

**PROPOSAL FOR SUPPORT UNDER THE  
SOUTH PACIFIC BIODIVERSITY CONSERVATION PROGRAMME**

**THE POHNPEI WATERSHED FOREST RESERVE AND  
MANGROVE FORESTS CONSERVATION AREA PROJECT**

**FEDERATED STATES OF MICRONESIA**

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## PRELIMINARY ASSESSMENT OF CA CONCEPT PROPOSALS TO THE SPBCP

### THE POHNPEI WATERSHED FOREST RESERVE AND MANGROVE FORESTS CONSERVATION AREA PROJECT

SPREP  
Information Resource Centre

#### Background

In response to growing concerns about environmental degradation, the Pohnpei State Legislature passed legislation in 1987 (The Pohnpei Watershed Forest Reserve and Mangrove Protection Act) designating some 5100 ha. (13,000 acres) of the central upland forest area and 5525 ha. of coastal mangrove forests of Pohnpei Islands as a protected area in order to safeguard 1) water supply to Kolonia and all Pohnpei Island communities; 2) cultural/archaeological sites; 3) high level of endemic flora and fauna species; and 4) economic potential for eco-tourism and recreation. However, local people had not been adequately consulted in the preparation of the law and as result, there were conflicts with these communities when the law was implemented. The need to involve local communities in the management of the watershed led to the formation in 1990 of the Watershed Steering Committee (WSC) comprising representatives from several Pohnpei State Government agencies, representatives of traditional leaders of Pohnpei, local NGOs and institutions and the US Forest Service. With funding support from the SPBCP in 1992, the WSC was able to implement public education programmes aimed at increasing the awareness and support of local people for the project.

#### The Conservation Area

The Pohnpei Watershed Forest Reserve and Mangrove Forests Conservation Area cover some 5100 ha. of upland forest and 5525 ha. of coastal mangrove forests which are by far, the largest remaining natural relatively undisturbed forests in the islands of Micronesia. Most of the area is owned by the traditional communities of Pohnpei although government also has control over the coastal mangrove areas.

#### Conservation Area Features

The upland rain forest of Pohnpei island include three major components that form transact roughly by elevation. These are the: 1) upland broadleaf forest; 2) upland palm forest; and 3) montane cloud forest. There are also small areas of swamp forest within the upland area. The mangrove forests which form a separate ecosystem (although hydrologically related to the upland forests) make up the fifth natural ecosystems found within the CA. These ecosystems are described in greater details in the second attachment to the CA proposal. In summary, the important features of the CA include the following:

- \* it is habitat for at least 269 species of plants, 110 of which are endemic.
- \* home for 24 species of forest-nesting birds, at least 5 of which are endemic.

- \* the upland forest contain about 34.4% of all plant species found on Pohnpei and 90% of all endemics.
- \* the forest vegetation of the area serves as to retard and reduce erosion and sedimentation into the economically important downstream environments of the State.

### Human Activities

Of particular importance to the management of the CA are five major concerns resulting from human activities in the area. These are:

- 1) Sakau cultivation - Known in other parts of the Pacific as 'kava', the cultivation of sakau in Pohnpei is steadily increasing as it becomes commercialised. Combined with the plant's need for rich organic soils, the cultivation of the sakau plant has lead to the destruction of natural forest cover in the upland areas.
- 2) Settlement - Homesteading has already encroached into the Watershed area where people are reported to have settled in areas as high as 500 m and on areas considered "highly erodible". Improved infrastructure will certainly encourage residents who have moved closer to Kolonia to return and this will complicate the problem as some of these returning residents will opt for settlement in the upland forest areas.
- 3) Road Construction - Although roads are banned from the watershed area under the 1987 law, many existing and planned (already funded) secondary and tertiary roads reach the vicinity of the Watershed reserve. These roads are typically un-designed, in most cases have virtually no surfacing materials and are commonly built on extreme gradients.
- 4) Hunting - Over-hunting in the area has caused the decline in population especially of several popular game birds as like the Micronesian pigeon and the Caroline Islands Ground Dove. Illegal poaching is common and the problem is compounded by the absence of an agency dealing with terrestrial wildlife protection and management.
- 5) Tourism and Trails - A system of "feeder trails" already exist in the area. These rails are little more than un-constructed paths of at least resistance over many years of use. They are sustained without damage to the resources of the area by a combination of the "light" bare foot step of the local people and the overall low use of the trails. With the expected heavier use that tourism and recreation would bring, these trails could become severely eroded gullies, especially in the steeper sections.

### **Conservation Area Values**

The conservation values and biodiversity of Pohnpei's forests are perhaps as important as their hydrological buffering function. A combination of strong traditional respect for the upland forest, heavy human depopulation during the last century, and relatively difficult access to inland areas have spared the upland forests of Pohnpei Island from much of the disturbance and destruction that has occurred in the island's lowlands and on other Micronesian islands. These factors, along with the relative age and isolation of the island make the flora of Pohnpei's upland forests some of the most diverse in Micronesia, with a high level of endemism.

### **Management Issues**

The success of efforts to manage in a sustainable manner the Pohnpei watershed area will depend to a great extent on what alternatives the project will offer in place of current human use of the area and how effective these alternatives can be in meeting the needs of the local communities. For example, there will be a need to investigate other production systems for sakau to improve on current practices which have been found to be a major contributing factor to the loss of island biodiversity. These alternatives will have to be both cheaper and easier for the local people than the traditional practices if they are to be accepted.

Eco-tourism is already being undertaken in Pohnpei both by the private individuals and the communities. These efforts have been assisted by other national and international agencies. The development of eco-tourism with community participation is a must but a very slow process involving education, negotiation, training and other developments that can take many years. For the Pohnpei project which is already attracting many tourists to Pohnpei, care must be taken to ensure that the increasing number of visitors will have an adverse effect on the area.

### **Management Structure**

A Watershed Steering Committee (WSC) comprising representatives of several government agencies, representatives of the local communities, local and international NGOs was established in 1990 to provide overall direction and management control over the project. The WSC is supported by Watershed Area Management Committees (WAMC) to be established in each of the five municipalities. The WAMCs comprising chiefs from the municipalities can negotiate with the WSC and government and will be largely responsible for the implementation of work plan activities. To assist the WAMCs implement work programme activities are Watershed Protection Officers whose main function will be the coordination of work between the WAMC, the municipal government and the Division of Forestry.

## Budget

A summary of the project budget for 1994 is presented below. The detailed budget is contained in the second attachment to the CA proposal.

### Personnel

1.	Conservation Area Support Officer	\$12,000
2.	Consultants (legal)	\$ 9,000

### Workshops and Meetings

3.	Watershed education workshops	\$ 4,000
4.	Mangroves education workshops	\$ 4,000

### CA Establishment & Management

5.	CA overflights for Community Planning	\$ 2,400
6.	Support for WSC & WAMCs	\$ 4,000
7.	Development of Community Planning Program	\$ 9,200
8.	WAMC Framework and Management Agreements	\$ 3,600
9.	Reptile Survey	\$ 3,000
10.	Freshwater Fauna Survey	\$10,200

### CA Sustainable Development Activities

11.	Alternative Sakau Cultivation & Production	\$ 5,000
12.	Local Medicinal Plants	\$ 6,000

### Equipment & Materials

13.	Printing & Photocopying	\$ 4,000
14.	Communications	\$ 2,000

### Miscellaneous

15.	Miscellaneous	\$ 2,500
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<b>TOTAL COST</b>	<b>\$80,900</b>
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**POHNPEI WATERSHED FOREST RESERVE AND MANGROVE FORESTS  
CONSERVATION AREA PROJECT**

**Request for FY 1994 support under  
the South Pacific Biodiversity Conservation Programme**

**Submitted by:**

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**Conservation Area Coordinating Committee (CACC):**

Pohnpei State Watershed Steering Committee  
c/o Pohnpei Dept. of C&RS  
Kolonias, Pohnpei FSM 96941

**January 21, 1994**

**POHNPEI WATERSHED FOREST RESERVE AND MANGROVE FORESTS  
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Request for FY 1994 support under  
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**INTRODUCTION/OVERVIEW**

In response to growing concerns about environmental degradation, the Pohnpei State Legislature passed legislation in 1987 ("The Pohnpei Watershed Forest Reserve and Mangrove Protection Act) designating some 5100 ha (13,000 acres) of the central upland forest area and 5525 ha of coastal mangrove forests of Pohnpei Island as a protected area (Figure 1) in order to safeguard the following: 1) water supply to Kolonia and all Pohnpei Island communities; 2) cultural/archaeological sites; 3) high level of endemic flora and fauna species; and 4) economic potential for eco-tourism and recreation.

However, it became evident early on in the extension/education efforts on the 1987 legislation that local communities had not been adequately involved in the development of the law. Community awareness was virtually nonexistent, and the proposed rules and regulations, failing to recognize traditional Pohnpeian resource use in the upland forest areas, were almost universally rejected. This led to the formation in 1990 of the Watershed Steering Committee, an interagency task force made up of representatives from several Pohnpei State Government agencies, representatives of traditional leaders of Pohnpei's communities, The Nature Conservancy, the Community College of Micronesia Science Department, College of Micronesia Land Grant Programs, Micronesian Islands Conservation, Inc., and the USDA Soil Conservation Service. As a result of the group's work, a highly successful pilot community education program was established in 1991 with US Forest Service assistance.

Since 1992, the Division of Forestry, in cooperation with various related Government and NGO agencies through the Watershed Steering Committee (WSC) and with funding from SPREP's South Pacific Biodiversity Conservation Programme and the US Forest Service, has been able to extend the Watershed Community Education Program to almost all parts of Pohnpei, with the exception of a few areas which will be completed within the next month. In conjunction with the education program, hearings on the proposed watershed rules and regulations have been held in all communities, and substantial community input has been collected on possible strategies for community involvement in the management of the Watershed Forest Reserve (WFR) and Mangrove Reserve areas. Community support of the WFR is very high, traditional chiefs and their people in each area of the island

have organized Watershed Area Management Committees (WAMCs), one member of each which serves as a representative to the WSC. Thus, Phase 1 of the Pohnpei Integrated Watershed Project- "Building awareness"- is now nearly complete.

In support of Phase II ("Data Gathering and Analysis") and Phase III ("Development of a Management Plan"), the Asian Development Bank (ADB) has approved technical assistance to Pohnpei State to substantially improve data availability (aerial photos) and management (GIS development), and to develop an integrated management plan for the WFR. In support of these efforts, the Division of Forestry and the WSC will carry on support activities not included in the ADB TA. Over the next 4-5 years these include:

**Phase I: Building Awareness (1994)**

- \* 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);
- \* Staff and community leader training and development
- \* Development and demonstration of various compatible community development projects in support of the upland forest watershed and mangroves (e.g. alternative agroforestry systems, "chemical prospecting" (medicinal plant development), and small-scale eco-tourism;

**Phase III: Development of a Management Plan (1994-95)**

- \* In support of the ADB-funded consultants, provide community input into the Integrated Watershed Management Plan (IWMP) development process, hold community hearings on the draft IWMP, and assist in the preparation of the final IWMP.

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

- \* Development of community-based monitoring and enforcement program;

Using the Pohnpei Watershed Forest Reserve as a model conservation area project, the Dept. of C&RS along with various cooperators including TNC, also plans to carry out (in 1995):

- \* Technical staff and traditional leader exchanges between Pohnpei and the other states of the FSM;
- \* Sponsoring a National Watershed/Sustainable Development Workshop.



## 1994 OBJECTIVES

The Pohnpei State Division of Forestry of the Department of Conservation and Resource Surveillance requests assistance from the SPREP South Pacific Biodiversity Conservation Programme to complete the following FY 1994 objectives (based on the long-term activities listed above):

- i. Finalize the Watershed Forest Reserve and Mangrove Area Rules and Regulations using the community input collected over the two year education program;
- ii. Complete final review of Rules and Regulations with the leaders and community members of each watershed unit (12 areas in Pohnpei);
- iii. Carry out community review of Integrated Mangrove Management Plan (IMMP)
- iv. In support of the ADB-funded consultants, provide community input into the Integrated Watershed Management Plan (IWMP) development process
- v. Develop and strengthen the Watershed Area Management Committees (WAMCs)
- vi. Carry-out fauna and flora surveys to fill in data gaps;
- vii. Begin development of ecologically sustainable development (ESD) projects in communities.

In addition, the Pohnpei State Division of Forestry of the Department of Conservation and Resource Surveillance requests assistance in hiring and paying salary and expenses of a Conservation Area Project Support Officer (CASO). The CASO is a new position within the Division of Forestry that will undertake overall responsibilities for the management of the Pohnpei Integrated Watershed Project as detailed in Appendix I.

## METHODOLOGY

- i. Finalize draft rules and regulations/draft amendments to the 1987 law Legislature.

An important part of the community watershed education program has been gathering the communities' response and suggestions regarding the current watershed and mangrove rules and regulations, the 1987 law, and the proposed management strategy. As the community education program has been completed, the Division of Forestry, assisted by the Watershed Steering Committee, has begun to redraft the Watershed Forest Reserve and

Mangrove Rules and Regulations based on this extensive community input. Because this is a legal document, it will be necessary to get unbiased legal assistance to translate it into English (official legal language of the FSM) and finalize it in proper legal framework. Then, in order for the rules and regulations, and the community-based management system they establish, to be legally viable, amendments to the parent law "Watershed Forest Reserve and Mangrove Protection Act of 1987 (S.L. #1L-128-87)" may need to be introduced to the Pohnpei State Legislature for their consideration and approval. With this legal framework in place, the Division of Forestry and the WSC will be free to proceed on the future objectives including community planning, environmental zoning, completion of biological and social surveys, establishment of community-based monitoring and enforcement, alternative sustainable development projects, and extension to other states in the FSM.

ii. Complete final Rules and Regulations review meetings in each existing watershed unit of Pohnpei (12 areas).

