

**Federated States of Micronesia  
State-Wide Assessment and Resource Strategy  
2010 – 2015 +**



## Table of Contents

Glossary of terms and acronyms .....	7
<b>I. FSM NATIONAL GOVERNMENT .....</b>	<b>8</b>
<b>Introduction.....</b>	<b>8</b>
<b>A Basis for future program, agency, and partner coordination .....</b>	<b>11</b>
1. State Forest Stewardship Coordinating Committee .....	11
2. State Technical Committee .....	13
3. State wildlife agency .....	13
4. Applicable Federal land management agencies .....	13
5. State Urban Forestry Council.....	13
6. Tribes (indigenous people) .....	14
7. State lead agency for the Forest Legacy Program.....	14
<b>Plans consulted and/or attached: .....</b>	<b>14</b>
1. Wildlife Action Plans.....	14
2. Community Wildfire Protection Plans .....	14
3. Forest Legacy Assessment of Need .....	14
4. Other .....	14
<b>FSM SWARS Process .....</b>	<b>14</b>
<b>Acknowledgements .....</b>	<b>15</b>
<b>Summary of Major Points.....</b>	<b>16</b>
Cross-cutting Issue.....	16
Food security .....	16
Watersheds.....	17
Production and sustainable harvesting .....	17
Coastal Stabilization .....	17
Urban Forestry .....	18
Capacity building.....	18
<b>Bibliography of FSM documents .....</b>	<b>19</b>
<b>II. YAP STATE .....</b>	<b>21</b>
<b>Introduction.....</b>	<b>21</b>
<b>I. Forest Assessment .....</b>	<b>22</b>
A. Food Security .....	31
B. Biodiversity Conservation.....	38
C. Watersheds .....	46
E. Coastal stabilization .....	51
F. “Urban” Forestry .....	52
G. Capacity-building.....	53
<b>II. Resource Strategy .....</b>	<b>54</b>
Long-term Desired conditions .....	54

General and Long-Term Strategies .....	55
Strategies for the next 5 years .....	55
Resources for addressing Strategy .....	57
Program Integration .....	66
Long-term Monitoring .....	68
<b>List of Yap Maps.....</b>	<b>69</b>
<b>References.....</b>	<b>69</b>
<b>III. CHUUK STATE .....</b>	<b>72</b>
<b>Introduction.....</b>	<b>72</b>
<b>I. Forest Assessment .....</b>	<b>73</b>
A. Food Security .....	77
B. Coastal stabilization .....	80
C. Biodiversity Conservation.....	82
D. Watersheds.....	85
E. Production & sustainable harvesting .....	85
F. “Urban” Forestry .....	88
G. Capacity-building.....	90
<b>II. Resource Strategy .....</b>	<b>91</b>
Long-Term Desired Conditions and Strategies.....	91
Resources .....	92
Long-term monitoring.....	103
<b>List of Chuuk Maps .....</b>	<b>103</b>
<b>References.....</b>	<b>103</b>
<b>IV. POHNPEI STATE .....</b>	<b>105</b>
<b>Introduction.....</b>	<b>105</b>
<b>I. Forest Assessment .....</b>	<b>105</b>
A. Food Security .....	110
B. Coastal Stabilization.....	112
C. Biodiversity .....	114
D. Watershed .....	119
E. Production & sustainable harvesting .....	122
F. “Urban” Forestry .....	122
G. Capacity-building.....	123
<b>II. Resource Strategy .....</b>	<b>124</b>
Long-Term Desired Conditions .....	124
Program Integration .....	124
Resources .....	124
General Strategies for Addressing Threats .....	126
Long-Term monitoring .....	133
<b>List of Pohnpei Maps .....</b>	<b>133</b>

<b>References.....</b>	<b>133</b>
<b>Appendices.....</b>	<b>134</b>
<b>V. KOSRAE STATE.....</b>	<b>135</b>
<b>Introduction.....</b>	<b>135</b>
<b>I. Forest Assessment .....</b>	<b>135</b>
A. Biodiversity.....	140
B. Coastal Stabilization.....	145
C. Watersheds.....	148
D. Food Security.....	152
E. Production and Sustainable Harvesting.....	155
F. Urban Forestry.....	157
G. Capacity Building.....	161
<b>II. Resource Strategy .....</b>	<b>162</b>
Long-term Desired Conditions .....	162
Resources.....	162
Strategy for investing USFS State and Private grants.....	163
The Kosrae Invasive Species Plan .....	168
Program Integration.....	168
Long-term monitoring.....	168
<b>List of Kosrae Maps.....</b>	<b>169</b>
<b>References.....</b>	<b>169</b>
<b>Appendices.....</b>	<b>170</b>
<b>VI. FOREST LEGACY – ASSESSMENT OF NEED.....</b>	<b>171</b>
<b>Introduction.....</b>	<b>171</b>
<b>I. Kosrae State.....</b>	<b>173</b>
Kosrae State Statistics.....	175
<b>II. Existing Conditions and Trends .....</b>	<b>175</b>
A. Government.....	175
B. Non-Government Entities .....	176
C. Social & Cultural Values.....	176
D. Marine Environment .....	177
E. Terrestrial Environment.....	180
F. Soils.....	180
G. Mineral Resources .....	181
H. Water Resources .....	182
I. Biodiversity.....	183
J. Forests .....	185
K. Public & Private Land Boundaries.....	188
<b>III. The Need for a Forest Legacy Plan.....</b>	<b>192</b>
A. The Importance of Forest Resources.....	192
B. Threats & Constraints on Kosrae’s Biodiversity.....	194

C. Goals and Objectives of the Assessment of Need .....	200
D. Criteria, Eligibility, FLA Selection & Program Amendments .....	200
E. Administration of Forest Legacy Areas.....	203
F. Recommended Forest Legacy Areas .....	206
<b>IV. Public Involvement in the Assessment Phase .....</b>	<b>206</b>
<b>List of Kosrae AON Maps.....</b>	<b>207</b>
<b>References.....</b>	<b>207</b>
Appendix I: Draft Application/Project Brief - Yela Forest Watershed.....	209
Appendix II: State Forest Stewardship Coordinating Committee.....	214
Appendix III: List of Areas of Biological Significance for the Nation.....	215

## Tables & Maps

### FSM National Government

<i>FSM Table-1: National Themes and Objectives.....</i>	<i>9</i>
<i>FSM Table-2: Membership of State Forest Stewardship Coordinating Committee .....</i>	<i>12</i>

### Yap State

<i>Map Y-1: Yap State.....</i>	<i>21</i>
<i>Map Y-2: The Vegetation of Yap .....</i>	<i>23</i>
<i>Map Y-3: Areas of native forest.....</i>	<i>25</i>
<i>Map Y-4: Mainland Yap areas of relatively intact native forest.....</i>	<i>26</i>
<i>Table Y-1: Summary of Yap State Issues arranged by FSM &amp; National Themes and Issues .....</i>	<i>29</i>
<i>Map Y-5: Spatial analysis of the impact of a 1-meter rise in sea level.....</i>	<i>34</i>
<i>Map Y-6: Vegetation vulnerable to storm surge.....</i>	<i>35</i>
<i>Map Y-7: General Soil types.....</i>	<i>36</i>
<i>Map Y-8: General soils types with zone of 1 meter sea level rise.....</i>	<i>37</i>
<i>Map Y-14: Yap State "areas of biodiversity significance" and protected areas.....</i>	<i>40</i>
<i>Map Y-9: Control of invasive Imperata grass. ....</i>	<i>42</i>
<i>Map Y-10: USFS Fire vulnerability map.....</i>	<i>44</i>
<i>Map Y-11: Areas of most flammable vegetation &amp; areas burnt by wildfires.....</i>	<i>45</i>
<i>Map Y-12: Yap streams, watersheds and wetlands. ....</i>	<i>48</i>
<i>Map Y-13: Watershed, Vegetation, and Fire.....</i>	<i>49</i>
<i>Table Y-2: Resources available for addressing overall SWARS.....</i>	<i>59</i>
<i>Table Y-3: Strategies and Actions .....</i>	<i>60</i>

### Chuuk State

<i>Map C-1: Chuuk Lagoon and Outer Islands of Chuuk State.....</i>	<i>72</i>
<i>Map C-2: Vegetation of high islands showing general vegetation types.....</i>	<i>74</i>
<i>Table C-1: Summary of FSM Issues, Priority Landscapes, and national themes.....</i>	<i>76</i>
<i>Map C-3: Food Security.....</i>	<i>79</i>
<i>Map C-4: Coastal Stabilization.....</i>	<i>81</i>
<i>Map C-7: Chuuk Areas of Biological Significance.....</i>	<i>84</i>
<i>Map C-5: Priority areas for development for production &amp; sustainable harvesting .....</i>	<i>87</i>
<i>Map C-6: Urban Areas, showing high, medium and low priority areas for urban forestry.....</i>	<i>89</i>
<i>Table C-2: Resources available to carry out SWARS strategies .....</i>	<i>93</i>
<i>Table C-3: Strategies and Actions.....</i>	<i>94</i>

### Pohnpei State

<i>Map P-1: Vegetation of Pohnpei.....</i>	<i>106</i>
<i>Map P-2: Serious progressive decline in native forest.....</i>	<i>108</i>

