Pohnpei Watershed Management and Environment Project

Project Preparation Document

for assistance under the

South Pacific Biodiversity Conservation Program

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Pohnpei Watershed Management and Environment Project
Project Preparation Document

EXECUTIVE SUMMARY

Project Background

The island of Pohnpei (formerly Ponape) located at 6°54' N latitude and 158°14' E longitude in the Caroline Islands group in the mid-Pacific Ocean, is one of the four states of the Federated States of Micronesia. It is of volcanic origin, with some 60% of the land area characterized as steep and mountainous, surrounded by a barrier reef and a shallow lagoon. By virtue of its location, Pohnpei is one of the wettest spots in the world.

As early as 1983 evidently the island interior was being rapidly deforested. The Pohnpei State Division of Forestry requested assistance from the Pacific Islands Forester Office (USDA Forest Service Institute of Pacific Islands Forestry -- Honolulu) to develop legislation to establish a watershed area for the interior upland forests located on public lands and to provide for the protection of the coastal mangrove forests.

The two agencies also closely cooperated in legislative efforts that resulted in the passage of "*The Pohnpei Watershed Forest Reserve and Mangrove Protection Act of 1987*" (S.L.1L-128-87). The Act designated some 5100 ha (13,000 acres) of the central upland forest area and 5525 ha (15,000 acres) of coastal mangrove forests of Pohnpei Island as a protected area in order to safeguard the following:

- the water supply to Kolonia and all Pohnpei Island communities;
- important cultural and archaeological sites;
- the high level of endemic flora and fauna species; and,
- the economic potential for ecotourism and recreation.

However, local communities were not adequately involved in drafting the law. The proposed rules and regulations did not recognize traditional Pohnpeian resource use in the upland forest areas, and as a result, they were almost universally rejected. These setbacks led to the formation of the Watershed Steering Committee (WSC) in 1990, which is an interagency task force made up of representatives from several Pohnpei State Government agencies, community leaders, The Nature Conservancy, the Community College of Micronesia Science Department, the College of Micronesia Land Grant Programs, Micronesian Islands Conservation, Inc., and the USDA Soil Conservation Service.

The WSC initiated a watershed education and negotiation program and extended it around the island of Pohnpei. As a result, two issues became clear:

- Local communities must be partners with the Government in order to successfully manage natural resources;

- Proper resource management practices must extend throughout the entire island ecosystem to be effective, from the upland forests to the reef. This includes the human-managed agroforests and settled areas (*nansapw*) and the lagoon (*nansed*).

The education program turned community opposition into public support over the course of less than two years. Together with chiefs representing communities around the island, the WSC has finalized a new set of rules and regulations based on community input, which were presented to the Governor in early 1994, and signed into law in November, 1994.

Concurrently, Technical Assistance was confirmed from the Asian Development Bank (ADB) to provide support for a watershed management and environment project. The South Pacific Regional Environment Programme (SPREP) was also approached to provide technical and financial support from the South Pacific Biodiversity Conservation Programme (a Global Environment Facility Programme administered by the UNDP, UNEP and the World Bank). The concept proposal was approved by the SPBCP in February 1994.

While the ADB is supporting technical aspects of watershed management and the identification of sustainable development activities, SPBCP assistance is being sought to cover biodiversity conservation and community planning and resource management. The Pohnpei State Department of Conservation and Resource Surveillance (DCRS) is the lead agency. Its contribution is in-kind, in the form of infrastructure, logistical and personnel time. The Nature Conservancy (TNC) is executing the ADB technical assistance part of project on behalf of the DCRS. TNC has also made a long term commitment to the conservation of the island by designating Pohnpei as one of its bioreserve projects and "Last Great Places."

Although a design document has been prepared for the ADB funded portion of the project, it is necessary to also prepare this Project Preparation Document (PPD) to facilitate future technical and financial support from SPREP and to ensure that the elements supported by the ADB and SPBCP are fully integrated.

Project Features

With the assistance of TNC, the WSC identified a number of threats that arise from human activities which negatively impact on the integrity of the upland forest

ecosystem, thereby impairing its ability to function as a watershed and support the existing diversity of plant and animal species. These include:

⇒ **c**onversion of forest habitat to agroforestry, agriculture and other uses.

⇒ settlement and homesteading, encroaching upslope.

⇒ road construction, which drastically increases erosion and runoff; and which makes watershed lands more accessible for agriculture, settlement and other types of use.

⇒ over-hunting of the popular game birds, especially the Micronesian Pigeon and the Caroline Islands Ground Dove (*Gallicolumba kubaryi*). Fauna is also affected by pressures from an increasing human population (over 3% p.a.) , inland settlement, and growing markets in the district centers and off-island.

⇒ pressure from economic development, which entails deforestation, massive earth-moving, land-filling, and other activities that inhibit the natural functioning of important ecosystems.

⇒ pollution of surface water by sediment and wastes from agriculture and settlement-related activities as populations move progressively inland.

Other issues include:

⇒ a young, transitional government with limited resource management capacity; and,

⇒ a shrinking operating budget due to the phase-out of the Compact of Free Association agreement with the U.S. Government.

⇒ a need to raise awareness of the linkages between conservation and development and to empower local communities to plan and manage their own environment and natural resources.

To deal with these issues, technical assistance has been obtained from the ADB, SPREP, TNC and others to gather essential base-line data so that management can be more informed and effective.

Rationale, Strategy, Objectives and Target Group(s) of the project

Rationale and Strategy

The project is predicated on the belief that:

- Government resources are stretched thin and are inadequate to actively manage, monitor, and enforce the watershed forest reserve legislation;
- Resource use has in the past been regulated by traditional authority and the designations of *kahpws* and other traditional use areas;
- Communities have an "enlightened self-interest" in managing their own environments and that this should be encouraged through participation in management activities;
- Local community institutions will be more effective than the State Government in detecting infractions and imposing sanctions to regulate resource exploitation;
- Sustainable land use practices must extend to the entire island of Pohnpei; and,
- The provision of a decision-making framework at the local level is necessary.

The Pohnpei Watershed Management and Environment Project has been designed to identify community development needs and conflicts in natural resource utilization by gathering and analyzing socio-economic, physical, and ecological data. This information will then be used to assemble an Integrated Watershed Management Plan (IWMP) -- a blueprint for watershed management on Pohnpei Island.

Objectives

The overall objectives of the project are to:

1. Protect the ecological functions and processes of the upland forest within the Pohnpei Island Watershed Forest Reserve area and the mangrove forests and to conserve other habitats and socio-cultural features in the lands (*nansapw*) between these two areas.

2. Encourage economically viable alternatives to the current unsustainable resource extraction practices within the watershed forest reserve and mangrove forest areas, including eco-tourism.

3. Effectively incorporate neighboring community and landowner input into natural resource planning and management.

4. Empower local communities to gather and analyze information on traditional and contemporary land use in order that they themselves can make better resource management decisions.

5. Serve as a model for other Pacific islands.

The target group

The target group are those with an interest and involvement in natural resource management in Pohnpei. For the most part these stakeholders are local far mers and their families who reside in the rural area and who are directly dependent on natural resources for their everyday existence.

Apart from these rural residents, there are others with an indirect interest in the conservation of the island's ecosystems and in the development of sustainable development projects. As a result conservation efforts require a cooperative approach supported by individuals, the government and the private sector.

Features of Project Design

Approach

Information describing the natural resources of any region (e.g. soil, water, and vegetation) forms the base on which sustainable development must be built. The approach being followed in Pohnpei is based on a combination of several techniques of data acquisition, interpretation, and management. Techniques being used include PRA (to get an understanding of indigenous knowledge and classification systems), aerial photography (to capture current island-wide state of forest and other resources), global positioning systems, GPS (to determine locations of various data collection points), and geographic information systems, GIS (to store and analyze resource information).

Using these various techniques and systems, options will be developed for local communities. These options will target conservation and sustainable development activities, such as income-generating activities (e.g. handicrafts, sustainably extracted plant and animal products, ecotourism development), basic social and rural infrastructure projects, and the promotion of conservation-oriented agroforestry and other appropriate land-use systems.

Project Phases and Components

The project is designed in four phases, as follows:

Phase I: Building Awareness (1994)

- Completing Watershed/Biodiversity Education Program in all communities
- Finalizing the Watershed Rules and Regulations

Phase II: Data Gathering and Analysis (1994-on)

- Community-based watershed planning (using Participatory Rural Appraisal (PRA) or similar approach);
- Development of a resource information system for decision-making (GIS);
- Evaluation of agricultural practices in the watershed, specifically farming and agroforestry systems, and development of options to minimize their environmental impacts;
- Identification of ways to improve habitat and species conservation practices;
- Staff and community leader training and development;
- Investigation of various compatible community development projects (e.g. alternative agroforestry systems, and small-scale eco-tourism);

Phase III: Development of a Management Plan (1995-96)

- Development of a spatial plan for the watersheds, including identification of development options in each zone;
- Preparation of a Prefeasibility study for selected development options which are environmentally sound, economically viable, and socially acceptable.

Phase IV: Implementation, monitoring, and evaluation (1995-on)

- Development of community-based monitoring and enforcement program;
- Technical staff and traditional leader exchanges between Pohnpei and the other states of the FSM;
- Sponsoring a National Watershed/Sustainable Development Workshop.
- Dissemination of findings and promotion of watershed management planning in other states.

At present, the project team is completing Phase II.

Components

Assistance being requested from SPBCP is in six key areas -- Project Management, Community-based Planning, Technical Assistance, Training, Extension, and Monitoring. Within each area, a number of activities are proposed, as follows:

Project Management - SPBCP will provide the CASO's salary, partial costs of communications/reporting (telephone, fax, and mail), and a modest budget to support quarterly meetings of the Watershed Steering Committee, which has been designated as the Conservation Area Coordinating Committee;

Community-based Planning - SPBCP will provide funding and technical assistance to support the on-going PRA/Community Planning program being undertaken by Pohnpei State Government agencies in conjunction with The Nature Conservancy;

Technical Assistance - SPBCP will provide funding, and in some cases, technical personnel, to carry out the following technical assistance:

- Freshwater Fauna Assessment (consultancy)
- Reptile Fauna Assessment (consultancy)
- Community-based Monitoring Program (consultancy)
- Land Tenure Study (consultancy)
- Baseline Assessment of Population and Migration (consultancy)
- Patterns (consultancy)
- Institutional and Legal Framework for Community-based Management (consultancy)
- Lowland *Sakau* Production
- Community-based Ecotourism Development

Training - SPBCP will provide funding and technical assistance to carry out the following training activities:

- GIS (from UNEP/GRID)
- Project Planning
- PRA Regional Workshop
- Best-use guidelines workshop
- Ecotourism Guide Training

Extension - SPBCP will provide funding to support extension activities that will promote improved watershed forest management in the other states of the FSM, including technical staff exchanges and traditional leader exchange.

Monitoring - SPBCP will join with other cooperating agencies and the local government to implement monitoring programs that will allow for an evaluation of

project impacts on both environmental and socio-economic well-being of the rural target communities.

