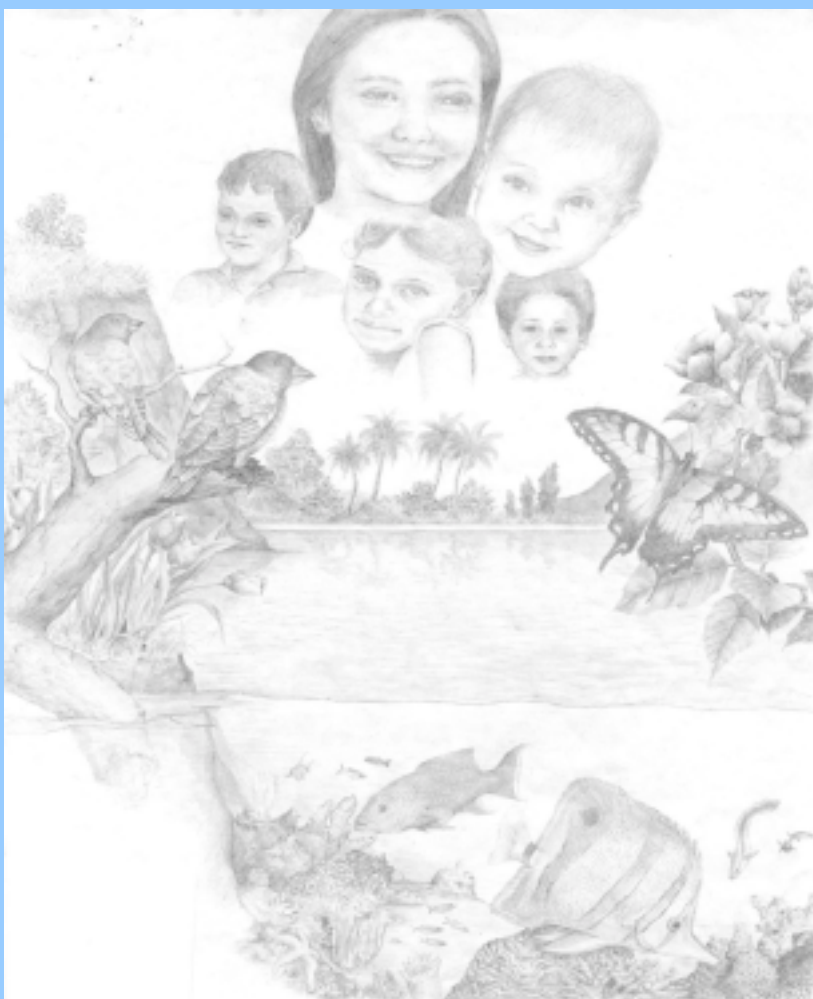
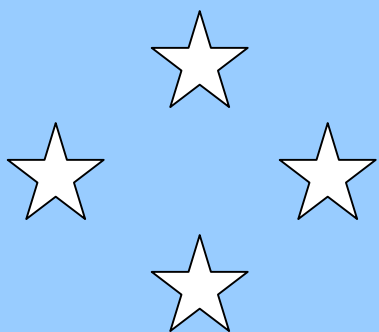


# *The Federated States of Micronesia*



# NBSAP

## National Biodiversity Strategy and Action Plan



# NBSAP

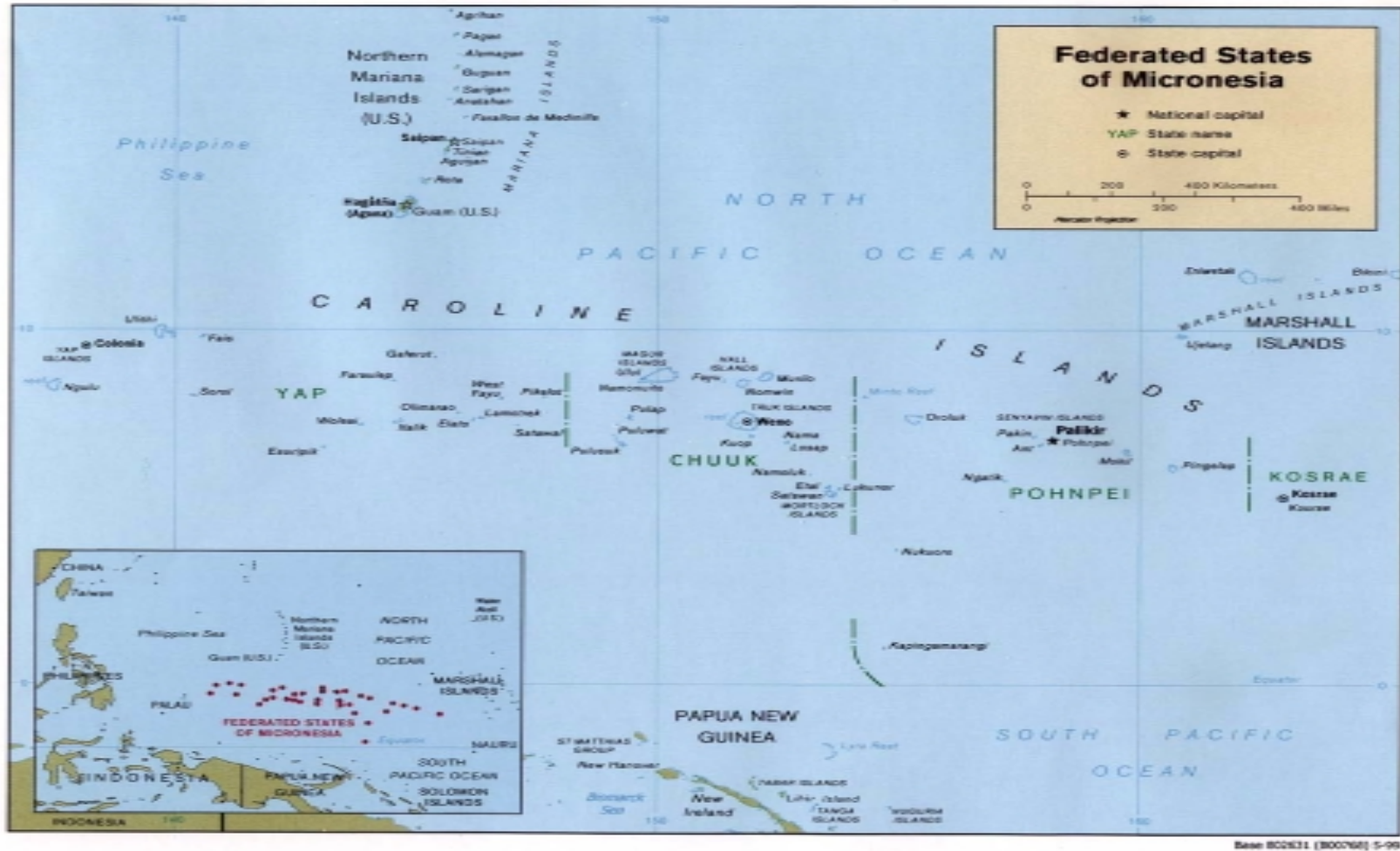
## National Biodiversity Strategy and Action Plan

# *The Federated States of Micronesia*

*Cover Design: The cover picture without text is designed by Filemeno Kilicho of Chuuk State, FSM - the winner of the National Cover Design Contest. The following is the explanation of the drawing:*

*“The natural wonders and beauty this picture portrays represents our goal towards biodiversity...A better understanding of biodiversity will only enhance a better-cleaner natural surrounding for us, but more importantly the outcome will be a great blessing for the young generation...The children in the portrait represents the new generation. Notice how they’re centered in the scene with their faces charmed with innocent smiles. That’s because it’s a reminder to us that our work today is the strong foundation for the generation tomorrow. Their faces show that they feel content and are comfortable with their surroundings. Let’s keep those smiles upon the faces of our children by reaching our goal.”*

Figure 1. Map of the Federated States of Micronesia. Source: <http://www.lib.utexas.edu/maps>



## Foreword

With the guidance of the National Environmental Management and Sustainable Development Council (SD Council) and the funding support of the Global Environment Facility through the United Nations Development Programme, a consultation process was undertaken throughout the FSM resulting in the National Biodiversity Strategy and Action Plan for the Federated States of Micronesia. Numerous stakeholders in several communities throughout the FSM were consulted and the results, with the approval of the four State Governments, have been translated into the actions outlined in this NBSAP. A national meeting involving multi-sectoral stakeholders from all our four States was held in our national capital whereby this document was finalized.

The vision and actions will heretofore serve as the basis of activities in the FSM to fulfill our obligations under the Convention on Biological Diversity, and more importantly, to ensure our resources are utilized sustainably for this generation and those to come.

Because environmental activities are primarily implemented by our four States, I anticipate working with each of the States in developing and incorporating Implementation Plans outlining specific activities and implementation frameworks into this NBSAP. I therefore endorse full support of all the National Government agencies in assisting the States with subsequent activities to develop and carry out these implementation plans as part of this NBSAP.

For the reasons above, I hereby fully endorse the National Biodiversity Strategy and Action Plan for the Federated States of Micronesia.

Endorsed this \_\_\_\_ day of \_\_\_\_\_, 2002

*His Excellency Leo A. Falcam  
President, Federated States of Micronesia*

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## 1.0 Acknowledgements

The formulation of the FSM National Biodiversity Strategy and Action Plan required tremendous efforts and resources to ensure sufficient and effective consultations throughout the nation to determine the priorities of the people and needs relevant to the conservation of the nation's biological resources. Many individuals in National and State government agencies and local communities are collectively responsible for the successful completion of the process to formulate the NBSAP. The funding contribution of the Global Environment Facility (GEF) through the United Nations Development Programme is gratefully acknowledged.

At the National level, the SD Council and its NBSAP Panel provided the Department of Economic Affairs with the necessary advice and support to successfully implement a process throughout all four States of the FSM. The most credit for the success of the NBSAP process goes to the four States, particularly the Biodiversity groups and the NBSAP counterparts who took on the challenge at the early stages of the process and continued with a strong resolve to complete consultations and ensure this document reflects the priorities of their States. The numerous individuals making up these biodiversity groups and acting as counterparts, must be commended for their dedication and sustained efforts throughout the process. The consultant that drafted this document and those who contributed technical reports must also be congratulated for their efforts in assisting this process.

Most important are the people in the communities and their leaders who, on their own time and through their concern for the welfare of the biological resources and the needs of the next generation, participated in and provided their views at community workshops. They are the most valuable resource in this whole process. It is on their commitment that we must base our dedication in ensuring that we achieve the vision by effectively carrying out all the actions outlined in this Plan for our sake and that of the future generations.

*The Honorable Sebastian L. Anefal*  
*Secretary, FSM Department of Economic Affairs*

## 2.0 Abbreviations

CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
COM-FSM	College of Micronesia – Federated States of Micronesia
CSP	Conservation Society of Pohnpei
CTF	Conservation Trust Fund
DEA	Department of Economic Affairs
DHESA	Department of Health, Education and Social Affairs
DLNR	Department of Land and Natural Resources
DFA	Department of Foreign Affairs
DOFA	Department of Finance and Administration
DOJ	Department of Justice
DRC	Development Review Commission
DRD	Department of Resources and Development
DTC&I	Department of Transportation, Communications and Infrastructure
ENSO	El Nino/Southern Oscillation Phenomena
EPA	Environmental Protection Agency
FSM	Federated States of Micronesia
GEF	Global Environmental Facility
GIS	Geographic Information System
IMO	International Maritime Organization
MAREPAC	Marine Resource Pacific Consortium
MFA	Micronesian Fisheries Authority
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non Government Organizations
PACPOL	Pacific Ocean Pollution Prevention Programme
SD Council	Environmental Management and Sustainable Development Council
SPC	Secretariat of the Pacific Community
TNC	The Nature Conservancy
TTPI	Trust Territory of the Pacific Islands
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
WWF	World Wildlife Fund

### 3.0 Executive Summary

The Federated States of Micronesia (FSM) National Biodiversity Strategy and Action Plan (NBSAP) was developed through a series of multi sectoral meetings and discussion throughout the nation over a period of 14 months. Representatives of the National and State Governments, Municipality Officials, Non Government Organizations (NGO), Academic Institutions, the private sector and resource owners participated. These consultations are part of the NBSAP project which was coordinated by the National Environmental Management and Sustainable Development Council (SD Council) through its working group, the “NBSAP panel”, which is comprised of representatives from relevant national agencies, NGO organizations and academic institutions on the Council. The Department of Economic Affairs (DEA) at the National Government was the lead agencies for the NBSAP project and was actively supported by counterpart agencies in each of the four FSM States: The Development Review Committee (DRC) in Kosrae State; the Department of Land and Natural Resources (DLNR) in Pohnpei State; the Environmental Protection Agency (EPA) in Chuuk State; and the Department of Resources and Development (DRD) in Yap State.

During the NBSAP process, the four individual States of the FSM undertook a series of community, municipal and state formal and informal consultations involving stakeholders ranging from government officials, politicians and traditional leaders to housewives, students and youth groups. Information on priorities, threats and actions relating to biodiversity gathered during these state consultations were synthesized and discussed at state and national seminars and this has been used to formulate the NBSAP presented here.



Scientific reviews of available literature on the nation’s terrestrial and aquatic biodiversity were also undertaken. These reviews document the current status of all ecosystem biomes and species within the nation based on the available literature and include specific information pertaining to endemic, rare, threatened and invasive species. Particular reference is made to those organisms that have traditional values and usage. Information pertaining to the nation’s biodiversity is limited and considerable gaps in information exist, especially for the lower invertebrate phyla. Recommendations to further document and manage the biodiversity of the nation are included. In addition, a series of ecoregional consultative workshops have been undertaken as part of the NBSAP process to develop a priority list of terrestrial and aquatic ecosystems and species that need to be conserved and managed. Summaries of these reports are included.

The NBSAP report outlines the state of the nation’s biological resources and the current biological and anthropogenic threats that are affecting their continued existence. Stakeholders identified eleven biodiversity themes as the most important issues currently facing the nation. Each theme has a series of proposed actions addressing these concerns. The responsibility for the implementation of the actions identified in the NBSAP has been sanctioned to the four individual states of the FSM. Currently, each state is undertaking additional stakeholder meetings to identify the themes that are most relevant to their individual circumstances and thus develop an implementation and monitoring program.

It is acknowledged by all stakeholders that considerable time and effort will be required to develop the human resources needed within the nation to implement the actions identified. Furthermore, sharing of information and resources at all levels of the government, non-government agencies, community groups



and resource owners will be required to assist in this endeavor. The commitment to preserve, conserve and sustainably manage the biodiversity of the FSM is real and is of utmost importance for the sustainable development of the nation.

The NBSAP vision for the nation is:

***“The FSM will have more extensive, diverse, and higher quality of marine, freshwater, and terrestrial ecosystems, which meet human needs and aspirations fairly, preserve and utilize traditional knowledge and practices, and fulfill the ecosystem functions necessary for all life on Earth”.***

## **4.0 Introduction**

The Federated States of Micronesia (FSM) is a young independent nation. It was a United Nations Trust Territory of the Pacific Islands (TTPI) administered by the United States of America until the two nations signed a Compact of Free Association in 1986 leading to the trusteeship termination by the United Nations in 1991. The Compact treaty established a special relationship with America and provides economic support to the FSM. The funding provisions under the original compact are currently being renegotiated between the two countries to determine their future relationship.