Based on the community meeting approach that we have developed over the last two years, it will be necessary to meet first with the high chiefs (Nahnwahrki and Nahnken) and Chief Magistrate of each municipality to secure their support and permission to take the revised rules and regulations to the communities for review. Once this is secured, the Division of Forestry will coordinate closely with the Watershed Area Management Committees in each watershed unit. They will determine the best venue for the team (made up of members of the Watershed Steering Committee, local leaders who participated in the 1991 USDA Forest Service-sponsored "Philippine Experience" trip, and Forestry Division Extension Agents) to meet with the communities involved and review the final draft of the Watershed Forest Reserve and Mangrove Rules and Regulations. During these meetings (twice in each area), all remaining suggestions and revisions will be recorded and later integrated into the final document, which upon legal review will be completed for the Governor of Pohnpei's signature. The entire process should be completed in early May, 1994.

iii. Carry out community review of Integrated Mangrove Management Plan (IMMP)

With technical and financial assistance of the US Forest Service (USFS), an Integrated Mangrove Management Plan (IMMP) was developed during FY 1993. The plan is based on earlier USFS and Pohnpei State-sponsored research in the mangrove forests and discussions with various Government and community leaders. The plan document is now in the final review stages by various Government and USFS officials. Beginning in first quarter FY

1994, the Division of Forestry (DoF) and selected members of the Watershed Steering Committee (WSC) will hold hearings on the plan in the local communities. The hearing process will be modelled on the successful watershed community education program, with a DoF/WSC team holding a series of village meetings in key communities around Pohnpei. The plan will be presented in an educational format, through various extension format- written materials, maps, oral presentations, and videos. Community input will be gathered and then integrated into a final IMMP to be completed late in FY 1994.

iv. In support of the ADB-funded consultants, provide community input into the Integrated Watershed Management Plan (IWMP) development process.

Development of an achievable Integrated Watershed Management Plan (IWMP), slated for completion in late 1995, will depend on strong community involvement. With the implementation of the ADB Technical Assistance, data gathering and organization will be greatly accelerated. In all cases though, it is imperative that the information is made available to the local communities. Also, as much as possible, local people should be involved in data gathering. Data collected without significant community input (e.g. census, aerial photography, water quality) should be presented in forms that will be useful and understandable by local community leaders. Because the ADB TA will be undertaken mainly by "outside" consultants, the Division of Forestry and the Watershed Steering Committee will need to provide the "interface" with the local communities. The Division of Forestry will organize community meetings for the ADB consultants, and assist them in translating, illustrating, creating base maps, or other methods of presenting information to the communities.

In addition, the DoF and WSC, especially the WAMC representatives, will provide and gather input from their respective communities for integration into the IWMP. In order to accomplish this, WSC members and selected DoF staff will be trained in Participatory Rural Appraisal (PRA) or similar methodology. PRA offers a collection of techniques for data gathering and the facilitation of community decision-making, and is being used in other Pacific countries. Since, natural resource management and development are inextricably linked, the resulting planning process will assist local communities to make informed decisions about their future. In turn, these decisions, and the understanding of why people are doing what they do and community perceptions of the values, uses and control of their local forest resources, will then be reflected in the overall Integrated Watershed Management Plan (IWMP).

v. Develop and strengthen the Watershed Area Management Committees (WAMCs).

For a community-based planning and management process to be feasible, a system of local day to day administration will be necessary. Already, local organizations (Watershed Area Management Committees, WAMCs) have begun to emerge in response to the community education program. These WAMCs for the most part reflect an alignment of the physiographic characteristics and the socio-political organization of the watersheds they represent, e.g. Woan Koapin Soamwoai Board, which covers the Woan Koapin Soamwoai Valley and is made up of representatives of the chiefs of each of the four kousapw (villages). These groups are an essential foundation for further planning and management activities and Division of Forestry must actively facilitate their formation. The Division of Forestry, through the CASO, will encourage the formation and formalization of these organizations through meetings and workshops with representatives of the existing WAMCs. DoF's role will be to develop a flexible framework for their organization, to which these WAMCs would have to conform. Some considerations for the WAMC framework are:

- 1) Size and shape- the WAMC should cover more than 1 kousapw but perhaps not an entire municipality, and have clear boundaries of responsibility;
- 2) Representativeness- the WAMC must fairly represent their respective communities and be considered legitimate by them.
- 3) Relationship with other groups/agencies- need to determine the WAMC relationship to each other, to traditional municipal leadership and municipal governments, and other groups which they will need to interact with. (This may also include determining local source of funding and other support).

In turn, the DoF will delegate specified responsibilities to each WAMC for watershed and mangrove forest conservation area planning and management. Negotiations to develop these management agreements will be held with existing and potential WAMCs. Legal assistance will also be sought to finalize these agreements to ensure that they are legally binding and in line with Pohnpei and FSM legal code.

vi. Carry-out fauna and flora surveys to fill in data gaps.

The proposed avifauna survey, which will be led by the local NGO Micronesian Islands Conservation, Inc. (MIC), will be carried out during FY 1994 with DoF and WSC assistance. This undertaking has already been funded by SPREP. Two other surveys are proposed to be undertaken during FY 1994. The first survey, which will be undertaken with the assistance of a local consultant, Dr. Don

Border of the COM/FSM, will be a reptile survey in mangroves and upland forest of Pohnpei. The second proposed survey is of freshwater fauna, which will be carried out with the assistance of two outside scientists. Pohnpei's river and stream ecosystems support a rich diversity of life that is only poorly understood. Biology of these freshwater dwellers needs to be examined to better develop management strategies for these ecosystems' continued functioning. Better understanding of freshwater fauna current population and distribution will also provide baseline data for long-term monitoring of water quality (and overall success of the watershed management program). Depending on the findings of the ABC consultants, it is expected that other data "gaps" will be identified. The DoF and TNC will work with regional organizations, including SPREP, to identify consultants and assist with actual field logistics. They will also ensure that local consultants and other experts are included in all survey work.

v.i. Begin development of economically sustainable development (ESD) projects in communities.

The problem of conserving biological diversity cannot be separated from social and economic development. The components of Pohnpei's proposed conservation area, which include both upland forests and mangroves, have always been exploited for subsistence, and while they remain important for these uses, they also will be the focus of current and future commercial economic development activities. However, current development options are not sustainable in the long term since they severely threaten biodiversity and the overall ecological integrity of these key ecosystems. The development of ecologically sustainable development (ESD) projects is a necessary component in conservation area management. Over the next year, the DoF and WSC, with the assistance of TNC and the local communities, will be investigating several possible environmentally compatible development projects that complement the conservation activities in Pohnpei's Watershed Forest Reserve and mangrove forests. The DoF and WSC will assist in the development of selection criteria for the projects and also in the actual selection. Projects will then be developed into "demonstration" projects in close coordination with the local WAMCs and communities. At present, the following alternatives are strong possibilities for development:

**\* Alternative Sakau (Piper methysticum) Production Systems-**  
Due to the threat of "sakau" production to the forest under current cultivation practices, the WSC, with the assistance of the Nature Conservancy (TNC), has already established a local working group for this alternative consisting of the TNC Field Representative; Chief, Pohnpei Division of Forestry (PDOF); Senior Extension Agent, PDOF; and Chief,

Pohnpei Division of Agriculture. This group is developing an action plan consisting of community education, cooperative on-farm agronomic and economic research trials, and policy analysis and recommendations. Besides a local consultant to oversee the project, it is anticipated that various ADB Watershed TA consultants (especially the Team Leader and Agroforestry Specialist) will also be involved with the development of this project, maintaining close contact with the farmers and assisting in the development and evaluation of various production strategies. A related note- "sakau" is a slow-growing crop, maturing in 3-5 years, so it will be several years before this project will be completed.

\* **Medicinal Plants ("Chemical Prospecting")**- The Field Representative of the Nature Conservancy has begun contact with various pharmaceutical firms interested in negotiating with the Pohnpei and FSM Governments for "chemical prospecting" rights. A legal consultant (preferably local) will be retained to work up a suitable agreement guaranteeing that Pohnpei benefits from this commercialization of its biodiversity and the related traditional knowledge. Efforts will be made to collect available knowledge on traditional medicinal plants. In conjunction with pharmaceutical firms, possibilities for cultivating potential medicinal plants will also be investigated. Again, this is a slow process that takes several years.

\* **Eco-tourism**- This option is already being undertaken on Pohnpei both by private individuals and communities. Various members of the WSC, DoF, and TNC assisted with the development of both the Pudoi Mangrove Sanctuary (Pohnpei's only mangrove boardwalk) and Enipein Marine Park. They are also in contact with a number of other local communities that are interested in developing trails into watershed forest areas. Local experience has shown that eco-tourism with real community involvement is a slow and complicated process involving education, negotiation, training, and other development that can take many years. Initial efforts in FY 1994 will include a general feasibility study to be undertaken by one of the ADB Watershed TA consultants.

For the Alternative Sakau (Piper methysticum) Production Systems demonstration plots, the following activities are foreseen in the coming year:

1. Identification of key "sakau" farmers in each municipality

This will be done by the project leader (CASO) in conjunction with the Division of Agriculture and the local traditional leaders in each area, and will be based on criteria

to include farmer innovativeness, leadership, history of cooperation with the DoA and other agencies, and reliance on agriculture (especially "sakau") for a major portion of their income.

2. Build farmer awareness about "sakau" and the watershed

Awareness will be built through meetings, field trips, and possibly an exchange to the South Pacific to view lowland commercial "sakau" production (if funding can be obtained).

3. Set up farmer informal research network

A workshop will be held in Quarter 3 FY 1994 to launch the farmer research network. In conjunction with the project leader (CASO) and the five Municipal Agriculture Extension Agents, the farmers will cooperatively and individually design research experiments to test alternative "sakau" growing techniques, concentrating on those suitable to lowland cultivation, and initiate them on their private lands.

4. Monitor developments, develop guidelines, and extend to other farmers

Follow-up will be done by WSC and the DoA Extension Agents. Farmers will occasionally meet together to discuss their findings, and the project leader (CASO) will work closely with the Division of Agriculture and TNC to develop extension materials (hand-outs, radio and video programs, etc.) for Pohnpei farmers.

#### MONITORING AND EVALUATION:

Monitoring will be accomplished by the timely submission and review of progress reports. Monthly progress reports will be submitted to the Department of Conservation and Resource Surveillance (C&RS), and quarterly reports, including both technical accomplishments and financial expenditures, will be prepared for the South Pacific Biodiversity Conservation Programme (SPBCP) and the Watershed Steering Committee, the delegated local Conservation Area Coordinating Committee (CACC). The Conservation Area Support Officer (CASO), an employee of the Division of Forestry (DoF) under the supervision of the DoF Chief, Dept. of C&RS, will be responsible for preparing all reports, in conjunction with the Administrative staff of the DoF and C&RS. Quarterly meetings will be held on Pohnpei, to be chaired by the Director of C&RS and attended by the CASO, WSC members, DoF staff, and a representative of SPREP's SPBCP if possible, to monitor progress, address bottlenecks, and prepare and approve the assistance request for the following quarter. Yearly review meetings will also be held on Pohnpei, under the

same format as the quarterly meetings.