FINANCIAL REQUIREMENTS, BY YEAR

Summary of Project Costs being requested from SPBCP

Activities	1994	1995	1996	1997	1998	Total
Project Management						
CASO Salary	4200	8400	8400	8400	4200	**33600**
Conservation Area Coordinating Committee Quarterly Meetings	320	640	640	640	320	**2560**
Communications/reporting (telephone, fax, postage)		2500	2500	2500	1250	**8750**
Community-based Planning						
Community-based Watershed Planning	6150	12300	12300	12300	6150	**49200**
Technical Assistance						
Freshwater Fauna Assessment (consultancy)		20100				**20100**
Reptile Fauna Assessment (consultancy)		23500				**23500**
Community-based Monitoring Program (consultancy)		12400				**12400**
Land Tenure Study (consultancy)			7300			**7300**
Baseline Assessment of Population and Migration Patterns (consultancy)*****		2770				**2770**
Institutional and Legal Framework for Community-based Management (consultancy)*						**0**
Lowland *Sakau* Production		12250				**12250**
Community-based Ecotourism Development		12250				**12250**

Activities	1994	1995	1996	1997	1998	Total
Training:						
GIS (from UNEP/GRID)		6000				**6000**
Project Planning		0				**0**
PRA Regional Workshop		0				**0**
Best-use guidelines workshop		4800				**4800**
Ecotourism Guide Training		9000				**9000**
Extension:						
Technical Staff Exchange			11640			**11640**
Traditional Leader Exchange			15900			**15900**
Monitoring:						
TOTAL	**10670**	**126910**	**58680**	**23840**	**11920**	**232020**

*** SPREP/SPBCP consultant**

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PART 1 -- INTRODUCTION

1.1 Foreword

The island of Pohnpei (formerly Ponape) is located at 6°54' N latitude and 158°14' E longitude in the Caroline Islands group in the mid-Pacific Ocean, about 4983 km southwest of the Hawaiian Islands (**Figure 1**). Politically, Pohnpei is one of the four states of the Federated States of Micronesia and the location of the nation's capitol. The island is surrounded by a barrier reef and a shallow lagoon. Pohnpei island is typically volcanic, with some 60% of the land area characterized as steep and mountainous.

The Pohnpei Conservation and Environment Project combines the upland rainforests and the coastal mangrove forests of Pohnpei Island in the Western Pacific to form a globally significant conservation area, which is also critical to the economic well-being of Pohnpei State and the Federated States of Micronesia.

The goal of the project is to create a large multiple-use area intended to protect normally functioning natural systems and conserve species, while finding ways for people to utilize the environment without degrading it. Critical components to its success will be the continued wise use of these areas for subsistence, tourism, limited commercial harvest (mangrove forests only), and recreation. The CAP program will respect private and traditional ownership of land and involvement of the local community and traditional leadership will be strongly encouraged at both the planning and implementation phase.

The project will not be a State or National Park, although core areas may receive special legislated protection. Rather it will be a multiple use protected area in which an attempt will be made to sort out and eliminate conflicting activities and determine the appropriate level of human use and harvesting which does not exceed the productive capacity of the ecosystems.

1.2 Project Preparation Document (PPD)

This document (the PPD) follows the approval of a concept proposal submitted to the South Pacific Biodiversity Conservation Programme in 1992 and approved in February 1994. The PPD sets out in more detail the rationale for the project and the detailed activities which will be funded by the SPBCP over a four year period. It is intended to be indicative of the type, timing and costs of activities and technical support that will be necessary.

The SPBCP is not the only agency supporting the project. Hence, this document also highlights the relationship between the lead agency (the Pohnpei State Department of Conservation and Resource Surveillance - DCRS), The Nature Conservancy (the

implementing agency for an Asian Development Bank Technical Assistance grant) and other players.

1.3 Project Background

As early as 1983, when the USDA Forest Service and local foresters teamed up to conduct the vegetation survey for the main island of Pohnpei (MacLean *et. al.*, 1986), it became evident that human movement and related deforestation in the densely forested, mountainous island interior was rapidly increasing . The Pohnpei State Division of Forestry requested assistance from the Pacific Islands Forester Office (USDA Forest Service Institute of Pacific Islands Forestry -- Honolulu) to develop legislation to:

- establish a watershed area for the interior upland forests located on public lands; and,
- provide for the protection of the coastal mangrove forests.

Utilizing the 1976 aerial photos of Pohnpei, the 1982 soil survey, and aerial reconnaissance (five flights), the actual watershed boundaries were determined by "carefully mapping, from the air, places [on Public lands] where people have not yet settled on the highly erodible soils" (Anson, *et. al*. 1985).

The two agencies also closely cooperated in legislative efforts that resulted in the passage of "*The Pohnpei Watershed Forest Reserve and Mangrove Protection Act of 1987*" (S.L. 1L-128-87). The Act designated some 5100 ha (13,000 acres) of the central upland forest area and 5525 ha (15,000 acres) of coastal mangrove forests of Pohnpei Island as a protected area in order to safeguard the following:

- the water supply to Kolonia and all Pohnpei Island communities;
- important cultural and archaeological sites;
- the high level of endemic flora and fauna species; and,
- the economic potential for ecotourism and recreation.

The upland forest protected area is made up of two legally designated areas:

1) **Watershed Forest Reserve (WFR)**, a large contiguous area of highly erodible soils that is to be protected from development and retained in forest cover to provide a long-term water supply for Pohnpei; and,

2) **Important Watershed Areas (IWA)**, areas that are already inhabited and consist of highly erodible soils that will require special care to avoid polluting river systems or increasing other hazards (Anson *et. al.*, 1985).

However, it became evident during the development of the 1987 legislation that local communities had not been adequately involved in drafting the law. Community participation was virtually nonexistent. The proposed rules and regulations had failed to recognize traditional Pohnpeian resource use in the upland forest areas, and as a result, they were almost universally rejected. Boundary survey teams of Department of Lands

and Division of Forestry employees were threatened and turned back in many areas of the island, and several near-violent incidents occurred.

These setbacks led to the formation of the Watershed Steering Committee (WSC) in 1990. The WSC is an inter-agency task force made up of representatives from several Pohnpei State Government agencies, community leaders, TNC, the Community College of Micronesia Science Department, the College of Micronesia Land Grant Programs, Micronesian Islands Conservation, Inc., and the USDA Soil Conservation Service.

Under the supervision of the Directors of the Department of Lands and DCRS, the WSC undertook to:

- develop, manage, and implement the Watershed and Mangrove Act;
- represent the Pohnpei State Government in all meetings, negotiations, and other implementation activities with municipal governments, traditional leaders, and land users pertaining to the Watershed and Mangrove Act;
- seek funding and technical assistance from other State agencies or outside agencies as needed for the implementation of the Watershed and Mangrove Act; and,
- develop and implement a long-term management strategy for the watershed and mangrove areas.

Based on municipal meetings and field surveys, the WSC determined that three major areas of the designated watershed were already seriously threatened by inland population movement: 1) the Koapin Soamwoai area of Kitti Municipality; 2) the Lehdau-Senipehn area of Madolenihmw Municipality; and, 3) the Nanpil area of Nett Municipality (**Figure 2: Map of Pohnpei**). These areas were designated as priority areas for watershed education and negotiation. As a result of the WSC's work, the USDA Forest Service funded a pilot watershed extension project in 1991.

At the same time, a local NGO group, Woaun Koapin Soamwoai Board, made up of representatives of four villages bordering the watershed area and their chiefs (Soumas en Kousapw) in Kitti Municipality, contacted the Pohnpei State Department of Lands and the Division of Forestry. The Kitti group had been organized one year earlier to address land issues in their area, including the proposed Watershed Forest Reserve. Convinced that watershed forest protection was needed in their area, but desiring more input in watershed management, the group agreed to work with the Division of Forestry to conduct a watershed education program and develop a local management plan for the Watershed Forest Reserve area. The resulting program involved this group, the community members of the four villages, and the WSC in a series of education and negotiation meetings held both in the communities themselves and in Kolonia, the island's district center.

Since then the watershed education and negotiation program has been extended around the island of Pohnpei (over 200 community meetings) with great success. Two issues were made very clear to the WSC through community input during the education program:

* Local communities must be partners with the Government in order to successfully manage natural resources;

* Proper resource management practices must extend throughout the entire island ecosystem to be effective, from the upland forests to the reef. This includes the human-managed agroforests and settled areas (*nansapw*) and the lagoon (*nansed*).

The education program has turned broadscale community opposition into widespread public support over the course of less than two years. Together with chiefs representing communities around the island, the WSC has finalized a new set of rules and regulations based on community input. The new rules and regulations focus on the involvement of traditional leaders with the Government in the actual management of the Watershed Forest Reserve. They were finalized and presented to the Governor in early 1994, and signed in November, 1994.

Based on these rules and regulations, the Pohnpei State DCRS and its Division of Forestry have initiated a community-based planning program to support the management of Pohnpei's upland forest watersheds and mangroves. A pilot project, based on Participatory Rural Appraisal (PRA) is currently being undertaken in Senpehn (Section 4) in Madolenihmw Municipality.

PART 2 -- EXISTING SITUATION

2.1 General Setting

By virtue of its location, Pohnpei is one of the wettest spots in the world. Rainfall is high and temporally well-distributed throughout the year, with an average of 4820 mm and 300 rainy days per year. Slightly less rain falls during the months of January-March, providing for a modest "dry season". Due to orographic effects, rainfall is believed to reach as high as 7500 mm in the rugged interior (Spengler, 1990). This immense rainfall, coupled with the relative infrequency of typhoon storm events (most passing to the north and west of the island), has resulted in the island's heavily forested interior. Upland rainforests consist of several forest types, including upland, palm, swamp forests, and at the highest elevations, dwarf or cloud forest. Lower slopes and coastal areas are characterized by agroforest and secondary vegetation, with small areas of grass or fern savanna. Lowland areas consist of swamp forest or taro patch. Extensive mangrove forests up to 4 km in width, also the result of high rainfall and resultant rich sediment flow from the uplands, line the coast.

2.2 Physical and Ecological Situation

The upland and mangrove forests of Pohnpei are by far the largest remaining natural relatively undisturbed forests in the islands of Micronesia. Their uniqueness and extent are the combined result of natural factors (high rainfall, isolation of Pohnpei from other land masses, and steep and relative inaccessibility of the upland interior) and the Pohnpeians' strong cultural respect and an almost sacred veneration of the upland and mangrove forests.

Pohnpei's forests are key elements in the island's ecosystem. Islands have at least two major forces acting on them:

1) the flow of water from higher altitudes to the ocean, and

2) ocean wave action moving from the ocean onto land.

Both of these forces have strong erosive powers, but natural island ecosystems, particularly upland and coastal mangrove forests, are arranged in such a way as to buffer them. When forests are removed on high volcanic islands like Pohnpei, as in the process of development, terrestrial erosion increases, streams become more sediment-laden and ultimately discharge into near shore waters. Excessive sedimentation may adversely affect freshwater communities, smother near shore marine bottom communities, and kill corals. Thus, damage to one part of an island's resource base can adversely affect others.

2.2.1 Key Ecosystems

Upland Forest (*Nanwel*)

The upland rainforest of Pohnpei Island includes three major components that form a transect roughly by elevation:

- ⇒ Montane Cloud Forest
- ⇒ Upland Palm Forest
- ⇒ Upland Broadleaf Forest

There are also small areas of swamp forest within the upland area.

Human-Modified Ecosystems (*Nansapw)*

Below the upland forest are located an array of various ecosystems, all to some extent human-modified, as follows:

- ⇒ Agroforest
- ⇒ Secondary forest
- ⇒ Fern savanna and grasslands

Mangrove Forests (*Naniak*)

On the shore side of the human-modified ecosystems are located the mangrove forests, which form a separate ecosystem related hydrologically to the upland forest.These ecosystems are more fully described in the following sections, along with their key ecological processes and major stresses.