The FSM is the largest and most diverse part of the greater Micronesian region and is comprised of four States, which are, in geographic sequence from west to east, Yap, Chuuk, Pohnpei and Kosrae. All but Kosrae State include more than one island and each state has considerable autonomy within the federation.

The total landmass of the FSM is 438 square miles (702 km<sup>2</sup>), with a declared Exclusive Economic Zone (EEZ) covering over 1 million square miles (1.6 million km<sup>2</sup>). The FSM is comprised of 607 islands with land elevation ranging from sea level to the highest elevation of about 2,500 feet (760 m). The archipelago lies in a broad east-west swath across 1.6 million square kilometers of the western Pacific Ocean above the equator between 1.0-9.9<sup>0</sup> N and 138.2-162.6<sup>0</sup> E (see map, Figure 1). The northeast trade wind belt heavily influences the tropical climate of the FSM. Trade winds prevail from December through April, periods of weaker winds and doldrums occur from May to November. Rainfall is extremely high on the high volcanic islands of Kosrae, Pohnpei and Chuuk and can exceed 400 inches (1,016 cm) a year (SPREP, 1993, Lindsay & Edward, 2000). The region is affected by storms and typhoons that are generally more severe in the western islands, and by periods of drought and excessive rainfall associated with the “El Nino” (ENSO) phenomena. In recent times, the droughts of 1982-1983 and 1997-1998 were especially severe on terrestrial habitats, further increasing localized threats to the biodiversity. Groundwater sources were taxed, agricultural systems damaged and problems associated with wildfires and invasive species were greatly aggravated. High mean water temperatures especially associated with low water spring tides caused coral bleaching and damage to inshore marine ecosystems (Falanruw, 2001).

The indigenous population is Micronesian with most of the people residing on the main islands of the State capitals. The 2000 census preliminary count of the population is 107,000 (July, 2000). Traditional, social and cultural institutions are still very strong in Micronesia. Micronesian society is based on the extended family, which is responsible for the family welfare, especially in relation to customary family land. Ownership of land and aquatic areas varies between States. In Kosrae and Pohnpei, land is both

privately and State owned, while aquatic areas are managed by the State as public trusts. In Chuuk, most land and aquatic areas are privately owned and acquired through inheritance, gift or, recently, by purchase. In Yap, almost all land and aquatic areas are owned or managed by individual estates and usage is subject to traditional control. In all States, land cannot be sold to non-citizens of the FSM (Falanruw, 2001 & URS, 2001). These land and aquatic ownership patterns greatly influence the strategies and actions required to sustainably manage the biodiversity of the nation.

The economy of FSM is small and is largely dependent on aid provided through the Compact of Free Association with the United States of America (NEMS, 1993). The majority of activities are government services, wholesale and retail, and subsistence farming and fishing. The government services dominate the economy at 42%. The commercial tuna fishery (international and domestic) is the nation's second highest revenue earner with annual revenues between US\$13–20 million dollars (FSM Government Report, 1999). Fifty thousand tourists (FSM Immigration, 2001) entered the FSM in 2000, (Kosrae 12%, Pohnpei 37 %, Chuuk 36 %, Yap 15 %), contributing small revenue earnings to the economy of the country (SPREP, 1993). Real GDP per capita for 2001 is US\$2030 (personal comms FSM Economic Affairs).

The national constitution of the FSM is the basis for all legal authority and decision making for the nation. The legislation and institutional framework of the Federated States of Micronesia includes, both National and individual State constitutions with each of the four States functioning as semi-autonomous governments. This structure makes it a prerogative of each State to enact their own legislation in line with their powers as mentioned in the FSM Constitution to address all issues relating to the conservation of biodiversity. Therefore, the responsibility for the implementation and monitoring programs of the NBSAP is to be undertaken by the individual States, not the National government. Each State will develop a State BSAP consistent with the NBSAP. At the State level there are also municipal ordinances and traditional precedents, which are associated with legislative issues of biodiversity (Mace, 1999). Individual State environmental and biodiversity regulations are in different stages of development and are being amended as new issues arise.

The responsibility for environmental issues is shared between the FSM National Government and the individual FSM State governments. This sharing of responsibility has at times resulted in legislation that appears duplicated at the State and National levels. It has also resulted in gaps in legislation and areas in which the location of responsibility between the State and National Governments has been less than clear. The States take the lead role in ensuring that development is avoided in vulnerable areas and ensuring that critical natural systems are protected. Each State has made efforts to control development and manage natural resources through the creation of land use plans, coastal zone plans, legislation and regulations. The National Government provides guidance and technical assistance to the States when needed and requested on matters related to planning, economic development, natural resources, fisheries, and the environment (Mace, 1999).

The FSM is an active member of several regional and international conventions and is currently reviewing additional conventions. Appendix 1 provides information pertaining to the current status (July, 2001) of the FSM in regards to international environmental treaties.

## **5.0 Background**

Biodiversity or Biological Diversity is defined as 'the variety of living things on earth'. It includes all the species that inhabit all ecosystems within the FSM, including those species that have been introduced to

the islands by people. The biodiversity of the FSM is the nation's living wealth (Falanruw, 2001). Species endemism is high within the FSM, especially among the terrestrial biota. The high endemism within the nation is a direct result of the isolation of the islands to one another and to other landmasses in the greater Micronesian region. The conservation and preservation of endemic species is of particular importance to the nation. The conservation and correct management of all biodiversity of the nation is vital to the ongoing social, economic and cultural development of the FSM.

The NBSAP report is an expanded and updated continuation of the nation's first documented environmental strategy: the National Environmental Management Strategies (NEMS, 1993). The major strategies that emerged from the NEMS were:

- Integrate environmental considerations in economic development;
- Improve environmental awareness and education;
- Manage and protect natural resources; and
- Improve waste management and pollution control.

The above themes and actions recommended in this report in 1993 are still the major issues required by the nation to be addressed before economic and environmentally sustainable development can be attained. These themes have been further endorsed by the nation's 2<sup>nd</sup> FSM Economic Summit (1999), and have therefore been integrated and expanded in the NBSAP.

### **5.1 Importance of the FSM Biodiversity Strategy**

The FSM's natural heritage has supported, maintained and improved both the social and economic well being of its people and cultures since the arrival of the first inhabitants. The importance of the nation's biodiversity cannot be understated and is present in every facet of a Micronesian's way of life including the provision of various natural resources for food, shelter, medicinal and traditional purposes. In the past, utilization of these resources was allowed under strict traditional and community management and is believed to have provided a balance with nature that allowed the biodiversity to be utilized in a sustainable manner.

Unfortunately, as the islands within the nation become "westernized" the traditional care Micronesians once had for their environment has decreased. This deterioration has increased in more recent times due to the changes from a subsistence to a commercial economy and the development of centralized governments. The nation's very high population growth and the movement of people towards urban centers has placed further pressure on the environment and its limited resources. Biodiversity is facing large-scale threats in these urban centers.

Global environmental crises such as global warming, frequent and severe typhoons, droughts, fires, and sea level rise are major concerns to the nation; the protection and conservation of island biological resources that can assist the nation to protect itself from these natural forces is extremely important. The development and implementation of suitable traditional and scientific resource management programs that can address these problems for the long term are crucial.

### **5.2 Convention on Biological Diversity**

The Federated States of Micronesia signed the Convention on Biological Diversity in 1992 and followed with ratification by the Congress in 1994. The development and subsequent submission of the NBSAP is

the nation's primary step to meet the obligations of this convention. The provisions of the Convention are set out in 42 articles, which clearly state the requirements that each ratifying nation needs to address. The elements of these articles relevant to the FSM have been addressed in the NBSAP.

### 5.2.1. Process of Strategy Development and Formulation

The FSM NBSAP was formulated during a 14-month period (January 2001 – March 2002), which comprised an extensive process of research, and multi-sectoral consultative activities involving a broad range of government (State and National), NGO and private and community stakeholders. The project was funded under the Global Environment Facility's (GEF) Enabling Activities that are administered by the United Nations Development Programme (UNDP).

Overseeing the NBSAP Project is the FSM Environmental Management and Sustainable Development Council (SD Council). The SD council is an interdepartmental advisory board established by the President and chaired by the Vice President of the nation. The SD Council established a working group called the NBSAP Panel to advise project management on implementation of the project. This panel includes members from the National government offices of DEA (Fisheries, Agriculture, Tourism and SD Units), DHESA, DFA, DOFA, DOJ, MFA, and representatives of the COM-FSM, TNC and Conservation Society of Pohnpei (CSP). The Fisheries Unit of DEA chairs the Panel.



The Department of Economic Affairs (DEA) was the lead agency that hired and housed a full time Project Manager. The four States each designated a counterpart to take on the responsibilities of coordinating the NBSAP activities for their respective States. The counterparts are: The Development Review Commission (DRC) in Kosrae State, The Department of Land and Natural Resources (DLNR) in Pohnpei State, The Environmental Protection Agency (EPA) in Chuuk State, and the Department of Resources and Development (DRD) in Yap State. In addition, several local and international consultants were

engaged to undertake specific components of the NBSAP project.

Throughout the consultative process an element of local capacity building was incorporated as a secondary objective of the project. Appendix 2 provides an outline of the timetable of activities undertaken to complete the NBSAP. It is anticipated that the implementation framework for this NBSAP will subsequently be developed by each of the four FSM States and incorporated as part of the NBSAP.

## 6.0 Biodiversity in the FSM

The biodiversity and natural heritage of the FSM is both globally significant and the foundation for the country's long term economic self-sufficiency. The islands of FSM contain over 1,000 plant species, at least 200 that are found nowhere else on Earth. Its reefs, which provide coastal protection and the source of livelihood for a majority of Micronesians, are home to nearly 1,000 species of fish and more than 350 species of hard coral.

Maintaining the habitats and ecosystems that nurture this diversity is crucial for improving Micronesians' quality of life and sustaining the country's rich traditions. FSM's long-term prospects for economic self-sufficiency rely on three sectors highly dependent on the continued vitality of the natural environment: fishing, agriculture, and tourism. Local cultures and values have strong ties to terrestrial and aquatic resources. Unfortunately, FSM's extraordinary natural resources face mounting threats to which urgent actions need to be undertaken to prevent the demise of the nation's unique biodiversity. In the face of these threats, there is a growing recognition among policy makers and the general public of the links between the health of the nation's natural heritage and biodiversity, sustainable economic future and traditional values and culture (Smith, 2001).

Environmental sustainability is considered as one of the core principles of the FSM National government economic plan and framework for its renegotiation with the United States of America for the renewal of the financial provisions of the nation's Compact of Free Association.

### 6.1 Terrestrial Biodiversity

The diversity of terrestrial plants and animals within the FSM varies from east to west due to differences in climate (particularly rainfall), geology, topography and geographical isolation. Major vegetation types in the FSM are: cloud forest, native upland forest, palm forest, agroforest, secondary vegetation, savanna, grass and fern lands, freshwater marsh, swamp forest, mangroves, atoll forest, limestone forest of rocky coasts and beach strand. The area covered by each vegetation type varies between the States and some types may not occur on all islands. Cloud forests are restricted to the cloud shrouded mountainous peaks of Pohnpei and Kosrae, which are absent in Chuuk and Yap. Upland forest and agroforest are the major vegetation types in all States, but the area of relatively intact native forest is very limited in Chuuk and Yap. Native forests are being heavily impacted throughout the FSM and updated vegetation maps are needed to assess changes since previous surveys conducted between 1976 and 1983.

The terrestrial biodiversity of the FSM has not been thoroughly documented as survey work has been limited and existing literature is scattered. Thus, only preliminary information on vascular plants and vertebrates is available. Further inventory and monitoring of the terrestrial biodiversity of the FSM is integral to a thorough understanding and appreciation of the island's biodiversity and should be a priority in the near future.

Over 1239 species of ferns and flowering plants have been described for the FSM. Approximately 782 species are native, including about 145 species of ferns, 267 species of monocots and 370 species of dicots. Each State of the FSM is represented by their unique biodiversity. Kosrae State has magnificent swamp forests dominated by endemic *Terminalia carolinensis* and *Horsfieldia nunu* trees. Pohnpei has the most endemic species in the FSM; Chuuk is also high in endemics and has the most endangered native forests in the FSM. Yap has the most diverse mangroves and agroforests in the FSM. Over 457 species of plants, including many food plants have been introduced to the FSM. The percentage of introduced

plants varies between the States with records of introduced species comprising about 22% in Kosrae, 40% in Pohnpei, 37% in Chuuk and 39% in Yap. Some of these introduced species have become invasive pests that have widely established themselves. The spread of invasive species is a continual threat due to increased movement of people and machinery between the islands, and needs to be carefully monitored and controlled.

Native terrestrial mammals of the FSM include five endemic species and subspecies of fruit bats of the genus *Pteropus* and a sheath-tailed bat of the genus *Emballonura*. Taxonomic and biological studies of the FSM's bats are not complete. Introduced mammals include 3 species of rats, a mouse, deer, pigs, dogs, cats, and from time to time goats, rabbits and cattle, all of which can have damaging impacts on native biodiversity.

One hundred and nineteen species of birds have been reported in the FSM. These include 31 resident seabirds, 33 migratory shorebirds, 19 migratory land or wetland birds and 5 vagrant species (Engbring et al.1990). Each state of the FSM has one or more endemic species or subspecies. They include the Gray White-eye of Kosrae and Pohnpei (with a locally endemic subspecies on each island), Pohnpei Lory, Pohnpei Greater White-eye, Pohnpei Flycatcher, Pohnpei Mountain Starling, Caroline Islands Ground-Dove (on Pohnpei and Chuuk), Truk Greater White-eye, Oceanic Flycatcher, Yap Monarch and Yap Greater White-eye. A number of the FSM's birds have become extinct or are declining in numbers.

The least understood group of vertebrates in the FSM are the reptiles and amphibians. There is one introduced amphibian (*Bufo marinus*), and over 27 species of reptiles, most of them native and at least one endemic (*Emoia ponapea*). Several species of lizards have been introduced but thus far, there have been no confirmed introductions of the brown tree snake, which has decimated bird and reptile populations on nearby Guam. While there has been some work undertaken on the terrestrial invertebrates of the FSM, reports are scattered, and mostly located outside of the FSM. There are indications however, that the invertebrate fauna of the FSM is also rich and interesting. Recent collections in Pohnpei for example have yielded numerous species of land snails, and 50 species of ants.

Due to the sparse knowledge of FSM's biodiversity, a list of threatened "species in peril" has not been compiled at National or State levels. Some species present in the FSM are, however, included in the IUCN Red List of threatened species as well as appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the U.S. Endangered Species Act listing of Threatened and Endangered species. The Endangered Species Act of the FSM was merely carried over from the Trust Territory of the Pacific Islands and is incomplete. Steps to inventory and identify FSM species in peril should be addressed. Threatened native habitat of the FSM includes cloud forest, remaining areas of native forest, native fresh water marsh and riverine systems, swamp forest, and critical areas of mangrove forest and uninhabited atoll seabird and turtle rookeries.

