. One of the objectives of the Board is to develop appropriate community based eco-tourism activities to promote small-scale economic activity in the state. President Tommy E. Remengesau, Jr. recently signed the Instrument of Accession to the RAMSAR Convention for the protection and conservation of marine and freshwater wetlands. Lake Ngardok is the first RAMSAR site proposed for the Republic of Palau.

Ocean Thermal Energy Conversion Project

In an attempt to reduce Palau's greenhouse gas emissions, President Tommy E. Remengesau, Jr. traveled to Japan to sign a Memorandum of Understanding with Saga University to look into the feasibility of using Ocean Thermal Energy Conversion or OTEC technology as an alternative source of energy for the Republic. The Ministry of Resources and Development – Energy Program and the Office of Capital Improvement Projects are tasked with the development and potential implementation of OTEC technology in Palau.

Energy Efficiency Pilot Projects

The Ministry of Resources and Development – Energy Program is currently in the process of upgrading and expanding its existing solar energy demonstration projects in several of the outlaying states. The Palau International Coral Reef Center conducted an assessment of its current power generation and provided recommendations for refitting the Center with energy efficient lighting systems and solar power panels. Negotiations are currently underway to implement the suggested energy efficiency recommendations.

National Land-use Plan

Initiated by the Association of Governors, the Republic of Palau is currently undergoing a nationwide land-use planning process. Once the entire Land-use Plan is completed and endorsed by the National Government, it will become the National Plan for zoning, building codes, and electrical codes for the Republic.

Office of Climate Change

The Office of Environmental Response and Coordination (OERC) was established on January 1, 2001 by President Tommy E. Remengesau, Jr., through Presidential Executive Order 189. The purpose of the OERC is to assist in the coordinated planning for Palau's response to issues regarding global climate change, biodiversity, desertification, and other internationally identified and funded environmental initiatives. The OERC is mandated to fulfill the Republic's obligations to the United Nations Framework Convention on Climate Change, United Nations Convention on Biological Diversity, United Nations Convention to Combat Desertification, and the Vienna Convention for the Protection of the Ozone Layer.

INTERNATIONAL ATMOSPHERIC MEMBERSHIP ARRANGEMENTS

Through the various international atmospheric conventions and protocols, Palau is incorporating climate change mitigation and adaptation processes into the national planning process. By mitigating and/or adapting to climate change, Palau hopes to alleviate the social, economic, and environmental stresses caused by global warming. In addition to incorporating safety measures to sustain Palau's resources, Palau is also doing its part to assist the world community reduce global greenhouse gas emissions by promoting the use of alternative energy and creating public awareness on the benefits of energy conservation.

United Nations Convention on Biological Diversity

Palau ratified the United Nations Convention on Biological Diversity on November 3, 1998 under Senate Joint Resolution 5-90. Palau is in the final process of receiving its first Enabling Funds for the Preparation of its National Biodiversity Strategies and Action Plan (NBSAP). The NBSAP will assess past and present resource use, including institutional frameworks, and provide sustainable development options and recommendations for the Republic.

United Nations Framework Convention on Climate Change and Kyoto Protocol

Palau ratified the United Nations Framework Convention on Climate Change and its Kyoto Protocol on September 14, 1999 under Joint House Resolution 5-89-20S. Palau received its Enabling Activity funds in January 2001, and is currently in the process of developing its first National Report to the United Nations Framework Convention on Climate Change. In 2001, Palau completed its first National Greenhouse Inventory, its first Environmental Vulnerability Assessment, and will conduct its first Vulnerability and Adaptation Workshop in October 2001. The Ministry of Administration – Planning, Program, and Budget Office has incorporated the Greenhouse Gas Inventory and Environmental Vulnerability Index into Palau's

Greenhouse Gas Inventory Capacity Building Workshop

annual reporting process.

Vienna Convention for the Protection of the Ozone Layer

President Tommy E. Remengesau, Jr., endorsed Palau as a Party to the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer on May 14, 2001. Palau is currently developing its ozone depleting substances phase-out schedule to meeting the international phase-out deadline of 2010.

United Nations Convention to Combat Desertification

Palau ratified the United Nations Convention to Combat Desertification on November 6, 1998 under House Joint Resolution 5-68-8. Palau completed and submitted its National Action Plan to combat desertification and degradation. The Plan highlights Palau's growing concerns over climate induced phenomena such as drought and associated soil erosion and Palau's growing population and associated habitat loss.

Environmental Legislation, Acts, and Plans

The National Government has also addressed the growing concern over climate change and environmental degradation through the following proposed and enacted legislation, acts, and plans.

- The *Endangered Species Act of 1975* provided the framework for the identification of indigenous plants and animals that are under threat of extinction. The Act provides the framework for the prohibition of tampering with species identified as endangered of extinction. It also provides the mechanism for effective enforcement of penalties[13].
- The *Natural Heritage Reserve System Act* became law in 1991. The bill calls for both terrestrial and marine area conservation measures through the identification and

[13] Environmental Protection 24 PNCA 1001/1004, Division 2: Wildlife Protection, Chapter 10: Endangered Species Act, 1975

implementation of reserve sites at the State level. The reserve status criteria is based on unique natural resources such as geological features, freshwater tributaries, marine and terrestrial habitats which support unique communities of natural flora and fauna[14].