Ecosystem Descriptions

Montane Cloud Forest

The cloud forest, or dwarf/mossy forest occurs only along Pohnpei's highest ridges. Cloud forests usually occur only at elevations above 1000 m, and at 450-780 m, Pohnpei's are amongst the lowest occurring in the world. This occurrence of cloud forest at abnormally low elevations on isolated peaks near the sea or on off-shore islands, is known as the Massenerhebung effect, and is believed to be the result of various factors including orographic rainfall, high cloud cover, constant wind stress, and high UVB radiation. This forest type is characterized by stunted and bent trees and shrubs which support large growths of mosses, ferns, and other epiphyses, and is found elsewhere in Micronesia only on Kosrae. The plants, dominated by endemic species, are usually less than 6 m (20 ft) in height. The high elevation cloud forest is also important hydrologically in that it can also capture and condense atmospheric moisture, and the so-called "occult" precipitation added to the effective moisture received by an area can be substantial, e.g. in Hawaii it represented an extra 760 mm above the 2,600 mm of rainfall (Ekern, 1964, in Hamilton and King, 1983).

Upland Palm Forest

Palm forests are unique to Pohnpei and cover approximately 1,383 ha of the island's land area or 7% of the total forest resource. These forests are made up of pure or nearly pure stands of endemic palm species. Clinostigma ponapensis (kotop) is the most common species between 450 and 600 m (1470 and 1970 ft) and attain a height of 25-30 m (80-100 ft). Ptychosperma hosinoi and P. ledermaniana are also present, especially at lower elevations. The palm forest, besides it's important hydrological function as watershed, also provides habitat for several species of birds, most importantly the endemic Pohnpei Greater White-eye, Rukia longirostris ("torong"), currently on the U.S. Endangered Species List.

Upland Broadleaf Forest (*Wahl)*

Comprising nearly 12,548 ha or 35% of Pohnpei's land area and 64% of the forest area as of 1983, the upland broadleaf forest comprises the largest forest type on the island. At one time, the uplands of the island were almost completely covered with native forest. Many of these areas have been converted to agroforest or secondary vegetation at lower elevations, but at higher elevations (>400 m), much of the native forest still remains.

The upland forest serves several important ecological functions. Perhaps most importantly, the forest vegetation with it's extensive root system and litter layer serves to capture rainfall, retarding surface runoff and improving infiltration of water into the soil, where it is filtered and slowly released into the streams and rivers that eventually make their way to the coastal mangroves and the lagoon. Through the retardation of surface runoff, erosion and sedimentation are reduced protecting these ecologically and economically important downstream environments from degradation. Flood severity and intensity are also reduced. The slow release of ground water helps ensure streamflow even during relatively dry periods.

The conservation values and biodiversity of Pohnpei's upland forests are as important as their hydrological buffering function. The upland forest on Pohnpei serves as habitat for at least 269 species of plants, 110 of which are endemic. In all, 34.4% of all the plant species found on Pohnpei are found chiefly in the upland forest, while fully 90% of the endemic plant species are found there. Major endemic families include Euphorbiaceae (7 species), Orchidaceae (35 species), Polypodiaceae (10 species), and Rubiaceae (10 species). Twenty-four species of birds nest in the upland forest, of which 5 species and 8 subspecies are endemic to Pohnpei, including the Pohnpei Lory (Trichoglossus rubiginosis, local name "serehd"), the only endemic member of the parrot family in Micronesia. Many of these plants and animals, besides their numerous ecological functions, are also an important subsistence and, to a lesser extent, commercial resources for the people of Pohnpei.

Swamp Forest *(Lepwul)*

Swamp forests are found in low-lying fresh water areas inland of mangroves, in river bottoms, and other areas where the water table is high, including several areas in the upland. Besides their function as wildlife habitat, swamp forests are important in the overall island hydrological system in that they trap sediments from upland areas, thus acting as a filter.

Agroforest (*Pahnwel)*

Agroforests are created by Pohnpeians, with some assistance in seed dispersal from fruit bats and birds. Agroforests include a number of fruit and other useful tree species and vegetable crops, generally established near homesteads. The area of agroforest has greatly increased in recent years -- in response to a rapidly growing population -- and now accounts for nearly 1/3 of Pohnpei's land area (>11,000 Ha). The agroforest serve a number of ecological functions, including prevention of soil erosion, maintenance of soil fertility, and provision of habitat for some species. In addition, the agroforests contains pockets of secondary and native forests which provide important habitat for indigenous flora and fauna, as well as wildlife corridors between the upland forests and mangroves.

Secondary Forest *(Weliwel)*

Areas of secondary vegetation are covered with a tangle of fast-growing vines, shrubs, and small trees. Some areas of secondary forest represent a successional stage following disturbance of natural forest. Often these areas are gardens in a fallow phase. Like agroforests, they provide a variety of important habitats in addition to their functions in water and soil conservation.

Fern Savanna and Grasslands *(Mal)*

Fern savanna and grasslands are thought to be the result of destruction of forest vegetation, particularly by fire, which removes the humus layer and exposed the soil to rain and sun. As frequent fires degrade the soil, tree species gradually disappear. The soils in these areas generally are infertile and poorly drained clays. Grasslands are important habitat for Pohnpei's Short-eared Owl (Asio flammeus), an endemic subspecies.

Mangrove Forest *(Naniak)*

On Pohnpei, the mangrove forests occur along the lower portions of rivers and streams and at their mouths, and on coastal mudflats and some off-shore islets. Mangrove forests cover 5,525 Ha or 6% of Pohnpei's land area and 28% of the island's forested area. The most common mangrove stand consists of trees of medium size. A distinctive mangrove type found only in Pohnpei is characterized by extensive areas of low, dense growth usually in the interior of large mangrove areas. These stands, called

"*pidiring en ahk*" on Pohnpei, consist mostly of Rhizophora with some Bruguiera trees which are too small to be useful for wood products.

The coastal mangrove forests protect the coast from wave action and strong storm waves that surge over the barrier reef. More importantly they stabilize coastal areas by trapping and holding sediment derived from upland areas, and preventing these sediments from entering the lagoon and destroying sea grass beds and coral reefs. Erosion and sedimentation are continually increasing with additional upland house sites and road construction, so the maintenance of mangrove forests is critical to the health of the nearshore environment. The mangrove forest also acts as a key nursery site. Many fish spawn in mangrove areas, and the forests act as habitat for many important subsistence and commercial species of shellfish, especially crabs and various mollusks, fish, and birds. Larval and juvenile fish shelter from larger predatory life forms among the mangrove roots, and in the rich mangrove environment, the young fish find abundant food.

2.2.2 Priority Species

Flora

Pohnpei's flora has been the object of outside research interest since the German Administration of the islands of Micronesia (1898-1914). During the Japanese Mandate (1914-45) several expeditions were launched into the interior of the island, and much of the present taxonomy is based on this early work. Since the American presence from 1945, numerous studies have augmented the Japanese work. The TNC field representative has worked closely with the Pohnpei State Division of Forestry and other agencies to compile a list of 769 plant species that have been recorded on Pohnpei, of which 111 plants (15%) are believed to be endemic to the island. On-going efforts to determine Pohnpei local name and additional local knowledge of these plants are being undertaken. Resource data currently available is insufficient to determine the ranges or status of these species, but it hoped that future efforts will determine this important management information.

Fauna

Of the fauna inhabiting Pohnpei's forests, only the avaifauna has been extensively surveyed. Of 29 bird species recorded on Pohnpei, 25 are known to make extensive use of the island's upland and mangrove forests. Of these, 5 species and 8 subspecies are known to be endemic to the island.

Table 1. Pohnpei's Endemic Bird Species and Subspecies

English	Scientific	Local
Endemic species:		
Pohnpei Flycatcher	Myiagra pluto	koikoi
Caroline Is. Ground Dove	Gallicolumba kubaryi	peluhs

Pohnpei Lory	Trichoglossus rubiginosus	serehd
Pohnpei Mt. Starling	Aplonis pelzelni	sie
Pohnpei Greater White-eye	Rukia longirostris	torong

Endemic subspecies:		
Short-eared Owl	Asio flammeus	likoht, tehot
Purple-capped Fruit Dove	Ptilinopus porphyraceus	kiniwed
Micronesian Kingfisher	Halycon cinnamomina	kutoahr
Micronesian Pigeon	Ducula oceanica	mwuroi
Cardinal Honeyeater	Myzomela cardinalis	pwiliet
Dusky White-eye	Zosterops cinerea	tiht
Bridled White-eye	Zosterops conspicillatus	tiht
Cicadabird	Coracina tenuirostris	totopai

Of these, the Pohnpei Mountain Starling is believed to be extinct, although the TNC Field Representative has heard conflicting reports from several villagers who are regular visitors in the upland forest. The Short-eared Owl and the Caroline Islands Ground Dove are considered rare. The Short-eared Owl is listed as a candidate endangered species under the U.S. Endangered Species Act (USFWS 1981). The Pohnpei Greater White-eye is also listed on the US Endangered Species List. The Cicadabird is uncommon and may need protection in the future. The Micronesian Pigeon has been a popular gamebird for many years, and populations are believed to be declining. The Pigeon is protected by a Pohnpei State law that only allows hunting in December, but this is not enforced. The Pohnpei Lory, although common, is completely protected by Pohnpei State Law as the State bird. Other avifauna of special concern include the Audobon's Shearwater (Puffinus lherminieri, "*liparok*") and Blue-faced Parrotfinch (Erythrura trichura, "*likedpwuhpwu*"). The major management recommendation for all these species is preserving the upland forest habitat (Engbring, Ramsey, and Wildman, 1990).

Pohnpei's forests also provide the habitat for a number of other species of fauna. The fruit bat (Pteropus molossinus) is important in both pollination and dissemination of many species of forest trees (Falanruw, 1988). Several reptiles are found in the forests, including various lizards, "*liseisei pahini*", "*kieil*", "*lamwer*", and "*lemlem en seri*". Numerous terrestrial gastropods have also been reported in Pohnpei's upland forests. A 1993 USFWS/TNC survey targeted the status of snail populations, focusing on endemic gastropods which comprise 74% (26 species) of the total land snail fauna reported from Pohnpei. It is believed that these endemic tree snails are perhaps threatened by the parasitic snail Euglandia and an introduced flatworm, both brought in the 1950's to control the giant African Snail (Achatina fulica), which was introduced during the Japanese Period. Freshwater streams and rivers are inhabited by a variety of fauna: "likodop", a small freshwater shrimp; "*kemisik*", the freshwater eel abundant in all freshwater areas and an important animal in Pohnpei mythology; "*palaiao*", a variety of freshwater carp; and "*soupwoun pihl*", a small colorful fish found in isolated pools of some of the larger rivers. Numerous insects and arthropods, many of relatively recent introduction can be found throughout the forest. A survey in conjunction with the terrestrial gastropod survey targeted spiders and flightless weevils inhabiting the cloud

forests, but data is not yet available. A species of deer introduced during German times is a source of meat and cash for many inland dwelling Pohnpeians.

2.3 Threats to Pohnpei's Forests and Biodiversity

With the assistance of TNC, the WSC identified the following major threats to the upland forest:

- conversion to agroforestry and other agriculture
- settlement
- road construction
- hunting and
- economic development
- pollution of surface water

These threats can be characterized as those human activities that adversely impact on the integrity of the upland forest ecosystem, thereby impairing its ability to function as a watershed and support the existing diversity of plant and animal species.

Certain key habitats need to be identified and set aside as special management areas. In addition, the ability of Government and community institutions to establish and enforce habitat and species conservation practices must be strengthened through education, training, and other support.