## **6.2 Marine Biodiversity**

The diversity of marine organisms and their assemblages within the FSM is high. Species richness and diversity for all inshore marine habitats decrease from west to east. Marine habitats and associated species compositions, due to the small geographic scale of the shallow water marine areas, function on small spatial scales. This condition provides a wide range of habitats within a small geographical location, which directly increases species biodiversity, but it also increases the potential for loss of biodiversity if the environment is under threat.

The coral reef ecosystems is the dominant shallow marine feature of the nation. Coral reef biodiversity and complexity is high within the FSM and this diversity diminishes notably from west to east within the region. Using stony corals as an example, approximately 350 species are recorded in Yap, 300 from Chuuk, 200 from Pohnpei and 150 from Kosrae (Lindsay & Edward, 2000). All major types of coral reefs are found within the FSM, including barriers reefs, fringing reefs, atolls and submerged reefs. Common reef habitats in the FSM include lagoon reefs (pinnacle, patch), passes, channels, shallow reef flats, terraces, submerged reefs, slopes, reef holes, embayments, quasi estuaries, seagrass beds, mangroves, mud flats and sand flats (Lindsay & Edward 2000). In addition, mangrove forests and seagrass beds are well developed especially along the fringes of the high islands and some atolls, and they are essential habitats to a very wide range of marine organisms. The condition of reefs and inshore marine environments within the FSM are healthy with natural processes controlling reef condition and marine biodiversity. However, reef and marine degradation and the loss of biodiversity (especially among food fishes) are attributed to various anthropogenic sources within urban centers.

The FSM has an Exclusive Economic Zone covering over 1 million square miles (1.6 million km<sup>2</sup>) that falls under the jurisdiction of the FSM National Government. The conservation, management and development of all commercial fisheries within this area are mandated to the Micronesian Fisheries Authority (MFA). The tuna fishery within the FSM EEZ is the largest commercial exploitation of natural resources within the nation, with license fee collections from foreign fishing permits providing the second largest external source of revenue for the nation after the US Compact of Free Association. This fishery has provided the nation with annual revenues between US\$13 - US\$20 million dollars and average annual catch rates range between 80,000 - 250,000 metric tonnes. The tuna fishery is composed of three gear types (purse seine, long line and pole and line) and it targets three main species of tuna (Skipjack *Katsuwonis pelamis*, Yellowfin *Thunnus albacares* and Bigeye *Thunnus obesus*). In addition, other pelagic fish (swordfish, marlin and shark species) are also caught as a by-product of this fishery. MFA operates an intensive monitoring program that collects fishing vessel data from compulsory log sheets, on board observer programs and port sampling activities (FSM Government, 1999). In addition MFA collaborates with the Secretariat of the Pacific Community (SPC) on tuna management issues via the regional standing committee on tuna and billfish.

All waters located within twelve nautical miles (22.2 kilometers) of land, falls under the jurisdiction of the respective State governments, and wherein all forms of foreign commercial fishing are excluded. These inshore resources are managed, conserved and developed by the respective State governments in association with resource owners. This includes all coral reefs and associated lagoonal and coastal ecosystems (territorial sea).

The Northern Mariana trench terminates at its greatest depth in FSM waters. Information pertaining to the biodiversity associated with this trench and all other oceanic mesopelagic and benthic ecosystems and species within the FSM is almost non-existent. Oceanographic data are collected throughout the central Pacific basin, including the FSM. In more recent times oceanographic exploration has targeted deep-sea mineral deposits, with the majority of this information residing outside the nation. Increased interest in the potential of benthic fisheries of deep-water communities, and seamounts highlights the urgent need for improved information on these communities, their species composition, and ecosystems.

The marine biodiversity of the FSM has not been thoroughly documented as survey work has been limited to inshore shallow waters and existing literature is scattered. There has not been any specific study undertaken to document the marine biodiversity of the nation to date. The majority of literature highlighting marine ecosystem composition is restricted to marine resource profiles that have been undertaken only on the major islands and specific resource evaluation reports (e.g. coastal resource

inventories for the islands of Yap, Pohnpei, Chuuk and Kosrae (Lindsay 2000). Furthermore, the majority of the biodiversity information has been undertaken on large visible invertebrate (e.g. corals) and vertebrate species (e.g. fish) associated with coral reefs whilst cryptic and less visible species have yet to be studied. Freshwater species show very high levels of endemism, (e.g. gobies, Buden, et al, 2001) and this habitat is incompletely studied. Further inventory and monitoring of the marine and freshwater biodiversity of the FSM is integral to a thorough understanding and appreciation of the islands' biodiversity and should be a priority in the near future.



The FSM has over 1000 species of fish, including at least 12 endemics (Edward, 2001), several species of marine mammals (dolphins and whales) and four species of marine turtles, (green turtle *Chelonia mydas*, hawksbill *Eretmochelys imbricata*, olive ridley *Lepidochelys olivacea* and the leatherback *Dermochelys coriacea*). Over 350 species of stony corals, 60 species of soft corals, 150 species of alga and sea grasses, several hundred species of mollusks, echinoderms and crustaceans have been documented. Information pertaining to species diversity among the major phyla of marine invertebrates is scanty and intensive scientific investigations are required to fill this void.

Information pertaining to marine endemic species, extinct species and invasive species is very limited and urgent assessments need to be undertaken to identify all organisms. Potential threats to biodiversity associated with invasive species need to be documented. Several species of marine mollusks (gastropods: *Trochus niloticus*, *Turbo marmoratus*; bivalves: giant clams) have been intentionally introduced into the nation to provide alternative foods and sources of income. To date, no detrimental reports have been documented on these introductions.

Several marine species present in the FSM (e.g. giant clams, turtles, marine mammals) are highlighted in the IUCN Red List of threatened species as well as appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the U.S. Endangered Species Act listing of Threatened and Endangered species.

### **6.3 Biodiversity Ecoregional Planning**

As part of the NBSAP process the FSM under the guidance of The Nature Conservancy (TNC) initiated a series of ecoregional planning workshops to highlight priority terrestrial and aquatic biodiversity ecosystems and specific taxa that need to be conserved and managed. Ecoregional planning consists of designing a portfolio of high priority conservation areas representative of the biodiversity of a particular ecoregional, and conserving that portfolio through direct action and multi-area strategies. To capture ecological and genetic variation in biodiversity across a full range of environmental gradients, planning units are based on ecological and geographical boundaries, rather than geopolitical boundaries. The ecoregional planning consists of six steps, including conservation target determinations, evaluating the health and viability of the targets, developing goals and designing target portfolios and designing strategies to address the threats for each habitat and species (TNC, 2000A & B).

Previously, the World Wildlife Fund (WWF) identified two major terrestrial ecoregions located entirely within the FSM, Yap Tropical Dry Forest in Yap and Yap outer islands, and Caroline Tropical Moist Forest in Chuuk, Pohnpei and Kosrae States. (WWF, 2001).



The ecoregional workshops identified 63 targets (46 terrestrial and 17 marine) out of a possible 293 identified within the nation. Over 500 occurrences were recorded for these targets and all occurrences were entered into a data base and documented on maps produced using a TNC developed Global Information System (GIS). The targets were selected based on endemism, ecosystem function, rarity, and other factors.

Examples of ecoregional targets that have been chosen for the FSM include ecological systems (e.g., cloud forests, upland broadleaf forests, mangrove forests, high island and near-shore marine systems, and freshwater streams), natural communities; (e.g., montane perched freshwater marsh, Ivory Nut palm forest, Coastal Freshwater Marsh and seabird nesting areas), and specific taxa (e.g., Chuuk monarch (*Metabolus rugensis*), Long-billed white-eye (*Rukia longirostra*), Micronesian imperial-pigeon (*Ducula oceanica*), Mortlocks flying fox (*Pteropus phaeocephalus*), Giant Micronesian gecko (*Perochirus scutellatus*), Pacific green turtle (*Chelonia mydas agassizii*), and Serranids (groupers).

From the mapping of the occurrences of the selected targets, 87 potential conservation areas were delineated and then prioritized based on biodiversity occurrences, richness and long-term viability. These include 18 in Yap State (11 in outer islands, 9 on the main islands), 29 in Chuuk State (8 in outer islands, 21 on the lagoon islands), 30 in Pohnpei State (11 in outer islands, 19 on the main island), and 8 on Kosrae State. Appendix 3 provides a list of potential conservation areas for the nation based on this process.

Final prioritization and assembly of a portfolio of recommended aquatic and terrestrial conservation areas is currently being developed and is expected to be considered and incorporated into the State BSAP implementation programs.

## **7.0 Major threats and Constraints to Biodiversity Conservation**

The FSM clearly still has a relatively rich biodiversity inheritance, including ethnobiological traditions. Nevertheless, this fragile biological inheritance is seriously threatened due to both natural and anthropogenic events. Significant declines in the biodiversity of the FSM are clearly evident. The start of the decline is hard to determine as the written record is not extensive, however, it probably began with the first arrival of man. The rate of biodiversity decline has considerably increased since the arrival of the first European explorers, culminating in the highest increases in biodiversity decline during last century. Unfortunately, this trend is continuing into the new millennium.

The decline of the FSM's biodiversity is clearly linked to increased centralisation and urbanisation of the population, very high population growth rates, more effective and efficient technology, commercialisation including increased exportation of natural resources, reliance on imported commodities and the general westernisation of the nation. In addition the nation faces mounting constraints that are inhibiting efforts to conserve the nation's biodiversity.

The list below is not exhaustive, but highlights the major threats and constraints identified by the stakeholders who were consulted during the preparation of this report.

### **Conversion and Degradation of Habitat and Ecosystems:**

- Inappropriate Farming Practices (e.g. Extensive Burning & Wildfires).
- Agricultural Degradation, Soil Degradation, Deforestation and Development.
- Inappropriate and Indiscriminate use of Fertilizers and Pesticides.
- Degradation of Freshwater Resources, Water Sheds/Catchments and Associated Ecosystems.
- Degradation and Deforestation of Coastal & Mangrove Forests from inappropriate and greatly increased Marine & Coastal Development.
- Ship Groundings.
- Increasing Populations and Urbanization.
- Increased and poorly planned Infrastructure Development (e.g. roads).

### **Over Exploitation and Unsustainable Harvesting Methods and Practices:**

- Destruction of Coral Reefs and Associated Ecological Communities (e.g. coral extraction, reef anchors).
- Over Exploitation of Marine Organisms (e.g. reef fish, sea cucumbers, giant clams) including Unregulated Exportation and Utilization for Social Functions.
- Overexploitation and inappropriate Development of Coastal & Marine Ecosystems (including Mangrove Forests).
- Over Exploitation of Forest Resources.
- Destructive and Unsustainable Fishing Methods – e.g. dynamite, chlorine, fish poisoning plant (*Derris elliptica*), small mesh gillnets.
- Marine Sand Mining, Dredging Operations, Causeway and Sea Wall Construction.
- Over Exploitation of Fish Aggregation Spawning Sites.
- Illegal Bio-Propecting of Genetic Resources.
- Loss of Traditional Ethnobiological Knowledge.
- Illegal Offshore and Inshore Fishing.

### **Waste Management:**

- Terrestrial and Aquatic Pollution (e.g. oil spills, coastal waste dumpsites).
- Solid Waste Collection and Disposal.
- Hazardous Waste Usage and Disposal.
- Sewage Collection, Treatment and Disposal.
- Disposal of Heavy Equipment (e.g. cars).

### **Invasive Organisms and Pests:**

- Introduction of Pests and Diseases.
- Direct Negative Impacts on Native Species and Terrestrial and Aquatic Habitats by Alien Invasive Species (e.g. *Mikania micrantha*, toad (*Bufo marinus*), rats and Feral Animals (e.g. pigs, wild cats).

### **Climate:**

- Increased Frequency and Intensity of Tropical Storms (Typhoons).
- Global Climate Changes and Sea Level Rise.

- El Nino – Southern Oscillation Phenomena.
- Increased Fluctuations in Precipitation Patterns (e.g. flooding & drought).

**Constraints:**

- Rapidly Increasing Populations and more Consumptive Lifestyles.
- Inadequate Scientific Base Line Biological Information on the Status of Biodiversity.
- Insufficient Aquatic and Terrestrial Conservation Areas and Management Plans.
- Insufficient Biodiversity Legislation and Lack of Enforcement.
- Insufficient Skilled/Trained Human Resources.
- Insufficient Coastal Planning and Zoning.
- Inadequate Awareness of Links between Conservation and Sustainable Economic Development.
- Insufficient Funding for Conservation Activities.

## 8.0 Vision

### ***NBSAP VISION:***

***“The FSM will have more extensive, diverse, and higher quality of marine, freshwater, and terrestrial ecosystems, which meet human needs and aspirations fairly, preserve and utilize traditional knowledge and practices, and fulfill the ecosystem functions necessary for all life on Earth”.***

## 9.0 Guiding Principles for Biodiversity Conservation in the FSM.

The list below was formulated from multi-sectoral discussions and workshops held throughout the nation, and provides a summary of the nation’s guiding principles for biodiversity conservation. It is from these principles that the NBSAP themes and actions have been derived. They include:

- ❖ **Sovereign Rights** - The people of the FSM hold the sovereign rights over their biological diversity.
- ❖ **Community-based Approach** - The community is the basic management unit for biodiversity in the FSM – they have the right and responsibility to manage and sustainably develop their biodiversity resources for their benefit and that of future generations.
- ❖ **Traditional Heritage** - We will build upon and utilize the rich traditional knowledge and experience of our ancestors to devise and implement strategies for the sustainable stewardship of our rich natural resources.
- ❖ **Ecological Integrity** – We will strive to maintain and improve the diversity and quality of our ecosystems, conserving our biodiversity in-situ while enhancing our ecosystems’ capacity to adapt to change.

## 10.0 Strategy and Action Plan

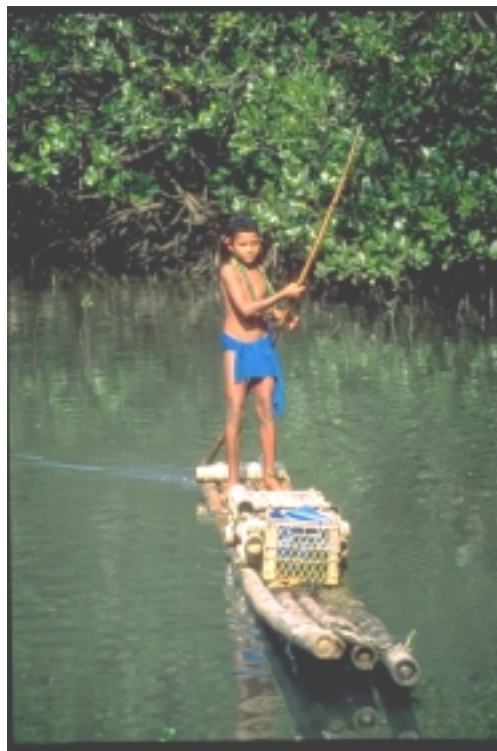
The strategic themes, their objectives and specific actions are direct outcomes from multi-sectoral discussions and meetings held throughout the nation. They are based on the four guiding principles developed for the successful long-term preservation, conservation, and sustainable utilization of the nation’s biodiversity. In total, eleven biodiversity strategic themes were developed.