<i>Table P-1: Summary of National Themes, FSM Issues and Priority</i> .....	109
<i>Map P-3: Areas suitable for agroforestry production for food security</i> .....	111
<i>Map P-4: Areas of moderate and high concern for coastal stabilization</i> .....	113
<i>Map P-5a: Pohnpei State areas of biodiversity significance</i> .....	115
<i>Map P-5b: Areas of biodiversity significance, Outer Islands of Pohnpei</i> .....	116
<i>Map P-5c: Areas of biodiversity significance, Outer Islands of Pohnpei</i> .....	117
<i>Map P-6: Occurrences of targeted invasive species</i> .....	120
<i>Map P-7: Private settlements within the watershed reserve</i> .....	121
<i>Table P-2: Resources</i> .....	125
<i>Table P-3: Strategies by FSM Issues, Funding, Cooperators, and Performance Measures</i> .....	127

## **Kosrae State**

<i>Map K-1: Generalized vegetation map of Kosrae</i> .....	136
<i>Table K-1: Summary of Kosrae State Issues and Priority Landscape areas</i> .....	138
<i>Map K-2: Kosrae "areas of biodiversity significance"</i> .....	142
<i>Map K-3: Marxan analysis of Kosrae "areas of biodiversity significance"</i> .....	143
<i>Map K-4: Kosrae Forest Legacy Map</i> .....	144
<i>Map K-5: Coastal Forests</i> .....	146
<i>Map K-6: Coastal hazard zones of Kosrae</i> .....	147
<i>Map K-7: Digital Elevation Model with Important Watersheds</i> .....	149
<i>Map K-8: Important watersheds and rivers</i> .....	150
<i>Map K-9: Highly erodible soils</i> .....	151
<i>Map K-10: Kosrae Agroforest and areas used or potentially useable for food production</i> .....	153
<i>Map K-10b: Priority areas for food security</i> .....	154
<i>Map K-11: Incidence of 3 targeted invasive species</i> .....	156
<i>Map K-12: Areas of urban development, agroforestry, and urban cultivation</i> .....	158
<i>Map K-13: Urban and agroforest areas</i> .....	159
<i>Map K-14: High, medium, and low priority areas for urban forestry</i> .....	160
<i>Table K-2: Resources</i> .....	163
<i>Table K-3: Issues, strategies, S&amp;P funding and leveraging</i> .....	164

## **Forest Legacy - Assessment of Need**

<i>Map AON-1: Map of Federated States of Micronesia</i> .....	171
<i>Map AON-2: Kosrae Municipalities Boundaries</i> .....	174
<i>Map AON-3: Trochus Sanctuary</i> .....	178
<i>Map AON-4: Utwe-Walung Marine Park Sanctuary</i> .....	179
<i>Table AON-1: Kosrae Soil Classification</i> .....	180
<i>Map AON-5: Highly Erodible Soils of Kosrae</i> .....	181
<i>Map AON-6: Kosrae Watershed Map</i> .....	183
<i>Table AON-2: Areas of Biological Significance</i> .....	184
<i>Map AON-7: Areas of Biological Significance</i> .....	185
<i>Map AON-8: The Yela Forests on Kosrae</i> .....	188
<i>Map AON-9: Japanese Line and Public and Private Boundaries</i> .....	189
<i>Map AON-10: Kosrae Areas of Particular Concern</i> .....	191
<i>Map AON-11: Special Consideration District</i> .....	192
<i>Map AON-12: Kosrae Roads</i> .....	196
<i>Map AON-13: Kosrae Watershed with Roads Overlay</i> .....	197
<i>Map AON-14: Mangrove and Swamp forests in the Yela area</i> .....	199
<i>Map AON-15: Kosrae Forest Legacy Areas</i> .....	202

## ***Glossary of terms and acronyms***

AON	Forest Legacy Assessment of Need
BSAP	Biodiversity Strategic Action Plan
CE	Conservation Education
CFAA	Cooperative Forestry Assistance Act
COM-FSM	College of Micronesia - FSM
CRE	Cooperative Research & Extension - COM-FSM
CWPP	Community Wildfire Protection Plans
DLNR	Department of Lands and Natural Resources (Pohnpei)
FSM DRD	FSM Department of Resources and Development
YDRD	Yap Department of Resources and Development
DREA	Department of Resources and Economic Affairs (Kosrae)
EQIP	Environmental Quality Incentives Program
EPA	Environmental Protection Agency (Pohnpei, Chuuk, or Yap not US)
F&AM	Fire & Aviation Management
FS	USDA Forest Service
FSM	Federated States of Micronesia
FSP	Forest Stewardship Program
GIS	Geographic Information System
NRCS	USDA Natural Resources Conservation Service
RNGR	FSP Reforestation, Nurseries & Genetic Resources
S&PF	State & Private Forestry
S&WCD	Soil & Water Conservation District
SAP	Spatial Analysis Project
SDP	FSM Strategic Development Plan
SFSCC	State Forest Stewardship Program Coordinating Committee
STC	State Technical Committee = TAC (NRCS)
SWARS	State-Wide Assessment and Resource Strategy
TAC	Technical Advisory Committee = STC (NRCS)
U&CF	Urban & Community Forestry
USDA	United States Department of Agriculture
USFS	United States (Department of Agriculture) Forest Service

## I. FSM NATIONAL GOVERNMENT

### *Introduction*

State-Wide Assessments and Resource Strategies (SWARS) are a tool for islands to identify their highest priorities for forest resource management and seek implementation of their strategies, with on-island partners and with assistance from the United States Department of Agriculture (USDA) Forest Service (FS).

State assessments and resource strategies are integral to the Forest Service's State and Private Forestry (S&PF) Redesign and required as an amendment to the Cooperative Forestry Assistance Act (CFAA), as enacted in the 2008 Farm Bill. Each State is required to complete a State Assessment and Resource Strategy within two years after enactment of the 2008 Farm Bill (June 18, 2008) to receive funds under CFAA.

This SWARS includes two components to the assessment and planning required by the S&PF Redesign approach to identify priority forest landscape areas and highlight work needed to address national, regional, and state forest management priorities:

**State-wide Assessment of Forest Resources**—provides an analysis of forest conditions and trends in the state and delineates priority rural and urban forest landscape areas.

**State-wide Forest Resource Strategy**—provides long-term strategies for investing state, federal, and other resources to manage priority landscapes identified in the assessment, focusing where federal investment can most effectively stimulate or leverage desired action and engage multiple partners.

The SWARS provides a basis for subsequent annual grant proposals, as authorized under several CFAA programs. The Redesign deemphasizes program-by-program planning and emphasizes program integration to meet island priorities, which are in turn tied to one or more broad national themes and objectives (Table 1).



**FSM Table-1: National Themes and Objectives**

U.S. National Themes	FSM Issues	Relevant FSM SDP Sector Goals
<b>1. Conserve Working Forest Landscapes</b>	1. Food security	<u>Agriculture Sector Strategic Goal 1:</u> A well resourced and properly focused agriculture sector operating within a stable and consistent policy framework
1.1. Identify and conserve high priority forest ecosystems and landscapes	(agroforest) in response to climate change impacts	
1.2. Actively and sustainably manage forests		<u>Agriculture Sector Strategic Goal 2:</u> Increase production of traditional farming systems for home nutritional and traditional needs and cash incomes
<b>2. Protect Forests from Harm</b>	2. Coastal stabilization	
2.1. Restore fire-adapted lands and reduce risk of wildfire impacts	(strand forest and mangrove forest) in response to climate change impacts	<u>Agriculture Sector Strategic Goal 3:</u> Increased volumes of saleable surpluses to be marketed by the private sector into local and regional markets
2.2. Identify, manage, and reduce threats to forest and ecosystem health		<u>Agriculture Sector Strategic Goal 4:</u> Promote environmentally sound and sustainable production.
<b>3. Enhance Public Benefits from Trees and Forests</b>	3. Biodiversity conservation	
3.1. Protect and enhance water quality and quantity	(relates to Forest Legacy, invasive species control, protected areas management, gap analysis, etc.)	<u>Environment Sector Strategic Goal 1:</u> Mainstream environmental considerations, including climate change, into national policy and planning as well as in all economic development activities
3.2. Improve air quality and conserve energy		<u>Environment Sector Strategic Goal 3:</u> Reduce energy use and convert to renewable energy sources / Minimize emission of greenhouse Gases
3.3. Assist communities in planning for and reducing forest health and wildfire risks		<u>Environment Sector Strategic Goal 4:</u> Enhance the benefits of sustainable use of the FSM's genetic resources and ensure benefits derived are fairly shared amongst stakeholders
3.4. Maintain and enhance the economic benefits and values of trees and forests	4. Watersheds (high islands)	
3.5. Protect, conserve, and enhance wildlife and fish habitat	5. Production and sustainable harvesting of forests	<u>Environment Sector Strategic Goal 5:</u> Manage and Protect the Nation's Natural Environment/Protect, conserve, and sustainably manage a full and functional representation of the FSM's marine, freshwater, and terrestrial ecosystems
3.6. Connect people to trees and forests, and engage them in environmental stewardship activities	6. Urban and community forestry (utilities cooperators, hazard trees, arboriculture)	<u>Environment Sector Strategic Goal 6:</u> Improve environmental awareness and education and increase involvement of citizenry of the FSM in conserving their country's natural resources
3.7. Manage and restore trees and forests to mitigate and adapt to global climate change	7. Capacity-building – overall (recruiting new generation of natural resource managers)	<u>Environment Sector Strategic Goal 7:</u> Establish effective biosecurity (border control, quarantine and eradication) programs to effectively protect the FSM's biodiversity from impacts of alien invasive species
		<u>Environment Sector Strategic Goal 9:</u> Enhance and Employ In-Country Technical Capacity to Support Environmental Programs