Conversion to Agroforestry and Other Agriculture

On Pohnpei, the cultivation of *sakau en Pohnpei* (Piper methysticum) has been identified as the most important agricultural threat to the upland forest. *Sakau*, a perennial plant with roots that have a mild narcotic effect, is an important crop on Pohnpei, both for ceremonial and recreational use. Since W.W.II, the use of *sakau* by the general population has been steadily increasing and its cultivation and marketing have become commercialized. The plant's need for rich organic soils has led to increased cultivation in the upland forest. The clearing of overstory trees during cultivation has contributed to increased erosion and landslides on steep slopes. Little data exists on the level of *sakau* cultivation, but indications are that it is substantial.

Settlement

Homesteading has already encroached into the upland forest in some parts of Pohnpei. Anson *et. al.* (1985) reported that settlement patterns tend to be along streams up to as high as 500 m elevation. In areas cleared for homesteads by burning, several landslides and other degradation problems were noted. Population pressures and unequal land tenure are exacerbating settlement of the island's interior. So far, the Pohnpei State Government has done little to address the issue of "squatters" in the upland forests despite their status as "public lands".

Road Construction

Roads are a major threat to the upland forests because they: 1) drastically increase erosion and runoff; and, 2) make watershed lands more accessible for agriculture, settlement, and other types of use. Many existing and planned (already funded) secondary and tertiary roads reach the vicinity of the upland forest. Often these roads are improperly designed, have extreme gradients, and have virtually no surfacing (Zeimer & Megahan, 1991). At present, there is little coordination between the municipal and state governments responsible for road construction.

Hunting

On Pohnpei, several of the popular game birds, especially the Micronesian Pigeon and the Caroline Islands Ground Dove (Gallicolumba kubaryi) are suffering population decline. The entire Pohnpei population of the Micronesian Pigeon was estimated to be only 822 birds in 1983 and the Ground Dove was even lower (Engbring, Ramsey, & Wildman, 1990). This decline is attributed to over-hunting from the increasing human population, inland settlement, and growing markets in the district centers and off-island. Currently, there is no agency dealing with the protection of terrestrial wildlife on the island.

Pressure from economic development

With the Government's increasing emphasis on economic development, upland and mangrove forests are being targeted as potential sites for development related infrastructure. Often this means deforestation, massive earth-moving, land-filling, and other activities that inhibit the natural functioning of these important ecosystems. Even ecotourism, if improperly planned and executed, can cause environmental degradation by exceeding an ecosystem's carrying capacity. In addition, the monetary benefits of economic development are often channeled away from local communities by foreign investors and their Kolonia-based partners. Current economic development efforts need to be assessed relative to the overall objectives of integrated watershed management. Strategies promoting community-based compatible development need to be encouraged and supported.

Pollution of surface water

An adequate and reliable supply of clean water is essential to economic development. Pohnpei depends on surface water for most of the Kolonia water supply and for all rural water supplies. Yet surface water is becoming increasingly polluted by sediment from agriculture and settlement-related activities as populations move progressively inland. Efforts must be made to safeguard surface and groundwater supplies through watershed zoning, limiting development along waterways and in upper watersheds, and improving agricultural practices.

2.4 Socio-economic situation

Traditionally Pohnpeians resided mainly in the coastal flats of the island. A rapidly growing population (34,000 at the last census in 1985 with an overall growth rate of 3.1 per cent per year) and the transition from a subsistence to a cash economy are resulting in a decline in traditional resource management practices and an increase in resource exploitation. Inland areas, formerly used sustainably, have come under increasing pressure from agricultural and settlement activities. This has been exacerbated by the provision of secondary access roads under an ambitious development program financed by the Compact of Free Association with the US. Opportunities to shift to more sustainable or environmentally acceptable development activities are hindered by limited business skills, limited capital, land, and labor. These problems are further exacerbated by:

1) a young, transitional government with limited resource management capacity; and,

2) a shrinking operating budget due to the phase-out of the Compact of Free Association agreement with the US Government.

Until recently, the government sector has been the major employer and source of cash to fuel the local economy. This situation, however, is changing as the Compact funds have declined. Economic pressures are leading to increased dependence on exploitation of the islands' natural resources for cash by governments and local populations. This general climate of uncertainty makes Pohnpei vulnerable to large-scale, unplanned development with little regard for environmental or socio-economic impact.

At the community level, traditional decision-making institutions are also challenged by increasing complex issues. For example, the pilot PRA study in Section 4 of Madolenihmw has revealed the following community issues/needs:

1. Need for a reticulated water system
2. Improved cash opportunities
3. Delays in land survey and titling
4. Unfenced pigs
5. Elementary School too far from village
6. Land use problems
   - decreasing soil fertility
   - nutrition
   - not enough local produce
7. Local produce and lagoon resources
   - prices too low
   - not enough markets
   - transport to markets
8. High prices of imported goods
9. Need for village road
10. Decrease in fish catch

While there was no specific mention by the communities involved in the pilot PRA exercise of the need to protect forest and biodiversity resources, it is obvious that many of the above issues are linked to declining environmental conditions. Establishing these linkages will be an important awareness raising exercise that must occur before community-based natural resource management can be successful.

2.5 Institutional Setting

In Pohnpei, as in the rest of the FSM, the government is divided into three branches: the Legislative; the Executive; and the Judicial. Modeled on the US system, the Legislative Branch is made of elected legislators and their staffs who make general law and allocate funds to various government programs and projects. The Executive Branch carries out policy and performs the work of the Government, and the Judicial Branch provides legal support to the other two branches while providing a check and balance function.

In the Executive Branch, the Department of Conservation and Resource Surveillance (DCRS) is responsible for natural resource management and conservation. The Environmental Protection Agency and the State Environmental Protection Board are responsible for the regulation of water quality, earthmoving, pesticides, solid waste disposal, air pollution and drinking water.

Other departments involved in environmental policy and decision-making include: the Office of Budget, Planning, and Statistics; the Department of Lands, and to a lesser extent, the Department of Commerce and Industry. DCRS has four divisions: Agriculture; Energy; Marine Resources; and, Forestry. Each Division is administered by a Chief who oversees several technical, extension and administrative staff members and laborers.

The Pohnpei State Legislature has enacted a series of laws to address environmental issues such as land tenure, pollution control, water quality, waste management, zoning, earthmoving, environmental impact assessment, fisheries, agriculture, forestry, biodiversity conservation, tourism, and cultural heritage (Harding, 1992). In 1987, the Pohnpei State Legislature enacted the **"Pohnpei Watershed Forest Reserve and Mangrove Protection Act"**. This Act vests the usage and management rights for certain public trust lands to the State government, specifically the Division of Forestry. The Act aims to protect watershed forests and conserve mangrove forests on Pohnpei. The legislature has continued its support of environmental legislation with the passage of recent laws establishing the Environmental Protection Agency and Board and the Pohnpei Soil and Water Conservation District Board, making Pohnpei eligible for assistance from the USDA Soil Conservation Service.

However, all of these agencies work at a State-wide level, largely independent of each other. Whilst there is a system for dealing with major one-off applications for planning consent, there is little local input into the decision-making process. Development proposals are rarely taken to the affected communities for discussion.

Furthermore, there is no system for dealing with incremental environmental changes caused by local subsistence, cash cropping and other resource dependent activities.

2.6 External Support

2.6.1 National Government

To address environmental problems, the FSM Government has formulated a Nationwide Environmental Management Strategy (NEMS) which is being implemented now. Developed with assistance from ADB and the South Pacific Regional Environment

Programme (SPREP), the key strategies of the NEMS include:

- integrating environmental considerations in economic development;
- improving environmental awareness and education;
- managing and protecting natural resources; and
- improving waste management and pollution control.

The NEMS specifically identifies the Pohnpei Watershed Project as a priority program for the FSM (p. 43).

2.6.2 US Government Agencies

Several foreign agencies assist the FSM and Pohnpei with environmental issues. At present, all US Federal agencies must have the approval of the Ambassador to operate within the FSM. Currently, four conservation-oriented agencies have this clearance: USDA Forest Service; USDA Soil Conservation Service; USDOI Fish and Wildlife Service; and, USDOI National Park Service. Four international agencies also provide external assistance: The Nature Conservancy; South Pacific Regional Environment Program; Water and Energy Resource Institute of the Western Pacific; and Program on Environment, East-West Center.

The **USDA Forest Service (FS)** through the Honolulu-based Pacific Island Forester's Office, has been involved with the watershed project since its inception in the early 1980's. As a result, they have great interest in the project's success. The Pacific Island Forester works directly with the Division of Forestry Chief and has provided several small grants and technical detailers to support the project. Despite budget constraints, this support is expected to continue at a similar level.

The **Natural Resources Conservation Service (NRCS)** has recently begun work in Pohnpei with the passage of a State law designating a Soil and Water Conservation District Board (SWCDB). Pohnpei has also received NRCS technical and financial assistance for the watershed project under the Island Resources Study for which funding has recently been approved. A Resource Conservationist is stationed on Pohnpei. The Director of the NRCS, based in Guam, coordinates activities closely with the Pacific Island Forester in Honolulu.

The **USDOI Fish and Wildlife Service (FWS)** recently signed an MOU with the FSM and is ready to provide expertise that is currently unavailable in local FSM and

state agencies. DCRS and others are working closely with them to secure technical and financial assistance to conduct various wildlife surveys and prepare management plans for endangered or threatened species. Local FSM and State agencies do not currently have this expertise, so the involvement of the USFWS should be a positive step.

The **USDOI National Park Service (NPS)** is mostly involved in archaeological work within the FSM through their San Francisco Office. They coordinate with the Historic Preservation Offices of the FSM and each State. Through TNC, they sponsored a trails expert from Haleakala National Park last year to visit the Pohnpei Watershed and provide recommendations on trail design, construction, and impacts on the forest and soils.

2.6.3 Regional and International Organizations

The Nature Conservancy (TNC) has been involved in the Watershed Project since 1992. A full-time Field Representative has worked closely with the Division of Forestry in the formulation of the project and provision of funding and technical assistance. In February, 1994, TNC was selected by the Asian Development Bank to act as the consultant to carry out the ADB TA FSM-1925 "Watershed Management and Environment Project". The ADB support includes provision of international consultants and activities which are described later in this document.

The biodiversity and community development aspects of the Watershed Project are being technically and financially supported by **SPREP** under the South Pacific Biodiversity Conservation Programme (funded through the World Bank/UNDP/UNEP Global Environment Facility).

The **Water and Energy Resource Institute of the Western Pacific (WERI, Mangilao, Guam)** with TNC assistance received a grant from the US Geological Survey (USGS) to conduct a preliminary water quality assessment for the major watershed rivers and make recommendations on a water quality monitoring system for the entire Pohnpei watershed. The work has been carried out by WERI and local scientists during 1994, and a report will be finalized soon.

The **Program on Environment, East-West Center (EWC, Honolulu, Hawaii)** has provided some initial grant money to study the extent of human activities in the Pohnpei watershed. Funding was also provided to develop a book on Pohnpei vegetation and island ecology for use in local schools.