FY 1994 WORK PROGRAM

TASKS AND ACTIVITIES

	Q1	Q2	Q3	Q4
<u>i. Finalize Rules and Regulations (R&amp;R)</u> a. WSC meetings b. Translate R&R to English c. Prepare amendments to S.L. #11-128-87	██████████ ██████████ ██████████			
<u>ii. Complete final review of R&amp;R</u>		████████████████████		
<u>iii. Carry out community review of Integrated Mangrove Management Plan (IMMP)</u>		████████████████████		
<u>iv. Provide community input into Integrated Watershed Management Plan (IWMP)</u> a. Development of community planning program b. PRA training for DoF and WSC c. Pilot Community Planning Program		████████████████████  ██████████	████████████████████	
<u>v. Develop and Strengthen Watershed Area Management Committees (WAMCs)</u> a. Develop framework for WAMC development b. Develop management agreements/MOUs c. WAMC workshops		████████████████████	████████████████████	
<u>vi. Fauna and flora surveys</u> a. Avifauna Survey (already funded) b. Reptile Survey c. Freshwater Fauna Survey		██████████	██████████ ██████████	██████████
<u>vii. Develop Compatible Development Projects</u> Alternative Sakau Cultivation: a. Finalize Alternative Sakau Cultivation Project plan		████████████████████		

<ul style="list-style-type: none"> <li>b. Identify key farmers in each municipality</li> <li>c. Sakau Production Workshop</li> <li>d. Set up informal farmer research network</li> <li>e. Monitor and extend network findings</li> </ul>		<p>[REDACTED]</p>	<p>[REDACTED]</p>	<p>[REDACTED]</p>
<p>Medicinal Plants:</p> <ul style="list-style-type: none"> <li>a. Develop "chemical prospecting" agreement</li> <li>b. Collect traditional medicinal plant knowledge</li> <li>c. Begin plant collections and testing with outside firm</li> </ul>		<p>[REDACTED]</p>	<p>[REDACTED]</p>	<p>[REDACTED]</p>
<p>Eco-tourism:</p> <ul style="list-style-type: none"> <li>a. General needs assessment (ADB TA)</li> </ul>		<p>[REDACTED]</p>	<p>[REDACTED]</p>	<p>[REDACTED]</p>

PROPOSED BUDGET- FY 1994

ITEM	Q1	Q2	Q3	Q4	TOTAL
<u>Personnel/Contractors</u>					
1. Conservation Area Support Officer (CASO) (Salary and benefits @ \$12,000/year)	3000	3000	3000	3000	12000
2. Per diem for NGO members of Watershed Education Team (\$20/day X 8 people X 25 meetings in 12 areas) (i&ii)	2000	2000			4000
3. Per diem for NGO members of Mangrove Education Team (\$20/day X 4 people X 50 meetings in 25 areas) (iii)	2000	2000			4000
4. Locally-based legal consultant(s) (translate revised regulations, 1987 law amendments, management agreements, "chemical prospecting" agreement) (i,v,vii)	2500	2500	4000		9000
5. Consultant- Development of community planning program/Participatory Rural Assessment Workshop (30 person days @ \$150/day)-SPREP? Pacific Isl Network		4200			4200
6. Local Consultants- WAMC framework and management agreements (6 people for 20 person days @ \$30/day) (v)		3600			3600
7. Local Consultant- Reptile Survey (20 person days @ \$150/day) (vi)			3000		2100
8. Consultants- Freshwater Fauna Survey (20 person days @ \$150/day) (vi)			6000		

9. Local Consultant - Alternative Sakau Cultivation and Sakau Production Workshop (20 person days @ \$150/day) (vii)		3000				3000
10. Local Consultants- Local Medicinal Plant Knowledge (120 person days @ \$50/day) (vii)			3000	3000		6000
	Subtotals	9500	20300	19000	6000	54800
<u>Transportation and per diem</u>						
1. Community Planning Consultant Airfare (1 RT from So. Pacific) Per diem (30 days X \$100/day)			2000 3000			2000 3000
2. Freshwater Fauna Consultants Airfare (2 RT from Hawaii) Per diem (2 X 20 days X \$100/day) Guides (2 persons X 20 days X \$30/day)				2000 4000 1200		
3. Overflights for Pilot Community Planning Program (X8)				1200	1200	2400
	Subtotals	0	5000	8400	1200	14600
<u>Equipment and Materials</u>						
1. Printing and Photocopying (R&R, management agreements, extension materials, etc.)		1000	1500	1000	500	4000
2. Communications (phone, fax, postage)		500	500	500	500	2000
	Subtotals	1500	2000	1500	1000	6000
<b>TOTALS</b>		<b>11000</b>	<b>27300</b>	<b>28900</b>	<b>8200</b>	<b>75400</b>

**TITLE: CONSERVATION AREA PROJECT OFFICER (CASO)**

**DUTIES:**

1. In conjunction with Chief, Division of Forestry, plan and coordinate the overall Pohnpei Integrated Watershed Project, including:
  - (a) preparation of plans and proposals;
  - (b) determine needs and requirements and implement actions as appropriate;
  - (c) identification of resource people;
  - (d) coordination with other collaborating government agencies and community groups;
  - (e) reporting and documenting progress.
2. Serve as liaison and spokesperson for the Watershed Project with other government agencies and outside assistance agencies. Develop and implement strong partnerships with government officials, community leaders and landowners, and international institutions.
3. Assist the Chief, Division of Forestry in other projects as needed and meet all administrative requirements for the program.

**ENTRANCE REQUIREMENTS:**

1. Three or more years work experience in Pohnpei in the area of environmental conservation, agriculture and nature conservation.
2. Understanding and familiarity with the Government structure, programs and policies, and environmental problems of Pohnpei State.
3. An understanding of Pohnpei culture, traditional land tenure and forest resource use, and an ability to work well with local people.

ECOLOGICAL SYSTEMS AND COMPONENTS OF THE POHNPEI  
WATERSHED FOREST RESERVE AND MANGROVE FORESTS  
CONSERVATION AREA PROJECT

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 for 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 nearshore waters. Excessive sedimentation may adversely affect freshwater communities, smother nearshore marine bottom communities, and kill corals. Thus, damage to one part of an island's resource base can adversely affect others.

### Key Ecosystems

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

- (1) Upland Broadleaf Forest
- (2) Upland Palm Forest
- (3) Montane Cloud Forest

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

On the shore side of the human-managed (disturbed) ecosystems, mainly agroforest with some secondary forest and savanna areas, are located the mangrove forests, which form a separate ecosystem which is related hydrologically to the upland forest.

These five natural ecosystems are more fully described in the following sections, along with their key ecological processes

and major stresses.

## Ecosystem Descriptions

### Upland Broadleaf Forest

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.

Dominant tree species in the lower elevation native forests include Camposperma brevipetiolata (dohng) and Elaeocarpus carolinensis (sadak). The endemic palm Clinostigma ponapensis (kotop) is also abundant. Patches of Parinari laurina (ais) and Eugenia carolinensis (kehnpap) are common in some areas. Other large trees include Parkia korom (kurum), Palaguium karrak (kalak), Myristica insularis (karara), Cinnamomum carolinensis (madeu), Ficus tinctoria (nihn), Barringtonia racemosa (wih), Terminalia carolinensis (keima), and Cynometra ramiflora (kammeu).

Small trees under 15 m (50 ft) in height include Pandanus cominsii (mwatal), Aglaiia ponapensis (marasau), Pandanus spp. (kipar), Eugenia stelechantha (kirek en wel), Ptychosperma spp. (kedei), Glochidion marianum (luwikedenlol), Claoxylon carolinianum (koihi), and Discocalyx ponapensis (kartiel). The tall herb Alpinia carolinensis (iuiu) is also common.

Above 300 m (980 ft), Parkia korom, Cynometra ramiflora, Ptychosperma spp., and Alpinia carolinensis become less common. Above 450 m (1470 ft) Parinari laurina, Ficus tinctoria, Myristica insularis, and Elaeocarpus carolinensis begin to disappear. Above 600 m, only Camposperma grows to 10 m (30 ft) tall and the Clinostigma palm to 15 m (40 ft). All other trees tend to be shorter and stunted. Epiphytes, especially mosses, are abundant. This type intergrades into montane cloud forest towards the mountain peaks.

The upland forest serves several important ecological functions. Perhaps most importantly, the forest vegetation with its 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 important subsistence and, to a lesser extent, commercial resources for the people of Pohnpei.

### Upland Palm Forest

Palm forests are unique to Pohnpei and cover approximately 1,383 Ha 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 its 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.

### 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 epiphytes, 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 most common plants include



Elaeocarpus spp., Astronidium ponapense (duduhnwoal), and the tree fern (Cyathea spp.), and to a lesser extent Camptosperma, Cinnamomum carolinensis, and Gynotroches axillaris (ahkenwel). Several pure stands of Pandanus patina (piht) can be found along the ridges as well as some open marshy areas dominated by Thoracostachyum pandanophyllum (pwoaki). Endemic and native orchids also abound in the mid and lower canopies. 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).

### Swamp Forest

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. Species common along rivers inland of mangrove include Heritiera littoralis (mwuropensed) and Cynometra ramiflora. The most common trees found on inland swampy areas are Terminalia carolinensis (keima), Camptosperma brevipetiolata (dohng), Pandanus cominsii (mwatal), and Barringtonia racemosa (wih). The endemic ivory nut palm Metroxylon amicarum (oahs) is sometimes present as an emergent species but is more commonly seen in patches associated with marsh areas. Hibiscus tiliaceus (keleu) is also a common component of many swamp forest areas. 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.

### Mangrove Forest

On Pohnpei, the mangrove forests occur along the lower portions of rivers and streams and 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.

Sonneratia alba is dominant on the seaward side of the mangrove forests. At the mouths of larger rivers or around bay indentations, Rhizophora mucronata and R. apiculata may occur as pure stands mixed with S. alba and some Bruguiera gymnorhiza. On

the landward side of mangroves, the species mix might include Lumnitzera littorea and Xylocarpus granatum. Where estuaries become river-like, Rhizophora drops out, Sonneratia remains common, and Bruquiera, Xylocarpus, and Lumnitzera become more common. Heritiera littoralis is common along the landward side of mangroves and upstream. Stands of Nypa fruticans occur along lower portions and mouths of some rivers.

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 molluscs, 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.

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**ASIAN DEVELOPMENT BANK**

*This Report has been prepared for  
the exclusive use of the Bank.*

**TECHNICAL ASSISTANCE  
(JSF-Financed)**

**TO THE**

**FEDERATED STATES OF MICRONESIA**

**FOR THE**

**WATERSHED MANAGEMENT AND ENVIRONMENT PROJECT**

**August 1993**

## I. INTRODUCTION

1. The Government of the Federated States of Micronesia (FSM) requested technical assistance (TA) from the Bank for a watershed management and environment project for Pohnpei State. The TA will assist in the implementation of the Watershed Protection Act of 1987 by preparing an integrated watershed management project for Pohnpei. The Bank sent a Fact-Finding Mission to FSM from 20 to 26 March 1993 to review the objectives and scope of the TA to assist in its formulation.<sup>1/</sup>

## II. BACKGROUND AND RATIONALE

2. The TA is based on the assessment in the 1992 State of the Environment Report, which concluded that there are several significant environmental problems that are increasing in scale, because of the increase in population and the expansion in agricultural activities on forest land. The Nationwide Environmental Management Strategy (NEMS)<sup>2/</sup> for the FSM indicates that one of the major environmental challenges currently facing the nation is the increasing population pressure on Pohnpei watershed. Therefore, the watershed environment needs to be improved and an Integrated watershed management system prepared for Pohnpei.

3. The forests serve as habitat for many species of flora and fauna of ecological, biological and economical significance, and therefore the conservation values of Pohnpei's forests are very high. The upland forest acts as an important habitat for at least 269 species of plants, 110 of which are endemic, and 24 species of forest-nesting birds, at least 5 of which are endemic. Many of these plants and birds, besides their ecological importance and contribution to Pacific and global biodiversity, are also important subsistence and, to a lesser extent, commercial resources for the people of Pohnpei.

4. Based on the aerial photos taken in 1976 and ground checking in 1983, it was estimated that during this seven-year period, the forest area was reduced from 24,789 ha (70 per cent of the island's area) to 19,683 ha (55 per cent), mostly from conversion to agricultural uses. This trend appears to be continuing and the further expansion of settlements into upland forests and mangrove areas can be expected because of the rapid increase in population. The loss of habitat of both plant and animals may result in the lowering of population of many species and possible extinction of rare ones. To reduce this loss, the Government and the Pohnpei State Legislature enacted the Pohnpei Watershed Forest Reserve and Mangrove Protection Act of 1987. A Watershed Forest Reserve (WFR) was established to safeguard, among others, the upland forest biodiversity including many endemic plant and wildlife species, the hydrological functions, the cultural heritage, and the economic potential of the forest.

5. However, the 1987 Act did not adequately consider the public interests in the land. To address the public concerns, the Government decided in 1989 to form the Watershed Steering Committee (WSC), an interagency task force with representatives from various agencies and non-government organizations (NGOs), that works under the Director of the Department of

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<sup>1/</sup> The TA first appeared in the ADB Business Opportunities in March 1993.

<sup>2/</sup> Prepared under the Bank-financed regional technical assistance (RETA) 5403: Strengthening Environmental Management Capabilities in Pacific Island Developing Member Countries (PIDCs).

Conservation and Resource Surveillance (C&RS) and the Director of the Department of Lands. The WSC will represent the Pohnpei State Government at all meetings and negotiations with the municipal government, traditional leaders, and land users about activities under the 1987 Act.

6. Detailed and reliable information on the status of natural resources is still inadequate or even lacking in the FSM. Since accurate information on natural resources is an essential prerequisite for proper management, the FSM needs assistance to compile the information (on the scope and quantity) of the existing natural resources. The development of a database will provide the information required for development planning and decision making.

7. The existing farming systems have degraded valuable primary rainforest. The preparation of an integrated watershed management plan that will address watershed improvement through improved farming systems, reforestation, development of well-designed agroforest systems, development of ecotourism and prevention of further deforestation is clearly needed. The conservation of the upland forest reserve and its biodiversity is also required for sustainable watershed management and will be addressed by the TA.

8. The South Pacific Regional Environment Programme (SPREP) has assisted the Pohnpei State Government with their watershed education program, which was co-sponsored by the United States Department of Agriculture, Forest Service. The Nature Conservancy (TNC), an international NGO, also has been involved in various environmental projects and programs in Pohnpei since 1991, focusing on watershed management and assisting in the promotion of environmental public awareness and in the establishment of the WFR. However, this TA will be the Bank's first environment-oriented assistance for the country.

### III. THE TECHNICAL ASSISTANCE

#### A. Objectives

9. The main objective of the TA is to assist the Government in improving the watershed environment through the preparation of an action program that will implement the 1987 Act and an integrated watershed management plan for Pohnpei. The work will cover all the watersheds on Pohnpei island. Thus, the integrated watershed management plan will serve as a development master plan for Pohnpei's watersheds.