The Federated States of Micronesia (FSM)<sup>1</sup> is the largest and most diverse part of the greater Micronesian sub-region of the vast Pacific region. It is a federation of four semi-autonomous island States, in geographic sequence from west to east - Yap, Chuuk, Pohnpei and Kosrae - comprised of 607 islands with land elevation ranging from sea level to the highest elevation of about 2,500 feet (760 m). FSM's total landmass is 438 square miles (702 km<sup>2</sup>), with a declared Exclusive Economic Zone covering over 1 million square miles (1.6 million km<sup>2</sup>). Its marine and terrestrial biodiversity are the nation's living wealth in which species endemism is high among the terrestrial biota. The high endemism within the nation is a direct result of the isolation of the islands to one another and to other landmasses in the greater Micronesian region. The conservation and preservation of endemic species is of particular importance to the FSM's natural heritage and globally significant. The marine and terrestrial significance are the foundation of the country's long term economic self-sufficiency as articulated in its National Biodiversity Strategic Plan (NBSAP) and subsequently its Strategic Development Plan 2004-2026 (SDP). Maintaining the habitats and ecosystems that nurture this diversity is crucial to sustaining the country's rich ethnobiological traditions while improving Micronesians' quality of life since sixty percent (60%) of its population is dependent on subsistence livelihoods (ADB, 2004). Further inventory and monitoring of the FSM terrestrial and marine biodiversities are integral and priority to a thorough understanding and appreciation of the island's biodiversity. The spread of invasive species is a continual threat due to increased movement of people and machinery between the islands, and needs to be carefully monitored and controlled.

Ownership of land and aquatic areas varies between States. In Kosrae and Pohnpei, land is both privately and State owned, while aquatic areas are managed by the State as public trusts. In Chuuk, most land and aquatic areas are privately owned and acquired through inheritance, gift or, recently, by purchase. In Yap, almost all land and aquatic areas are owned or managed by individual estates and usage is subject to traditional control. In all States, land cannot be sold to non-citizens of the FSM, thus these land and aquatic ownership patterns greatly influence the strategies and actions required to sustainably manage the biodiversity of the nation. The responsibility for environmental issues is shared between the FSM National Government and the individual FSM State governments. The sharing of responsibility has at times resulted in legislation that appears duplicated at the State and National levels. It has also resulted in gaps in legislation and areas in which the location of responsibility between the State and National Governments has been less than clear. Each State has made efforts to control development and manage natural resources through the creation of land use plans, coastal zone plans, legislation and regulations. The National Government provides guidance and technical assistance to the States when needed and requested on matters related to planning, economic development, natural resources, fisheries, and the environment.

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<sup>1</sup> [http://www.lib.utexas.edu/maps/islands\\_oceans\\_poles/statesmicronesia.jpg](http://www.lib.utexas.edu/maps/islands_oceans_poles/statesmicronesia.jpg)

**A Basis for future program, agency, and partner coordination**

Consolidated Grants	Competitive Grants
<p>Subsequent to the funding advice from the USDA FS Regional State &amp; Private Director, the FSM Forestry Agency liaises with two of its four counterpart local Forestry Agencies<sup>2</sup> to develop their respective 2-fiscal year duration proposal under a FSM Consolidated Grant Proposal on a rotational basis to achieve their local priorities/objectives under the USDA FS Forest Cooperative and Forest Health Programs<sup>3</sup> aligned to the National themes and objectives (Table 1).</p> <p>Sub-granting to NGOs, landowners or community groups is dependent on the approval language of each program/grantor</p>	<p>Subsequent to National/Regional Competitive Grant notifications, FSM Forestry Agency invites all its cooperators and/or eligible entities to submit a proposal articulating their project goal(s) and objective(s) in line with the National themes and objectives (Table 1). All submitted proposals are ranked internally by a review panel in accordance with selection criteria menu. The top four ranked proposal applications are submitted by the FSM Forestry Agency to enter into the competitive grant cycle</p> <p>Sub-granting to NGOs, landowners or community groups is dependent on the approval language by the grantor</p>

<sup>1</sup> Chuuk and Kosrae State Forestry Divisions are on even-fiscal year rotation while Pohnpei and Yap State Forestry Divisions are on odd-fiscal year rotation

<sup>2</sup> Urban & Community Forestry Program, Forest Stewardship Program, Forest Legacy Program, Forest Health Protection Program, Forest Health – Invasive Plants Program and Conservation & Education Program

This SWARS will be regularly monitored quarterly/annually in accordance with the annual consolidated and/or competitive grant cycles’ reporting procedures. Note that the FSM Forestry Agency (Department of Resources and Development) is the lead agency for State Forester, Forest Legacy, Fire, etc.

**1. State Forest Stewardship Coordinating Committee**

A new committee began to be formed with passage of the Farm Bill, and is known as the FSM Stewardship Council. Its membership reflects the coordinating role of the national FSM government (eligible as a “state” in the Farm Bill), and the primary role of the FSM’s four States in handling land management and land issues. Members and state-level subgroups of this Council were consulted at all stages of developing this SWARS. A SWARS inception workshop launched in March 2009 where State and National Forestry Agencies and cooperators conducted its first series of consultations and developed outcomes outlining the milestone developments of the FSM SWARS, AON and establishment of the FSM National Forest Stewardship Committee with State and National cooperators up until May 2010. Because of the expense of interisland travel, it is anticipated that most Council business will take place in state-level subgroups, by email and by telephone; the first full face-to-face meeting is likely to take place in August 2010 at the 3<sup>rd</sup> FSM National Environment Summit slated for August 23 – 27, 2010. A program-level

strategy for the FSM is to complete membership of the Council and conduct its business according to Forest Stewardship guidelines.

**FSM Table-2: Membership of State Forest Stewardship Coordinating Committee**

<b>Interest or agency required by law “if feasible”</b>	<b>Name, Title, Affiliation</b>
Forest Service	Kathleen Friday, USFS
NRCS	NRCS Pohnpei Field Office
Farm Service Agency	Not in the FSM
Cooperative Extension Service	Jim Currie, Vice President, COM-FSM Cooperative Research and Extension
Local Government	Maheta Kilafwasru, Chairman, Council of Mayors, Kosrae State Pintas Kenneth, Mayor Rep, Chuuk State Mike Peterson, Chairman, Pohnpei Council of local Chief Executives (Intend to add local government representatives from Yap Traditional Leadership Focal Points)
Soil and Water Conservation District	(To be added when and if a Pohnpei or other S&WCD is established by USDA NRCS)
Consulting foresters	Francis Ruegorong, Waab Land & Wildlife Coordinator Erick Waguk, State Forester, Kosrae State Basiente Atan, UCF Coordinator, Chuuk State Mayoriko Victor, Forester, Pohnpei State
Forest products industry	Dr. Tholman F. Alik, Yela Environmental Landowners Authority, Kosrae State Mr. Claudio Panuelo, Chairman, Pohnpei Farmers Association (Intend to add Yap, Chuuk and Kosrae Farmers associations <sup>4</sup> and ecotourism representatives)
Private Forest landowners	Mr. Barton Musrasrik, Kosrae Farmers Representative Mr. Namio Nahnpei, Chairman Nahnpei Estates (Intend to add Chuuk and Yap Farmers representatives)
Land-trust organizations	Mr. Robinson H. Timothy, Principal Judge, Kosrae Land Court Kaster Sisam, Division of Land Management, Chuuk State Mr. Largo Edwin, Chairman, Pohnpei Board of Trustees (Intend to add Yap State Land Commission Focal Points when designated)-Mr. Claudio Panuelo represents Pohnpei above
State lead agency for Forest Legacy	Mr. Gibson Susumu, State Forester
Environmental/ Conservation organizations	Mr. Marston Luckymis, Acting Executive Director, Kosrae Conservation Safety Organization Bradford Mori, GIS Specialist, Chuuk EPA Curtis Graham, Chuuk Conservation Society Patterson Shed, Executive Director, CSP Mr. Albert Roby, Director, Pohnpei EPA

<sup>4</sup> Local farmers associations mostly practice agroforestry methods

State fish & wildlife agency	Robert Jackson, Director, Kosrae Island Resource Management Authority Romeo Osiena, Director, Dept of Marine Resources, Chuuk State Yap State Dept of Resources and Development [already represented by Francis Ruegorong, Waab Land & Wildlife Coordinator, above, and Michael Gaan, Director, below] Yosuo Phillip, Director, DLNR, Pohnpei
Tribal representatives (chiefs)	Henry Nedlic, Traditional Chief, Chuuk State (Intend to add representatives from: Yap Council of Pilung and Tamol Hon. Kepert Hebel, Chairman, Council of Traditional Leaders (Mwoalen Wahu of Pohnpei) Council of Mayors of Chuuk and Kosrae State already represented above
Other (Departments of Agriculture)	Innocente Penno, Director Dept of Agriculture, Chuuk State Julian Sivas, Chief of Forestry, Chuuk State Steven L. George, Director, DREA, Kosrae State Michael Gaan, Director, DLN&R, Yap State Saimon Lihpahi, Chief, Forestry Division, PNI Adelino Lorens, Chief, PNI Division of Agriculture
Other	Furasi Bonocho, Dept of Public Safety, Chuuk State

## 2. State Technical Committee

The “State” Technical Committee convened by the NRCS in the Pacific is intended to cover all Pacific islands by quarterly videoconference meetings, but in fact its membership and agenda tends to focus on Hawaii. The NRCS suggested that SWARS consultation be conducted through the FSM Local Working Group convened by NRCS Pohnpei Service Center staff. To comply with this requirement, DRD consulted with the USDA Natural Resource and Conservation Service Pohnpei Service Center extensively and the Resource Conservationist will be provided with a final draft copy to facilitate the STC review process.