PART 3 -- RATIONALE AND PROJECT DESIGN

3.1 Design

3.1.1. Conceptual Framework

The basic concept of this project is that communities will manage natural resources with the assistance of the DCRS. "Co-management", as this approach has come to be known on Pohnpei, recognizes several cultural and social factors:

1. Government resources are stretched thin and are inadequate to actively manage, monitor, and enforce the watershed forest reserve legislation;

2. The upland forest is not strictly a common property regime - while past exploitation may have been limited by cultural attitudes, it has also been regulated by traditional authority and the designations of "*kahpws*" and other traditional use areas;

3. Communities have a much greater stake in forest resources and values than do government managers, so this "enlightened self-interest" should be encouraged through participation in management activities;

4. Local community institutions will be more effective than the State Government in detecting infractions and imposing sanctions to regulate resource exploitation;

5. The protected forest areas included in the 1987 legislation, represent a relatively small proportion of the total land area of Pohnpei (about 15%) and less than half (42%) of remaining dry forested areas. To achieve the management goals, sustainable land use practices must extend to a greater area.

An important goal is to provide a decision-making framework at the local level by supporting and enhancing the DCRS's community education and planning efforts and by strengthening traditional community institutions.

3.1.2 Approach

The Pohnpei Watershed Management and Environment Project has been designed to identify community development needs and conflicts in natural resource utilization by gathering and analyzing socio-economic, physical, and ecological data.

Information describing the natural resources of any region (e.g. soil, water, and vegetation) forms the base on which sustainable development must be built. The approach being followed in Pohnpei is based on a combination of several techniques of data acquisition, interpretation, and management. Techniques being used include PRA to get an understanding of indigenous knowledge and classification systems, aerial photography to capture current island-wide state of forest and other resources, global

positioning systems (GPS) to determine locations of various data collection points, and geographic information systems (GIS) to store and analyze resource information.

Participatory Rural Assessment (PRA)

A key objective of the Pohnpei PRA process is to empower local communities to gather and analyze information on traditional and contemporary land use in order that they themselves can make better resource management decisions.

In Pohnpei as in other traditional societies, local resource managers possess a detailed understanding of resource values and management practices. A large part of this understanding is contained within the classification systems that indigenous resource managers use to describe resources (Dahl, 1993; Tabor and Hutchinson, 1994). Unlike western objective classification systems (e.g. those used to produce the 1982 Pohnpei soil survey and the 1986 Pohnpei vegetation survey), indigenous systems embody local values and management systems as well as the relationships among other resources (e.g. soil/vegetation associations). Moreover, they provide a common language for exchanging information locally.

Aerial Photography

Aerial photography is a tool for producing objective resource survey maps. Because indigenous systems of resource classification are also based on observable characteristics, air photos and other forms of remote sensing can play a useful role, especially in areas that are relatively difficult to access (e.g. Pohnpei's upland forests). The key is to have local indigenous resource managers designate the units to be mapped to supplement those derived by outside surveyors or specialists. Finally, images acquired for the survey are historical documents that describe conditions at the time they are captured, and subsequently these can be used in monitoring the project's impact.

Geographic Information Systems (GIS)

Finally, a geographic information system (GIS) permits the capture, storage, manipulation, analysis, and display of spatial data. These may be in the form of maps (e.g. land-use), images (e.g. air photos), point data (e.g. rainfall), or tabular data associated with geographic areas (e.g. census). A GIS is capable of storing, processing, and displaying all these types of data. A GIS must be able to manage and analyze map features in two dimensions (e.g. vegetation or soil units), but also their associated attributes (e.g. soil type, texture, and depth), so a database management system is also required for entering and managing tabular data as well as performing certain statistical and logical operations. In GIS, various features can be combined and compared to select regions of interest (e.g. critical habitat of a rare plant species dictated by vegetation, soil type, and proximity to surface water).

Using these various techniques and systems, options will be developed for local communities. These options will target conservation and sustainable development activities, such as income-generating activities (e.g. handicrafts, sustainably extracted

plant and animal products, ecotourism development) basic social and rural infrastructure project and the promotion of conservation-oriented agroforestry and other appropriate land-use systems.

"Best management" guidelines will also be produced in recognition of the fact that statutes and conventional land-use plans will be inadequate to deal with dynamic resource-based activities, such as land clearance for agriculture.

3.1.3 Project Objectives

The overall objectives of the project are to:

1. Protect the ecological functions and processes of the island to

    - ensure continued supply of high quality water,
    - minimize sedimentation of the fringing reef;
    - protect endemic flora and fauna species, and to
    - protect sites of high cultural significance.

2. Encourage economically viable alternatives to the current unsustainable resource extraction practices.

3. Effectively incorporate community and landowner input into natural resource planning and management.

4. Empower local communities to gather and analyze information on traditional and contemporary land use in order that they themselves can make better resource management decisions.

5. Serve as a model for other Pacific islands.

3.2 Phasing and Work Plan

3.2.1 Specific Activities by Phase

The overall project is divided into four phases as follows:

Phase I: Building Awareness (1994)

* Completing Watershed/Biodiversity Education Program in all communities
* Finalizing the Watershed Rules and Regulations

Phase II: Data Gathering and Analysis (1994-on)

* Community-based watershed planning, using Participatory Rural Appraisal (PRA) or a similar approach;

* Development of a resource information system for decision-making (GIS);
* Evaluation of agricultural practices in the watershed, specifically farming and agroforestry systems, and development of options to minimize their environmental impacts;
* Identification of ways to improve habitat and species conservation practices;
* Investigation of various compatible community development projects (e.g. alternative agroforestry systems, "chemical prospecting"[medicinal plant development] and small-scale ecotourism);

Phase III: Development of a Management Plan (1995-96)

* Development of a spatial plan for the watersheds, including identification of development options in each zone;
* Preparation of a pre-feasibility study for selected development options which are environmentally sound, economically viable, and socially acceptable.

Phase IV: Implementation, monitoring, and evaluation (1995-on)

* Development of community-based monitoring and enforcement program;
* Staff and community leader training and development;
* Technical staff and traditional leader exchanges between Pohnpei and the other states of the FSM;
* Sponsoring a National Watershed/Sustainable Development Workshop.
* Dissemination of findings and promotion of watershed management planning in other states.

3.2.2 Project Components and Elements by Agency

Activities	Agency	1994	1995	1996	1997	1998
Project Management						
CASO Salary	SPREP	✓	✓	✓	✓	✓
ADB Team Leader	ADB/TNC	✓	✓			
Project Administrative Asst.	ADB/TNC	✓	✓			
Government agency PRA Team Members	PSG	✓	✓	✓	✓	✓
Conservation Area Coordinating Committee Quarterly Meetings	SPREP	✓	✓	✓	✓	✓
Logistical Support (Office, Vehicle, Administrative, etc.)	PSG	✓	✓	✓	✓	✓
Community-based Planning						
Community-based Watershed Planning	SPREP	✓	✓	✓	✓	✓
Technical Assistance						
Conduct Aerial Photography	ADB/TNC		Jan/Feb			
Aerial Photo Interpretation (consultancy)	ADB/TNC		March			
Establish GIS and incorporate data sets	ADB/TNC	✓	✓			
Develop watershed spatial plan	ADB/TNC	✓	✓			
Compatible development option study	TNC	Completed				
Avifauna survey	SPREP	Completed				
Freshwater Fauna Assessment (consultancy)	SPREP/ USFWS		✓			
Reptile Fauna Assessment (consultancy)	SPREP/ USFWS		✓			
Community-based Monitoring Program (consultancy)	SPREP		✓	✓		
Land Tenure Study	SPREP		✓	✓		
Baseline Assessment of Population and Migration Patterns (consultancy)	SPREP		✓	✓		

Activities	Agency	1994	1995	1996	1997	1998
Institutional and Legal Framework for Community-based Management	SPREP		October	March		
Lowland *Sakau* Production	SPREP/ TNC/PSG		✓			
Community-based Ecotourism Development	SPREP/ PIN/TNC/ PSG		✓	✓		
Prefeasiblity study of compatible development options	ADB/TNC		November			
Integrated Watershed Management Plan	ADB/TNC		November			
Training:						
GIS	SPREP	November-Completed	February			
Project Planning	SPREP	October-Completed				
PRA Regional Workshop in Samoa	SPREP		✓			
Best-use management guidelines workshop	SPREP		✓			
Extension:						
Technical Staff Exchange	SPREP			✓		
Traditional Leader Exchange	SPREP			✓		
Monitoring and Evaluation						
	ADB/TNC SPREP/ PSG	✓	✓	✓	✓	✓

3.2.3 Details of SPBCP-Funded Elements

COMMUNITY-BASED PLANNING

Activity 1: Community Based Watershed Planning

Objectives:

1. Communities have identified and addressed the major social, economic, and environmental problems that are affecting them (Community Action Plan)

2. Institutional structure has been organized that allows communities to effectively manage the common property resources that they have at hand. Effective institutions will:

    - establish clear and legitimate control over a defined set of resources;
    - have membership that corresponds with those using the resources;
    - be capable of monitoring resource use and sanctioning those who violate agreed upon rules;
    - be able to establish rules related to access and use of resources that is seen as legitimate by both members and Government.

3. A set of guidelines has been developed by resource users for the sustainable use of adjacent forest areas

4. Communities have agreed on a core area of upland forest that will be a reserve where activities affecting biodiversity and ecological integrity are not allowed

Description:

A workshop was held in July 1994 to train government extension personnel and community leaders in participatory rural appraisal methodology (PRA). It is expected that PRA will be form the core of an extended process to involve communities in planning and management of natural resources. Based on the results of this initial workshop exercise, a process has been outlined that will enable villages to identify and address problems related to forest resource use, to identify the boundaries of the Watershed Reserve based on topography, develop land use guidelines for buffer areas adjacent to the reserve, and to develop a community-based administrative framework for on-going management of natural resources. Development of methodology will continue in the area where the workshop exercise was held: Senpehn (Section IV), Madolenihmw and the process will be completed in this section. Once near completion in this area, the process will be initiated in a second pilot area, Woun Kepin Semwei and upper Lehn Mesi, Kitti. A third pilot area will be identified in Nett municipality and the process begun there upon completion of work in Senpehn. Based on the work in these three pilot areas the methodology will be assessed and refined. Over the duration of the project it is anticipated that all areas of Pohnpei will be covered. Although the exact areas that will be the focus of each exercise have not been determined, they will

generally correspond to political sub-divisions known as Sections (Pwihn or lopidi) and there are about 30 of these on Pohnpei.

As part of the PRA process traditional land-use management practices will be determined and compared with technical "best-use" practices. Technical assistance will be sought from the USDA Soil Conservation Service for this purpose.

Expected outputs

- Community-based management framework
- Locally developed "best-use" practices for buffer areas
- Agreement on boundary of Watershed Reserve and accepted practices within it

Timeline for first phase:

- **Senpehn:** July - December 94
- **Wou en Kepin Semwei/upper Lehn Mesi**: March - July 1995
- **Nett**: July- October 1995

Overall Budget (four years): Based on the assumption that 8 areas will be covered each year

	1994	**1995**	**1996**	**1997**	**1998**	**Total**
Community facilitators	4800	9600	9600	9600	4800	38400
Supplies	1350	2700	2700	2700	1350	10800
SPREP Total by year	**6150**	**12300**	**12300**	**12300**	**6150**	**49200**

TECHNICAL ASSISTANCE

Activity 2: Consultancy To Assess The Freshwater Fauna In Major Catchments

Objectives:

- To better understand the biodiversity and endemism of freshwater fauna to facilitate better conservation and management.