#### B. Scope of Work

10. The scope of TA will include the following: (i) resource information system (database) development; (ii) preparation of spatial planning of the watersheds including identification of development options in each zone; (iii) evaluation of agricultural practices in the watershed, specifically farming and agroforestry systems, and development of options to minimize the environmental impact of such practices; (iv) improvement of habitat and species conservation practice; (v) preparation of an integrated watershed management program; and (vi) dissemination of the findings and promotion of watershed management principles in other states.

### C. Implementation Arrangements

11. The TA will be implemented over 24 months by a consulting firm with a team of consultants consisting of a team leader, database management/geographic information system (GIS) specialist, watershed management specialist, agroforestry specialist, and biodiversity/nature conservation specialist. The Pohnpei State Government requested that the team leader be a local consultant with experience in the field of environmental conservation; and with knowledge in watershed management, agroforestry, and biodiversity/nature conservation; the local dialects; the local culture; and the ability to communicate well with government officials at all levels. A total of about 34 man-months will be required to implement the TA of which 10 man-months will be provided by the international consultants and about 24 man-months by the team leader. The international firm will be required to recruit a qualified local consultant to serve as the team leader. The terms of reference for the consultants are given in Appendix 1.

12. The consultants will be engaged by the Bank in accordance with the Bank's Guidelines on the Use of Consultants and will work with government counterparts to carry out the tasks. The required equipment will be procured in accordance with the Bank's Guidelines on Procurement from the TA funds and will be retained by the Executing Agency upon completion of the TA.

13. The Executing Agency for the TA will be the Pohnpei State Department of Conservation and Resource Surveillance (C&RS). The senior staff of the department will direct the implementation of the TA. The Executing Agency will delegate one full-time representative as Project Coordinator who will liaise with the team leader and the consultants to facilitate the implementation and provide guidance to ensure that the consultants' activities are in line with the government needs. The overall supervision of the TA will be by an Advisory Committee, which will include aid agencies and participating government agencies. The Advisory Committee, including the Bank, will provide guidance to the consultants through review meetings during the implementation of the TA. This arrangement is expected to help transfer skills and knowledge to the government counterparts so they can implement the watershed management strategy.

14. The Government has agreed to provide at least 30 man-months of professional/technical counterpart inputs and 48 man-months of support staff (secretaries/administrative) well as office space, furniture and related office equipment and reproduction facilities for the TA and to maintain the equipment provided under the TA.

### D. Cost Estimate and Financial Arrangement

15. The total cost of the TA is estimated at \$813,000 equivalent including the Government's and SPREP's contributions (see Appendix 2). The Pohnpei State Government will contribute in-kind the equivalent of \$78,000 and SPREP will finance the equivalent of \$150,000. SPREP will disburse its budget directly to the Executing Agency to finance the activities specified in the TA. The Bank will provide \$585,000. The technical assistance will be financed by the Bank on a grant basis from the Japan Special Fund.

#### IV. THE PRESIDENT'S DECISION

16. The President, acting under the authority delegated to him by the Board, has approved the provision of technical assistance, on a grant basis, to the Government of the Federated States of Micronesia in an amount not exceeding the equivalent of \$585,000 for the purpose of the Watershed Management and Environment Project, and hereby reports his action to the Board.

## TERMS OF REFERENCE

### A. Introduction

1. The Nationwide Environmental Management Strategy (NEMS) has been adopted and endorsed by the Government of the Federated States of Micronesia (FSM). The NEMS reported on the state of the environment in FSM and included proposed program profiles. The NEMS has identified the need for integrated watershed management as one of the priorities to address the deterioration in watersheds. A team of consultants from an international firm will assist the Department of Conservation and Resource Surveillance (C&RS) of the Pohnpei State Government to improve the watershed environment through the preparation of an integrated watershed management plan, which will provide a detailed action program for the Pohnpei watersheds, and the formulation of a replicable watershed management system for the other states of FSM. The integrated watershed management plan will also serve as a development masterplan for the watersheds.

2. The consultants will assist the C&RS in the watershed management and conservation and will concentrate on the following critical environmental problems in the watersheds:

- (i) inadequate or lack of data on the watersheds,
- (ii) population pressure on forests in the upper watershed areas,
- (iii) watershed degradation,
- (iv) threats to the forest and biodiversity,
- (v) pressure from tourism development, and
- (vi) pollution of surface water.

### B. General Terms of Reference

3. To assist in the implementation of the technical assistance (TA), the Bank will select an international firm that will provide a team of consultants including:

- (i) a database management specialist with expertise in geographical information system (GIS) and remote sensing,
- (ii) a watershed management specialist with experience in spatial planning, environmental monitoring and surveys,
- (iii) an agroforestry specialist with experience in integrated conservation and development projects including buffer zone establishment, ecotourism and rural development projects, and
- (iv) a biodiversity/nature conservation specialist with experience in resource survey and development of conservation database.

A qualified local consultant will serve as the team leader.

(Reference in text: page 3, para. 11)



4. The team leader should have the following qualifications:
- (i) the leadership and skills to manage the TA,
  - (ii) several years work experience in the country in the field of environmental conservation, agroforestry, and biodiversity/nature conservation,
  - (iii) an understanding and familiarity with the government structure, programs and policies and environmental problems of the country,
  - (iv) an understanding of the culture, traditional land tenure system, a fluency in local dialects and an ability to work well with the Government, non-government organizations and the local people, and
  - (v) a willingness to live in Pohnpei for 24 months.
5. The required team of international consultants should have:
- (i) wide experience in the development of environmental management plans in developing countries and in integrated watershed management in tropical areas,
  - (ii) a familiarity with the development of environmental management plans for small island countries, and
  - (iii) the technical qualifications to fulfill the specific terms of reference.

C. Detailed Terms of Reference

1. Team Leader

The team leader will:

- (i) Set up and organize the project office at the C&RS, including determining the needs for office personnel, equipment, supplies and logistical requirements.
- (ii) Coordinate the overall Project particularly: (a) the preparation of work schedule for the implementation of the TA; (b) the work program of the team members; (c) the assistance to the Executing Agency, including coordination with other collaborating government agencies for the overall implementation of the TA; and (d) the reports on the progress of TA implementation to the Government, the Bank and SPREP.

- (iii) Facilitate and assist in the work of international consultants by providing directions as necessary to address environmental problems in the watershed and to improve watershed management, and assist in the preparation of reports.
- (iv) Consult with the Government, the Bank and SPREP and identify the key local/regional resource persons that will assist in the implementation of the TA. With their assistance, conduct surveys covering bio-physical environment and human population including the socioeconomic/cultural aspects, traditional land tenure system and beneficiary preference in development at the Pohnpei watershed areas to supplement the available data.
- (v) Assist the Government in implementing a proper land-titling program in the priority areas with support from the team members.
- (vi) Implement, to the extent possible, the recommended actions for environmental rehabilitation with the assistance from related government agencies, agricultural research station and the expertise of the team members.
- (vii) Disseminate and replicate similar integrated watershed management on other FSM islands.
  - (a) collect available data on the distribution of important watershed in FSM and review the watershed condition, and
  - (b) using the Pohnpei watershed area as a model, organize a workshop and promote exchanges of extension technical personnel and traditional leaders to encourage the adoption of watershed management principles in other FSM states, including the development of watershed protection legislation, and selection of priority watersheds to receive immediate attention for conservation/management.

## 2. Database Management Specialist

The Database Management Specialist will:

- (i) Determine the data required for the development of geographic information system (GIS) for integrated watershed management of Pohnpei.
- (ii) Obtain, assess and collate available data and information concerning the country's natural resources and management, identify data gaps and the required actions to collect data for the database system establishment.

- (iii) Select and install the most suitable hardware/software of the system and explore access to international environmental databanks and sources for optimum performance of GIS to be established for the Project.
- (iv) Based on information gathered and discussions made with interested/concerned groups (government agencies, scientists and the community), determine the data required and to be used for the development of GIS for Pohnpei watersheds.
- (v) Assess the alternative computerized systems in terms of access to data and a practical operating system.
- (vi) With the assistance of the team leader provide overall coordination for training of operators and assist in the preparation and provision of training materials and preparation of a manual for easy use of the operators.

3. Watershed Management Specialist

The Watershed Management Specialist will:

- (i) Using the available data and recent data from air photos and field surveys, determine the state of the environment of the watershed, and identify and analyze essential environmental components for sustainable integrated watershed management.
- (ii) Based on the current condition of the watershed area and considering the value of the upper watershed, propose a spatial plan for optimal and sustainable utilization of the watershed resources, which will include: (a) protected areas, including the upland forest reserve and mangroves; (b) buffer zone areas; (c) areas of limited use, which include historical/cultural, ecotourism development and limited production zones; and (d) development zones or intensive use zones including settlements, agricultural lands and areas for other development options. Participatory land use planning should be emphasized in the development of the spatial planning, and efforts should be made to incorporate neighboring communities/landowners' input in watershed planning and management.
- (iii) Determine and detail development options and prepare an integrated development plan for the watershed area that will address the problem of watershed degradation and achieve the objective of rehabilitation, sustainable high productivity and conservation of tropical rainforest environment and its biodiversity. The development plan of the upper catchment includes economic development of conservation areas (considering its zonation) under the integrated protected area system (IPAS) approach.

- (iv) Detail the institutional arrangement, interagency coordination and institutional strengthening for integrated watershed management program.
- (v) Propose a long-term implementation plan including community-based watershed monitoring, evaluation procedures, research required and other activities supportive of the integrated watershed management.
- (vi) In coordination with related agencies, collect and review available data/information on the state of water quality in rivers and other surface waters. Identify and review various sources of pollution which include point as well as non-point sources, determine the level of pollution, analyze the future trend and provide general recommendations for minimizing the problems.

#### 4. Agroforestry Specialist

The Agroforestry Specialist will:

- (i) Collect and review data (types and extent of areas) and information on traditional agricultural/agroforestry practices including farming systems in the watershed area. Evaluate their appropriateness to the current situation in the light of productivity, economic values, and environmental conservation, and recommend improvement of the systems which are tailored for an area and therefore more likely for adoption by local people.
- (ii) Assess the population pressure on the upper watershed areas. Determine the extent of environmental degradation due to conversion of primary forest into farming (especially for "sakau"<sup>1/</sup>), agroforestry and other land uses, and assess efforts required to resolve resource use conflicts.
- (iii) Design buffer zone development for areas near population centers (i.e., villages or settlements) to absorb population pressure on the protected forest areas and provide fuelwood and other subsistence products to the local communities. Identify forest plant species having high economic value for possible cultivation in the buffer zone and other areas to provide for job opportunities and sources of income for the local people.
- (iv) Prepare a detailed plan for the improvement of farming practices and the rehabilitation of degraded land (i.e., grassland areas) through appropriate farming systems, reforestation with native plant species, development of plantation, agroforestry; or other methods suitable for the integrated watershed management goals.

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<sup>1/</sup> "Sakau" is the local term for *Piper merysticum*, the root of which is squeezed to produce liquid for traditional beverage.

- (v) Assess ecotourism development in the area, taking into account the potentialities and its fitness to the overall objectives of watershed management including environmental conservation. Recommend ecotourism development planning in the watershed areas with maximum involvement of local communities and assist the Government in preparing brochures on ecotourism prospects and related environmental improvements required to support a successful ecotourism industry.
- (vi) Review the existing policies regarding tax incentives and subsidies given to other related agricultural activities, whether the present investment regime is hospitable for promoting ecotourism and whether the development finance institutions provide adequate financing access to local communities to undertake ecotourism projects.
- (vii) Develop a model for sustainable watershed management to enhance the conservation of upland forest biodiversity, including development of demonstration plots that will augment community education/ awareness effort and demonstrate the viability of the options. Two demonstration plots (trial planting of several farming options and ecotourism development) will show alternative uses and activities for forest areas with maximum public participation, as follows:
  - (a) Alternative production systems for "sakau" and development of guidelines and improved practices to minimize negative impacts and develop alternative production systems.
  - (b) Development of ecotourism which consists of the establishment of several trails into lower area sites, waterfalls, look-outs, etc, and a series of feeder trails and a main ridge trail. This demonstration project would also be used to organize and train guides.

5. Biodiversity/Nature Conservation Specialist

The Biodiversity/Nature Conservation Specialist will:

- (i) Review government policies, regulations and institutional framework for the conservation of nature and biodiversity. Evaluate their effectiveness and adequacy and, if necessary, recommend improvements for better and effective conservation practices.
- (ii) Identify government programs on biodiversity/nature conservation and on-going conservation activities in Pohnpei. Evaluate their progress and constraints, and recommend improvement.
- (iii) Assess habitat deterioration caused by external disturbances, evaluate their impact on plants and wildlife especially the rare endemic and endangered species, and map critically endangered habitats. Assess and

recommend efforts required to resolve resource use conflicts.

- (iv) Update and collect data on flora and fauna of the watershed especially within the Watershed Forest Reserve and establish conservation database. Propose measures for effective protection of habitat and the species.
- (v) Considering the traditional land right system and other customary rights in the area, propose better and acceptable approaches to ensure the conservation of the Watershed Forest Reserve through public participation.
- (vi) Propose a long-term management plan and the implementation plan for the conservation of the Watershed Forest Reserve, with the objective of conserving the upland forest and the biodiversity, including development of long-term planning for the use of biodiversity of forest for sustainable economic development.