## 3. State wildlife agency

Responsibility for terrestrial and marine wildlife rests with the Chuuk State Departments of Marine Resources and Agriculture; Kosrae Island Management Authority; Pohnpei State Department of Lands and Natural Resources; and Yap State Department of Resources and Development. In most cases these are the head agencies which house the forestry agencies and thus were completely engaged in SWARS development.

## 4. Applicable Federal land management agencies

Not applicable. No “federal” (US) agency owns or manages land in the FSM.

## 5. State Urban Forestry Council

The FSM National Stewardship Council will play the role of the “FSM-wide” Urban Forestry Council in advising the FSM concerning U&CF as well as FSP programs. It was consulted as explained above. In addition, the following state-level councils were engaged throughout the series of consultations from May 2009 – May 2010:

- Chuuk State Urban & Community Forestry (U&CF) Council
- Kosrae State U&CF Council
- Pohnpei State U&CF Council
- Yap State U&CF Council

## **6. Tribes (indigenous people)**

Majority of the stakeholders listed and local communities are indigenous people, especially in the non-urban centers.

## **7. State lead agency for the Forest Legacy Program**

This is the same as the state forester: FSM Department of Resources and Development, Division of Resource Management and Development, Agriculture Program.

### ***Plans consulted and/or attached:***

#### **1. Wildlife Action Plans**

Because the FSM is not part of the US, there was no single Wildlife Action Plan previously required by the US Fish & Wildlife Service. Documents serving this purpose were extensively used in the development of the SWARS, especially the mapped Areas of Biological Significance in “A Blueprint for Conserving the Biodiversity of the FSM” (The Nature Conservancy, 2003), “The Federated States of Micronesia National Biodiversity Strategy and Action Plan: (FSM 2004) and subsequently the state-level BSAPs.

#### **2. Community Wildfire Protection Plans**

Because the FSM only recently became eligible for Fire & Aviation Management assistance, no Community Wildfire Protection Plans exist yet. Lying at the western end of the FSM where wildfires are a greater problem due to climatic conditions, Yap State has developed a wildfire program. The Yap State Fire Management Assessment is incorporated and referenced in the Yap chapter, and the Yap State Second Five-Year Wildfire Plan is appended to that chapter. Currently the other three States have no similar plans however, F&AM issues are incorporated into their State Chapters. In all States, efforts will lead to working with communities to develop Community Wildfire Protection Plans within the SWARS period. FSM DRD will serve as the coordinating/lead agency for any F&AM assistance.

#### **3. Forest Legacy Assessment of Need**

See chapter above for Assessment of Need establishing Kosrae Forest Legacy Area.

#### **4. Other**

See plans referenced at the end of each State chapter.

### ***FSM SWARS Process***

The FSM SWARS’ development has been a collaborative effort and iterative consultation process from July 2009 – May 2010 coordinated by FSM DR&D with assistance from TNC and USFS in cooperation with the Chuuk, Kosrae, Pohnpei and Yap State Forestry agencies and their

key cooperators and stakeholders. At the initial process, identification of issues that addresses the three National themes were identified in consultation with the states forestry agencies along with their stakeholders. Through coordination by FSM DR&D with the FSM states, several consultation processes and trainings were done to develop the assessment component of this SWARS. Several agencies and other key partners, including conservation NGOs, Tribes and natural resource related entities were involved in this SWARS process. During the assessment process, several data gaps were identified which were provided by the FSM GIS team. The development of the AON presented in this SWARS involved consultations by FSM DR&D and a consultant from TNC with Yap, Chuuk, Pohnpei and Kosrae which provides a comprehensive case for the usefulness of a Forest Legacy Program (FLP) for FSM that would act as a pro-active forest resource conservation tool and a framework for program implementation that is needed to preserve the threatened forestland in the FSM. In addition, there were several potential forest legacy projects in each of the FSM States were identified that have critical conversion pressure and/or harbor unique and threatened habitat that is in need of protection and long-term forest management.

### ***Acknowledgements***

FSM DR&D would like to acknowledge and sincerely thank the following organizations for their contribution on the development of this FSM SWARS:

- College of Micronesia - FSM
- Chuuk State Department of Agriculture  
Division of Forestry
- Chuuk EPA
- Chuuk Conservation Society
- Kosrae Island Resource Management Authority  
Division of Forestry  
GIS Unit
- Pohnpei State Department of Lands and Natural Resources  
Division of Forestry and Marine Conservation  
Division of Survey and Mapping, GIS Unit
- Dr. Reed Perkins, Colleagues, and Students of Queens University – North Carolina
- Yap State Department of Resources and Development  
Division of Agriculture and Forestry  
Division of Land Resources
- Yap EPA
- Yap Institute of Natural Science
- Secretariat of the Pacific Community, Pohnpei Office
- TNC
- USFS

## **Summary of Major Points made by all FSM States**

While the order of sequence of the 7 FSM Issues in response to the U.S. Themes varied among the four states of the FSM, a number of shared major issues relating to these themes emerge from the State chapters. These cross-state issues are presented below.

### **Cross-cutting Issue: A need for up to date aerial photography & LIDAR data**

The basis for most data for forest assessments in this SWARS are vegetation maps based on aerial photography from 1976. Only for Pohnpei have more recent vegetation maps been made based on more recent aerial photography. These maps indicate a serious decline in upland native forest. There is no data on overall forest trends for the rest of the FSM. All 4 states have requested assistance to obtain current aerial imagery in their respective chapters. The availability of such imagery combined with increasing GIS capacity, will enable even local foresters to develop updated vegetation maps to compare with earlier vegetation maps to determine trends, and to serve as baselines from which to measure progress in forest stewardship. An FAA certified airline experienced in the precision flying needed for such aerial photography is based on Yap, and the U.S. Forest service or other agencies have the cameras and professional staff for such work.

In addition to current aerial photography, LIDAR imagery is greatly needed in order to more accurately assess vulnerability to sea level rise and storm surge throughout Micronesia. This is especially important for low-lying outer island that are close to sea level.

### **Food security**

This was a major concern of all 4 states, especially with respect to climate change and Sea level rise. At the same time, the conservation of biodiversity and protection of ecosystem integrity is a high priority of all 4 states. A general strategy for achieving both objectives is to enhance agroforests and expand food production activities upland into already disturbed areas of secondary vegetation, while conserving areas of native forests: upland forests and coastal mangroves. This general strategy is expressed on the landscape maps as enhancing the warm colored areas (agroforest & secondary vegetation, color-coded red and orange respectively), and protecting the cool colored areas (mangroves and native forests color-coded blue and green respectively).

Food production via agroforestry was seen by all states as a way to maintain ecosystem integrity while producing food. A further need to preserve “agrobiodiversity”, the wide range of species and sub-specific varieties of traditional crops that provide genetic resilience in the face of climate change. In addition, all states wanted to protect agroforests and other forests from invasive species, pests and diseases.

Unfortunately, it was noted that most all outer island islets lie within the 2 meter zone of potential sea level rise, and all lie within a 5 meter zone of storm surge. This brings up a need for a 4<sup>th</sup> theme: that of adaptation to sea level rise that is not included in this SWARS, and is recommended as a theme for the next iteration of SWARS. The high islands of the FSM will need to begin now to pre-adapt to rapid population increase in the form of climate change



refugees from low-lying islands, while at the same time, enhancing and adapting their own food production systems. The Yap State map showing that the islands most fertile alluvial soils are all vulnerable to salt water inundation indicates the magnitude of this challenge.

Biodiversity conservation: maintaining ecosystem integrity, conserving native species and major biosecurity issues of invasive species and wildfires. All 4 states have indicated areas of special biodiversity significance, and keystone habitats (such as mangroves and sea turtle and seabird rookeries), and keystone species such as fruit bats (flying foxes). The conservation of these areas involves addressing forest health “biosecurity” issues of invasive species and wildfires as well as the establishment of protected and wisely managed areas.

The Forest Legacy program is a great source of assistance in conserving privately owned lands that are under threat. Kosrae State, with its world class *ka* swamp forest will be the pilot Forest Legacy project for the FSM and an Analysis of Need for this project is included in this SWARS. The other three states of the FSM do not have the capacity to carry out a Forest Legacy project yet, however it is hoped that some of the 12 million dollars pledged by TNC and Conservation International in support of the Micronesia Challenge will contribute to an increase in Forestry staff needed to carry out both Forest Legacy and Micronesia Challenge projects in the near future.

## **Watersheds**

All 4 states recognize and request assistance in managing watersheds on a landscape basis, and the states with the highest mountains, Pohnpei and Kosrae are already working on central watershed reserves. The states of Chuuk and Yap have more scattered, smaller watersheds and will be developing proposals for competitive grants to evaluate and begin working in high priority watersheds. On low-lying atoll islets, the issue is not watersheds, but the thinning of fresh water lenses.