Description:

Little work has been done on the freshwater fauna of Pohnpei and the results of previous work are not easily obtainable locally. However, like on many Pacific islands, there are a number of endemic fish species in Pohnpei streams. There is a need to better understand both the diversity (it may be that all species have not been adequately described) and species distribution (which may vary between catchment areas) of this fauna. In addition, it may be that freshwater fauna can be used as indicator species in a program of biological monitoring for ecosystem health. The consultant will (1) carry out a complete literature survey and develop a bibliography of key references to the freshwater fauna of Pohnpei and Micronesia prior to field work in Pohnpei; (2) survey the major catchment areas for the diversity and distribution of freshwater fauna; (3) identify critical areas for endemic, rare, and threatened freshwater fauna; and (4) make recommendations on how freshwater fauna may be used in a program of biological monitoring to assess ecosystem health.

Outputs:

- Report outlining diversity and distribution of freshwater fauna and recommendations for biological monitoring program.

Timeline:

- August 1995, 30 days

Budget:

A local NGO, Micronesian Islands Conservation, Inc., will be contracted for project management (this NGO managed the 1994 avifauna survey with SPREP funding). In addition it is anticipated that two scientists will be recruited from off-island (University of Guam's Marine Laboratory).

Item	Costs
Consultants -2 X 30 days @ $150/day (2 Guam-based scientists)	9000
Travel (2 RT Guam-Pohnpei-Guam)	1200
Perdiem (2 X $80 X 30 days)	4800
Local field guides/assistants (2 X 30	2100

days X $35/day)	
Ground transportation (rental vehicle @ $50/day for 30 days)	1500
Miscellaneous supplies and equipment	1000
Report production	500
TOTAL	**20100**

Note: Additional technical and financial support are being sought by the project management, which may allow for some of the costs of this activity to be covered by other agencies besides SPBCP.

Activity 3: Survey Of Reptilian Fauna

Objectives:

- Better understanding of the biodiversity and endemism of reptilian fauna in order to facilitate management

Description:

Like freshwater fauna, there is a need to fully assess reptilian fauna on Pohnpei. Besides avifauna this represents the other major group of native fauna. This consultancy will survey the watershed area for the distribution and diversity of reptiles and make recommendations for their use in biological monitoring for ecosystem health.

Outputs:

- Report outlining diversity and distribution of reptiles and recommendations for biological monitoring program.

Timeline:

- August-February 95 (60 day consultancy during this period)

Budget:

A local NGO, Micronesian Islands Conservation, Inc., will be contracted for project management (this NGO managed the 1994 avifauna survey with SPREP funding). In addition it is anticipated that one scientist will be recruited from off-island (Hawaii?)

Item	Costs
Consultants -	
1 local X 60 days @ $150/day	9000
1 off-island X 30 days @ $150/day	4500
Travel (RT Hawaii-Pohnpei-Hawaii)	1000
Perdiems -	

1 local @ $25/day for 60 days 1 off-island @ $80/day for 30 days	1500 2400
Ground transportation (rental vehicle for 30 days @ $50/day)	1500
Local field guides/assistants (2 X 30 days X $35/days	2100
Miscellaneous supplies	500
Report production	1000
TOTAL	**23500**

Note: Additional technical and financial support are being sought by the project management, which may allow for some of the costs of this activity to be covered by other agencies besides SPBCP.

Activity 4: Community-based Monitoring Program

Objectives:

- Actively involve local communities in the collection of key data needed to make important resource management decisions;
- Raise awareness of environmental degradation and its consequences in local communities;
- Increase interaction and build stronger working relationships between Government resource management agencies and local communities.

Description:

Under the proposed "co-management" approach, locally-based community institutions will be charged with the day-to-day management of natural resources within their vicinities. This will require that local communities have up-to-date environmental data available to them. The simplest and most cost-effective way to accomplish this is through the development of simple methodologies for the collection and analysis of regular data -- a community-based monitoring system. Efforts are already being made to develop a methodology for community monitoring of simple water quality parameters under the joint WERI (Water and Energy Research Institute at the University of Guam)/TNC/Pohnpei Government/COM-FSM fresh water quality assessment project. Preliminary results indicate little change in the levels of chemical constituents in the water but further work needs to be done on bacterial contamination. In addition, erosion and sedimentation, reflected in variation in turbidity needs to be monitored.

A variety of other environmental parameters can be successfully monitored by local communities. This would also facilitate better understanding by communities of the link between local human activities and environmental impacts. A consultant will be contracted to develop sampling design. data analysis methods and to train identified community members in the collection and analysis of various environmental parameters. The Pohnpei State Environmental Protection Agency would have on-going responsibility for project management and it is expected that the consultant would work

closely with this agency, especially in regards to how it may provide on-going support for data interpretation and development of remedial policies for environmental management. It may be possible to seek assistance for this project from WERI and/or the USDA Soil Conservation Service.

Outputs:

- Environmental monitoring techniques that can be implemented at the community level.
- Overall monitoring program design including data analysis methods.
- Villagers trained in data collection methods.
- Assistance to the state EPA to facilitate their on-going support and management of the program including data interpretation and development of remedial policies.

Timing:

- 30 days in March 1995

Budget

Item	Costs
Consultants -2 X 30 days @ $150/day	9000
Travel and per diem	1000
Supplies and materials	2400
TOTAL	**12400**

Note: it may be possible to obtain assistance from WERI or USDA SCS for this consultancy. In this case consultancy fees could be waived and only travel and per diem would be necessary, reducing budget to $5,400. Two return trips from Guam are budgeted, allowing the consultancy to be broken into two phases (e.g., initial assessment and training phases) if deemed appropriate. As a contingency, budgeted travel allows a single return fare to Hawaii if it is necessary to contract with a consultant from there.

Activity 5: Land Tenure Study

Objectives:

- To fully describe and analyze indigenous view of land tenure and their relation to the legal framework for land management.

Description:

A central issue in management of the Forest Reserve and adjacent watershed areas is the role that land tenure plays in the access and use of natural resources. There is no documentation or understanding of indigenous attitudes towards the land that may include non-instrumental and non-consumptive uses of landscape and resources. There

are also embedded systems that regulate use of resources on lands that may be various classified under the legal framework that regulates the ownership and use of land. There is undoubtedly some discrepancy between indigenous attitudes and the legal regulation of land use. A fuller understanding of these issues and difference is essential for successful management of natural resources. Funding will partially support in-depth research into these issues.

Outputs:

- Report outlining indigenous attitudes towards land
- Assistance to integrate land registration records into Geographic Information System and carry out analysis

Timing:

- 1996 (6 months support for extended research)

Budget:

Item	Costs
Subsistence (180 days @ $35/day)	6300
Travel (RT Hawaii-Pohnpei)	1000
TOTAL	**7300**

Activity 6: Baseline Assessment of Population and Migration Patterns.

Objectives:

- To better understand the size and characteristics of the present human population, recent trends in migration (within catchments and in-migration from elsewhere) and to make future projections of population growth.

Tasks:

- Train research team in census and interpretation techniques
- Undertake a pilot field- based training exercise in one catchment
- Interpret results and make recommendations for future census work and team training.

Description:

A survey of the population and migration patterns is necessary in order to understand the magnitude of recent population growth and to project population trends in order to assess the likely impact on the demand for land and hence the threat to habit and long term conservation of resources.

Outputs:

- Trained research team
- Report on the census of one water catchment

Personnel, Timing and Costs:

Item	**October 1994**
Consultant	
Fees and per diems (3 weeks)	**SPREP**
Travel	**SPREP**
Research team (six people)	
Daily subsistence (per diem for food and other field expenses)	2520
Supplies	250
TOTAL	**2770**

Activity 7: Institutional and Legal Framework for Community-based Management

Objectives:

- To revise the law to allow for community management of forest resources;
- To trial the proposed *Soumas*-based decision making process;
- To strengthen the administrative and technical ability of local decision-making institutions (*Soumas*-based).

Tasks:

1. Document and assess the traditional decision-making institutions (*Soumas*-based or other) in the local communities
2. Assess evolving community-based watershed management arrangements
3. Propose alternative institutional arrangements to facilitate community management of natural resources
4. Following feed-back from government and communities, draft legislation to recognize community-based management systems.

Description:

The present forest law does not contain provisions which devolve decision-making of natural resources to local communities. Yet, the thrust of the watershed management and conservation project is to promote local control over day-to-day decision-making. Thus, the role, functions and responsibilities of local communities and their relationship with the Forestry Division of the Department of Conservation and Resource Surveillance need to be clearly articulated and enshrined in law. In this light, the roles and functions of the Forestry Division will need to be redefined.

As this task is contingent on the acceptance by the State Government of a change in its philosophy towards forest management (shifting the responsibility for day-to-day management of resources towards local groups, under the overall surveillance of the Department) three phases are necessary. In the first phase, a concerted effort must be made to point out the inadequacies of the current legislation and the proposed "co-management" philosophy and its ramifications. This will entail the preparation of a concept document, and then follow-up meetings with key Government officials. The second phase will involve actual implementing the trial "co-management" Soumas-based management system in a series of pilot communities. This will allow for fine-tuning the process before it is implemented in all communities. The third phase would entail the drafting of a new forest law .

Outputs:

Phase 1: Concept document

Phase 2: Trials in pilot communities and fine-tuning

Phase 3: Draft legislation

Personnel, Timing and Costs:

Phase 1 February 1995	**Total cost**
Consultant	
Fees and per diems (3 weeks)	**SPREP**
Travel	**SPREP**
Printing	**SPREP**
Total	**$0**

Phase 2 November 1995	**Total cost**
Consultant	
Fees and per diems (3 weeks)	**SPREP**
Travel	**SPREP**
Printing	**SPREP**
Total	**$0**

Phase 3 March 1996	**Total cost**
Consultant	
Fees and per diems (4 weeks)	**SPREP**
Travel	**SPREP**
Printing	**SPREP**
Total	**$0**

Activity 8: Lowland *Sakau* Production

Objectives:

1. To determine the biophysical and social factors that lead to the cultivation of *sakau* (Piper methysticum) in the upland forest;
2. Through networking with regional institutions, to determine agronomic and socio-cultural strategies to decrease the pressure of commercial "sakau" cultivation on the upland forest;
3. To involve local communities in the determination and implementation of locally appropriate "sakau" cultivation strategies through community-based research, demonstration projects, and workshops.

Tasks:

- Document current and traditional *sakau* growing practices, focusing on constraints to lowland cultivation;
- Recommend suitable strategies for overcoming biophysical constraints to lowland *sakau* production;
- Assist farmers in three communities to set up field trials/demonstrations

Description:

Sakau en Pohnpei (Piper methysticum), a perennial plant whose roots have a mild narcotic effect, is an important traditional crop on Pohnpei, both for ceremonial and social use. Although traditionally a beverage of the noble class on Pohnpei, since WWII the use of *sakau* by the general populace has been steadily increasing. With increased urbanization and participation in the cash economy for a large segment of the island's population, *sakau* production for sale on the local market has been steadily increasing since the 1970's. The strong local demand for *sakau* provides many people with a ready source of cash. However, the easy market for *sakau* also means a great deal of stealing of the plant in the field. This combined with the plant's need for rich organic soils for best growth, creates pressure for a continuous inland movement of cultivation areas away from populated areas and into newly cleared forest areas. As a result of these factors, *sakau* cultivation is now threatening the upland forest, whose role in water quality, diverse products, conservation of biodiversity, recreation, and beauty that supports a growing tourist industry is well-documented. Commercial *sakau* production, with the need to remove almost all tree cover for fastest growth, is more destructive than more traditional practices in which the tree canopy is maintained.