#### 6. A Prefeasibility Study

A prefeasibility study will be prepared for a pilot project to test the applicability of the project findings and development options in the watershed, including, but not limited to the following aspects:

- (i) Justification for selection of the project options from ecological, biological, sociological and economical aspects including the economic return which could be generated from their management.
- (ii) Determination of the project scope and identification of data gaps and the need and extent of data required as a basis for an integrated watershed management.
- (iii) Interagency coordination, institutional arrangements, research, public awareness, monitoring and evaluation.
- (iv) Identification of components to be developed under the pilot project for maximum community participation to achieve better watershed environment and development of economically viable development options acceptable to the people.
- (v) Estimation of local and foreign consultancy requirements needed for project implementation. Estimate investment, operation and maintenance costs, economic evaluation including cost-benefit analysis specifying all non-tangible benefits.
- (vi) The screening and assessing of environmental and social impacts by preparing an initial environmental examination of the proposed project.

**BUDGET ESTIMATE**  
(\$)

A. Bank-Financed

Foreign Costs

1.	Remuneration of Consultants 10 man-months x \$19,000	190,000
2.	International travel <sup>1/</sup>	30,000
3.	Per diem	33,600
4.	Equipment and supplies:	
	(i) Vehicle (4WD pick-up)	10,000
	(ii) Computer hardware and software <sup>2/</sup>	50,000
5.	Aerial photos	100,000
6.	Communication, report and documentation	15,000
7.	Government representative at contract negotiation	6,000
8.	Contingencies	<u>54,400</u>
	<b>Subtotal</b>	<b>497,000</b>

Local Costs

1.	Remuneration of Project Team Leader (local consultant), 24 man-months at \$3,250 per month	78,000
2.	Contingencies	<u>10,000</u>
	<b>Subtotal</b>	<b><u>88,000</u></b>

**Total Bank Grant** **585,000**

B. SPREP-Financed

a.	Field surveys and database establishment	60,000
b.	Demonstration plots/trial planting	60,000
c.	Workshop	<u>30,000</u>

**Total SPREP Financing** **150,000**

C. Government-Financed (in-kind)

a.	Office space and facilities	14,000
b.	Equipment maintenance/operation	10,000
b.	Government professional/technical counterpart remuneration	30,000
c.	Government support staff	<u>24,000</u>

**Total Government Contribution** **78,000**

**GRAND TOTAL** **813,000**

<sup>1/</sup> The watershed management and agroforestry specialists will travel to Pohnpei twice, at the early phase (first year) and at the latter phase (second year) of the implementation period, to optimize the use of data collected during the TA implementation period. A total of six trips is proposed.

<sup>2/</sup> The Bank will provide microcomputer and laser printer for office use at \$5,000 and GIS hardware/software at \$45,000.

File: AP 2/7/5/1

5  
Map (App II)  
not attached

# COMMUNITY BASED WATERSHED MANAGEMENT AND BIODIVERSITY CONSERVATION PROGRAM

Proposal for support under the South Pacific Biodiversity Conservation Program

## Summary

Some 5,100 hectares (13,000 acres) of the upland rain forest of central Pohnpei Island has been legally designated as a protected area to safeguard the following resource values: (1) surface water of adequate quality to supply water systems for island communities (2) the great cultural and archaeological importance of upland forest sites (3) relatively high endemism of flora and fauna (4) economic potential of sustainable development through eco-tourism and related recreational activities.

This protected area, the Watershed Forest Reserve, was established under the "Watershed Forest Reserve and Mangrove Protection Act of 1987" (S.L. 1L-128-87) passed by the Pohnpei State Legislature. It is administered by the Pohnpei State Division of Forestry within the Department of Conservation and Resources Surveillance. For the past several years efforts have been made to implement the law but only recently has significant progress been made. A multi-agency project has been proposed that will enhance current efforts being undertaken by Pohnpei State agencies and non-profit entities. The overall goal is to develop over five years a sustainable upland forest management program for this protected area and use it as a model for other Pacific Islands.

Support is being sought for the project described herein principally from four external organizations including the Asian Development Bank, the South Pacific Regional Environmental Programme, the United States Department of Agriculture Forestry Service, and the Nature Conservancy (a large international non-government conservation organization). This proposal describes the overall project and indicates which components are requested for funding through the SPREP South Pacific Biodiversity Conservation Program.

## A. Background

### 1. General Setting

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. 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, with extensive mangrove forest development around most of the coast line. Pohnpei island is typically volcanic, with some 60% of the land area characterized as steep and mountainous.

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). November to June is the main period of the northeasterly trade winds. Typhoons are fairly rare, most passing to the north and west of the island, although occasionally large storm events do occur.

The interior of the island is heavily forested, with vegetation consisting of several forest types. Lower slopes and coastal areas are characterized by agroforest and secondary vegetation, with locally extensive areas of grass or fern savannah on degraded soils. Lowland areas consist of swamp forest or taro patch. Extensive mangrove forests up to 4 km in width line the coast.

## 2. Importance of Pohnpei's Upland Forest

The upland forest provides several environmental services. Forest vegetation with its 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. Erosion and sedimentation are prevented, protecting important downstream environments from degradation. Flood severity and intensity are also reduced. The slow release of ground water ensures stream flow even during relatively dry periods. The high elevation cloud forest 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).

The conservation values and biodiversity of Pohnpei's forests are perhaps as important as their hydrologic buffering function. A combination of strong traditional respect for the upland forest, heavy human depopulation during the last century, and relatively difficult access to inland areas have spared the upland forests of Pohnpei Island from much of the disturbance and destruction that has occurred in the island's lowlands and on other Micronesian islands. These factors, along with the relative age and isolation of the island make the flora of Pohnpei's upland forests some of the most diverse in Micronesia, with a high level of endemism.

Most of the plant families represented amongst the indigenous and endemic plants of the island are of Indo-Malayan origin (Glassman, 1952). The upland forest acts as important habitat for at least 269 species of plants, 110 of which are endemic, and 24 species of forest-nesting birds, at least five of which are endemic. In other words, 34.4% of the plant species are found chiefly in the upland forests and 90% of the endemic species are found mainly in the upland forests. Major endemic families include Euphorbiaceae (7 species), Orchidaceae (35 species), Polypodiaceae (10 species), and Rubiaceae (10 species). Many of these plants and animals, besides their ecological importance and contribution to Pacific biodiversity, are also important subsistence and, to a lesser extent, commercial resources for the people of Pohnpei.

Last, the forest adds to the beauty and attraction of Pohnpei to residents and visitors alike. Tourism is perceived as one of the most promising development sectors by both state and national governments. Tourism has proved to have had severe environmental impacts when developed intensively on other Pacific islands. Recently interest in so-called "eco-tourism" has increased substantially. Pohnpei's extraordinarily beautiful and unique upland forests are potentially one of the premier eco-tourism resources in the Federated States of Micronesia.

### 3. Threats to the upland forest

#### a. General situation

The upland forest is threatened by a rapidly growing population and the resultant inland movement of people in search of agricultural land and homesteads. Most of this movement has occurred in the last 20 years. Based on aerial photography and ground-checking, MacLean *et al.* (1986) estimated that between 1976 and 1983, forest area was reduced from 24,789 Ha (70% of the island's area) to 19,683 Ha (55%), most being converted to agricultural uses, mainly agroforest. This trend appears to be continuing, and further expansion of homesteads into upland forests and mangrove areas can be expected as population continues to rapidly increase. Forest conversion, even to agroforest, stimulates erosion which lowers soil productivity, lowers soil water holding capacity, and degrades water quality. Loss of forest cover also results in lower water tables, lower dry season flows, and increased frequency and severity of flooding (Hamilton and King, 1983). Loss of habitat of both plants and animals, while not yet a serious problem, will also become more severe, resulting in lower populations of many species and possible extinction of rare endemics.

#### b. Critical Issues for Management

Threats to the upland forest can be summarized in critical issues that must be addressed in any attempt to manage Pohnpei's watersheds. Of these, five are of particular relevance to the conservation of upland forest biodiversity and will be addressed through the program outlined in this proposal. These are briefly outlined below.

##### 1. Conversion to Agroforestry and Other Agriculture

Sakau (known in other Pacific areas as kava) is an important traditional crop on Pohnpei, both for ceremonial and recreational use. Although traditionally a beverage of the noble class on Pohnpei, since World War II the use of sakau by the general populace has been steadily increasing. In addition, the cultivation and marketing of sakau has become commercialized, stimulating increased production. The easy market for sakau also means a great deal of stealing. Theft, combined with the plant's need for rich organic soils for best growth, has led to increased cultivation in upland areas. Because overstory trees are cleared during cultivation and the sakau plant is shallow rooted, erosion and mass wasting on steep slopes has increased. At present little data exists on the level of sakau cultivation in the Watershed Reserve. However, anecdotal information along with presumed trends of increased population growth, monetization of the economy and

demand for Sakau by Pohnpeians living off island suggest that if unchecked, cultivation and conversion of upland forests will continue.

## 2. Settlement

Homesteading has already encroached upon the Watershed Reserve Area and the Important Watershed Areas in some parts of Pohnpei. It is reported that people are settled in areas as high as 500 m and on many areas considered "highly erodible". Additional roads and associated infrastructure exert a major influence on homesteading patterns. Improved infrastructure may encourage residents who have moved to urbanized Kolonia to return to rural areas. Combined with natural population growth, a 30% increase in population can be expected over the next five years in some rural areas. While many of these people will locate near roads and infrastructure, a certain number will opt for homesteading in the upland forest watershed areas. So far the State Government has done little to address the issue of "squatters" within the Watershed Reserve, besides maintaining a policy that this land will not be legally transferred to any individual as long as the 1987 law is in force.

## 3. Road Construction

Roads are the single greatest threat to the integrity of the designated watershed area, both in terms of the drastically increased surface runoff and erosion precipitated by their construction and use, and the function they serve in making upland forest more accessible for agriculture, settlement, and other types of accelerated resource use and extraction. Although roads are banned from the designated watershed area under the 1987 law, many existing and planned (already funded) secondary and tertiary roads reach the vicinity of the Watershed Reserve. These roads are typically un-designed, in most cases have virtually no surfacing materials and are commonly built on extreme gradients.

## 4. Hunting

Several of the popular game birds, especially the Micronesian Pigeon (*Ducula oceanica*) and the Caroline Islands Ground Dove (*Gallicolumba kubaryi*) are suffering population decline due to over-hunting. The entire population of the Micronesian Pigeon was estimated to be only 822 birds in 1983 and the Ground Dove was even lower (Engbring et. al., 1990). Although many Pohnpeians comment on the bird population decline, few connect this phenomena with human hunting and settlement activity. In legislation dating from the former Trust Territory, the month of December is the only month the Micronesian Pigeon can be hunted, but illegal poaching is common. This lack of enforcement is in part due to a lack of an agency dealing with terrestrial wildlife (it falls under the Division of Forestry which has neither spare personnel nor wildlife expertise).

## 5. Tourism and Trails

With the growth of tourism on Pohnpei, and an ever-increasing number of Pohnpeians and local expatriates who wish to visit the upland forest and mountain ridges, the issue of trail improvement is becoming more pertinent. The Pohnpeians' traditional dependence

on the upland forest for timber, hunting, medicine, recreation, and as a short-cut across the island has led to a system of existing trails. This trail system consists of "feeder trails" which originate at what could be described as "trail heads" in Madolenihmw, Kitti, and Nett municipalities, and a system of interconnecting ridge trails in the interior. According to Stephen Griswold of the U.S. National Park Service (Trip Report, 1992), the trails are little more than un-constructed paths of least resistance evolved over many years of use. They are sustained without resource damage by a combination of the "light" barefoot steps of the local people and the overall low use of the trails. With the heavier use that tourism and recreation would bring these trails could become severely eroded gullies, especially in the steeper sections. Extractive use of forest resources by tourists, cutting of trees and branches for firewood and bedding for example, could be locally severe if visitor use is unregulated.

#### 4. Project History

As early as 1983, when the USDA Forest Service and local foresters teamed up to do the vegetation survey for the main island (MacLean *et. al.*, 1986), it became evident that inland movement and deforestation 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 delineate and develop legislation to establish a watershed area made up of much of the interior upland forests located on public lands and also to 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, 1985).

The two agencies also closely cooperated in developing the legislation through a series of drafts, with the result that in 1987, the Pohnpei State Legislature enacted "The Pohnpei Watershed Forest Reserve and Mangrove Protection Act of 1987" (S.L. 1L-128-87) (see Appendix). The law assigns all watershed and mangrove forest management responsibilities to the Division of Forestry of the Pohnpei State Department of Conservation and Resource Surveillance (C&RS). The creation of the WFR also specifies that all utilization of the area by residents of any particular municipality must be coordinated with State officials, in other words, continued expansion of homestead farms, agroforestry and sakau cultivation is restrained. This designation has effectively limited the interior boundaries of all municipalities to the Watershed Forest Reserve boundary (Perin, 1991).

However, it became evident early on in the extension/education efforts on the 1987 Forest Watershed Reserve and Mangrove Protection Act that local communities had not been adequately involved in the development of the law. Community awareness was virtually nonexistent, and the proposed rules and regulations, failing to recognize traditional Pohnpeians resource use in the upland forest areas, were almost universally rejected. Boundary survey teams made up of Department of Lands and Division of Forestry employees were turned back in many areas of the island, and several near-violent incidences occurred. These setbacks led to the formation in 1989 of the

Watershed Steering Committee, an interagency task force made up of representatives from various state agencies and non-governmental organizations.