1. Ecosystem Management.
2. Species Management.
3. Genetic Resources Use.
4. Agrobiodiversity.
5. Ecological Sustainable Industry Development.
6. Biosecurity.
7. Waste Management.

8. Human Resources & Institutional Development.
9. Resource Owners.
10. Mainstreaming Biodiversity.
11. Financial Resources.

The above **themes** each have a **strategy goal** that the FSM believes to be those goals which, if pursued effectively, would steer the nation on a sustainable voyage towards the NBSAP Vision. Each goal may be achieved through the fulfillment of **objectives**, which have been identified as priority areas that need to be addressed to allow the effective conservation, preservation and sustainable use of the nation's biodiversity.

Each objective includes a specific list of required **actions** necessary for fulfillment of the objective and thereby further contributing towards the achievement of the strategy goal for a theme. The actions have been carefully developed to be realistically achievable within a relatively short time frame and within the current human resource capacities and financial constraints of the nation. It is, however, clearly acknowledged that considerable time and effort from all sectors of the nation is required to achieve the Vision. Financial and technical assistance from outside the nation is also acknowledged and will be required to achieve the goals of the NBSAP.



## 10.1 THEME 1. ECOSYSTEM MANAGEMENT:

- ❖ **Strategy Goal:** *A full representation of FSM's marine, freshwater and terrestrial ecosystems are protected, conserved and sustainably managed, including selected areas designated for total protection.*

The biodiversity and natural heritage of the FSM is globally significant and the foundation for the country's long term economic self-sufficiency. The islands of FSM contain over 1,000 plant species, at least 200 that are found nowhere else on Earth. Its reefs, which provide coastal protection and the source of livelihood for a majority of Micronesians, are home to nearly 1,000 species of fish and more than 350 species of hard coral (Smith, 2001, Edward, 2002).

Maintaining the habitats and ecosystems that nurture this diversity is crucial for improving Micronesians' quality of life and sustaining the country's rich traditions. Local cultures and values have strong ties to terrestrial and aquatic resources. Unfortunately, FSM's extraordinary natural resources face mounting threats to which urgent actions need to be undertaken to prevent the demise of the nation's unique biodiversity. In the face of these threats, there is a growing recognition among policy makers and the general public of the links between the health of the nation's natural heritage and biodiversity, sustainable economic future, and traditional values and culture (Smith, 2001).

Preliminary surveys and workshops have been undertaken to identify important ecological areas and ecosystems within the nation that need to be protected, conserved and managed. To achieve this goal the development and implementation of conservation areas and management plans to preserve these ecosystems for the future are required.

The formulation of land use and marine management plans are currently being developed through community/government consultations in each State. These plans will have a direct positive impact on the implementation of ecosystems management programs and assist in the preservation, conservation, and sustainable use of the nation's resources.

**Objective 1: Research and Monitoring:** To undertake research and resource assessment/evaluation for the identification, documentation and monitoring of the FSM's ecosystems for the implementation of appropriate resource management programs, including conservation and protected areas.

### **Actions:**

- Undertake comprehensive biological resource surveys of the nation's Terrestrial, Marine and Freshwater biodiversity.
- Periodically obtain aerial photographs to update vegetation maps, document and evaluate land use practices and conditions of the aquatic environment.
- Develop and implement a long term monitoring program for all ecosystems within the nation to provide scientific information on the status of the nation's biodiversity through time.
- Develop priority research topics and monitoring techniques to be addressed, taught and utilized by all natural resource management agencies and relevant institutions.

- Publish all research and monitoring documents and develop a database available to the public.
- Develop and implement a program for monitoring the impact on biodiversity from Global Warming and Climate Change.

**Objective 2: Conservation Areas:** To enhance the management of existing conservation areas and establish new areas to achieve a full representation of the FSM's ecosystems.

**Actions:**

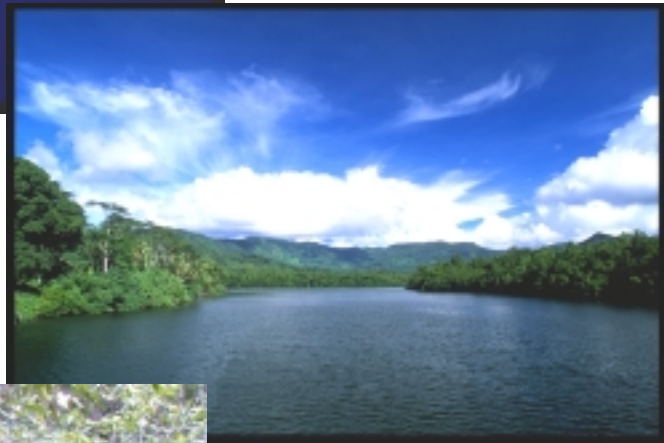
- Further develop and implement management plans for the existing marine and terrestrial conservation areas within the nation.
- Identify, develop, design and implement management plans for new aquatic and terrestrial conservation areas within the nation, especially in areas that are currently poorly represented, contain unique habitats, or have high levels of threats.
- Integrate all management plans and protected area programs with community/resource owner participation activities including enforcement.
- Incorporate large conservation areas to include more than one ecosystem (e.g. mangroves, sea grass beds, lagoon systems and barrier reefs).
- Further develop an appropriate information system (e.g.: Geographical Information System) to store and share information on ecosystems and conservation areas.
- Continue to develop and refine the Ecoregional Conservation Planning process for the nation and implement recommendations.
- To identify and conserve critical watershed areas.
- Develop and implement programs for the restoration of degraded aquatic and terrestrial ecosystems, prioritizing those of endemic, endangered and threatened species.
- Develop and implement conservation of biodiversity in important natural and cultural heritage sites throughout the nation (e.g. Nan Madol – Pohnpei State).

**Objective 3: Sustainable Use of Ecosystems:** To develop and implement effective management programs that promote income-generating activities and use of biodiversity resources sustainably within all FSM's ecosystems.

**Actions:**

- Finalize, implement and enforce ecosystem management plans through legislation. Special enforcement actions are required to eliminate destructive practices (e.g. dynamite fishing).
- Develop guidelines and protocols for the sustainable use of the nation's biodiversity through activities (e.g. eco-tourism, non-timber forest products and mariculture).

- Undertake economic valuations of ecosystem services for terrestrial, aquatic area use.
- Increase the number of mooring buoys located within designate marine areas in each State for large vessels, especially the tuna fishing fleet.





## 10.2 THEME 2. SPECIES MANAGEMENT:

- ❖ **Strategy Goal:** *FSM's native, endemic, threatened, and traditionally important species are protected and used sustainably for the benefit of the people of the FSM and the global community.*

Species biodiversity within the FSM is among the richest and most diverse within the Pacific region. The nation has currently only preliminary information on the number of species for most groups of marine, freshwater and terrestrial organisms, however initial results indicate high levels of species endemism within the nation. This species diversity includes over 1200 species of ferns and flowering plants of which over 780 are native, 119 native species of birds, 27 native species of reptiles, over 1000 species of fish and more than 350 species of corals. Each State of the FSM is represented by their unique biodiversity. As an example, Kosrae State has magnificent swamp forests dominated by endemic *Terminalia carolinensis* and *Horsfieldia nunu* trees (Falanruw, 2001, Edward, 2001).

The preservation of all species within the FSM was highlighted during the NBSAP process and the nation places great importance on conserving individual animals and plants. In addition, the use of native species for pharmaceutical purposes has further highlighted conservation actions. There is a need to continue to identify and document all species of organisms within the FSM and this is seen as a priority area for each State.

Preliminary surveys have been undertaken to identify important species within the nation and to develop and implement conservation areas and management plans to preserve these species for the future.

**Objective 1: Conservation of Species:** To preserve and conserve all native, endemic, threatened, and traditionally important species in the FSM through effective conservation programs.

### Actions:

- Establish, maintain and update a threatened species list.
- Review existing lists of threatened species in peril and develop and implement appropriate conservation programs. Determine which species are suitable for recovery/reintroduction programs (including propagation) and develop and implement such programs.
- Further develop State botanical gardens to house collections of native flora.
- Investigate the potential and feasibility of developing captive breeding programs to prevent species extinctions.
- Work with other countries to further develop and implement regional and international programs to protect migratory species (e.g. Turtles).



- Further develop and strengthen endangered species laws and regulations.
- Develop and implement programs for the conservation and protection of native species and varieties from the destructive impact of alien and invasive species.

**Objective 2: Research and Monitoring:** To undertake research for the identification, documentation and monitoring of species contributing to the implementation of appropriate conservation and management programs.

**Actions:**

- Undertake research programs to complete the identification and current status of the nation's flora and fauna.
- Establish and implement resource-monitoring programs for species that are threatened, rare, endemic, commercially harvested and culturally significant.
- Develop a central location within each State that will house all findings and distribute them to interested parties.
- Develop monitoring programs to evaluate, document, and implement appropriate actions on all possible threats to the biodiversity of the nation.
- Support and develop a monitoring program to evaluate the impact of coral bleaching and crown of thorns starfish on coral reefs.
- Develop research and monitoring programs to identify the presence and evaluate effects of invasive species and develop eradication programs where appropriate.

**Objective 3: Sustainable Use and Management of Species:** To ensure the sustainable use and management of species for social and economic development.

**Actions:**

- Reevaluate and/or develop appropriate sustainable management plans, including sustainable harvesting levels and enforcement programs for all commercial and subsistence harvested marine (inshore and offshore), freshwater and terrestrial flora and fauna.
- Through legislation and enforcement eliminate all destructive harvesting practices (e.g. dynamite and fish poisoning fishing).
- Develop and implement native forest regeneration and rehabilitation programs.
- Develop and encourage environmentally sustainable and economically viable aquaculture and forest product programs.

- Identify and implement suitable sustainable use management programs for species that are important for the eco-tourism industry (e.g. game fishing, manta ray observations, mangrove forest tours).
- Provide technical, financial and marketing support and assistance for all environmentally sustainable development.
- Establish environmental certification “green products” for natural resource export by the private sector at sustainable levels (e.g. marine aquarium council certification and forest stewardship certification).

## 10.3 THEME 3. GENETIC RESOURCE USE:

- ◇ **Strategy Goal:** *The FSM's genetic resources are accessible for utilization and all benefits derived are equitably shared amongst the stakeholders.*

The Convention on Biological Diversity has as one of its main objectives to ensure the equitable sharing of benefits from the use of genetic resources. To date, foreign companies and countries have benefited both financially and academically from the use of the FSM's genetic resources with little if any of these benefits returning to the nation and the traditional resource owners. Furthermore, the ownership of these genetic resources now resides with outside interests.

The protection, preservation, conservation and utilization of the nation's heritage and the ownership of the intellectual property rights need to be addressed. Legislative framework and appropriate infrastructures are required to facilitate the continued availability of the nation's genetic resources for future scientific research, but to ensure that all benefits derived from such activities are managed through an appropriate benefit sharing mechanism with traditional owners being acknowledged.

**Objective 1: Equitable Sharing of Benefits of Genetic Resources:** To develop and implement appropriate National and State legislation and measures to effectively access genetic resources and carry out fair and equitable sharing of benefits from the use of these resources.

### **Actions:**

- Develop National and State bioprospecting legislation.
- Develop National and State bioprospecting enforcement programs and penalties.
- Develop and implement appropriate benefit sharing mechanism and legislation for all holders of traditional knowledge and owners of resources utilized in bioprospecting.
- Clearly define through appropriate legislation intellectual property rights.
- Establish a bioprospecting-coordinating national expert panel.
- Develop, implement and enforce a scientific code of conduct for all biodiversity and bioprospecting research in the FSM.
- Develop a research permit process that include provisions for hiring local associates in order to assure that local capacity is developed and supported in conjunction with research on genetic resources.
- Develop a system for tracking biodiversity research in the nation.
- Establish a process for permitting the collection of biological specimens needed for scientific studies in order to comply with international regulations on the transport of biological specimens as well as to control biopiracy.

## 10.4 THEME 4. AGROBIODIVERSITY:

- ◆ **Strategy Goal:** *The conservation and sustainable use of Agrobiodiversity contributes to the nation’s development and the future food security of the FSM.*

Agrobiodiversity refers to the variety and variability of animal, plant and microbial organisms on earth that are important to food and agriculture. The rich and diverse agroforests and related traditional agricultural systems of the FSM have attracted the interest of scientist from around the world as possible models for sustainable agricultural development. These extensive “man-made” forests are complex and environmentally sustainable agriculture systems that are the result of thousands of years of development. They mimic natural forest ecosystems and shelter extremely high species and cultivar’s diversity. For example: Pohnpei State agroforestry consists of over 130 species and studies have identified 179 yam, 130 breadfruit, and 50 banana cultivars. Studies in Yap State have found about 80 yam, 40 breadfruit and 27 banana cultivars interspersed in an integrated system of shifting gardens tree garden/taro patch systems. The FSM is the world center for breadfruit (*Artocarpus altilis*) and swamp taro (*Cyrtosperma chamissonis*) diversity.

Traditional FSM agricultural practices were used over generations to develop new crops and maximize the use of natural environment to cultivate relevant species for food production. Many techniques and species have been replaced by hybrids and modern techniques, which are sometimes inappropriate.

Agriculture production is the primary livelihood for most FSM citizens. It is also one of the main activities that are contributing to the loss of biodiversity. An example of this is the loss of nearly two thirds of native upland forest in Pohnpei in just 20 years to farming “sakau” (*Piper methysticum*).

The development of increased agricultural production and the protection of native biodiversity can be achieved through sustainable agricultural practices such as agroforestry. Promoting sustainable agrobiodiversity practices further ensures the long-term protection of traditionally important agriculture practices and cultural methods.

Although in its infancy, the culture of marine and freshwater organisms is included under this theme and all objectives and actions described below are relevant to these activities. The sustainable and economic development of mariculture activities is important to the future development of the nation.

**Objective 1: Conservation and Sustainable Use of Agrobiodiversity:** To develop and ensure the effective implementation of appropriate conservation measures for the sustainable use of agrobiodiversity.

### **Actions:**

- Promote methodologies for sustainable use of agrobiodiversity.
- Eliminate unsustainable agrobiodiversity use.
- Establish incentives that encourage conservation and sustainable use of agrobiodiversity.
- Promote environmentally sound agricultural practices (e.g. organic farming, agroforestry and polyculture).

- Promote, develop and share environmentally sustainable agricultural practices.
- Identify, develop and establish botanical gardens featuring local endemic, endangered and threatened species.
- Identify, promote and enhance existing programs for the inventory, propagation and preservation of traditional species, varieties, cultivars and breeds.

**Objective 2: Promotion and Development:** To compile existing research findings and develop programs and projects critical to the development of agrobiodiversity.

**Actions:**

- Document existing traditional agrobiodiversity resources and practices, including the usage of aerial photography.
- Develop and expand on existing markets for local species and varieties that can be produced on a sustainable basis.
- To promote existing research findings with farmers through training programs and public education.