## **Production and sustainable harvesting**

All 4 states face problems of unsustainable harvest of forest resources. The unsustainable harvesting of mangroves for firewood is greatest in Kosrae and Chuuk. Ironically, the most unsustainable exploitation of upland trees for lumber is in Yap which has the least amount of forest with big trees. Yap is already experiencing an unsustainable number of sawmills, and a foreign owned sawmill has recently been set up in Kosrae. All 4 states are requesting an assessment of the level of timber that could be sustainably supported (or the lack of such potential). Such information is urgently needed in Yap and Kosrae, and it is important that other states have information from such an assessment up front, before timber extraction projects are proposed or just initiated.

There is also a need to plant more trees to provide a sustainable supply of timber, tree crops and forest habitat, and to protect the best tree planters: fruit bats and birds.

## **Coastal Stabilization**

Coastal stabilization is a great concern of all 4 States, especially on low-lying islands where the existence of a whole culture of *Rematau*, “people of the deep sea” adapted to life on small islets

and to traditional seafaring is threatened. On high islands it is essential to protect mangroves as a hedge against storm winds and surge. Mangroves sequester more than their share of atmospheric carbon and store it in deep mud, adding prospects of revenue from carbon credits to the ecosystem service value of these marine forests. Unfortunately mangroves are under great threat throughout the FSM. Most States have developed or are working on, or planning to develop mangrove management plans. Negotiations for carbon credits will help increase incentives to preserve mangroves. We are already seeing how some efforts to protect coastlines serve to telescope the problem to adjacent areas. Expert advice on coastal management is urgently needed to guide activities in the FSM.

### **Urban Forestry**

Urban Forestry supports both activities and a U&CF staff that provide a link between government Forestry agencies and communities. This is a very important program as it is the main avenue to address the need to "turn forestry from a small government agency into a community concern." Now that communities have access to assistance from the UNDP Small Grants Program State forestry agencies can assist communities in developing and implementing quality projects. Funding available through U&CF program thus has considerable leverage.

### **Capacity building**

There are three needs for capacity building in Forestry. The first is in the number of staff. As shown in Table 2 of State chapters current staff levels are low. With the advent of the TNC Micronesia Challenge and other expectations, Forestry staff currently finds it difficult to both carry out work under performance based budgets as well as to accommodate these additional programs and visitors. It is anticipated that some of the 12 million dollars pledged by The Nature Conservancy and Conservation International will help increase the number of persons working in Forestry.

The second need in capacity development is for training relevant to work at hand. Forestry agencies are interested in opportunities for scholarships to develop Forestry professionals, internships and relevant training resulting in certification in needed skills. The Yap State chapter describes a potential training and internship program with mainland U.S. firefighters.

The third need in capacity development is to assist communities in understanding environmental issues and in developing and implementing quality projects.

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## IV. POHNPEI STATE

### ***Introduction***

Pohnpei State includes the high island of Pohnpei with a number of small islets within a large lagoon, and Outer atolls including Ngatik, Oroluk, Nukuoro, Kapingamarangi, Mokil, and Pingelap. There are 5 Municipalities in mainland Pohnpei, each with a local government and mayor as well as traditional leaders. The Outer Islands of Pingelap and Sapwuafik (Ngatik) retain traditional chiefs.

Pohnpei Island lies at 6 degrees Latitude and 158 degrees longitude, about 660 km north of the equator and about 4,983 km southwest of Hawaii. The island is roughly circular, with a land area of about 35,500 ha (87,693 acres). The island is mountainous and heavily forested in the interior. Eleven peaks rise more than 600 m above sea level. It is hot and humid, with a mean temperature at Kolonia, the capital, of 27C (81 F). Temperatures vary little from month to month. The mean annual rainfall is 4,820 mm (190 in), with January and February being slightly drier than average.

### ***I. Forest Assessment***

This section provides a qualitative, quantitative and geospatial assessment of Pohnpei's forest resources and major issues of forest stewardship referenced to USFS themes. It includes a discussion of priority landscapes, trends, values of these forest resources, threats and opportunities. The term "geospatial" is interpreted literally as the use of GIS data and maps rather in the more narrow sense of doing analyses with the ESRI Arc View supplementary geospatial analysis tool. The use of GIS is new in the FSM and while there are College of Micronesia and Land Management staff who can conduct geospatial analysis it would be misplaced sophistication to utilize such a tool before data layers have been thoroughly georeferenced and rasterized. In addition, the use of the geospatial tool in a small island setting where all ecosystems are limited in size and closely integrated could result in fragmentation of ecosystems and efforts. It also carries the danger of omitting some communities' areas from consideration. Inasmuch as successful forest resource management involves the actions of the people who own or use these resources, it is not wise to omit community areas that are integral parts of the whole Pohnpei ecosystem. It would also be difficult to explain maps created through the geospatial tool to stakeholders in villages and communities. This SWARS therefore utilizes standard GIS maps along with some ESRI geospatial analyses. Should more geospatial analyses be helpful in the future, as monitoring of progress of this SWARS indicates a need for revision, they will be made.

Pohnpei State and the FSM have, in recent years, developed a number of natural resource plans, most of which are listed in the reference section. More details on topics included in this SWARS can be found in these references.

Map P-1 shows the distribution of general vegetation types on mainland Pohnpei. A description of vegetation types on Pohnpei may be found in MacLean et al (1986). The 1986 vegetation map reports some 12,548 hectares of upland forest and 5,525 hectares of mangrove. It also indicates some 1,945 hectares of native palm forest, 214 hectares swamp forest, 6 hectares plantation forest and 1 hectare of dwarf cloud forest. In addition some 19,683 hectares were mapped as agroforest, 9,796 hectares of agroforest with coconuts and 124 hectares of coconut plantation. The Forest Inventory Assessment (2009/10) provides additional data on the species composition and condition of measured plots. Areas of intact native upland forests are of special interest because of the high rate of endemism in mainland Pohnpei related to variation in elevation and to the isolated location of Pohnpei. The dwarf cloud forests of Pohnpei's peaks are especially unique. Unfortunately, cloud cover prevented these special forests from being completely demarcated on the 1987 vegetation survey.

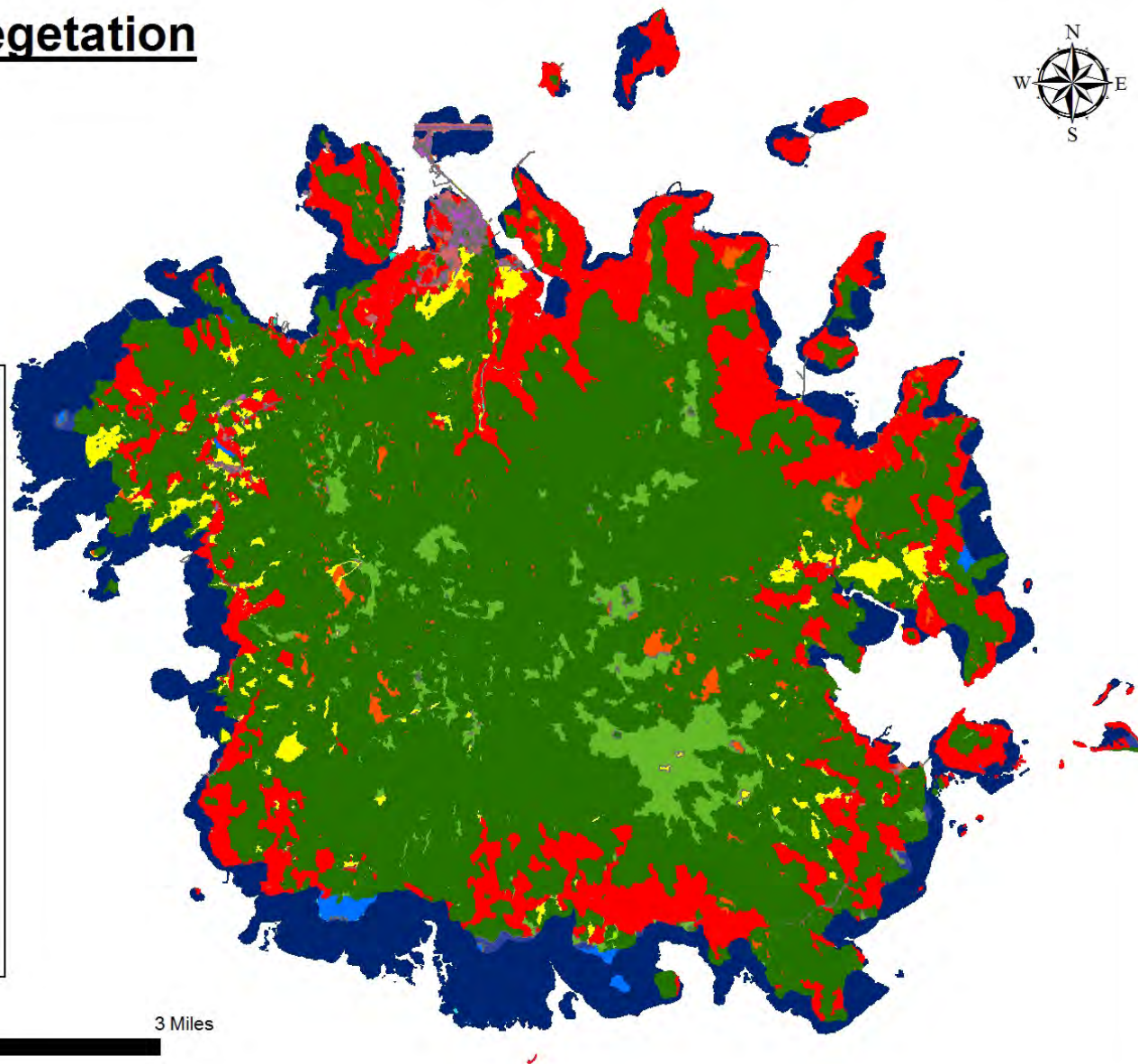
# Pohnpei Vegetation



## Legend

Pohnpei\_pic\_vegetation  
CLASS

- Agroforest
- Background
- Barren
- Cropland
- Mangrove Forest
- Marsh
- Palm Forest
- Savanna
- Secondary Vegetation
- Swamp Forest
- Upland Forest
- Urban Builtup
- Urban Cultivated
- Water