- The *Marine Protection Act of 1994* promotes sustainable development of marine resources for commercial fishermen in the Republic of Palau. The Act identifies annual fish spawning periods and prohibits the buying or selling of certain fish species during spawning season. The Act also provides for size prohibitive criteria for the buying and selling of crustaceans and certain species of fish stocks[15].
- Olbiil Era Kelulau ratified bill *RPPL No. 4-107-7* to amend the Marine Protection Act of 1994[16]. The Act further clarifies the taking of certain species of marine organisms while using an underwater breathing apparatus other than a snorkel. The Act identifies specific penalty fees and further strengthens enforcement of the Marine Protection Act of 1994.
- The *1994 Forest Management Plan* provides direction for the long-term sustainable management of Palau's forest systems. The Plan identifies Palau's various forest habitats and sets forth specific guidelines for resource preservation for all forest areas in Palau[17].
- *Section 62 of a 1997 Natural Resources* bill passed by the Olbiil Era Kelulau (Senate) addressed energy efficiency of government buildings. Section 62 required an appropriation of money to the Ministry of Resources and Development – Energy Program to conduct audits on three government buildings, Belau National Hospital, Palau Community College, and the Olbiil Era Kelulau buildings. The audits were completed and submitted to the OEK for review. The outcomes of the audits were to determine the feasibility of replacing and/or installing energy efficient measures such as florescent lighting, solar-powered water heaters, and other devices in the respective buildings.
- The follow-up *Energy Efficiency Act of 2001* bill, calls for an appropriation of $25,000 to conduct audits on seven additional government buildings.
- The *Mangrove Management Plan* was developed in 1999 based upon the recommendations of the National Master Plan. The Plan provides for a framework for the sustainable management of Palau's mangrove forests. The plan builds upon the Palau's 2020, Master National Development Plan and the Palau Natural Heritage Reserve System Act[18]. The

[14] Natural Heritage Reserve Systems Act, 24 PNCA 3202, Chapter 32: Natural Heritage Reserve System
[15] Environmental Protection Act, 24 PNCA 1201.1204, Fishing, Chapter 12: Marine Protection Act of 1994
[16] Fourth Olbiil Era Kelulau, Tenth Regular Session, April/May 1995, House Bill No. 4-107-7, HD3, SD3, CD1
[17] Palau Forest Management Plan, Final Draft May 1994, F. Bell, United States Department of Agriculture - Forest Service
[18] The Palau Mangrove Management Plan, Volume 1 (version 2.0, 09/29/00), Ministry of Resources and Development - Bureau of Natural Resources and Development, W.D. Metz, United States Department of Agriculture - Forest Service, September 2000

plan has yet to be implemented for lack of resources.

- The Plant and Animal Quarantine Regulations in accordance with the Administrative Procedure Act was officially adopted in June 1999. The regulations provides for the identification of official points of entry, importation permit requirements, disposal of prohibited organisms, releasing of plants and animals, and emergency measures for the eradication/control of quarantine pests[19].
- The Olbill Era Kelulau ratified the *Palau Natural Resources Council Act* of 2001 in August of 2001. The Council mandate is to provide comprehensive analysis, planning, and implementation on methods of preventing soil erosion, improving water quality, and protecting other natural resources. Council members include all relevant stakeholders from national and state governments, non-governmental organizations, and traditional and community leaders.

The following legislation, acts, and plans are currently under development or pending national approval.

- The Palau Forest Practice Act, developed in 1992 is still pending Olbiil Era Kelulau approval. The Act identifies mangrove conservation areas throughout the Republic.
- Modification of the Endangered Species Act of 1975. President Tommy E. Remengesau, Jr. tasked the Bureau of Natural Resources and Development under the Ministry of Resources and Development to expand Palau's existing Endangered Species Act to reflect all internationally identified species under threat of extinction.
- President Tommy E. Remengesau, Jr., via Presidential Executive Order, created the Sustainable Tourism Taskforce to identify and develop a long-term tourism plan for the Republic. Completed in August of this year, the *2001 Sustainable Tourism Plan* identifies high-end/low-impact eco-friendly tourism development as an essential component for Palau's long-term sustainability. The Plan is currently under review by the Executive Branch. Once endorsed, the Plan will be submitted to the Olbiil Era Kelulau for ratification.

[19] Plant and Animal Quarantine Regulations, Ministry of Reosurces and Development - Division of Agriculture and Mineral Resources and the Ministry of State - Bureau of Domestic Affairs, June 1999

CONCLUSION

Palau is expected to see significant economic growth over the next ten years. This escalation in development is primarily due to the development of the 53-mile Compact Road that will unite the big island of Babeldaob with Koror, the current economic capital of Palau.

It is imperative that Palau identifies and implements infrastructure and adaptation programs to mitigate the impacts of the projected economic expansion coupled with global warming environmental stresses. Even with Palau's limited technical, human, and financial resources, many programs to ensure long-term sustainability of Palau's environment are underway.

However, to effectively manage Palau's growing environmental concerns, Palau must upgrade its infrastructure, especially in the areas of freshwater management and disaster management. Palau must also expand its coral reef monitoring and assessment efforts through a national system of marine protected areas, and encourage capacity building programs for sustainable resource management. It is also critical for Palau to expand and strengthen its capacity for environmental data collection and compilation for local and international reporting obligations.

Palau is tackling these issues, but additional technical and financial assistance is needed to fully develop and implement these programs and activities.