**Objective 3: New Research and Development:** To conduct relevant research critical to the development of agrobiodiversity.

**Actions:**

- Evaluate the usefulness and impacts of new biotechnologies.
- Document existing traditional agrobiodiversity resources and practices, including the usage of aerial photographs.
- Develop and expand on new markets for local species and varieties.
- Develop and implement research and development training programs for all relevant agencies and institutions involved in agrobiodiversity.
- Document and publish all research information and findings and maintain collections of information in each State.
- Conduct research on the ecology of traditional agricultural methods.

**Objective 4: Food & Health Security:** To enhance and strengthen food and health security through the use of sustainable agrobiodiversity practices.

**Actions:**

- Develop and implement new and existing programs that promote the production of local nutritional food.
- Develop and implement programs that increase local food production and enhance agrobiodiversity.
- Encourage sustainable breeding programs for livestock (e.g. pigs and chickens)



## 10.5 THEME 5: ECOLOGICAL SUSTAINABLE INDUSTRY DEVELOPMENT:

- ❖ **Strategy Goal:** *Economic development activities in the FSM meet the needs of the population while sustaining the resources for the benefit of future generations.*

The FSM has traditionally utilized subsistence farming and fishing practices to meet the needs of the population. However, in recent times the reliance on imported commercial items (e.g. electricity, motor vehicles) and the need to generate personal incomes to purchase these commercial products has greatly increased the pressure on the nation's biodiversity. This development and commercialization trend is expected to continue and therefore a nation wide awareness program and economic incentives supporting proactive legislation are required to provide information to develop ecologically sustainable industries reducing the possible negative impacts on the environment. The development of ecologically friendly agriculture, eco-tourism operations and selective forestry are pilot programs currently practiced within the nation. These programs and the skills required to manage these new techniques must be further promoted and developed.

All the major islands have large diesel-fueled power stations, whilst the majority of the smaller island and outer communities utilize small portable petrol/diesel generators to meet their requirements. The islands of the FSM have abundant and consistently high levels of solar radiation, wind and water (high Islands), which could be utilized to provide sustainable energy. Several outer atoll communities have developed small alternative power generation schemes utilizing solar energy and wind. The development of alternative power systems and the careful use and management of the current fossil fuel power systems needs to be further addressed within the nation.

**Objective 1: Ecologically Sustainable Industries:** To develop long-term ecologically sustainable industries that provide attractive incomes while minimizing the exploitation and impact on natural resources.

### **Actions:**

- Promote the development of ecologically sustainable and economically profitable enterprises utilizing and conserving the nation's biodiversity and utilizing economic incentives (e.g. tax breaks) to promote expansion of these activities while removing all incentives for non-compliant industries.
- Promote and support research and pilot programs that develop partnerships between the government and private sector to develop ecologically sustainable industries.
- Further develop and support those industries currently meeting ecological sustainability goals (e.g. Eco-tourism).
- Develop and implement mechanisms for the establishment of National and State "green" accounting programs, including incentives.



- Establish incentive based programs for “environmentally friendly” community development, including economic incentives and financial access for these activities.
- Develop and implement environmental economic valuation procedures for assessing the full economic value of biodiversity to the nation.
- Integrate biodiversity valuation as an integral component of all land use and coastal use planning.
- Explore and develop a program that introduces a user fee program for conservation areas to provide additional funding assistance for the management of these areas.

**Objective 2: Income Generating Activities:** To develop and promote long-term ecologically sustainable income generating activities for resource owners and the community.

**Actions:**

- Identify and implement appropriate programs to promote and support sustainable income generating activities at the community level and provide financial incentives and capacity building to assist in the development of these programs.
- Establish and strengthen networks and partnerships between public and private sectors including donor agencies to support sustainable income generating activities.
- Undertake evaluations of feasibility and ecological sustainability of all proposed income generating activities.
- Develop mechanisms to derive income and develop capacity from eco-education and eco-research industries.



**Objective 3: Energy Resources:** To secure long-term efficient and sustainable energy sources that promote the use of technology contributing to energy conservation and the protection of biodiversity.

**Actions:**

- Promote and support environmentally sound development of natural energy sources at all levels of the nation and including National and State strategies for energy safety and efficiency.
- Promote renewable energy resources and provide incentives for their use.
- Promote and provide technical information to develop alternative energy sources using solar, wind, water and hydrogen cells for power generation.
- Promote technology that contributes to energy conservation.
- Develop management plans to allow sustainable use of the nation’s forests for energy sources, especially mangrove forests.

- Reduce reliance on wood as fuel.
- Reduce green house gas emissions.

## 10.6 THEME 6. BIOSECURITY:

- ◆ **Strategy Goal:** *Border control, quarantine and eradication programs are effectively protecting the FSM's native biodiversity from impacts of alien invasive species.*

One of the greatest threats to the long-term survival of native biodiversity in small and fragile island environments such as the FSM is the spread of both intentionally and inadvertently introduced alien species.

The FSM has recorded over 457 species of plants, including many food plants that have been introduced to the FSM. The percentage of introduced plants varies between the states with introduced species comprising about 22% in Kosrae, 40% in Pohnpei, 37% in Chuuk and 39% in Yap (Falanruw, 2001). Some of these introduced species have become invasive pests that have widely established themselves.

Table 1 provides a recent list of the ten most invasive weed species within the nation.

**Table 1:** The selection of the top ten (10) invasive weed species within the FSM. Adopted from FSM Quarantine Services.

<b>Invasive Plant Species</b>	<b>Pohnpei</b>	<b>Chuuk</b>	<b>Kosrae</b>	<b>Yap</b>
<i>Coccinia grandis</i>	<b>NWS</b>			
<i>Chromolaena odorata</i> Siam weed	<b>WS</b>	<b>WS</b>	<b>WS</b>	<b>WS</b>
<i>Clerodendrum paniculatum</i> Pagoda flower	<b>WS</b>	<b>NWS</b>		
<i>Clerodendrum quadriloculare</i>	<b>WS</b>	<b>WS</b>	<b>WS</b>	<b>WS</b>
<i>Clerodendrum chinense</i> Honolulu rose	<b>NWS</b>	<b>NWS</b>		
<i>Costus speciosus</i> Crepe ginger	<b>WS</b>			
<i>Merremia peltata</i>	<b>NWS</b>	<b>WS</b>	<b>WS</b>	<b>WS</b>
<i>Mimosa diplotricha</i> Giant Sensitive plant	<b>WS</b>			<b>WS</b>
<i>Piper auritum</i> False kava	<b>NWS</b>			
<i>Spathodea campanulata</i> African tulip-tree	<b>WS</b>	<b>NWS</b>	?	<b>NWS</b>
<i>Wedelia trilobata</i> Wedelia	<b>WS</b>	<b>WS</b>	<b>WS</b>	<b>WS</b>

**WS** Widespread

**NWS** Not widespread? In Question

Comprehensive lists of aquatic invasive organisms and terrestrial invasive animals (e.g. African land snail and cane toad) have not been developed to date. The identification, assessment, control and/or eradication of all invasive species have been highlighted as a priority for the nation.

The spread of alien invasive species is a continual threat due to increased movement of people and machinery between the islands, and across political and biological/geographical barriers, and these movements need to be carefully monitored and controlled. Increased control measures evaluating

organisms transferred between and within islands of the FSM need to be addressed, as current legislation and enforcement is minimal. The implementation of rigorous programs, associated facilities and well-trained personnel are required to minimize the potential of possible negative impacts on native biodiversity from alien species.

The possible adverse impacts of genetically modified organisms on the native biodiversity could be drastic and therefore mechanisms need to be developed and implemented to regulate these activities in the future.

**Objective 1: Policy and Legislation:** To improve and strengthen appropriate National, State and Municipal policies and legislation to ensure the effective management of Biosecurity.

**Actions:**

- Develop National and State policies and actions for the management of all Biosafety issues.
- Develop National and State policies, legislation and actions for the management of genetically modified organisms.
- Further develop and implement National and State laws and screening processes for alien species introductions and genetically modified organisms to manage or minimize their impacts on the nation's biodiversity.
- Further develop the National Government's power to enforce (including issues of transportation and staffing) all laws and legislation relating to alien introductions.

**Objective 2: Control and Eradication:** To identify and develop appropriate programs to ensure effective control and eradication of species threatening biodiversity.

**Actions:**

- Strengthen facilities and provide informed and trained personnel for border control and quarantine services.
- Develop programs for the control and eradication (where feasible) of invasive species.
- Develop programs for the control of all endemic species being exported from the nation.
- Further develop screening protocols for all international watercraft entering the nation's ports and traveling within the nation.
- Organize invasive species task force and develop rapid response plans in each State.
- Further develop screening of all domestic watercraft operating between ports within the nation.
- Implement regional and international programs to protect native marine biodiversity on the high seas and all coastal ports (e.g. PACPOL and IMO programs).

**Objective 3: Research & Monitoring:** To undertake a systematic and scientific research monitoring program to allow management of Biosecurity threats.

**Actions:**

- Review, evaluate, update and prioritize the lists of terrestrial and aquatic invasive species in the FSM.
- Strengthen the National and State government agencies to be able to undertake appropriate scientific research and assessment of introduced species.
- Increase collaboration with regional and international agencies to assist in the identification, control and eradication of invasive species.

## 10.7 THEME 7: WASTE MANAGEMENT:

- ◆ **Strategy Goal:** *All human-generated wastes are effectively managed to prevent or minimize environmental degradation, pollution and loss of the nation's biodiversity.*

The impact of pollution and the need for waste management programs in the past in the FSM were small as most waste products were biodegradable and populations were dispersed. However, recent increases in urbanization and the importation of non-biodegradable materials and chemicals have brought with them ever-increasing pollution problems and the urgent need for correct collection, disposal and management programs for wastes.

The current level of pollution from solid and liquid waste in the FSM is increasing particularly in the vicinity of main population centers. It is clear that the generation of wastes will increase both in quantity and type in the future. Increased ship traffic, both domestic and international has greatly increased pollution in the marine environment and directly affects biodiversity within the nation's major ports.

The effect of pollution on the terrestrial, marine and freshwater environments is a major concern for the sustainable development of the nation and the protection of the environment and its biodiversity. The government agencies (National and State) that develop and maintain these services are inadequate to keep pace with the growing population; without corrective action, human and environmental health will deteriorate.

The development of adequate waste management programs for each population center, including recycling programs and the ability to store and remove toxic waste is required to prevent further land and water degradation within the nation.

**Objective 1: Solid Wastes and Sewage.** Provide an environmentally safe mechanism for the collection, storage and disposal of solid wastes and sewage within the nation to prevent further degradation of the environment and loss of biodiversity within the nation.

### **Actions:**

- A technical assistance program will be developed and implemented to fund necessary infrastructure (e.g. water systems, refuse dumps, recycling facilities, sewer systems and treatments plants) to assure the health and welfare of all FSM inhabitants.
- Develop and implement waste collection, storage and disposal programs for residential and commercial premises in the main urban centers.
- Develop and implement programs for reuse and recycling of wastes, both within and outside the country.
- Develop and implement waste management programs that prevent contamination of freshwater (including ground water lens and coastal marine environment) from dumpsites.
- Develop and implement sewage treatment programs and redevelop marine sewage discharge locations to limit negative impacts on the marine environment.

**Objective 2: Petrochemicals:** Provide an environmentally safe mechanism for the collection, storage and disposal of petrochemical wastes to prevent degradation of the environment and loss of biodiversity within the nation.

**Actions:**

- Develop and implement waste collection, storage and disposal programs for residential and commercial premises throughout the nation.
- Develop and implement programs for reuse and recycling of petrochemical wastes.
- Develop and implement monitoring legislation and enforcement of petrochemical pollution, including ship waste dumping in open waters.
- Develop and implement programs for the safe collection and disposal of petrochemical wastes resulting from shipwrecks.

**Objective 3: Hazardous Chemicals.** Provide an environmentally safe mechanism to prevent or eliminate the use and abuse of hazardous chemicals and to develop and implement correct storage and disposal programs to prevent the degradation of the environment and loss of biodiversity within the nation.

**Actions:**

- Develop and implement waste collection, storage and disposal programs for residential and commercial premises throughout the nation.
- Develop and implement programs for the importation, handling, use and safe disposal of hazardous wastes (including lead batteries, pesticides, fertilizers, and chlorine) both within and outside the country.
- Develop and implement monitoring legislation and enforcement programs to prevent unauthorized use and misuse of hazardous chemicals including incorrect storage and disposal.
- Revise and further develop legislation and regulations of hazardous chemicals, including importation requirements.

**Objective 4. Pollution Emergencies:** Enhance the nation's capability to effectively respond to pollution emergencies to reduce negative impacts on the environment.

**Actions:**

- Increase preparedness and skills of the relevant government and private sector agencies and acquire equipment required to rapidly respond to petrochemical spills and other hazardous chemical emergencies, both within the lagoons and in open ocean.
- Enhance and strengthen the links between National, State and Municipal governments with regard to coordination and response to petrochemical spills and other hazardous chemical emergencies.

- Develop and implement legislation to require all polluters (governmental and private) to clean up and/or pay for damages occurred by polluting the environment

**Objective 5: Air and Noise Pollution:** Provide an environmentally safe mechanism for the reduction of all activities that degrade the atmosphere and associated biodiversity.

**Actions:**

- Develop and implement air and noise quality monitoring programs for residential and commercial premises throughout the nation.
- Revise and further develop legislation and regulations to effectively reduce air and noise pollution within the nation.
- Develop and implement monitoring and enforcement of air and noise, light and thermal pollution legislation.





## 10.8 THEME 8. HUMAN RESOURCES & INSTITUTIONAL DEVELOPMENT:

- ◇ **Strategy Goal:** *All citizens, residents and institutions of the nation are aware of the importance of biodiversity and have the technical knowledge, skills and capability to conserve, preserve and sustainably utilize, manage and develop all biodiversity within the nation.*

The successful management of the nation's biodiversity for future generations lies on the ability and skills of the present population to develop appropriate legislation and management of all biodiversity related programs. Currently, the understanding of the principals of biodiversity in the general population is limited. Therefore, there is a need to develop a nation wide education and awareness program for all age groups to provide the knowledge needed to understand the principles, actions and value of biodiversity. Once this knowledge is understood the correct management of the nation's biodiversity can be attained. The information required must be included in all educational curricula at all education levels and available to all citizens and communities.

Furthermore, human capacity building and institutional strengthening programs need to be developed to further provide educational avenues, programs and stimulate information exchange to allow those individuals and agencies currently involved in biodiversity work additional skills and knowledge. The establishment and support of NGO's working directly with communities and resource owners is a priority. These skills will assist the nation to develop and implement appropriate biodiversity management programs. Assistance may be required from outside donor organizations to provide skills to develop the human resource capacity of the nation.

The successful development of biodiversity conservation, preservation and sustainable development programs will be attained once the human resources of the nation have the required skills and knowledge to develop appropriate programs.

The objectives below and their actions are directly related to all themes highlighted within this report. The development of human resources and institutional strengthening programs was highlighted throughout the nation as a major objective of the NBSAP.