3 1.5 0 3 Miles

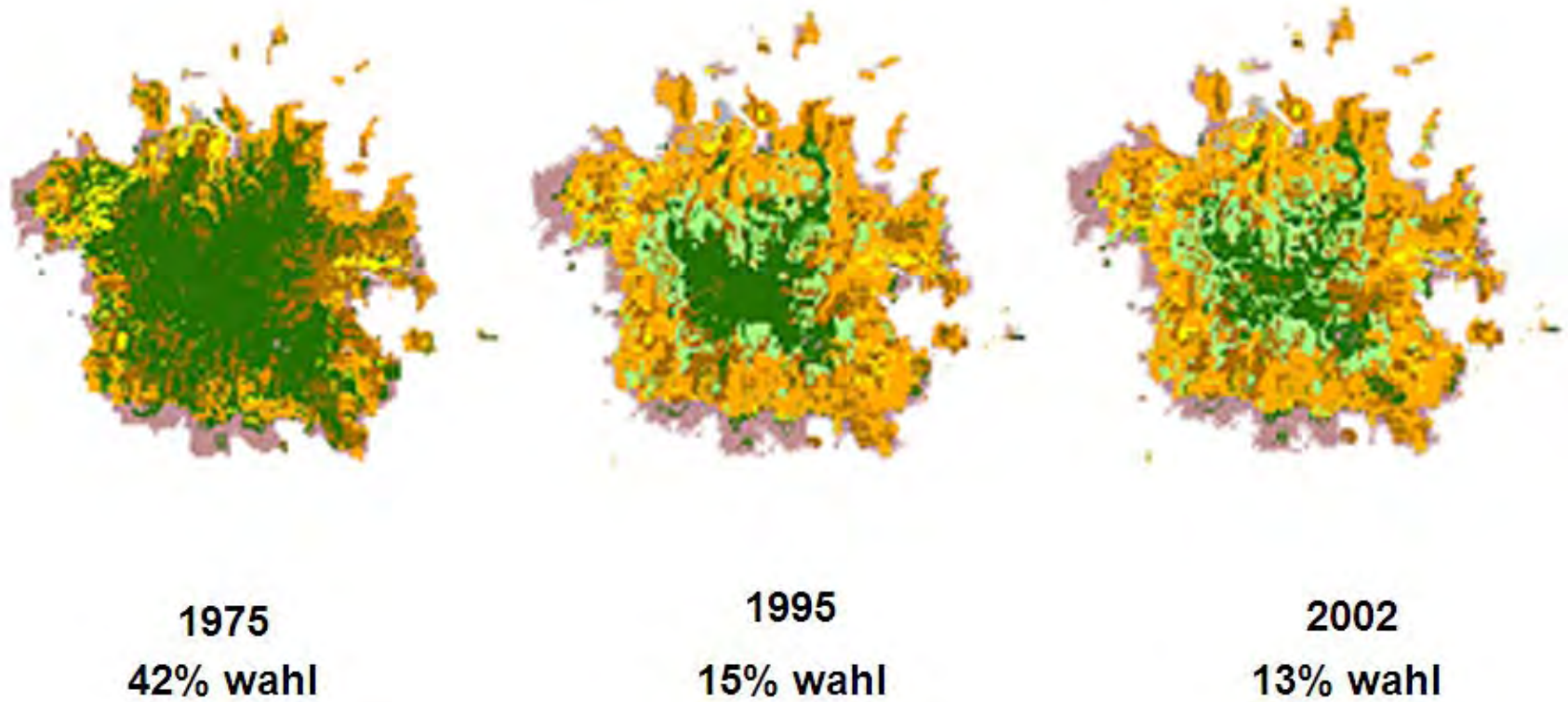
*Map P-1: Vegetation of Pohnpei*

Upland forests provide habitat for biodiversity including a number of endemic species. They are also important for their watershed services. Mangrove forests have multiple values for fisheries habitat, wood production, trapping sediments and shoreline protection. Mangrove forests significantly buffer the force of waves, including storm surges, and thus protect the coastline from erosion. The “fringe” (seaward) mangrove is most valuable for this coastal protection function. Recent studies (Kauffman & Donato 2009) have shown that mangroves sequester especially high levels of carbon that is stored in both tree biomass and in deep mangrove mud. They are thus important in reducing greenhouse gasses. Agroforests provide food, fiber, medicines and materials needed to support culture while at the same time providing the ecosystem services of forests. Coastal forests occurring above high tide mark, especially on the coasts of atoll islets, help stabilize coasts and reduce the extent of erosion during storm surges. Strand forests also provide a windbreak protecting the forests behind them from strong winds, desiccation, and salt spray.

No published descriptions of the forests of Pohnpei Outer Islands were available to the writing team. The general species composition of atoll beach strand and atoll forest and agroforest is fairly consistent; however there may be important variation at the sub specific and varietal levels that are potentially valuable in terms of adaptation to climate change and sea level rise. In addition uninhabited islets are refuges for native biodiversity such as sea turtles and sea birds, and even recently discovered endemic species such as the endemic giant Micronesian gecko, *Perochirus scuttelatus* thus far known only from Ulithi in Yap State, Kapingamarangi in Pohnpei State and possibly a few remote areas of Palau; and one or two endemic species of *Ramphotyphlops* snakes found in Ulithi in Yap State and more recently on Ant atoll in Pohnpei State.

*Trends:* Pohnpei is the only State for which there is data on the status of native forest. Maps P-2 (TNC 1975, 1995, 2002), based on aerial photos taken in 1975, 1995 and 2002, show a serious and progressive decline in the area of intact native forest on Pohnpei. Data on trends in plots measured by the FIA (2009/10) will be available after the next 10-year iteration of this survey. All native forests of Pohnpei are threatened by many factors (NBSAP 2002, PBSAP 2004), especially land moving operations such as clearing, road building and dredging and deforestation for agricultural use, including *sakau* (*Piper methysticum*), a high value crop.

# Tikitiklahn Wahl en Pohnpei



*Map P-2: Shows a serious progressive decline in native forest in Pohnpei from 1975 to 1995 to 2002*



The most crucial information needed to determine vegetation change is up to date high-resolution aerial photos. Such photos would indicate the trend in forest change from 2002 to present, and provide an initial baseline view of Pohnpei Outer Islands. Such imagery would enable even local staff to determine trends and monitor progress in resource stewardship. An important added benefit is that such aerial images could be shared with communities. Having an intimate knowledge of their surroundings and a vested interest in their natural resources, such imagery would be very valuable to the development of community natural resource stewardship plans.

In addition, LIDAR imagery would enable natural resource planners to evaluate threats of sea level rise and storm surge and to plan for adaptation to sea level rise. Aerial photography and LIDAR imagery from which elevation and hydrological profiles could be developed, are an especially critical need for Pohnpei’s low lying Outer Islands, most of which lie within the 2 meter zone of sea-level rise and/or the 5 meter zone of storm surge.

### Major Issues

Table P-1 below summarizes FSM Cross-cutting issues and their Priority Landscapes in relation to USFS Primary National Themes. Maps of priority areas are indicated in this table and inserted with their respective issues. An overall listing is provided in the Reference Section.