*Conservation  
Retention Swaoi*

The Watershed Steering Committee, under the supervision of the Directors of the Department of Lands and the Department of C&RS, undertook to:

- 1) develop, manage, and carry out the implementation program for S.L. 1L-128-87;
- 2) represent the Pohnpei State Government in all meetings, negotiations, and other implementation activities with municipal governments, traditional leaders, and land users pertaining to S.L. 1L-128-87;
- 3) seek funding and technical assistance from other State agencies or outside agencies as needed for the implementation of S.L. 1L-128-87; and,
- 4) develop and implement a long-term management strategy for the watershed and mangrove forest areas specified under S.L. 1L-128-87.

Based on municipal meetings and field surveys, the WSC determined that three major areas of the designated watershed area were already seriously threatened by inland population movement- the Kehpin Soamwoai area of Kitti Municipality, the Lehdau-Senipehn area of Madolenihmw Municipality, and the Nanpil area of Nett Municipality. These areas were designated as priority areas for watershed education and negotiation.

As a result of the group's work, in 1991 the USDA Forest Service Tropical Forestry Program financed a pilot watershed extension project. Simultaneously, a local NGO group, Woanun Koapin Soamwoai Board, made up of representatives of four villages bordering the watershed area and their chiefs 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 assist the Division of Forestry in watershed education efforts and work with Forestry to develop a local management plan for the Watershed Forest Reserve area. Over the last several months this group, the community members of the four villages, and the Watershed Steering Committee have participated in a series of education and negotiation meetings held both in the communities themselves and in Kolonia, the island's district center. In June 1992 the watershed education and negotiation program was extended to Madolenihmw municipality, resulting in the formation of another local management group, the Lehdau-Senipehn Watershed Board. The eventual goal is to reach all parts of Pohnpei Island.

### B. Objectives

The overall goals of the Area-wide Management Plan are:

1. Protect the integrity of the Pohnpei Island Watershed Forest Reserve area: (a) to

ensure continued supply of high quality water and minimize sedimentation of the fringing reef; (b) to ensure protection of endemic flora and fauna species found within the watershed area; (c) to protect sites of high cultural significance.

2. Encourage economically viable alternatives to the production of "sakau" and other crops and bird hunting within the watershed area, including eco-tourism.
3. Effectively incorporate neighboring community and landowner input into catchment area planning and management.
4. Serve as a model for other Pacific high islands with watershed management problems.

Specific objectives include:

1. Organize Watershed Area Management Committees for approximately ten discrete watershed units  
 Output: development of community organizations for watershed management
2. Extend community education program to all watershed areas on Pohnpei  
 Output: increased community support for watershed protection.
3. Collect baseline data on the biogeography and biodiversity of upland forest areas using scientific teams.  
 Output: more complete and accurate information on forest resources.
4. Update aerial photographic coverage of Pohnpei island.  
 Output: substantial information on resources and resource distribution; accurate information on changes in forest type and cover.
5. Develop methodology and collect data on resources use in cooperation with Watershed Area Management Committees.  
 Output: a better understanding off resource use patterns and their impacts by both project managers and communities
6. Develop a microcomputer based conservation data base.  
 Output: an effective planning tool that integrates information on geophysical characteristics, resource distribution, resource use and land ownership status.
7. Initiate community level watershed planning and management efforts.  
 Output: Watershed use plans and permitting that ensures appropriate uses in watersheds.
8. Develop and strengthen community based watershed monitoring and enforcement.

*Are there 10 Watersheds?*

*PM Watershed*

**Output:** an effective and sustainable watershed monitoring system to implement and enforce watershed management plans.

9. Develop and implement model sustainable development projects to conserve upland forest diversity.

**Output:** adoption of alternative income generating uses of upland forests that minimize impacts to conservation values.

10. Develop and implement regional extension efforts.

**Output:** improved watershed management in other Micronesian high islands based on experience in Pohnpei.

### C. Project Description

#### 1. Project Philosophy

Through the Watershed Protection Act regulatory authority of the Division of Forestry only extends to the designated Watershed Reserve and to a lesser extent Important Watershed Areas. However, these represent a relatively small proportion of the total land area of Pohnpei (about 15%) and less than half (42%) of all dry land forested areas. To achieve the management goals sustainable use of the land must extend to a greater area. It is recognized that the government's coercive authority is limited outside the Watershed Reserve. In other words, the Division of Forestry has almost total legal authority to regulate use in the Watershed Reserve; in Important Watershed Areas this authority is diminished and outside these areas the government's authority is limited to weakly enforced environmental permitting requirements. In practice achieving management goals will be largely dependent on voluntary compliance in all these areas. Two basic themes emerge from these conditions.

First, from a management perspective three concentric rings can be visualized, the Reserve, IWAs and unprotected areas. Management through coercion is most feasible (at least legally) in the inner ring while voluntary compliance as a management strategy takes precedence in the outer ring. Management values, which center around the maintenance of surface water quality and protection of remaining native forest, are greatest in the Reserve where intact forest is abundant and slopes are steep.

The second theme that informs the management regime proposed here is that communities, and especially the forest resource users within them, should participate in management planning and, to the degree feasible, regulation of use. If communities can be made to see that they have the greatest stake in sustainable management of watershed resources and participate in decision making, voluntary compliance will be greater. In addition, if community leaders are supportive, coercion at the community level, which is probably much more effective than government sanctions, may be employed to ensure compliance.

state govt?

important watershed areas

## 2. Project Components

### a. Organize Watershed Area Management Committees

Based on past experience, it has been decided that the first step in developing community based management must be the organization of a local institution to oversee the process and represent the community's interests. After meeting and securing the support of the high chief (Nahnmwahrki) of a particular municipality, a team made up of members of the Watershed Steering Committee, local leaders who participated in the 1991 USDA sponsored Philippine Experience<sup>1</sup> and two Forestry Division extension agents begin to meet with village chiefs 4-6 months prior to community meetings. The village chiefs are educated individually and in groups about the importance of the watershed to their community through discussion and field trips and the contents of the 1987 law. The team and village chiefs from communities within discrete or related watersheds meet and work out the details of forming a Watershed Area Management Committee (or WAMC) that can negotiate with the government and develop and carry out a local watershed management program. Village chiefs are represented on the first of these two committees to be organized, in Kitti and Madolenihmw municipalities. It is expected that future WAMCs will be organized in a similar manner.

It is also proposed that Municipal Watershed Protection Officers be nominated within all municipalities. They will assist in coordinating between WAMCs, the municipal government and the Division of Forestry. The Watershed Protection Officers will also ensure that municipal infrastructure plans, particularly secondary road alignments, are consistent with watershed management goals.

### b. Continue the on-going Watershed Forest and Biodiversity Conservation Community Education Program

Once a WAMC has been organized for a group of villages within a watershed the Watershed Steering Committee provides per diem and transportation for the local WAMC to organize a three month community education program for each village. The education program consists of an initial short educational meeting and a two to three day workshop which utilizes slide shows, video, formal and informal presentations and discussion. This program encourages community members to begin thinking about watershed values and the impacts of current land use practices. Follow-up meetings are organized as needed. Since several villages will be organized under one WAMC this meeting schedule is repeated several times at each community. The Committee members act as community organizers and carry out extension activities within their communities during the three month program. They will also represent the villages in negotiations over watershed boundaries, organize community based surveys and coordinate with the Division of Forestry in developing rules and regulations. Once established a similar approach can be used for future watershed and mangrove forest management activities

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<sup>1</sup>a trip to see environmental degradation first hand in the Philippines.



carried out jointly by the WAMC and the Division of Forestry.

The main areas included in the current education program include:

1. General conservation of soil, water and natural systems such as rain forests, marine and freshwater ecosystems and mangroves.
2. Watershed concepts and importance.
3. Specific information on the Pohnpei legislation.
4. Recognition, appreciation and protection of native and endemic species.

The community education program will also garner support and input for regulations to implement the watershed legislation. The education program also serves as a preliminary for development of community based management systems for all of Pohnpei's watersheds.

#### c. Watershed Use Planning and Development of Regulations

At the conclusion of the community education program the Division of Forestry and the Watershed Steering Committee will work with WAMCs to develop and implement **Watershed Unit Plans (WUPs)**. This phase will consist of three components:

1. gathering data on resources and resource use patterns and conservation values within watersheds
2. synthesis of data at the community level and through the development of a microcomputer based Conservation Data Base; and,
3. development of Watershed Unit Plans and use regulations.

##### i. Data Gathering

Data gathering will take two approaches. Baseline data on upland biota, archaeological sites and human demographics will be carried out by trained scientists from off-island in coordination with local agency personnel. Information on resource use patterns will be gathered through a community participation strategy similar to the one discussed above.

Overall, baseline data is comparatively complete. However, for some groups of organisms (e.g. freshwater fauna) little information exists. Where detailed surveys have been made, of vegetation for example, the information is dated. Because resource use has intensified in the past ten years there is an urgent need for re-surveys to detect changes in distribution and abundance. For this reason the following baseline surveys will be carried out:

1. avifauna 10 year follow-up survey

2. botanical survey
3. freshwater and terrestrial (non-avian) fauna survey
4. archaeological survey
5. socio-cultural surveys
6. updated soil, vegetation and human population census surveys

Aerial photography, a must for proper management, has not been carried out on Pohnpei since 1975. The need for new photography (low-level, 1:8,000, color positive) is imperative to assessment of current forest resources and watershed management, including boundary delineation. Periodically, aerial photos will be repeated to monitor the effect of the watershed management program and for further planning and management needs.

Information on resource use patterns, will be gathered by communities as part of this project phase, employing Participatory Rural Appraisal (PRA) methods. This approach, widely used in Africa, seeks to involve communities directly in planning efforts that lead to better management of local resources.

PRAs will be carried out by teams trained in the methodology who work with communities to identify problems, develop a plan and assist in its implementation. This will require the development of appraisal methodologies appropriate to watershed management and the socio-economic conditions that pertain on Pohnpei. In addition, DoF/WSC personnel must receive PRA training in preparation for the task of developing Watershed Unit Plans. While gathering this data will be of great value for management, the involvement of villagers, so that they better understand the distribution of resources and uses in the watershed is also of importance. If the villagers have this information in hand, augmented by scientific resource surveys, subsequent planning and implementation efforts within the community will be much more easily undertaken.

#### ii. Data synthesis

Data synthesis will be achieved primarily through the development of a microcomputer driven conservation database for Pohnpei Island. This database will be in the form of existing databases to ensure integration with regional databases. Database design will ensure that community gathered data can be integrated into the database and that the information output from the database can be used in community planning efforts. It is likely that the database will eventually take the form of a geographic information system (GIS). Locational information, whether obtained through baseline surveys or participatory community resource use surveys, can be very accurate through the use of hand-held global positioning satellite (GPS) receivers. These units are relatively low cost and give reasonably accurate location fixes. Simple, preliminary methods of data synthesis, ideally involving communities, will also be developed so that watershed planning can proceed prior to full development of the data base.

### iii. Watershed plan development and implementation

While management authority covers only the Reserve and IWAs, WUPs will cover the whole of the respective watershed. Outside the Reserve and IWAs the plan can only recommend action; compliance must be largely voluntary. However, by involving communities in planning efforts through WAMCs, voluntary action will receive more support.

Once information has been gathered on conservation values and use patterns for a particular watershed area planning efforts may begin. Ideally, the microcomputer driven conservation database will be sufficiently developed so that it can be a vital tool in community level planning. However, alternate non-computer driven methods of displaying data for planning will be developed so that watershed planning may begin in the event that the database is not 'up and running.' Communities will be directly involved in planning efforts through community level planning workshops. Zoning and permitting will be the primary management strategies employed in Watershed Unit Plans. As noted elsewhere, planning, and thus zoning, should cover the whole of the watershed unit with voluntary compliance outside of the Reserve and IWAs. Four use zones are proposed:

1. Agricultural Zones.
2. Tourist Buffer Zones
3. Wildlife (Non-hunting) Zones
4. Historical/Cultural Zones

Watershed Unit Plans will also integrate proposed or planned infrastructure including roads, improved trails and village water system catchment areas. A completed watershed unit plan will incorporate zones designated with substantial community input and will form the basis for a system of use permits that will be jointly administered by the Division of Forestry and Watershed Area Management Committees.

Development and implementation of an agricultural use permit system should receive highest priority. While the Division of Forestry seeks to establishing permitting procedures in partnership with local WAMCs, for the sake of overall consistency general guidelines will be developed by the Division of Forestry at the outset. Recreation/tourist permits can be used to monitor and regulate use, raise revenue and help ensure that use is within specified tourist buffer zones. Historical/cultural zones may be designated in the case of culturally important or sacred areas where the general consensus is that visitation must be restricted. Permitting under the Watershed Protection Act will be closely coordinated with permitting activities under state environmental law as a way to regulate road construction.