**Objective 1: Human Capacity Building:** To develop and strengthen the capacity of resources owners, traditional leaders, communities, technical staff and policy makers in the coordination and implementation of conserving, preserving and sustainably utilizing and developing the biodiversity of the FSM.

### **Actions:**

- Develop and implement local capacity training programs for National, State and Municipal personnel involved in the formation and implementation of conservation related programs, including education and enforcement sectors.
- Develop and implement capacity building training for local communities, resource owners and traditional leaders on the principals and benefits of Environmental Impact Assessment (EIA), so EIA activities can be applied to development projects at community levels.

- Secure and seek financial assistance to develop and implement capacity development programs for all sectors.
- Require all visiting researchers and research agencies to hire local individuals to assist in all program activities.
- Require grant-funding agencies to include local individuals to assist in the preparation of program documents.
- Develop and implement local capacity building and strengthening programs on biological surveys, monitoring techniques and ecosystem management.
- Establish multi-sectoral groups of local experts to co-ordinate and undertake biological surveys and monitoring programs, seek outside assistance when necessary.
- Provide and implement local training programs on community based conservation management approaches, methodologies and the development of sustainable income generating activities.
- Provide training and capacity building for communities on their legal rights and appropriate procedures for reporting environmental offences.
- Undertake capacity building training for National and State personnel on genetically modified organisms and their possible effects on the nation's biodiversity.
- Undertake capacity building training for quarantine personnel (National and State) on border control, quarantine services and the effective screening of new species introductions and necessary eradication of potentially invasive species.
- Develop and implement training programs to enhance and strengthen public and community knowledge of the understanding, awareness and commitment to sustainable agricultural practices.
- Provide training on proposal development and strengthen human capacity to seek and acquire outside funding assistance.
- Develop and implement local capacity building and strengthening programs on correct waste management usage and disposal, including removal of hazardous waste products (e.g. machinery and toxic products) and recycling.
- Develop and implement local capacity building and strengthening programs on alternative ecologically friendly industries and energy conservation and management.

**Objective 2: Institutional Strengthening:** To develop and strengthen the capacity of National, State and Municipal government agencies, NGO's and academic institutions in the coordination, education and implementation of activities for conserving, preserving and sustainably utilizing the biodiversity of the FSM.

**Actions:**

- Develop and implement institutional strengthening training programs for National, State and Municipal government agencies, educational institutions and NGO's involved in the formation and implementation of conservation related programs.
- Develop and implement institutional strengthening programs for all National, State and Municipal government agencies on the principles, benefits and enforcement of Environmental Impact Assessment (EIA).
- Secure and seek financial assistance to develop and implement institutional strengthening programs for all sectors.
- Strengthen the ability of the National and State agencies, education institutions and NGO's to provide and implement local educational training programs to all citizens on community based conservation management approaches, methodologies and the development of sustainable income generating activities.
- Strengthen the capacity of National, State and Municipal government agencies, education institutions and NGO's to develop a mechanism to integrate traditional and modern conservation management practices to further improve the agrobiodiversity of the nation.

**Objective 3: Public Awareness and Education:** To promote, encourage and strengthen the awareness and understanding of all stakeholders (local resource owners, traditional leaders, communities, government agencies, academic institutions, NGO's and policy makers) of the importance of protecting, preserving and ensuring sustainability of the biodiversity of the FSM.

**Actions:**

- Develop, promote and conduct public awareness campaigns and programs through media, workshops/seminars and information material for National and State government agencies, municipal councils and relevant target groups including resource owners on the functions and benefits of conserving and sustainable utilization of the nation's biodiversity.
- Integrate information on traditional knowledge and promote traditional practices that are important for the conservation and sustainable use of biodiversity into the education curriculum.
- Increase coordination and networking between relevant National and State agencies to better utilize information on the FSM's biodiversity for use and integration into school and college curricula, youth and development programs.
- Develop and distribute public awareness material on all legislation relating to biodiversity use to all stakeholders in the nation's official language (English) and translated into each State language.

- Develop and implement public awareness and educational programs on the importance and management of all ecosystems, native and other important species and agrobiodiversity.
- Develop public awareness programs to increase the knowledge and appreciation of the functions and benefits of biodiversity.
- Develop and implement National and State public awareness programs for invasive species to prevent illegal introductions and encourage control.
- Increase public awareness, education and acceptance of correct sanitation practices, waste disposal mechanisms and pollution programs.
- Increase public awareness, education and acceptance of correct ecologically sustainable industry development and energy usage, including alternative energy options (e.g. solar and wind).
- Develop a National and State clearinghouse mechanism for disseminating and sharing information on biodiversity activities.

## 10.9 THEME 9. RESOURCE OWNERS:

- ◆ **Strategy Goal:** *Traditional resource owners and communities are fully involved in the protection, conservation, preservation, and sustainable use of the nation's biodiversity.*

In the past, traditional leaders held considerable authority, respect and influence over the use of community owned resources with traditional resource management practices developed to sustainably utilize community resources. These traditional management systems are still undertaken within the nation, however, they are declining in some communities resulting in unsuitable and unsustainable utilization of resources. The degradation of the nation's biological biodiversity has a direct correlation with the erosion and loss of the nation's cultural heritage, traditional knowledge and traditional conservation initiatives.



To prevent further loss of these most valuable human and biological resources a concerted effort must be made by all citizens to ensure those individuals making the decisions on conservation or the utilization of the natural heritage of the nation have access to the necessary information to be able to make correct decisions.

With most of the land and water (over 90% in Chuuk and Yap States) held under customary and individual ownership, it is vital that individuals and communities have access to and increase their understanding and knowledge of the consequences and impacts of their individual and combined actions on biodiversity and livelihoods. This is especially important for future generations.

Individuals and family clans, as owners of land, and in some cases water, have the ultimate power to decide how the land and water will be used. Therefore, they need to be given the necessary skills and knowledge to be able to use this birth right power wisely, for the present and for the future.

One such process that has been utilized by several NGO agencies within the FSM with positive results is "Community Visioning". The goal of this approach is "shared vision to build a sustainable economy that contributes to social, economic, and environmental justice to achieve the quality of life desired by all" (Agres, 2000). A community visioning process is based on the idea that a community's desired changes and positive impacts within the community can best be achieved through the development of:

- A shared vision for sustainable development and the creation of a sustainable economy,
- Sustainable approaches that preserve core resources and assets while contributing to social, economic, and environmental justice,
- Community-based approaches that benefit all people through individual and community capacity building,
- New and innovative partnerships and collaborative problem-solving relationships and
- Systematic change to sustain adaptive efficiency (ability to innovate, continuously learn, and productively change) through inclusive community-based governance.

Furthermore, resource owners and communities need to be empowered to promote the conservation and sustainable use of biodiversity and to assist the State and National Government agencies to enforce and monitor laws and regulations whilst these agencies provide incentives to assist with the improvements of living standards (Agres, 2000).

**Objective 1. Traditional Knowledge, Practices and Innovations:** Preserve traditional knowledge and practices of the cultures of the FSM that are important for the protection, conservation, preservation and sustainable use of biodiversity.

**Actions:**

- Develop a register to document and preserve all traditional knowledge, practices and innovations important for the conservation of biodiversity.
- Develop suitable National and State legislation to protect traditional knowledge, practices and innovation and provide a mechanism for benefit sharing to appropriate knowledge holders.
- Develop programs that integrate traditional knowledge, practice and innovation with modern scientific technology and methodologies to promote conservation and sustainable use of biodiversity.

**Objective 2. Empowering Resource Owners:** Empowering resource owners and communities to conserve and sustainably manage biodiversity under suitable customary and modern resource management practices.

**Actions:**

- Develop and implement programs for resource owners, traditional leaders, communities and municipalities to be responsible for the conservation and sustainable use of biodiversity.
- Integrate activities and programs that promote the conservation and sustainable use of biodiversity into relevant government agency extension services.
- Further develop and encourage the full participation of all resource owners and community groups in the formulation, coordination and implementation of programs for the conservation and sustainable use of biodiversity.
- Establish an incentive scheme to encourage environmentally friendly communities/municipalities that promote conservation and sustainable use of biodiversity.
- Develop appropriate legislation at the State and Municipal levels that encourages the empowerment of resource owners and communities to monitor and enforce environmental regulations.



## 10.10 THEME 10. MAINSTREAMING BIODIVERSITY:

- ◇ **Strategy Goal:** *All economic and social activities of the FSM take full account of impacts on and fully consider sustainability of biodiversity.*

The development of the National Biodiversity Strategy and Action Plan reemphasizes the importance of an integrated approach to promoting the conservation, preservation, and sustainable use of the nation's biodiversity. This strategy is a further continuation of the National Environmental Management Strategies (NEMS) that were highlighted nearly a decade ago (SPREP, 1993). The NBSAP requires the collaboration between all sectors of the government, especially policy makers along with private sector, non-governmental organizations and the community at large for the effective implementation of this plan. The development of environmental policies and legislation will provide a stable legal system that will enable the appropriate management of the nation's biodiversity. The participation and endorsement of all stakeholders must be attained to achieve the NBSAP's goals. Awareness and enforcement of all policies relating to biodiversity are required to conserve and sustainably use the nation's biodiversity.

**Objective 1. Population:** To enhance understanding of links between Population and our islands' carrying capacity.

### **Actions:**

- A program will be developed to link data on population, natural resources and biodiversity to sustainable development.
- Indicators of sustainable development will be developed and monitored.
- A public awareness program on the links between population density, natural resources, biodiversity and prospects for sustainable development will be implemented.
- Public Health programs will support responsible parenthood.
- An immigration policy will be established.

**Objective 2. Policy:** To integrate concepts of conservation and sustainable use of biodiversity into all relevant sectoral policies, programs and plans.

### **Actions:**

- To incorporate and develop the concepts of biodiversity conservation into all future National, State and Municipal social and economic policies and development strategies.
- To incorporate a population policy providing information pertaining to environmental and resource carrying capacities and poverty alleviation.
- Provide advice and technical information pertaining to the development of policies that fall within the NBSAP framework.

**Objective 3. Multi-Sectoral Collaboration:** To strengthen and develop multi-sectoral collaboration in promoting conservation, preservation, and sustainable use of biodiversity in the FSM.

**Actions:**

- Enhance and strengthen the linkages between National, State and Municipal government agencies, NGO's and private sector to provide information on the conservation and management of the FSM biodiversity (e.g. Pohnpei Resource Management Committee, Yap Environmental Stewardship Consortium and the Kosrae Resource Management Committee).
- Enhance the collaboration and assistance from regional and international agencies to assist the nation's stakeholders.
- Strengthen National and State linkages with regional and international environmental conventions that the FSM is party to.
- Develop and implement programs to further strengthen the partnerships between the private sector, NGO's and local community in implementing biodiversity related programs.
- Establish a multi-sector team of experts (domestic, regional and international) to conduct biological research, resource evaluations and monitoring programs on the FSM biodiversity.

**Objective 4. Legislation:** To ensure that appropriate National, State and Municipal legislation is developed and effectively enforced to sustainably manage the FSM's biodiversity.

**Actions:**

- Review and strengthen existing National, State and Municipal government environmental legislation and acts to incorporate relevant actions from the NBSAP and ensure integration of all themes across all relevant sectors within the nation.
- Review the FSM participation in international treaties relating to biodiversity to which the nation is a party.
- Support and further develop National, State and Municipal capabilities for the enforcement of all biodiversity legislation.
- Develop, implement and adopt EIA legislation at the National, State and Municipal governments to minimize the adverse impacts of the nation's development on the environment.
- Develop mechanisms and legal framework regulating access to traditional knowledge, intellectual property issues, genetic resources and bioprospecting.
- Develop ecological planning based on islands' biological carrying capacities.



**Objective 5. Environmental Impact Assessments:** To ensure that EIA's are conducted for all development projects to minimize any adverse impacts on the FSM's biodiversity.

**Actions:**

- Further develop and regularly review relevant National, State and Municipal EIA legislation and policies as they relate to biodiversity.
- Implement National, State and Municipal legislation that requires all developers (including all levels of government, non-government organizations and the private sector) to undertake EIA's and to involve resource owners and stakeholders in all EIA procedures.
- Include the undertaking of biological surveys/assessments and economic evaluations as integral parts of all EIA procedures.



## 10.11 THEME 11: FINANCIAL RESOURCES:

- ◆ **Strategy Goal:** *Local, regional and international financial sources provide for the long-term financial sustainability of all conservation and biodiversity related activities.*

The implementation of plans and programs for the conservation, preservation, and sustainable use of biodiversity ultimately depends on the availability of human resource capacities and financial resources. Implementation of human capacity building is often limited by financial constraints at all levels of activity.

To effectively implement biodiversity conservation and sustainable use programs, all available avenues need to be identified from which funds can be accessed, secured and managed effectively. This obligation requires the commitment of all stakeholders at the Local, State, National, Regional and International levels. All levels of government need to recognize the importance of their biodiversity and allocate financial resources to ensure sustainability of the nation's biological resources, in addition to developing and implementing other locally generated sustainable financial mechanisms (e.g.; resource use taxes/fees, tourist/diver fees, construction bonds, etc) for these activities. This commitment will also require assistance from international bilateral and multilateral donor sources.

The FSM has embarked on the development of a National Conservation Trust Fund (CTF), the Micronesia Conservation Trust (MCT). It is envisaged that the MCT will act as a permanent endowment that can generate investment income providing a long-term source of stable annual funding for activities that support conservation and effective management of natural resources, build consensus on conservation priorities, complement and support government funded programs and national sustainable development and conservation strategies.

It is also anticipated and gratefully acknowledged that the international community that includes donor agencies and relevant regional organizations will be approached for financial assistance to facilitate the full implementation of the activities of the NBSAP.

**Objective 1. State Commitment:** To define support needed to implement and monitor progress on the NBSAP at the State level.

### **Actions:**

- Determine staffing and financial and other recourses needed to carry out NBSAP activities in the States.
- To define and establish incentives to implement NBSAP activities.
- Develop and support community based biodiversity-friendly NGO's.

**Objective 2. National Commitment:** To provide, in accordance within national capabilities, long term national financial support and incentives for undertaking conservation programs.

**Actions:**

- Continue the development of long-term financial plans within each State for undertaking conservation programs at all levels of the government.
- Develop sustainable conservation funding mechanisms within the nation (e.g. allocation of tax revenue, user fees, eco-labeling).
- Continue National and State government budget allocations for staff and project activities for conservation and management of the nation's biodiversity.
- Develop and support community based biodiversity friendly NGO's.
- Design and develop a network of relevant biodiversity agencies for documenting revenues and expenditures on biodiversity related activities.

**Objective 3. International Cooperation:** To effectively acquire and allocate resources available under cooperation schemes with member of the international community.

- To develop long term financial plans for undertaking sustainable biodiversity management and conservation programs for the nation.
- Continue developing linkages to regional and international donor organizations, including private foundations and NGO's to provide financial assistance for sustainable biodiversity management and conservation.
- Continue developing linkages with other developed country partners party to the Convention on Biodiversity (CBD) as a means to effectively implement and provide financial assistance for sustainable biodiversity management and conservation.
- Develop and regularly update a database of all potential donor assistance programs and distribute to all relevant agencies within the nation.