A consultant will be hired to address the following issues:

1. Improving lowland (agroforestry) production methods
   - improve soil fertility and management
   - improve shade management/complementary species
   - establish a farmer network
   - collect traditional knowledge

- distribute planting stock
- demonstrate successful farming techniques

2. Improving upland production methods
   - improve vegetation management
   - community education
   - develop limits on plantation size, areas
   - encourage alternative forest products- medicines, ecotourism, handicrafts, other products.

3. Addressing commercial marketing, theft, and related issues
   - implement tougher theft laws
   - license upland growers (public land permitting)
   - license sakau buyers/markets
   - educate buyers/public

Outputs

- Biophysical constraints to lowland *sakau* production will be identified and suitable strategies developed to overcome these;
- Field lowland *sakau* production trials/demonstrations will be established in three communities using recommended strategies.

Personnel, Timing and Costs:

Item	**Total cost**
Consultant	
Fees and per diems (2 months @ $150/day)	10000
Travel	2000
Miscellaneous supplies and materials	250
Total	**$12250**

Activity 8: Community-based Ecotourism Development

Objectives:

- Create additional activities for tourist in order to lengthen their time of stay on the island and increase the amount of money they spend.
- Provide income/employment opportunities in the communities.

Tasks:

1) Assist three communities with the identification of attractions they wish to promote as tourist destinations (half to one day hikes).
2) Conduct an environmental impact study to determine potential damage to the resource area, at what level use is sustainable and recommendations for monitoring impacts.
3) Research the site's natural, cultural and historical value in order to collect information for use in developing interpretation.
4) Work with communities to develop criteria for choosing guides, policies regarding their performance, procedures for the referral system and fees.
5) The community selects the guides.
6) Train the guides in interpretation, tourist expectations, first aid and possibly English.
7) Implement the program and monitor the satisfaction of tourists.
8) Develop promotional strategies for the trails including a booklet that includes description of all ecotourism attractions on island.

Description:

Pohnpei has some of the most interesting cultural, natural and historical resources in the Pacific Region. However, there are few opportunities for tourists to access the vast majority of these resources. This is one of the biggest factors limiting Pohnpei's ecotourism industry (Anson). The rich culture that exists today as well as the unique ecosystem that is still intact are left almost completely in-accessible and uninterpreted to tourists.

Currently the majority of revenues gained from tourists are collected by tour companies, hotels, restaurants, bars and crafts stores in Kolonia. There are very few opportunities for people living in the rural communities to access this source of income. A few trails that tourists pay to use produce revenues only for the family whose land the tourist must cross. Often the attraction (i.e. waterfall) lies on public land. This is not an equitable distribution of income nor does it provide a value-added opportunity like that offered by guided interpretation. Quality interpretation enriches the experience for the tourist, can improve Pohnpei's overall marketability and justifies charging a higher fee per person which will leave more money in the community.

A consultant, preferably locally-based, will be hired to carry out the tasks detailed above.

Outputs:

- Trained guides who can offer a quality service
- Increased income in the communities from tourists
- Unique attractions that can improve Pohnpei's marketability

Personnel, Timing and Costs:

Item	Total cost
Consultant	
Fees and per diems (2 months)	$10000
Travel	2000
Miscellaneous supplies and materials	250
Total	**$12250**

TRAINING

Objectives:

- To improve the effectiveness of local staff in carrying out planning and management activities.
- To provide local community decision makers with the skills necessary for effective natural resource management decision-making.

Activities:

Activity 10: GIS training to cover land suitability analysis
Activity 11: Workshop on project planning in Fiji for the CASO
Activity 12: Attendance at PRA regional workshop in Samoa for the CASO.
Activity 13: Local decision-makers workshop on "best management" practices and institutional arrangements for resource management.
Activity 14: Training for local ecotourism entrepreneurs and guides

Descriptions:

Training of local personnel is essential to ensure that local resource managers assume control and management of the project once external funding comes to an end:

* GIS training is required as the ADB has not provided funds for this, only the hardware and software.
* The ADB-funded project manager is only funded until 1996. After that date local personnel will have to assume the management of the planning process. He will require further training in project planning and management (with CASOs from other Conservation Area projects in the Pacific).
* PRA has proved to be a useful approach to gather needed resource information at village level, to raise the consciousness of villagers and to facilitate their involvement in decision-making. Whilst a beginning has been made to gather information, further assistance will be required to interpret the data and help villagers prepare local management plans and implement resource management guidelines. A regional workshop in Western Samoa will enable CASOs from around the Pacific to exchange experiences with the PRA approach in order to refine techniques.
* During the PRA process practical land management guidelines will be developed. There is a need to develop a consensus on the adoption of these measures. To this end, an island-wide workshop will be held.
* Local ecotourism entrepreneurs and guides will be trained on-island in small business management, interpretation, tourist expectations, and environmental issues.

Outputs:

Activity 10: Increased skills in map and land use interpretation and analysis

Activity 11: Better trained CASO in project planning techniques
Activity 12: Attendance at workshop
Activity 13: Increased capability of community decision-makers to implement practical land management measures
Activity 14: Increased business and interpretation skills and environmental knowledge among local ecotourism entrepreneurs and guides

Personnel, Timing and Costs:

GIS Overseas Training (3 locals) in 1995	
Consultant	**SPREP**
Tuition (3 weeks)	**SPREP**
Travel	6000
Total	**$6000**
GIS On-island Training (3 locals) in 1995	
Consultant	**SPREP**
Travel	**SPREP**
Other supplies and materials	500
Total	**$500**
CASO Project Planning- Fiji	
Per diems	**SPREP**
Travel	**SPREP**
Total	**$0**
CASO PRA Regional workshop (Vanuatu)	
Per diems	**SPREP**
Travel	**SPREP**
Total	**$0**

"Best-use" management guidelines workshop in 1995	
Consultant (10 days @ $200/day)	2000
Travel and per diem (airfare and $80/day)	1800
Local per diems (10 people)	1000
Total	**$4800**
Ecotourism Guide Training	

Consultants, 2 people for 2 weeks- fees ($150/day)	3000
Travel and per diems	5000
Supplies and Materials	1000
Total	**$9000**

EXTENSION

Objective:

- To use the project as a model for other conservation efforts in other parts of FSM

Activities:

Activity 15: Technical staff exchange to pilot watershed management areas by professional officers from other FSM states (Yap, Kosrae and Chuuk).
Activity 16: Exchange of traditional leaders from other FSM states to promote watershed and biodiversity conservation regionally

Description:

As the project cannot comprehensively cover the whole FSM, the pilot projects should be used to demonstrate the progress achieved in co-management of watershed resources. The most effective way of spreading the project to other islands and to stimulate further resource management activities, is to bring people to the project to see what has been achieved.

Outputs:

- Through demonstration, extension of co-management concepts to other areas in the region.

Personnel, Timing and Costs:

Item	Total costs
Technical Staff exchange (6 visits) in 1996	
Local per diems (6 people for 3 weeks each @ $80/day)	8640
Travel	3000
Total	**$11640**
Traditional Leader Exchange in 1996	
Local per diems (5 people for 1 week from each state @ $80/day)	8400
Travel	7500
Total	**$15900**

FINANCIAL REQUIREMENTS, BY YEAR

Summary of Project Costs being requested from SPBCP

Activities	1994	1995	1996	1997	1998	Total
Project Management						
CASO Salary	4200	8400	8400	8400	4200	**33600**
Conservation Area Coordinating Committee Quarterly Meetings	320	640	640	640	320	**2560**
Communications/reporting (telephone, fax, postage)		2500	2500	2500	1250	**8750**
Community-based Planning						
Community-based Watershed Planning	6150	12300	12300	12300	6150	**49200**
Technical Assistance						
Freshwater Fauna Assessment (consultancy)		20100				**20100**
Reptile Fauna Assessment (consultancy)		23500				**23500**
Community-based Monitoring Program (consultancy)		12400				**12400**
Land Tenure Study (consultancy)			7300			**7300**
Baseline Assessment of Population and Migration Patterns (consultancy)*****		2770				**2770**
Institutional and Legal Framework for Community-based Management (consultancy)*						**0**
Lowland *Sakau* Production		12250				**12250**
Community-based Ecotourism Development		12250				**12250**
Training:						
GIS (from UNEP/GRID)		6000				**6000**
Project Planning		0				**0**
PRA Regional Workshop		0				**0**
Best-use guidelines workshop		4800				**4800**
Ecotourism Guide Training		9000				**9000**
Extension:						
Technical Staff Exchange			11640			**11640**

Traditional Leader Exchange			15900			**15900**
Monitoring:						
TOTAL	**10670**	**126910**	**58680**	**23840**	**11920**	**232020**

*** SPREP/SPBCP consultant**

Summary of Project Indicators and Risks

Activities	Means of Verification (measures of success)	Measurable outputs	Risks/constraints
Project Management			
CASO Salary			
Conservation Area Coordinating Committee Quarterly Meetings			
Community-based Planning			
Community-based Watershed Planning	Community level management committees established and active; Alternative income generation projects in place which reduce pressure on forest conversion; Clearance of primary forest reduced and area of undisturbed upland forest remains stable;	Watershed Reserve boundary implemented and allowable activities agreed on; Best-use guidelines developed and adhered to; Hectares of primary forest stable or increasing determined by regular survey;	Limited technical expertise within Forestry Division; Difficulty in developing/adapting PRA techniques to Pohnpei situation; Difficulty in identifying viable alternative income generating activities.
Technical Assistance			
Freshwater Fauna Assessment (consultancy)	Guidelines for effective Freshwater Fauna identified and implemented.	Report produced; Biological monitoring program in place.	Lack of technical survey skills locally; data insufficient for comprehensive assessment and analysis.
Reptile Fauna Assessment (consultancy)	Guidelines for effective Reptile Fauna identified and implemented.	Report produced; Biological monitoring program in place.	Lack of technical survey skills locally; data insufficient for comprehensive assessment and

			analysis.
Community-based Monitoring Program (consultancy)	Environmental and socio-economic monitoring program implemented and active; Villagers capable of using data, with EPA assistance to develop remedial policies and improve stream water quality.	Sampling methodologies designed; At least 6 villagers trained in sampling techniques and data analysis; State EPA formally committed to program support; Village based socio-economic measurable outputs.	Inappropriate sampling design: may be difficult to get villagers to collect data; equipment difficult to maintain/replace; EPA may not have resources to effectively support program; Villagers may have difficulty translating sampling results into action for improved environmental quality.
Land Tenure Study (consultancy)	Deeper understanding of land tenure system on Pohnpei Improved policy formulation and decision making by government agencies responsible for land policy Reduced settlement pressure in buffer areas (public trust lands below legal watershed area)	Report produced; Reduced land-use conflicts; On-going survey of land-use activities.	Results could be controversial, since some differences exist between "official legal" and actual land use practices; recommendations could be rejected by government.
Baseline Assessment of Population and Migration Patterns (consultancy)	Population profiles and migration patterns evident; Local Government staff trained in population and conservation.	Workshop and pilot census completed by November 1995	SPREP staff may not be available for time needed; Local resources may be insufficient to carry out field exercise.
Institutional and Legal Framework for Community-based Management (consultancy)	Legal empowerment and recognition of local role in the management of watershed and biodiversity	Concept document completed; Draft legislation prepared, translated and circulated by March 1996	Failure by legislature to recognize the importance of co-management and lack of political will to enact changes in legal framework
Lowland *Sakau* Production (consultancy)	Biophysical constraints to lowland *sakau* production will be identified and overcome	Report completed and filed trials initiated in three communities by early 1996	Constraints to *sakau* production may be too serious to overcome; rural populations