- d. Develop and strengthen community-based watershed monitoring and enforcement

To ensure the integrity of the watershed area, an effective and sustainable watershed monitoring system must be developed to implement and enforce Watershed Unit Plans. The current plan is to train selected members of the staff of State Forestry Division and local watershed management groups in monitoring and enforcement. In addition a conservation officer will be recruited from each local watershed area. While employed by the Division of Forestry this person will work closely with the local WAMC. It is anticipated that about ten WAMCs will be organized to cover the whole of Pohnpei and thus ten conservation officers will be needed. Conservation officers will receive initial training in watershed and forest conservation, law enforcement and the 1987 law's rules and regulations. They will work closely with local WAMCs beginning in the planning phase. These conservation officers could be recruited from people who go to the forest often. In addition, at a later date they could receive additional training so that they could supplement their income by working part time as forest guides for tourists and other forest visitors. Also, coordination needs to be developed between the Division of Forestry, WAMCs and existing municipal and state law enforcement agencies.

**e. Develop and implement model sustainable development projects that enhance the conservation of upland forest biodiversity.**

Conservation efforts will only be successful if Pohnpeians are able to maintain or improve their standard of living in ways that sustain upland forest and watershed conservation values. To augment education efforts demonstration projects will seek to develop and extend alternative uses and activities for forest areas. One project will address an existing problematic use, the planting of sakau, while the other will encourage a non-consumptive use of forest resources-- ecotourism.

**Alternative production systems for "sakau en Pohnpei"** Determine effect of sakau on the watershed forest area, develop guidelines and/or improved practices to minimize negative impacts and develop alternative production systems, preferably in the lowlands.

**Ecotourism** Determine the feasibility and develop low impact tourism projects consisting of several trails into lower area sites- waterfalls, look-outs, etc. and a series of feeder trails and a main ridge trail. This project would also help to organize and train guides.

**f. Encourage similar watershed management programs on other FSM islands and elsewhere in the Pacific.**

Using the Pohnpei watershed area as a model, hold a watershed workshop for the F.S.M. states and promote exchanges of extension and technical personnel and traditional leaders. The goal of this project component is to encourage the adoption of watershed management principles in other F.S.M. states, including the development of watershed protection legislation, delineation of important watershed areas and promoting watershed education.

## D. Workplan

### 1. Specific Activities for Which Assistance is Requested From SPREP

Assistance from the SPREP South Pacific Biodiversity Conservation Program will be targeted for specific activities within the various program components. These activities are:

1. Per diem and transportation for extensionists and community organizers for WAMC organization and watershed education.
2. Organizational costs for an island wide workshop in mid-1993 on watershed protection to finalize regulations.
3. Materials development for and extension educational package on watershed conservation.
4. Consultancy to develop planning methodology for Watershed Unit Plans and to train local extensionists in methodology.
5. Consultancy to undertake a preliminary assessment for database development.
6. Consultancy to develop community data gathering methodology for data base and community planning and training of local extensionists.
7. Consultancy for design of database and training of local staff.
8. Initial funding (2 years) for a position within the Division of Forestry to maintain database and enter data.
9. Partial funding for conservation officers' salary.
10. Initial funding (3 years) at one quarter time salary for Municipal Watershed Officers.
11. Funding for short term staff and traditional leader exchanges between other FSM states and Pohnpei and the Republic of Palau and Pohnpei as part of the regional extension program.
12. Provide consultancy on ecotourism marketing for sustainable development project component.

Where ever possible SPREP staff will be used for consultancies and funds from the SPBCP would be paid to SPREP.

### 2. Timeline- see Appendix IV

### E. Country Arrangements

The project will be jointly administered by the Division of Forestry, Pohnpei State, and the Pohnpei office of The Nature Conservancy. The Nature Conservancy is an international non-governmental organization that supports conservation and the establishment of protected areas.

#### 1. Principal government contact point:

Herson Anson  
Chief  
Division of Forestry  
Department of Conservation and Natural Surveillance  
Pohnpei State Government  
P.O. Box  
Kolonia, Pohnpei FM 96941

Phone (691) 320-2402

FAX (691) 320-5997

#### 2. In-country project co-coordinator:

Bill Raynor  
Pohnpei Field Representative  
The Nature Conservancy  
P.O. Box 216  
Kolonia, Pohnpei FM 96941

Phone (691) 320-2652

FAX (691) 320-2901

### F. Institutional Arrangements

#### Collaborating Institution:

Micronesian Islands Conservation, Inc.  
c/o The Community College of Micronesia  
P.O. Box 159  
Kolonia, Pohnpei FM 96941

Phone (691) 320-2482

FAX (691) 320-2479

G. Outside Arrangements

Leonard Newell  
Pacific Islands Forester  
Institute of Pacific Islands Forestry  
United States Forest Service  
1151 Punchbowl St., Rm. 323  
Honolulu, HI 96813

Phone 808-541-2628/29

FAX 808-528-0556

Paul McCabe  
Programs Officer  
Asian Development Bank  
P.O. Box 789  
1099 Manila PHILIPPINES

Phone (632) 711-3851

FAX (632) 741-7961

Kelvin Taketa  
Director  
The Nature Conservancy  
Pacific Regional Office  
1116 Smith St. #201  
Honolulu, HI 96817 USA

Phone 808-537-4508

FAX 808-545-2019

F. Budget

The budget outlined below only reflects those projects being requested from SPREP through the SPBCP and relevant Pohnpei State Government (PSG) matching contributions. A full project budget showing all program components and requests to other donor agencies may be found in Appendix V.

PROJECT COMPONENT	PSG			SPREP		
	1993	1994	1995	1993	1994	1995
<b>1. Community Education and Organization</b>						
A. Community ed & org.						
1 Extensionists/community organizers (per diem)				\$21,600		
2 overflights				\$6,400		
3 Island-wide workshop (per diem)				\$3,600		
C. Extension materials development						
1 design				\$5,000		
2 production				\$5,000		
<b>2. Boundary Delimitation and Survey</b>	\$130,000					
<b>3. Watershed Planning</b>						
A Data gathering- land tenure		\$5,000			\$15,000	
3 Community data gathering methodology and training				\$40,000		
4 overflights					\$6,400	
5 Extensionists/community organizers (per diem)				\$5,760	\$34,560	\$2,880
B Data synthesis						
1 Preliminary assessment- database design				\$7,500		
2 database design				\$60,000		
3 training in db operation					\$20,000	
4 data entry and db maintenance					\$5,000	\$6,000
C. Watershed planning						
1 Community planning methodology and training				\$40,000		
2 Extensionists/community organizers (per diem)					\$34,560	\$8,640
<b>4. Monitoring and Enforcement</b>						
A Conservation Officers						
1 training					\$10,000	
2 salary		\$30,000	\$30,000		\$30,000	\$30,000
B Municipal watershed officers						
1 quarter time salary					\$7,500	\$7,500
<b>5. Regional Extension</b>						
A Staff exchange						
1 travel						\$32,000



6. Model Sustainable Development						
B Ecotourism						
1. Marketing consultant					\$20,000	
2. Training					\$20,000	
Overhead	\$12,000	\$12,000	\$12,000	\$6,000	\$6,000	\$6,000
Project Management	\$21,000	\$21,000	\$21,000			
TOTAL	\$163,000	\$68,000	\$63,000	\$200,860	\$203,020	\$93,020

The total amount requested from SPREP for the three year proposal period (FY 1993-1995) is \$496,900.

*5/10/94  
 - 1/10/94 consultant  
 - 1/10/94 TA document  
 Total SPREP contribution  
 1993-94 = \$150,000*

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- Glassman, S. 1952. The Flora of Ponape. Bulletin # 209. Bernice P. Bishop Museum. Honolulu, HI. 152 pp.
- Griswold, S. 1992. Trip Report-- One week in Pohnpei, F.S.M. March 22- March 28, 1992 March 30, 1992 letter to Emensio Eperiam, Historic Preservation Officer, Pohnpei State Government. 5 pp.
- Hamilton, L. with P. King. 1983. Tropical Forested Watersheds: Hydrologic and Soils Response to Major Uses or Conversions. Westview Press, Boulder Colorado. 168 pp.
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- Perin, D. 1991. First Physical Development Plan: Kitti Municipality, Pohnpei, Federated States of Micronesia. 148 pp. plus appendices.
- Spengler, S. 1990. Geology and Hydrogeology of the Island of Pohnpei, Federated States of Micronesia. PhD Dissertation, University of Hawaii

Appendices

I. Biodiversity of Pohnpei's Watershed Forest Reserve Area

II. The Pohnpei Watershed Forest Reserve and Mangrove Protection Act of 1987

III. Map of Pohnpei showing Watershed Forest Reserve

IV. Timeline

V. Overall Project Budget

## APPENDIX 1

### BIODIVERSITY OF POHNPEI'S WATERSHED FOREST RESERVE AREA

#### Flora

A combination of strong traditional respect for the upland forest, heavy human depopulation during the last century, and relatively difficult access to inland areas have spared the upland forests of Pohnpei Island from much of the disturbance and destruction that occurred on other islands. These, along with the relative age and isolation of the island make the flora of Pohnpei's upland forests some of the most diverse in Micronesia, with a high level of endemism. Several forest types make up the upland forest resource, including the most widespread broadleaf forest dominated by Camposperma brevipetiolata, Elaeocarpus spp., Parinari glaberrimum, and other tree species; scattered palm forest dominated by the endemic palm Clinostigma ponapensis, Garcinia ponapensis, and Cinnamomum carolinense; and small patches of swamp forest, Pandanus forest, and cloud or dwarf forest. The palm forest especially is unique in Micronesia and is found only on Pohnpei. Of 767 plant species recorded on Pohnpei, 264 species (34.4%) are found chiefly in the upland forests. Of the total number of plant species 111 species (14.6%) are endemic to Pohnpei, 101 or 90% of these found mainly in the upland forests. Major endemic families include Euphorbiaceae (7 species), Orchidaceae (35 species), Polypodiaceae (10 species), and Rubiaceae (10 species). Notable endemic plants include Fragraea berteriana var. sair (Gentianaceae), "seir en Pohnpei", an epiphyte with fragrant flowers popular for "mwarmwars"; Garcinia ponapensis (Guttiferae), "kehnpwil", a common understory tree in the palm forests that can burn even when wet; Cinnamomum carolinense (Lauraceae), "madeu", the bark used as a delicious popular medicinal tea; Clinostigma ponapensis (Araceae), "kolop", Ptychosperma hosonoi and P. ledermanii (Araceae), "kedei", all endemic palms with various food and other uses; Metroxylon amicarum (Araceae), "oahs", a local ivory nut palm; Alpinia carolinensis (Zingiberaceae), "iuiu", a large attractive member of the ginger family; Cyathea nigricans and C. ponapensis (Cyathaceae), local tree ferns; and Palaquium karrak (Sapotaceae), "karak", and four species of Elaeocarpus (Tiliaceae), all important timber trees for local use.

#### Avifauna

Birds are the most important animal resource in the Pohnpei upland forests. Of 26 species of birds found on the island, 24 nest and/or otherwise inhabit the upland forest. Of the 26 species, 9 species are endemic to Micronesia, five endemic to Pohnpei alone. Besides the numerous sea birds that nest in the upland forests, notable bird of the upland forests include the Micronesian Pigeon (Ducula oceanica, "mwato"), a large popular gamebird that inhabits the upper canopy; the ground nesting Caroline Islands Ground Dove (Gallinucula kubaryi, "pelohs");

the Purple-Capped Fruit Dove (Ptilinopus porphyraceus, "kiniwed"), another popular game bird; the Pohnpei Lory (Trichoglossus rubiginosus, "serehd"), the only endemic member of the parrot family in Micronesia and the Pohnpei State bird; the abundant Micronesian Starling (Aplonis opacus, "sioahk") and its very rare relative, the Pohnpei Mountain Starling (Aplonis pelzelni, "sie"); the Pohnpei Short-eared Owl (Asio flammeus, "likoht"), an endemic owl inhabiting forest openings; and the small, common Pohnpei Flycatcher (Myiagra pluto, "koikoi"). Endangered species include the Nightingale Reed warbler (Aerocephalus Iuscinia, "limwedi"), the Pohnpei Greater White-eye (Rukia longirostris, "tiht" or "torong"), the Pohnpei Mountain Starling and the Pohnpei Short-eared Owl. Other avifauna of special concern include the Micronesian Pigeon, the Pohnpei Lory, Audobon's Shearwater (Puffinus lherminieri, "liparok"), the Cicadabird (Coracina tenuirostris, "totopai"), 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).

#### REFERENCES

- Engbring, J., F. Ramsey, and V. Wildman. 1990. Micronesian Forest Bird Surveys; The Federated States: Pohnpei, Kosrae, Chuuk, and Yap. USDOI Fish and Wildlife Service, Honolulu, HI. 312 pp.

Appendix II: The Pohnpei Watershed Forest Reserve and Mangrove  
Protection Act of 1987

FIRST PohnPEI LEGISLATURE  
FOURTH REGULAR SESSION, 1987

L. B. No. 381-85  
L. O. 1  
L. O. 2

S. L. No. 12-128-87

AN ACT

Relating to the dedication and vesting of use and management rights in certain public trust lands to the State Government for watershed forest protection purposes, to the protection of important watershed areas and to the conservation of mangrove forests on Pohnpei.

BE IT ENACTED BY THE PohnPEI LEGISLATURE:

1 Section 1. Short title. This act is known and may be cited as  
2 the Pohnpei Watershed Forest Reserve and Mangrove Protection Act of  
3 1987.

4 Section 2. Purpose. The purpose of this act is to create and  
5 provide for the protection and maintenance of an effective watershed  
6 forest reserve, to protect important watershed areas and to provide for  
7 the conservation and management of mangrove forests.