**Objective 4. Conservation Trust Fund:** The continued establishment and development of the Micronesian Conservation Trust Fund (MCT) for implementation of the NBSAP and relevant biodiversity work.

**Actions:**

- Formally establish and implement the Micronesia Conservation Trust Fund (MCT).
- Identify long term funding sources for the establishment of this fund for the implementation of the NBSAP and relevant biodiversity related activities within the nation.
- Utilize the MCT to strengthen and empower resource owners and communities to manage their own resources sustainably.

- Explore the feasibility of establishing taxes and other sources of income generation for the use of the nation's biodiversity.
- Explore the possibilities of community based conservation trust funds.

## **11.0. Implementation and Monitoring.**

The National constitution of the FSM is the basis for all legal authority and decision making for the nation. The legislation and institutional framework of the FSM includes both National and individual State constitutions with each of the four States functioning as semi-autonomous governments. This structure makes it a prerogative of each State to enact their own legislation in line with their powers as outlined in the FSM Constitution to address the threats to or conserve biodiversity. At the State level there are also municipal ordinances and traditional precedents associated with legislative issues of biodiversity (Mace, 1999).

This State responsibility has prompted the NBSAP to place the responsibility for the implementation and monitoring programs of the NBSAP with the individual States, with the full support of the National government.

The development of the nations NBSAP implementation and monitoring programs will involve working partnerships between the National government, State governments and Municipal Governments and their Communities. These entities have defined obligations, objectives and requirements to fulfill to successfully develop and implement the NBSAP. The individual State government entities have been given the initial responsibility to document the implementation and monitoring programs identified by their constituents within their respective States.

The planning and development of State implementation priorities will involve multi-sectoral consultations to define and prioritize the specific programs. The development and planning of these implementation projects will be conceived and initiated at the Municipal government/Community level through extensive stakeholder workshops/meetings to be endorsed and supported by the State governments. In turn, the State governments, representing their constituents, will assist in the further development and documentation (including budget and personnel requirements) for these programs to be included in the individual State BSAP. The programs developed will directly address the issues highlighted in the strategic themes outlined in this report. The State documents will then be forwarded to the National government for further endorsement to provide an implementation and monitoring program for the nation.

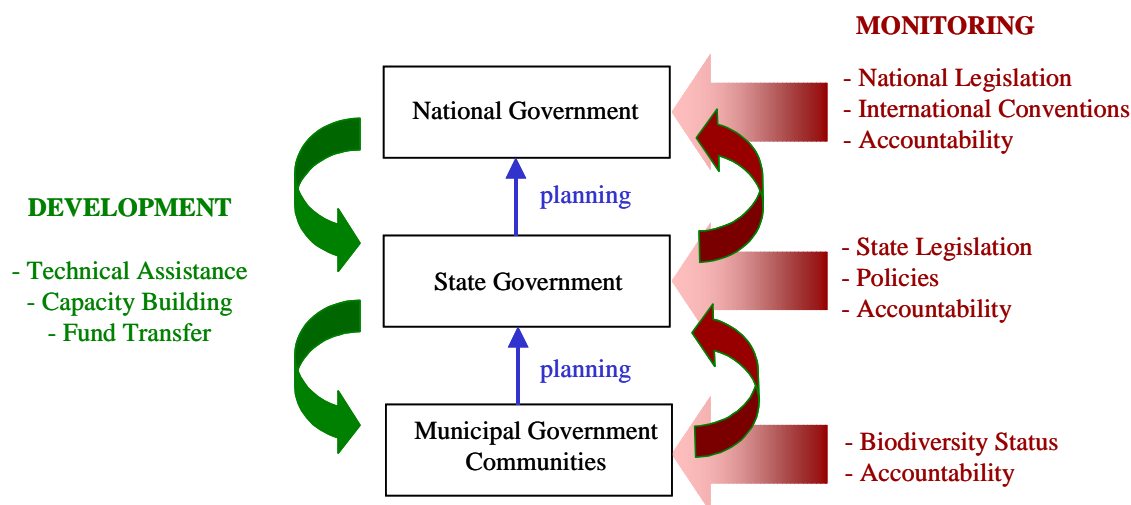
Assistance will be provided by the National government to identify funds to implement the individual States recommended actions. Once funding assistance and support is secured, the National government's role is to act as a conduit to provide financial support directly to the individual States to distribute the funds directly to the implementation program agencies. The implementation of these projects will be undertaken at the municipal/community level in each State. It is envisaged that NGO's and private companies will be critical partners in the implementation and development of these projects.

In addition, both National and State government agencies have the responsibility to provide the necessary technical skills required to assist and allow the successful implementation of the individual programs. Capacity building and institutional strengthening programs are therefore an integral component and will be incorporated into each program.

Monitoring programs will be incorporated into each implementation project to provide a mechanism to evaluate all biodiversity projects undertaken within the nation. A working partnership between the National government, State governments and Municipal Government/Community agencies is required to allow the successful evaluation of these programs, and with each entity having specifically defined roles, objectives and requirements.

The National government will be required to evaluate each project for compliance with National legislation and international conventions, provide capacity building and institutional strengthening, and be accountable to financial sources. State governments will be required to evaluate for compliance with State laws and policies, be financially accountable to the National government and donor agencies for each project and provide capacity building and institutional strengthening. The municipal government and communities that are the implementers of the NBSAP will be required to evaluate and provide information pertaining to progress of each project, as well as to document and monitor the status of the biodiversity health and threats within individual projects, provide capacity building opportunities and provide financial accountability to their respective government and donor funding agencies.

**Figure 2** provides a diagrammatic representation of the linkages between the National, State and Municipal/Communities agencies with regards to the implementation and development, planning, and monitoring of the NBSAP.



It is envisaged that the respective state NBSAP designated counterpart agencies will continue as the facilitators for the development of individual State implementation and monitoring programs.

The SD Council and the Department of Economic Affairs (lead agency) through the NBSAP Panel will provide continued national government support and assistance to the States in the development of programs for implementation and monitoring of the NBSAP. The National government's main task initially will be to assist each State to develop and finalize their individual Implementation Strategies and Plan. Appendix 4 provides a summary of relevant National and State government agencies, committees and NGO's that will assist in the formulation of the State plans. The roll of the NBSAP Panel therefore is to:

- Identify lead agencies and ensure collaborations between all agencies (National and State) on the implementation of specific actions identified in the NBSAP
- Monitor and recommend appropriate actions regarding the implementation of the NBSAP
- Discuss biodiversity issues and be the nations mediator and representative to regional and international biodiversity related conferences and meetings
- Facilitate and assist with the dissemination of biodiversity related materials to all stakeholders

- Coordinate and facilitate interstate collaboration for all biodiversity programs
- Maintain and update a list of all biodiversity related projects undertaken within the FSM
- Facilitate and assist expert groups to undertake biodiversity related projects when required
- Initiate monitoring programs to assess the effectiveness of the NBSAP in managing and sustaining the FSM biodiversity
- Coordinate and integrate activities carried out under the CBD convention, climate change and other related conventions.

### **11.1.1 Local Expert Panels.**

Implementation of the NBSAP requires the collection and analysis of scientific data. To obtain this information and to provide useful recommendations on appropriate actions to be taken, relevant expert panels will be required. It is recommended that local expert panels be formed to undertake such tasks where feasible. Panel members would include representatives from National, State and Municipal governments, NGO's, Institutions of higher learning (COM-FSM), private consultants and the private sector. Membership of such panels should be based on recommendations of the NBSAP panel and other relevant agencies. It is acknowledged that specific scientific skills required to develop the nation's biodiversity program may not be available within the FSM and that technical assistance from outside the nation will be required.

### **11.1.2 Regional and International Linkages.**

To advance the development of the nation's biodiversity program, especially the programs associated with the implementation of the NBSAP, strong associations and links need to be made with relevant regional and international organizations and private companies to provide needed skills and expertise when required. It is envisaged that these organizations would work closely with the local expert panels and include local capacity building program components in all activities. Therefore, the FSM needs to identify all regional and international agencies, which can assist these programs and utilize these resources when required.

### **11.1.3 National Biodiversity Database and Clearing House.**

A national biodiversity database is required to provide a mechanism for the collection, storage and dissemination of all biodiversity information obtained within the FSM. This should include both digital and printed copies of all published documents including all gray literature. Presently, information is scattered throughout the FSM and Pacific region and therefore there is a need for the collection and cataloging all biodiversity information.

To function effectively, it is recommended that all relevant information pertaining to the nation's biodiversity should be deposited at a national biodiversity database. A mechanism needs to be in place that requires as a mandatory practice for all government and non-government agencies to deposit all documents at this database. The successful development of this database will require the full cooperation and support of all National, State and Municipal government agencies, NGOs and the private sector to assist in this endeavor.

To ensure all information is available and can be accessed and disseminated by all users in each State, a formal biodiversity clearing house mechanism needs to be established. Additional staff and capacity training programs may need to be undertaken before the National database can be initiated.

## **11.2 Monitoring.**

The assessment and continued monitoring of all NBASP actions undertaken in the future are integral components of the nation's biodiversity program. Careful evaluations and monitoring of such action programs need to be undertaken to ensure that projects are indeed producing useful results and therefore meeting the goals and objectives of the NBSAP. Monitoring programs to track changes in the status of biological resources will serve as indicators of the effectiveness of implementation. In addition, threat based monitoring programs will be implemented to provide additional information to support biological monitoring data (e.g. aerial photography and vegetation mapping). The monitoring program should utilize information from the National Biodiversity database with additional information collected from specific field surveys and evaluations when required.

A monitoring program is dependent on an implementation plan and therefore the NBSAP monitoring program will form part of the BSAP Implementation Strategy and Action plans to be formulated by the four FSM states. The national government will provide overall coordination and support through the SD Council and the Department of Economic Affairs.

## **11.3 Reporting.**

The national government is responsible for the reporting and dissemination to all stakeholders of information pertaining to all NBSAP programs. A mechanism to effectively distribute updates and progress reports on all biodiversity related programs and activities will be established and coordinated by the National government. Such a mechanism must include participation and assistance from all relevant agencies in each State.

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## 13.0 Appendices:

### Appendix 1: A list of International environment treaties to which the FSM is a signatory.

Environment Treaties in FSM	Enter into Force (F) Signed (S) Ratified (R) Accession (A)	Follow on Treaties	National Activities
Convention on Biological Diversity	F – 12/29/93 S – 6/12/92 R – 6/20/94		NBSAP – Department. of Economic Affairs
UN Framework Convention on Climate Change	F – 3/21/94 S – 6/12/92 R – 11/18/93	Kyoto Protocol S – 3/17/98 R – 6/21/99	PICCAP – Department of Economic Affairs
Vienna Convention for the Protection of the Ozone Layer	F - 9/22/88 A – 8/3/94	Montreal Protocol F – 1/1/89 A – 9/6/95	Department of Economic Affairs
Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal	F – 5/5/92 A - 9/6/95		Department of Health, Education and Social Affairs
UN Convention to Combat Desertification in those Countries Experiencing Drought and/or Desertification, Particularly Africa	F – 12/26/96 S - 12/12/94 R – 3/25/96		Department of Economic Affairs, TC&I
UN Convention on the Law of the Seas	F- 11/16/94 A – 4/29/91	Agreement relating to implementation of Part XI of UNCLOS of Dec 10,1982 – Ratified 9/6/95 - Agreement Implementing Provisions of December 10, 1982 on Straddling Fish Stocks and Highly Migratory Fish Stocks – Ratified 5/23/97	Micronesian Fishing Authority
Stockholm Convention on Persistent Organic Pollutants	S – 7/31/01		POPS Project – Department of Health, Education & Social Affairs

**Appendix 2: A timetable of activities undertaken for the development and finalization of the NBSAP.**

June 2000	NBSAP Panel Mobilized
August 2000	First draw down of Funds
January 2001	Project Commenced, Project Manager Hired.
April 2001	First National Biodiversity Meeting
May 2001	COP Preliminary Report Submitted
June – November 2001	State Consultations/Meetings
June – November 2001	Local Consultant hire Terrestrial and Marine Biodiversity Technical Reports undertaken
November 2001	State & Technical Workshop Reports Submitted to National Government
November 2001	Reports reviewed
December 2001	Individual State Visit – Review of State Workshop Reports
January 2002	First Draft NBSAP report for Review.
January 2002	First draft of COP report and reviewed
February 2002	Final National NBSAP Workshop
March 2002	Finalization of NBSAP and COP reports
April 2002	Conference of Parties
April 2002 – January 2003	Formulation of State Implementation Plans

### Appendix 3: Potential Conservation Areas in the Federated States of Micronesia.

<b>Conservation Area</b>	<b>Island</b>	<b>Description</b>	<b>Targets</b>
Northeast Ngulu CA	Ngulu Atoll	Taapuyappu, North, and Mesoran islets	Seabirds, Coconut Crabs
Yap West Central Marine CA	Yap Proper	Mangroves and reef	Mangrove Forests, High-Island Nearshore Marine
Yap Forest CA	Yap Proper	Upland Forest within 75 m contour	Upland Broadleaf Forest
Central Yap Marine CA	Yap Proper	Goofnuw and Mil Channels and inshore waterways and mangroves	High Island Nearshore Marine, Mangrove Forest, Yap Monarch, Yap Flying Fox, Coconut Crab, Napoleon Wrasse, Manta birostris, Serranid Spawning
North Yap Marine CA	Yap Proper	Northern reef from Rumung north	High Island Nearshore Marine
East Harbor Marine CA	Yap Proper	Northern harbor mangroves, reefs, and channels	High Island Nearshore Marine
Dalipebinao School Forest Reserve	Yap Proper	Delineated school forest reserve	Low-Elevation Broadleaf Forest
Southern Reef CA	Yap Proper	Southern reef tip	Napoleon Wrasse, Humphead Parrotfish, High Island Nearshore Marine
Yinuuf/Galiil/Luech Mangrove CA	Yap Proper		Yap Flying Fox, Mangrove Forest, Coastal FW Marsh
Tomil Mangrove/Marsh CA	Yap Proper	Tomil coast area and mangroves	Mangrove Forest, Coastal FW Marsh
Northwest Ulithi CA	Ulithi Atoll	Numerous (Towachi to Dao passage including Pontangerasi islet	Seabirds, Coconut Crab, Mariana Flying Fox, Giant Micronesia Gecko, Turtle Nesting Beaches, Atoll Inland Mangroves
Ulithi Turtle Islands CA	Ulithi Atoll	Pao, Bulabul, Losiep, Gielap and Iar islets	Turtle Nesting Beaches, Seabird Nesting
Eau and Ealil Islets CA	Ulithi Atoll	Eau and Ealil Islets (SW Ulithi)	Seabird Nesting
Lolang Islet CA	Ulithi Atoll	Lolang Islet (NE Ulithi)	Marianas Flying Fox
Pig Island CA	Ulithi Atoll	Pig Islet (S Ulithi)	Turtle Nesting Beaches, Coconut Crab
Northwest Sorol CA	Sorol Atoll	Falewaidid, Bigeliwal, and Bigelimal islets	Turtle Nesting Beaches, Coconut Crab
Fais Limestone Forest CA	Fais Atoll	Fais forest area	Limestone Forest
Sand Islet CA	Woleai Atoll	Sand Island	Seabirds
Gaferut Atoll CA	new		