**Table P-1: Summary of National Themes, FSM Issues and Priority**

<b>Issue</b>	<b>Priority landscape area(s)</b>	<b>Primary National Themes</b>
A. Food Security in adaptation to climate change	Strong emphasis on atolls. In Mainland Pohnpei, priority landscape areas for food security are agroforests, shown in red, and areas of secondary vegetation shown in orange on map P-1, P-3.	Enhance, Protect
B. Coastal Stabilization	Eroding shorelines and mangroves, with priority placed on those areas overlap with Areas of Biological Significance, reference red (high) orange (medium) and yellow (low) areas on map P-4. All areas of Pohnpei Outer Islands are highest priority but maps are not available.	Conserve, Enhance
C. Biodiversity	Native forest and designated areas: see narrative.	Conserve, Protect
D. Watershed	Pohnpei Watershed Reserve, Map P-7 (blue polygon)	Enhance, Conserve, Protect
E. Production & sustainable harvesting	Mangrove forests. Reference map P-1 (blue areas along coast)	Enhance, Conserve
F. “Urban” forestry	Residential, commercial, historic, school and public park areas, and areas along road (Map P-7 road system), and “urban built-up” and “urban cultivated” from Reference maps P-1	Enhance
G. Capacity-building	(non-spatial)	Enhance

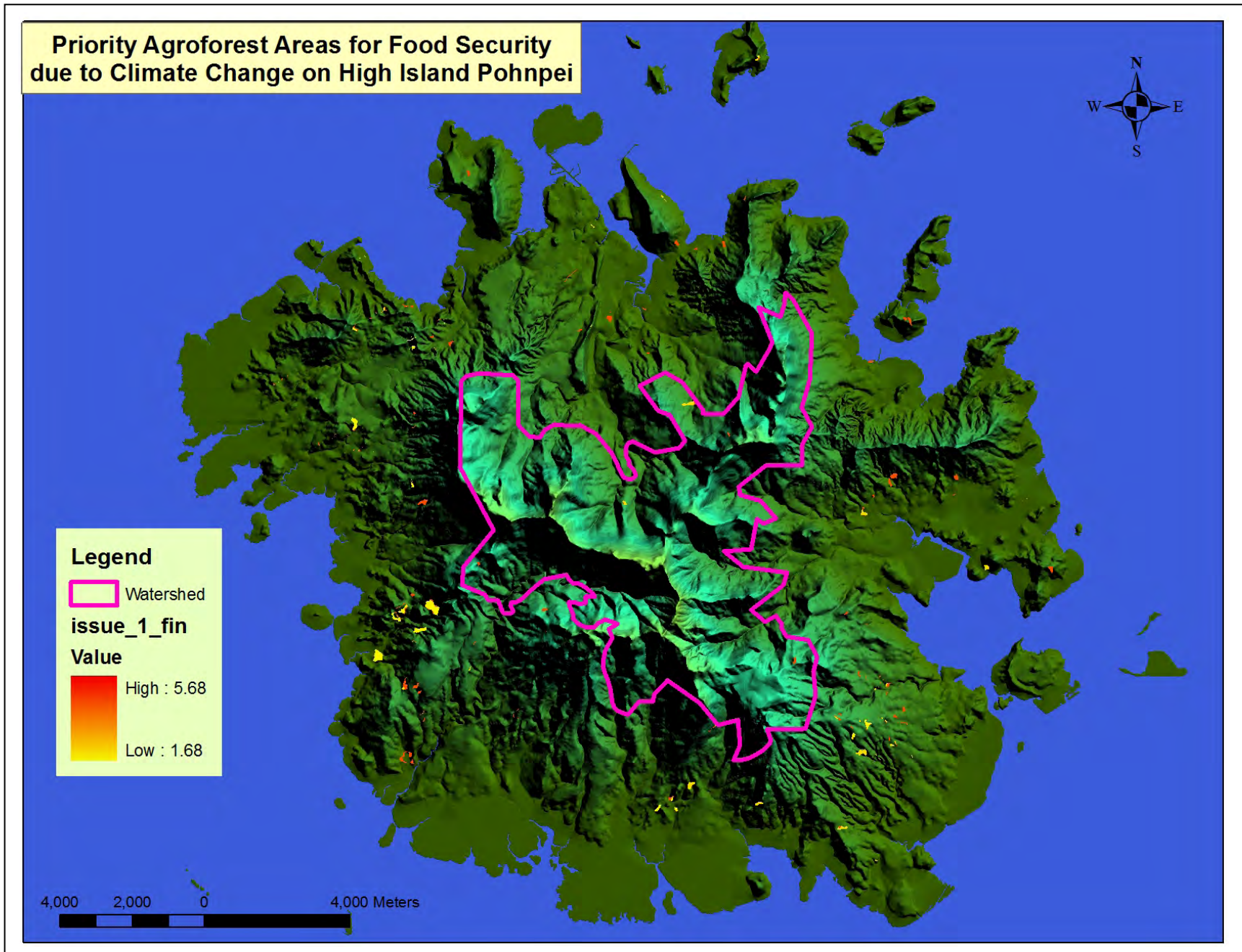
The methodology for spatial analyses is described in the Appendix.

## **Discussion of Issues**

### **A. Food Security**

Traditional Ponapean forest management is agroforest management, providing tree crops and associated foods and medicines. The 1986 vegetation map of mainland Pohnpei indicated that some 33% of Pohnpei was under this type of land use. Agrobiodiversity, the range of species, subspecies and varieties incorporated into the traditional Pohnpei agroforestry system is quite high as has been documented in Balick (2008). Priority maps for this issue are Map P-1: Vegetation of Pohnpei shows the agroforest vegetation type in red, and secondary vegetation in orange. Map P-2 shows that the area of secondary vegetation has increased considerably since the 1986 vegetation map (that was based on 1976 aerial photos). Areas of secondary vegetation are a second priority for agroforestry development as they represent land that has already been disturbed and could be converted to agroforestry production without sacrificing more native forest, or assisted to revert to native forest.

Map P-3 on Food Security is a spatial analysis of areas more suitable for agroforestry based on soils, slopes and conservation considerations. Areas within the watershed conservation area were masked out and mangroves were color-coded as unsuitable. Soil categories include slope considerations.



*Map P-3: Areas suitable for agroforestry production for food security*

Forest Stewardship “Resource Management Plans” Pohnpei State Forestry is still committed to working with its’ partners in developing written Resource Management Plans to meet the Forest Stewardship program standards. In collaboration with CSP, local governments, and communities, we have developed two different mangrove management plans & one terrestrial management plan for three communities. There are two in Kitti and one in Madolenihmw. As part of our SWARS consultation with our U&CF Council, there has been some revision on the selection and requirements of project proposals. Some of the new information that are being inserted for e.g. Community demographic information, land area/map, land use type, historical sites, socio-economics, invasive species, etc. We believe that including these kinds of information will improve on monitoring & evaluating project progress and impact, and at the same time use to develop a management/land use plan.

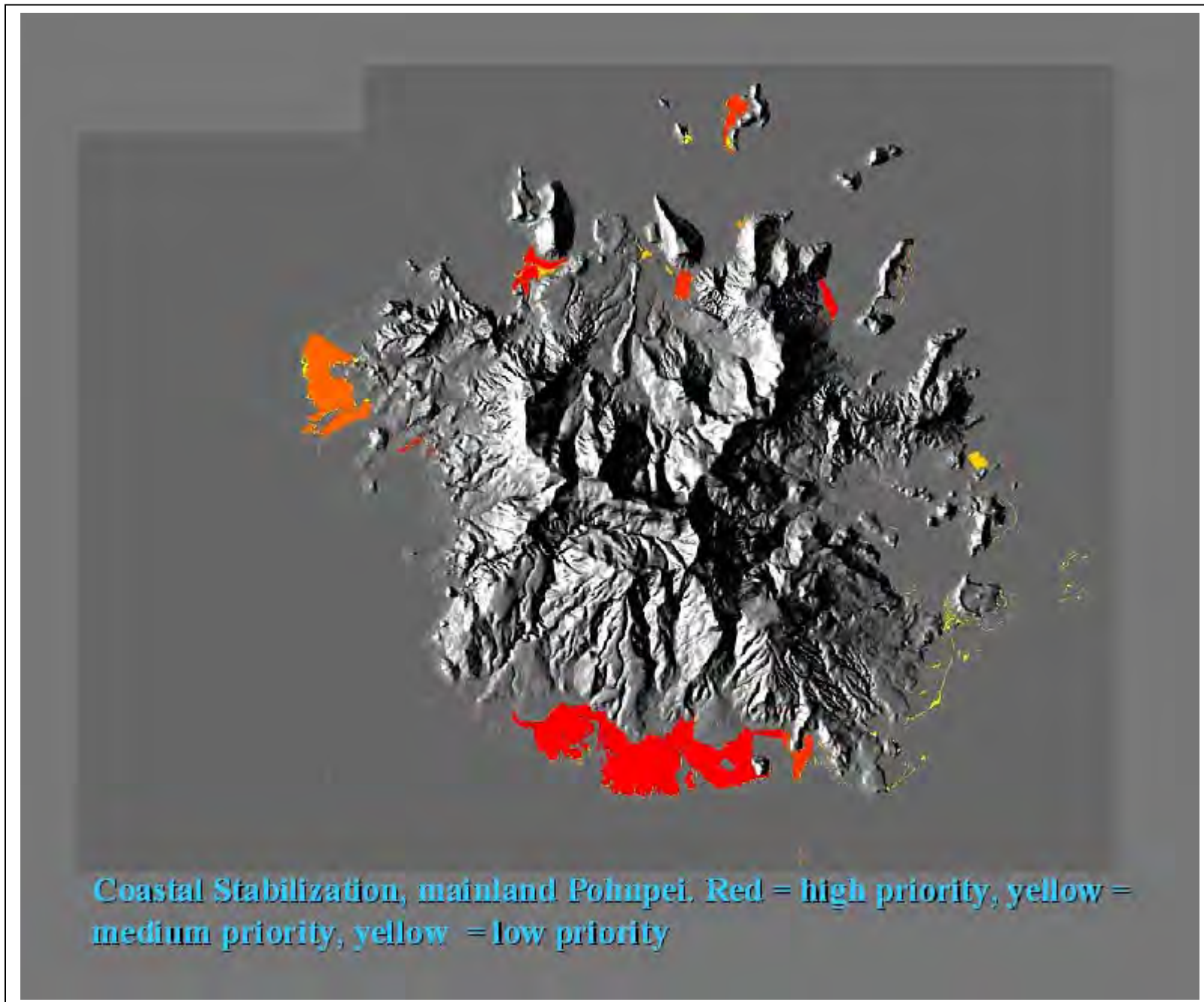
Actual data on trends of agroforests in mainland Pohnpei were not available, however in recent years, one of the main food crops, *Dioscorea* yams have been impacted by disease, and it is commonly believed that increases in lifestyle diseases such as diabetes and high blood pressure are related to a change from a traditional diet to less nutritious imported foods. There is however growing awareness of this problem and a vigorous program to encourage residents to “go local” and grow and eat more local foods. This, and increasing cost of imported foods, could result in increased agricultural and agroforestry production.