8 Section 3. Findings. The Legislature finds that:

9 (1) There are many thousands of hectares of public trust  
10 lands with highly erodible soils, that should not be cleared of forest  
11 cover and/or used for domestic and farm purposes because such uses  
12 endanger the watersheds of Pohnpei;

13 (2) There are in Pohnpei's forests, unique and valuable  
14 plants and animals that require legal protection to assure their con-  
15 tinued survival;

16 (3) Mangrove forests provide the basis for healthy fisheries,  
17 and are thus of benefit to all the people of Pohnpei; and

18 (4) The conservation, protection and wise management of  
19 Pohnpei's forests in perpetuity is of material benefit to all the  
20 people of Pohnpei.

21 Section 4. Definitions. Unless the context or phrase requires  
22 for purposes of this act:

23 (1) "Board" means the Pohnpei Environmental Protection  
24 Advisory Board or its successor in Pohnpei law.

25 (2) "Chief" means the Chief of the Division of Forestry of

L. O. No. 331-85  
L. O. 1  
L. O. 2

---

1 the Department of Conservation Resource Surveillance.

2 (3) "Director" means the Director of the Department of Con-  
3 servation and Resource Surveillance.

4 (4) "Watershed forest reserve" means a large, contiguous  
5 area of highly or very highly erodible soils that is protected from  
6 development and retained in forest cover to provide long-term water  
7 supply for Ponape.

8 (5) "Important watershed areas" means areas that, as of  
9 1985, were already inhabited on highly erodible soils, and that will  
10 require special care to avoid polluting river systems, or increasing  
11 other associated hazards.

12 (6) "Highly erodible or very highly erodible soils" means  
13 soils defined by the USDA Soil Conservation Service (SCS) in the 1982  
14 report Soil Survey of Ponape, Federated States of Micronesia as having  
15 a high or very high potential for being eroded by water. Specifically,  
16 they are as follows:

17 SCS #

---

18 301	Dolokel - Fomseng Association, 30-60% slopes
19 303	Dolokel - Fomseng Association, 30-60% slopes, cobbly
20 305	Fomseng-Dolokel Association, 60-100% slopes
21 308	Fomseng Variant silt loam, 30-60% slopes
22 318	Toloster-Dolen Association, 30-60% slopes
23 319	Toloster-Dolen Association, 60-100% slopes

24 These soils are shown approximately on the attached map bounded by a  
25 red line.

L. B. No. 381-85

L. O. 1

L. O. 2

1           (7) "Permit" means a written instrument allowing a specified  
2 use in a Watershed Forest Reserve, or Important Watershed Area issued by  
3 the Director.

4           (8) "Mangrove forest" means a salt-tolerant tidal fringe  
5 ecosystem of trees, other plants and animals.

6           (9) "Solid waste" means any refuse composed of metal,  
7 plastic, glass, wood or wood fibers, synthetic material or any non-  
8 liquid substance deemed unsafe for the health of a watershed by the  
9 Director.

10           (10) "Polluting liquids" means any synthetic liquid substance  
11 which will or may get into ground or surface water, such as gasoline,  
12 oil, brake fluid, pesticides, laboratory chemicals or any liquid sub-  
13 stance deemed unsafe for the health of a watershed by the Director.

14           Section 5. Establishment of a Watershed Forest Reserve. Pursuant  
15 to Section 5 of D.L. No. 4L-203-79, as amended, the Pohnpei Public Lands  
16 Authority is hereby empowered, authorized and instructed to dedicate and  
17 vest the control and use rights in the following delineated public trust  
18 lands to the State Government, Department of Conservation and Resource  
19 Surveillance, to be managed as a watershed forest reserve:  
20 all public lands within the green line on the attached USGS topographic  
21 map.

22           (1) Boundary marking and maintenance will be necessary to  
23 assure enforcement of this act. The Division of Forestry, with the  
24 assistance of surveyors from the Division of Lands and Surveys, will  
25 establish the boundary on the ground and describe it in metes and bounds



1 within 18 months following the effective date of this act. Maintenance  
2 of the boundary will be the responsibility of the Division of Forestry.

3 (2) Uses permitted within the watershed forest reserve, under  
4 permit from the Director, are as follows:

- 5 (a) Growing of certain crops;
- 6 (b) Research on plants, animals, and natural processes;
- 7 (c) Recreation such as hiking, camping in designated  
8 areas and sightseeing;
- 9 (d) Gathering of wild plants;
- 10 (e) Harvesting of timber, under supervision of the  
11 Chief; PROVIDED that watershed protection is the principal concern for  
12 use of the land, and any timber harvesting so permitted is planned and  
13 conducted so as to assure watershed protection; and
- 14 (g) Other such uses as may be deemed compatible with  
15 watershed protection as authorized in writing by the Director.

16 (3) Uses specifically forbidden within the Watershed Reserve  
17 are as follows:

- 18 (a) Permanent occupancy of any kind, or the building of  
19 structures such as houses, sheds, or barns;
- 20 (b) Any use of pesticides or other chemicals, unless  
21 specifically permitted after appropriate environmental review;
- 22 (c) Building of roads or trails unless permitted in  
23 writing by the Director after appropriate environmental review;
- 24 (d) Cutting of any trees, except as may be authorized  
25 under permit;

1 (e) Clearing by the use of fire, or any other use of  
2 fire not authorized by written permit; and

3 (f) Grazing of livestock.

4 Section 6. Important watershed areas. The Legislature finds that  
5 the lands lying between the green and red lines on the attached USGS  
6 topographic map are on soils designated as erodible or highly erodible  
7 by the Soil Conservation Service, are partly occupied by farms and home-  
8 steads, and are important watershed areas to all the people of Palmpel.

9 (1) The Division of Forestry, with the assistance of sur-  
10 veyors from the Department of Land, will establish the boundary corres-  
11 ponding to the mapped red line on the ground and describe it in metes  
12 and bounds, assuring that the line is entirely on public lands, within  
13 two years of the date of final approval of this act. Maintenance of the  
14 boundary will be the responsibility of the Division of Forestry.

15 (2) In order to assure the future protection of these  
16 important watershed areas, the following restrictions shall apply within  
17 them:

18 (a) No additional building of roads or structures is  
19 permitted after the date that this act becomes law;

20 (b) No rebuilding or improvement of structures now in  
21 existence is permitted;

22 (c) The Board shall strictly enforce all regulations  
23 pertaining to location and design of toilets, septic tanks, drain  
24 fields, piggeries, fire, use of chemicals, and other pertinent regula-  
25 tions within these areas;

1 (d) All disposal of solid waste shall be at authorized  
2 dump sites located outside of the important watershed area; dumping of  
3 solid wastes within the area is forbidden;

4 (e) Any dumps currently existing within this area shall  
5 be cleaned up within one year of the effective date of this act, by  
6 those who created them or by the Department of Public Works; and

7 (f) It is at all times forbidden to dump polluting  
8 liquids on the ground or to dispose of them by any manner within the  
9 area.

10 (j) The Board shall monitor a representative sample of these  
11 areas to see how well the above restrictions, and the enforcement of  
12 them, work to protect the important watershed areas. Within three years  
13 of the effective date of this act, and every three years thereafter, the  
14 Board shall submit a report to the Legislature on the status of water-  
15 shed protection in these areas, together with recommendations for any  
16 improvements deemed necessary. The Director shall concur in this  
17 report, or shall state in writing to the Governor any differences with  
18 it.

19 Section 7. Mangrove forests. Broad goals for the mangrove forests  
20 of Palau are to conserve these forests for the maximum sustainable  
21 benefit to people, and to minimize those non-sustainable or conversion  
22 activities that lead to the destruction of the forests. Cooperation  
23 between the Department of Conservation and Resource Surveillance and  
24 the Board will be necessary to meet these broad goals.

25 (1) Within two years of the effective date of this act,

---

1 The Director shall make a study to determine which mangrove areas of  
2 Pohnpei, if any, should be designated as Pohnpei mangrove forest  
3 reserves. The Director's report will include recommendations for pro-  
4 tection and management of any areas so designated.

5 (2) Upon passage of this act and filing of regulations, the  
6 following restrictions shall apply to all mangrove forests on Pohnpei:

7 (a) All cutting of trees is prohibited except as  
8 permitted in writing by the Director, through the Chief of the Division  
9 of Forestry;

10 (b) All dredging, road building and other major land-  
11 disturbing activities affecting mangrove forests, whether privately or  
12 publicly sponsored, will require approval and a permit from the  
13 Director. Environmental review will be required for all such projects  
14 prior to approval;

15 (c) The building of new houses, sheds or other struc-  
16 tures will be allowed only if the proponent can show a valid deed for  
17 the property to be built upon, or if the Pohnpei Public Lands Authority  
18 and the Director agree that a permit can be issued without significantly  
19 harming the mangrove forest. If either disagrees, the permit will be  
20 denied; and

21 (d) All use of chemical pesticides and herbicides, and  
22 the dumping of solid waste or polluting liquids is prohibited in  
23 mangrove forests except as may be permitted by the Director after  
24 appropriate environmental review.

25 Section B. Authorization for appropriation. There are hereby

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1 authorized to be appropriated annually from the General Fund of Pohnpei  
2 such sums as are deemed necessary to implement this act, the sums herein  
3 authorized for appropriation shall be administered and expended by the  
4 Governor solely for the purpose of this act. The Governor shall report  
5 to the Legislature on or before October 15, following each fiscal year  
6 wherein sums are appropriated under the authorization of this Section.  
7 All sums appropriated for a fiscal year, remaining unexpended or un-  
8 obligated for expenditure at the end of the fiscal year shall revert to  
9 the General Fund of Pohnpei.

10 Section 9. General Provisions.

11 (1) The Director shall make and prescribe rules and regula-  
12 tions for the use of watershed forest reserves, important watershed areas,  
13 and mangrove forests. Proclamation of initial regulations by the Direc-  
14 tor, for the implementation of this act shall be completed within  
15 90 days after the effective date of this act. Copies of the Department  
16 regulations pursuant to this act shall be available for inspection at  
17 the offices of the Director and the Chief of the Division of Forestry.

18 (2) The Director and the Chief shall, to the maximum extent  
19 possible, cooperate and coordinate with the Board, the Marine Resources  
20 Division, water authorities, and with all other agencies or organi-  
21 zations, public or private, which are concerned with forest resources,  
22 and with the College of Micronesia.

23 (3) Public understanding and acceptance of the provisions of  
24 this act are important to the success of its objectives. The Director  
25 shall work with the College of Micronesia and the Pohnpei Department of

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1 Education in curriculum development and training for grade school and  
2 high school level teachers, and in extension education for adults.

3 Areas of education that need to be emphasized are:

- 4                   (a) General conservation of soil, water and natural  
5 systems such as forests, mangroves, and lagoons;  
6                   (b) Watershed concepts and importance;  
7                   (c) Specific education regarding this act;  
8                   (d) Wildfire prevention and responsible use of fire; and  
9                   (e) The recognition, appreciation and protection of  
10 native species.

11                   (4) The enforcement of the provisions of this act shall be as  
12 follows:

13                   (a) Patrol of the areas and their boundaries established  
14 by this act, and reporting of violations, will be the responsibility  
15 of the Division of Forestry. All other law enforcement agencies on  
16 Pohnpei are also specifically authorized and encouraged to enforce the  
17 provisions of this act.

18                   (b) Taking legal action against reported violators  
19 shall be the responsibility of the Pohnpei Department of Justice.

20                   (5) Penalties for violation of certain provisions of this act  
21 are as follows:

22                   (a) Anyone who violates Subsection (1) of Section 5 or  
23 Subsection (2) of Section 6 of this act shall be subject to a fine  
24 of not more than \$500, a term of not more than six months in jail for  
25 each offense, and liability for restoration of the site(s) to as near

1 original condition as possible.

2 (b) Violators of Subsection (3) of Section 5, regarding  
3 prohibited uses in a watershed forest reserve, and Subsection (2) of  
4 Section 7, regarding prohibited uses in mangroves, shall be subject to a  
5 fine of not more than \$1,000 and a jail term of not more than one year  
6 for each offense, and liability for restoration of the site(s) to as  
7 near its original condition as possible; except that violation of  
8 Paragraph (d) of Subsection (3) of Section 5, and Paragraph (a) of Sub-  
9 section (2) of Section 7, shall carry a fine of up to \$1,000 per tree so  
10 cut, consistent with D.L. No. 4L-203-79, as amended.

11 Section 10. Effective date. This act shall take effect upon its  
12 approval by the Governor, or upon its becoming law without such  
13 approval.

14

15 PASSED BY THE Pohnpei LEGISLATURE ON 21 OF MAY, 1987.

16

17

18

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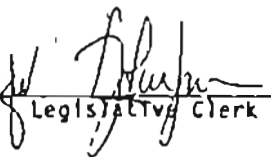
  
\_\_\_\_\_  
Speaker, Pohnpei Legislature

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22

23

Attest:   
\_\_\_\_\_  
Legislative Clerk

24

25

Approved: Became law pursuant to Section 11(5) Article 10 of Pohnpei Constitution  
\_\_\_\_\_  
Governor, Pohnpei Dec 17, 1987  
Date





POHNPEI

NETT


U

SOKEHS

KOLONIA

KITTI

MADOLENIHMW

-  Mangrove
-  Watershed Forest Reserve