Olimarao CA	Olimarao Atoll	Entire atoll	Turtle Nesting, Coconut Crabs, and Seabirds
Pogue Islet CA	Lamotrek Atoll	Pogue Islet	Coconut Crab
West Fayu CA	West Fayu Atoll	Entire atoll	Turtle Nesting, Seabirds
Satowan Atoll CA	Satowan Atoll	Whole lagoon	Sea Bird Nesting Site, Serranid Spawning, Atoll Nearshore Marine, and Atoll Beach Forest
West Puluwat CA	Puluwat Atoll	Alet, To, and Elangelab islets and passages	Atoll/Beach Forest, Inland Mangrove, and Serranid Spawning
Pulusuk Atoll CA	Pulusuk Atoll	Whole lagoon	Atoll Nearshore Marine
Southwest Pulap CA	Pulap Atoll	Fanadik to Tamatam	Serranid Spawning, Coconut Crab
Pulap Atoll CA	new		
North Namonuito CA	Namonuito Atoll	Magur and Magererik islets	Turtle Nesting Beaches, Seabirds
East Fayu CA	East Fayu Atoll	Entire atoll	Turtle Nesting Beaches, Seabirds
Murilo Atoll CA	Murilo Atoll	Whole lagoon	Atoll Nearshore Marine
Northwest Reef CA	Chuuk Lagoon	Taualap Passage to Pis Islet	High Island Nearshore Marine, Serranid Spawning
Pieanu Pass CA	Chuuk Lagoon	Pieanu Pass and surrounding reefs	Serranid Spawning
South Reef CA	Chuuk Lagoon	Aualap to Aleon pass	Serranid Spawning
Southeast Reef CA	Chuuk Lagoon	Uligar Pass to Feinid Islet	Seabirds and Chuuk Monarch
Northeast Pass CA	Chuuk Lagoon	NE Pass and surrounding reefs	Manta birostris
Winipot CA	Tol Island, Chuuk	Winpot mountain on Tol Island, Faichuks	Chuuk Monarch, Upland Broadleaf Forest, Caroline Islands Swiftlet, Micronesia Imperial Pigeon, Faichuuk White-eye, Chuuk Flying Fox
Faichuk Mangrove CA	Tol, Pata, Polle and Wonei Islands, Chuuk	All mangroves	Mangrove Forests, Chuuk Flying Fox, Estuaries, and Chuuk Monarch
Nom en Chun CA	Tol and Pata Islands	Nom en Chun Bay	High Island Nearshore Marine
Fanapanges CA	Fanapanges Island, Chuuk	Fanapanges island and mangroves	Chuuk Monarch
Udot CA	Udot Island, Chuuk	Udot Island and mangrove	Chuuk Monarch, Chuuk Flying Fox
Parem Marine CA	Parem Island, Chuuk	Shallow reefs to west of Parem and Tarik Islands	High Island Nearshore Marine, Giant Clams
Uman CA	Uman Island, Chuuk	Uman Island and mangroves	Chuuk Monarch, Chuuk Flying Fox

West Fefan CA	Fefan Island, Chuuk	Central west Fefan mangroves and reef	High Island Nearshore Marine
Fefan Forest CA	Fefan Island, Chuuk	Northern Fefan Upland Forest above 100 m contour	Chuuk Monarch, Upland Broadleaf Forest, Caroline Islands Ground Dove, Ivory Nut Palm Forest, Cynometra yokatai
North Fefan Marine CA	Fefan Island, Chuuk	North Fefan mangroves and reef	Mangrove Forest
Namwanan Marine CA	Tonoas Island, Chuuk	Namwanan Bay	Mangrove Forest, Chuuk Flying Fox
Muenon FW Marsh CA	Tonoas Island, Chuuk	Muemon Marsh and Mangrove	Mangrove Forest, Chuuk Flying Fox, Coastal FW Marsh
Tonoas Forest CA	Tonoas Island, Chuuk	Tonoas Island upland forest	Chuuk Monarch, Cynometra yokatai, Upland Broadleaf Forest
Pou Bay CA	Weno Island, Chuuk	Pou Bay and mangroves	Chuuk Flying Fox, Estuary, and Mangrove Forest
Epinup-Winipis Marine CA	Weno Island, Chuuk	South central Weno mangroves and reefs	Mangrove Forest, High Island Nearshore Marine, Chuuk Flying Fox
Weno Ridge Forest CA	Weno Island, Chuuk	South Weno ridge forest over 100 m	Upland Forest, Chuuk Monarch, Cynometra yokotai
Tol Ivory Nut Palm Forest CA	Tol Island, Chuuk	Freshwater swamp and Ivory Nut Palm forest in this area	Ivory Nut Palm Forest
Nukanap FW Marsh CA	Parem Island, Chuuk	Freshwater swamp area	Coastal FW Marsh
Nepwon FW Marsh CA	Udot Island, Chuuk	Freshwater swamp area	Coastal FW Marsh
Wichap FW Marsh CA	Polle Island, Chuuk	Freshwater swamp area	Coastal FW Marsh
Chorong FW Marsh CA	Romonum Island, Chuuk	Freshwater swamp area	Coastal FW Marsh
Nukaf FW Marsh CA	Pata Island, Chuuk	Freshwater swamp area	Coastal FW Marsh
Southeast Kuop CA	Kuop Atoll	Lauvergne Islet reef passage	Serranid Spawning
Kouop Atoll CA	Kuop Atoll	Whole lagoon	Atoll Nearshore Marine
Losap Atoll CA	Losap Atoll	Whole lagoon	Atoll Nearshore Marine
Nama Atoll CA	Nama Atoll	Whole lagoon	Atoll Nearshore Marine
Namoluk Atoll CA	Namoluk Atoll	Whole lagoon	Atoll Nearshore Marine

Nomoi Flying Fox CA	Satawan, Lukunor, and Etal Atolls	All uninhabited islets	Mortlocks Flying Fox
South Channel Marine CA	Satawan Atoll	South Channel reef passage	Serranid Spawning
Etal Atoll Marine	Etal Atoll	Whole lagoon	Atoll Nearshore Marine
Minto Reef Marine CA	Minto Reef	Entire reef	Submerged Reef
Oroluk CA	Oroluk Atoll	Entire reef and lagoon	Atoll Nearshore Marine, Turtle Nesting Beaches, Coconut Crabs, Seabirds, Pacific Hawksbill
Nukuoro Marine CA	Nukuoro Atoll	Entire reef and lagoon	Atoll Nearshore Marine
Kapingamarangi Marine CA	Kapingamarangi Atoll	Uninhabited islets	Giant Micronesian Gecko
Kapingamarangi Gecko CA	Kapingamarangi Atoll	Entire reef and lagoon	Atoll Nearshore Marine
Sapwauhfik Marine CA	Sapwauhfik Atoll	Entire reef and lagoon	Atoll Nearshore Marine
Sapwauhfik	Sapwauhfik Atoll	Eastern uninhabited islands	Seabirds, Micronesian Pigeon
Pakin CA	Pakin Atoll	Entire reef and lagoon	Coconut Crab, Seabirds, Micronesian Pigeon, Atoll nearshore Marine
Ahnd CA	Ahnd Atoll	Entire reef and lagoon	Coconut Crab, Seabirds, Micronesian Pigeon, Atoll nearshore Marine, Serranid Spawning, Pacific Hawksbill Turtle
Pohnpei Central Forest CA	Pohnpei Island	Central contiguous forest block	Montane Cloud Forests, Upland Broadleaf Forest, Low-Elevation Broadleaf Forest, Pohnpei Island Skink, Long-billed White-eye, Pohnpei Mountain Starling, Polynesian Sheath-tailed Bat, Musa tikap, Clinostigma Palm Forest, Ivory Nut Palm Forest, Fern/Sedge Savanna, Montane Perched Freshwater Swamp
South Pohnpei Marine CA	Pohnpei Island	Southern Kitti coastal swamp, mangroves, lagoon and reef	Ivory Nut Palm Forest, Tidal Saltwater Swamp, High Island Nearshore Marine, Mangrove Forest, Atoll/Beach Forest, Coastal Freshwater Marsh, Swamp Forest

Southeast Pohnpei CA	Pohnpei Island	Lohd to Temwen Mangroves, swamp forest, Nan Madol, Nahpali, up to Pohnlangas savanna	Ivory Nut Palm Forest, High Island Nearshore Marine, Mangrove Forest, Atoll/Beach Forest, Swamp Forest, Turtle Nesting Beach, Pohnpei Sort-eared Owl, Low-Elevation Broadleaf Forest
Sapwalap Mangrove CA	Pohnpei Island	Same	Mangrove Forest, Swamp Forest
Temwen Island CA	Pohnpei Island	Central Temwen swamp forest area	Ivory Nut Palm Forest, Caroline Islands Swiftlet, Pohnpei Flying Fox
Edienleng/Pohn Tehnmei Ridge CA	Pohnpei Island	Ipwetek/Sapwalap Ridge	Low-Elevation Broadleaf Forest, Caroline Islands Swiftlet
Alokapw FW Marsh CA	Pohnpei Island	Same	Coastal FW Marsh
Nan Pailong CA	Pohnpei Island	Mangroves and swamps	Ivory Nut Palm Forest, Mangrove Forest, Coastal FW Marsh
Nan Mand Forest CA	Pohnpei Island	Forest in Sapwtakai area	Low-Elevation Broadleaf Forest
Southern Kitti Reef CA	Pohnpei Island	Reef and lagoon from Kehpara to Nahlap	High Island Nearshore Marine, Atoll/Beach Forest, Serranid Spawning
Palikir-Paies CA	Pohnpei Island	Palikir savanna grasslands	Fern/Sedge savanna, Low-Elevation Broadleaf Forest, Micronesia Kingfisher
West Pohnpei CA	Pohnpei Island	Swamp forest	Swamp Forest, Mangrove Forest, Tidal Saltwater Marsh, Seabird Nesting Area,
Lenger-Parem CA	Pohnpei Island	Lenger CA and Parem mangroves	High Nearshore Marine, Mangrove Forest
Dausokele Estuary CA	Pohnpei Island	Dausokele area estuary, mangroves, swamp forest, etc.	Estuary, Mangrove Forest, Swamp Forest, Fern/Sedge savanna
Pohnlehr CA	Pohnpei Island	Top of Nett ridge	Fern/Sedge savanna, Short-eared Owl
Dau Mwoakote Mangrove CA	Pohnpei Island	All mangrove forests between Sokehs Island and main island	Mangrove Forest
Etscheit Land CA	Pohnpei Island	Etscheit savanna lands behind Kolonia	Fern/Sedge Savanna, Micronesia Kingfisher
Sokehs Ridge CA	Pohnpei Island	Entire ridge of Sokehs Island	Caroline Islands Swiftlet, Pohnpei Flying Fox
Dien Mangrove CA	Pohnpei Island	Dien, U, mangroves	Mangrove Forest



Palikir Pass Marine CA	Pohnpei Island	Palikir pass reef area and lagoon	Napolean Wrasse, Serranids, Manta Ray
Depehk Island Marine CA	Pohnpei Island	Mwahnd Pass reef area and lagoon	Serranid Spawning, High Island Nearshore Marine
Mwahnd Pass Marine CA	Pohnpei Island	East side of Depehk island from coast out	High Island Nearshore Marine, Manta Rays
Mwoakilloa CA	Mwoakilloa Atoll	Entire reef and lagoon	Atoll Nearshore Marine, Turtle Nesting Beaches, Seabirds
Pingelap CA	Pingelap Atoll	Entire reef and lagoon	Atoll Nearshore Marine
Kosrae Forest CA	Kosrae Island	All central forest above 100 m line	Upland Broadleaf Forest, Montane Cloud Forest, Micronesian Imperial Pigeon
Wiya Swiftlet Cave	Kosrae Island	Cave on NE main island	Caroline Islands Swiftlet
Utwa-Walung Marine Park	Kosrae Island	Existing boundaries of UWMP	Mangrove Forests, Turtle Nesting Beach, High-Island Nearshore Marine, Kosrae Flying Fox, Micronesian Imperial Pigeon
Northeast Kosrae Marine CA	Kosrae Island	From shore to 100 m out past reef	High Island Nearshore Marine
Yela-Okat Terminalia/Mangrove CA	Kosrae Island	Yela and Okat Terminalia, Okat to Walung mangroves,	Terminalia Swamp Forests, Mangrove Forests
Yela-Okat Marine CA	Kosrae Island	Shore to reef from Yela passage to airport	High Island Nearshore Marine
Tofol FW Marsh CA	Kosrae Island	Entire marsh below COM/High School	Coastal FW Marsh
Foko Puk Marine CA	Kosrae Island	Shore to 100 m off reef	High Island Nearshore Marine
Malem Marsh CA	Kosrae Island	FW Marshes and beach in central Malem	Turtle nesting beach and Coastal Freshwater Marsh
Utwa Mangrove CA	Kosrae Island	Mangroves and lagoon to outer reef in Utwa area	Mangrove forests, Kosrae Flying Fox, Humphead Parrot Fish
Finkol Terminalia Forest CA	Kosrae Island	Terminalia Forest at mouth of Finkol River in Utwa	Terminalia Swamp Forests, Mangrove Forests
Lelu Marine CA	Kosrae Island	Coast and lagoon out to outer reef in Lelu area	Coconut crabs, Napolean Wrasse,
Foko Finfoko Marine CA	Kosrae Island	Foko Finfoko coast to outer reef	Serranid Spawning

**Appendix 4:** A summary of National and State government agencies, committees and NGO's involved in biodiversity conservation (FSM Government, 2001).

	<b>National Level</b>	<b>Yap State</b>	<b>Chuuk State</b>	<b>Pohnpei State</b>	<b>Kosrae State</b>
<b>Council and Committees</b>	The President's Environmental Management and Sustainable Development Council. "NBSAP PANEL"	Environmental Stewardship Committee		Resource Management Committee	Resource Management Committees
<b>Terrestrial Biodiversity</b>	Department of Economic Affairs	Department of Resources and Development, Division of Agriculture and Forestry	Department of Agriculture	- Department of Land and Natural Resources - Bureau of Economic Affairs	- Development Review Commission - Department of Land, Agriculture & Fisheries
<b>Marine Biodiversity</b>	Department of Economic Affairs	Department of Resources and Development, Marine Resources Management Division	Department of Marine Resources	- Department of Land & Natural Resources - Bureau of Economic Affairs	- Development Review Commission - Department of Land, Agriculture & Fisheries
<b>Environmental Quality</b>	Department of Health, Education and Social Affairs	Environmental Protection Agency	Environmental Protection Agency	Environmental Protection Agency	- Development Review Commission
<b>Non-government</b>	- Micronesian Island Conservation - College of Micronesia - USDA NRC Office	- Yap Community Action Program - Yap Institute of Natural Sciences		- The Nature Conservancy - Conservation Society of Pohnpei	