			may be adverse to adopting recommendations for lowland *sakau* production
Community-based Ecotourism Development (consultancy)	Constraints to current community-based ecotourism development will be identified and a process for ecotourism development in local communities will be developed	Report completed and process initiated by the Pohnpei Tourism Commission	Tourism Commission may be unwilling to adopt improved process of implementing community-based ecotourism.
Training:			
GIS	Increased skills by project staff in interpretation and analysis	Training completed with notable skills increase in GIS Technical Manager; In-house evaluation of performance.	Failure to maintain training will result in lack of utilization of GIS output
Project Planning	Better trained CASO	Training completed. In-house evaluation of performance	Failure to continue to train counterpart (CASO) will lessen his effectiveness once outside funding ceases
CASO PRA Regional Workshop in Vanuatu	Increased awareness of PRA, and refinement of its usefulness	Training completed in 1995.	Depends on PRA being implemented elsewhere in SPBCP countries and prior experience gained in CA projects
Best-management practice workshop	Non-statutory guidelines developed and agreed upon by villagers	Attendance at workshop.	Failure of villagers to appreciate the importance of everyday practical 'best-use' practices will lead to continued misuse and degradation of soil and water resources.
Ecotourism Guide Workshop	Ecotourism entrepreneurs and guides will have increased environmental awareness, improved business and interpretation skills.	Training completed in 1995.	Could be difficult to find suitable consultant/trainers; interpretation skills may be hindered by lack of English

			language skills by guides
Extension:			
Technical Staff Exchange	Extension of co-management concepts to the rest of FSM	Number of people visiting project; Initiation of similar co-management practices in FSM	Lack of interest/apathy by bureaucrats
Traditional Leader Exchange	Extension of co-management concepts to the rest of FSM	Number of people visiting project; Initiation of similar co-management practices in FSM	Lack of interest/apathy by kousapw/community leaders

3.3 Project Costs by Agency

Activities	Agency	1994	1995	1996	1997	1998	Total
Project Management							
CASO Salary	SPREP	4200	8400	8400	8400	4200	**33600**
ADB Team Leader	ADB/TNC	68000	81500	13500			**163000**
Project Administrative Asst.	ADB/TNC	5600	8400	1500			**15500**
Government agency PRA Team Members	PSG	5000	10000	10000	10000	5000	**40000**
Conservation Area Coordinating Committee Quarterly Meetings	SPREP	320	640	640	640	320	**2560**
Communications/reporting (telephone, fax, postage)	SPREP		2500	2500	2500	1250	**8750**
Logistical Support (Office, Vehicle maintenance, Administrative, etc.)	PSG	3300	6600	6600	6600	3300	**26400**
Office equipment (computers, printers, xerox, etc.)	ADB/TNC	8300					**8300**
Project Vehicle	ADB/TNC	21305					**21305**
Community-based Planning							
Community-based Watershed Planning	SPREP	6150	12300	12300	12300	6150	**49200**
Technical Assistance							
Conduct Aerial Photography	ADB/TNC		79000				**79000**
Aerial Photo Interpretation (consultancy)	ADB/TNC		10000				**10000**
Establish GIS and incorporate data sets	ADB/TNC	37500	27000				**64500**
Develop watershed spatial plan	ADB/TNC		38500				**38500**
Compatible development option study (consultancy)	ADB/TNC	19000	16000				**35000**
Avifauna survey	SPREP	25000					**25000**
Freshwater Fauna Assessment (consultancy)	SPREP/ USFWS		20100				**20100**
Reptile Fauna Assessment (consultancy)	SPREP/ USFWS		23500				**23500**
Community-based Monitoring Program	SPREP		12400				**12400**

(consultancy)							
Land Tenure Study	SPREP			7300			**7300**
Baseline Assessment of Population and Migration Patterns (consultancy)	SPREP		2770				**2770**
Institutional and Legal Framework for Community-based Management	SPREP		0	0			**0**
Prefeasiblity study of compatible development options	ADB/TNC		9000				**9000**
Lowland *Sakau* Production	SPREP		12250				**12250**
Community-based Ecotourism Development	SPREP		12250				**12250**
Integrated Watershed Management Plan	ADB/TNC		44500				**44500**
Training:							
GIS	SPREP		6500				**6500**
CASO Project Planning Workshop in Fiji	SPREP	0					**0**
CASO PRA Regional Workshop in Vanuatu	SPREP		0				**0**
Best-use management guidelines workshop	SPREP		4800				**4800**
Extension:							
Technical Staff Exchange	SPREP			11640			**11640**
Traditional Leader Exchange	SPREP			15900			**15900**
Monitoring and Evaluation:	ADB/TNC SPREP PSG	4000	8000				**12000**
TOTAL		**207675**	**456910**	**90280**	**40440**	**20220**	**815525**

3.4 Organization and Management

A management system has been devised for the project which combines local community and traditional institutions with the Municipal and State Governments. Four entities are participating in the watershed management and biodiversity conservation program:

The **Division of Forestry** (DoF) is designated as the lead agency, and will maintain the ultimate responsibility and authority to develop and implement the management program and regulate use within the Watershed Forest Reserve and other important areas. The **CASO** (Conservation Area Support Officer) will be stationed within the Division. The Chief of the DoF acts as Chairman on the Pohnpei State **Watershed Steering Committee** (WSC) which will serve as the interagency task force/advisory board to the DoF and its parent agency, the Department of Conservation and Resource Surveillance. In this capacity, it will be considered the **CACC** (Conservation Area Coordinating Committee) for the project.

Municipal **Watershed Protection Officers** would liaise with the DoF/WSC in municipal matters related to the watershed, particularly municipal infrastructure development plans, and assist with enforcement as necessary. As a result of the community education and negotiation program, local **Watershed Area Management Committees** (WAMCs) will also be formed for each discrete management unit comprised of one or more adjacent streamsheds. These WAMCs, either consisting of the local "*soumas en kousapw*" (village chiefs) or their delegates, will act as co-managers with the DoF. They, along with the individual Soumas of each Kousapw (village) will be responsible for day-to-day management of the project areas. Ultimately, it is envisioned that about 10 WAMCs will be formed covering all the streamsheds of Pohnpei.

3.5 Project Coordination

The major donors involved in the project, ADB, TNC and SPREP, together with the lead agency, the DCRS, formally met in April 1994 at an Inception Meeting, in order to clarify responsibilities and to ensure that biodiversity conservation was an integral part the project. As a result of that meeting the elements for which SPREP assistance was needed became more apparent.

Since then, a workshop was held in Pohnpei in November 1994 to determine how the PRA exercise (funded by SPREP, with the assistance of PIN/Sea Grant) could be integrated more closely with the GIS/spatial planning work being undertaken by Landcare Research N.Z. (sub-consultants to TNC under the ADB's TA).

It is intended to follow-up this cooperative working arrangement next March (1995) when the sub-consultants meet in Pohnpei to prepare draft GIS maps of vulnerable and sensitive resources, a land use capability for the entire island and an assessment of sustainable development possibilities. At this period, the support that is being requested from SPREP would provide for a review of the institutional arrangements for local decision-making and the need for local administrative and technical strengthening.

It is intended to have another multipartite meeting of donors and the lead agency around April 1995 and again in 1996.

3.6 Monitoring and Evaluation

There are two levels of monitoring that are being considered:

1) technical, island-wide monitoring of changes in biophysical conditions;

2) community-based monitoring of local biophysical conditions and socio-economic indicators of change.

State-wide monitoring can be carried out using published data so as to establish trends, such as the extent of forest cover. However, specific surveys are sometimes needed to up-date information. An example is the carrying out of aerial photography early in 1995, with financial assistance from the ADB Technical Assistance. New forest maps will then be prepared and the information digitized and inputted into the GIS.

Local monitoring has already been initiated by the carrying out of a pilot census in Senpehn, Section 4, Madolenihmw. This will be extended to other sections and will be reviewed and modified, as appropriate, with the support of a consultant requested from SPREP. (A national census was recently carried out in Pohnpei, but the results will not be available for some time).

It is proposed to start a monitoring programme covering biophysical conditions at the local level, covering indicators such as water quality. Support is requested from SPREP for this exercise.

A more complex and difficult challenge is the monitoring of socio-economic conditions. It is not intended to carry out a comprehensive monitoring exercise of the variables that might contribute to the welfare of local communities. This would be an enormous task of dubious worth: it is impossible to isolate cause and effect. However, it is intended to discuss the selection of some key indicators with local groups (such as dispute resolution, the effectiveness of local decision-making, the generation of benefits from conservation and development activities and the equitable distribution of them). The selection of these key indicators depends on further discussion and agreement with local communities, who, it is intended, will carry out the monitoring themselves.

3.7 Training

Proposed training activities are covered under Section 3.2.3. Please refer to this section.

PART 4 - PROJECT IMPACT

4.1 Community Level

The designation of the Watershed Forest Reserve and the mangroves initially had a negative impact because it caused a great deal of apprehension and social unrest . This was because the decision was imposed by the State, with little prior local discussion and input.

Following an island-wide public awareness campaign, the rules and regulations were subsequently amended. There is now widespread support for the conservation of the watershed, and, significantly, a local desire to extend conservation efforts to the whole island. To this end, the PRA exercise was initiated by this project and will be extended to other sections (*kousapws*). The use of this technique to involve local people in the collection and interpretation of data for their own planning, has been both an awareness raising and empowering exercise. *Soumas* (chiefs) and villagers are beginning to appreciate that they have the ability to effect change themselves.

In order for environmental planning and management to succeed at the local level, an institutional framework needs to be put in place. At present the Environment Protection Agency (EPA) deals with development applications with respect to water quality, earthmoving, pesticides, solid waste disposal, air pollution and drinking water. Incremental changes from non-point sources, such as conversion of habitat to agricultural use, have so far not been dealt with by the EPA. Yet, these are the very changes that are having a significant detrimental impact on water and soil conditions and on biodiversity.

It is apparent that a land-use planning and management system is needed at the local, regional and State level, integrated with and supplementary to the EPA. At the local level, there is a feeling that the *soumas* should be at the center of decision-making affecting the granting of local resource consents. However, for this to be realized, there needs to be a devolution of decision-making from the State to the chiefs. Legislation would also have to be reviewed and amended.

Furthermore, as a statutory planning system, supported by rules and regulations, is likely to be insufficient to deal with dynamic natural resource utilization issues, "best-use" guidelines need to be produced. If local traditional conservation practices can be successfully integrated with modern guidelines, and internalized by local communities through an educational process and institutional support, then a potentially powerful and sustainable system will have been created. The intention is to trial such as system in the three pilot areas.

Assuming this process is successful, the planning and management system should serve as a model for the other states in the FSM.

4.2 State level

The impact of the watershed management and environment project at the State-wide level should be positive, provided that the lessons learnt at the local level are taken up by other *kousapws* and the State government. Assuming that an effective planning and management system can be created, a more systematic and comprehensive way of dealing with change will have been put in place.

4.3 Risks

One of the major risks is that local communities will be unwilling to buy into the co-management process. This could arise if they see no tangible benefits from doing so, such as the failure to create income generating projects, or the benefits of conservation and development are not equitably distributed. So far this situation has not arisen, but delays in implementing the project could dampen enthusiasm. Villagers efforts could also be thwarted if the State government fails to devolve decision-making to the local level.

Another risk is that personnel will not be available to carry out the tasks necessary to support a planning and management system, or even if available, will not be adequately trained. (This is an issue in many other island states, too). The project hopes to overcome this potential constraint by placing emphasis on training and education and by devising a system which is both simple and capable of being implemented by local villagers themselves.