Food production on atolls is challenging due to thin, nutrient poor soils, limited supply of fresh water, desiccating sea breezes and storm winds, lack of a watershed gradient to wash out accumulated salt, occasional droughts, typhoons, sea level rise and storm surges. The difficulty of raising food on atolls, has led to an increasing reliance on imported foods, and a correlated decline in agrobiodiversity. Recent high sea levels and storm surges have seriously damaged food production systems on Outer Islands of Pohnpei.

## **B. Coastal Stabilization**

Reports of the International Panel on Climate Change and other groups acknowledge climate change and predict more severe ENSO events and storms and rises in sea level that result in coastal erosion in coastal areas of mainland Pohnpei and especially in Pohnpei’s Outer Islands. This damage is exacerbated by damage to coastal ecosystems such as mangroves through road building, landfills and dredging operations. Mangrove forests have multiple values for fisheries habitat, wood production, trapping sediment and shoreline protection. Mangrove forests significantly buffer the force of waves, including storm surges, and thus protect the coastline from erosion. The “fringe” (seaward) mangrove is most valuable for this coastal protection function. Strand forests occupy sandy coastal areas above high tide mark, especially on the coasts of atoll islets. They stabilize the coastal dunes and reduce the extent of beach erosion during storm surges. Strand forests also provide a windbreak protecting the forests behind them from strong winds, desiccation and salt spray. While strand forests will not affect the rate of sea level rise, it is possible that by stabilizing the crest of the beach, they will reduce the extent that a high-water event overtops the beach crest and deposits salt water in the island interior. Coastal erosion in the Outer Islands of Pohnpei is especially severe and of considerable concern. Map P-4, shows areas of concern for coastal stabilization in mainland Pohnpei. Lack of relevant elevation data precluded the development of a spatial analysis map.

It should be noted that while maps and exact elevation data are not available, most of the Outer Island atoll islets of Pohnpei State are very close to sea level and within a 5-meter storm surge zone.



*Map P-4: Areas of moderate and high concern for coastal stabilization*

Maps and data to support a spatial analysis of priority landscapes for coastal stabilization in Outer Islands of Pohnpei were not available. However, since these low lying islets are mostly below 5 meters from sea level (Liphai 2010), they are all priority areas for coastal stabilization, given rates of sea level rise and intensity of storm surges.

### **C. Biodiversity**

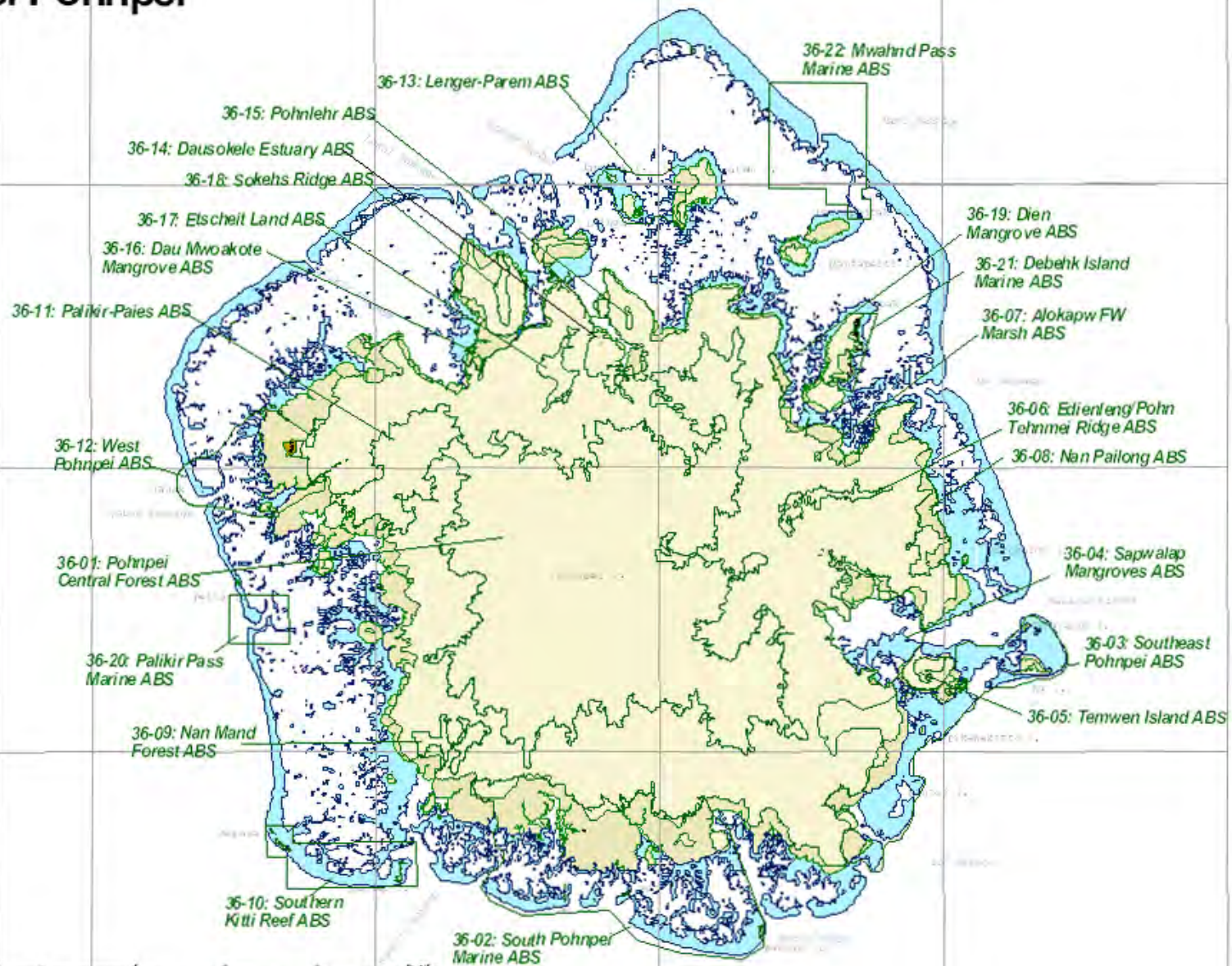
As an isolated oceanic high island, Pohnpei is rich in endemic species, and the island's forests represent a valuable natural heritage. This heritage is, however threatened by many activities, including agricultural clearing, road building, and during extreme ENSO related droughts, wildfires that erode forest edges. Map P-2 shows a rapid reduction in the area of intact forest. Much of this change is attributed to forest clearing for growing *sakau*, *Piper methisticum*, a high value crop for cultural presentations and for commercial sale. *Sakau* is a profitable crop so farmers clear forested area for its production. Especially when aided by drought conditions, forest clearing for sakau production erodes threatens intact native forest. While the serious decline in intact native forest indicated in Map P-2 is generally attributed to clearing to grow high value *sakau*. It is likely that droughts, especially the severe drought of 1982-1983, made it much easier to clear forest with fire and contributed significantly to the decline of intact native forest. Once openings are made in forested areas, aggressive vines such as *Merremia peltata* overgrow trees, killing them and preventing seedlings and saplings from regenerating forests. Feral pigs and introduced deer are also a potential threat to seedlings of forest trees.

The TNC Micronesia Challenge calls for the protection of 20% of the land, or of forests or of a representative sample of native habitats by the year 2020, and the TNC Blueprint for conservation in Micronesia (2003), indicates a number of "areas of biodiversity significance" (ABS) as shown in Maps P-5 & 6, that follow. Ant Atoll has or is being established as a Biosphere Reserve. Among its biodiversity values are a sea turtle rookery and the locality of an as yet unnamed species of endemic snake. The atoll of Oroluk is also a sea turtle sanctuary. While Pohnpei State has no Wildlife Plan per se, there are a number of laws to protect wildlife such as the protection of the rare Pohnpei owl, fruit bats (by virtue of International and U.S. Endangered species laws), a closed season for grouper fish during their spawning season and the protection of mangrove crabs in mangrove sanctuaries. It appears that Pohnpei could achieve the goal set by the Micronesia Challenge by effectively protecting the proposed watershed reserve along with some areas of mangrove (blue areas in Map P-1). The appendix provides results of a recent Marxan gap analysis of Pohnpei's progress toward the Micronesia Challenge.

*Priority area:* all areas within any of the following categories, with higher priority for lands where more categories overlap.

- (a) Native forest (mangrove forest, upland forest, and palm forest) as shown on Map P-1
- (b) Undisturbed upland native forest as shown by dark green on the 2002 inset of Map P-2
- (c) Terrestrial Areas of Biodiversity Significance (Pohnpei or atolls) as shown on Map P-5a

# 36. Pohnpei



Map P-5a: Pohnpei State areas of biodiversity significance

## 32. Kapingamarangi

1: Kapingamarangi  
Ine ABS



32-02: Kapingamarangi  
Gecko ABS

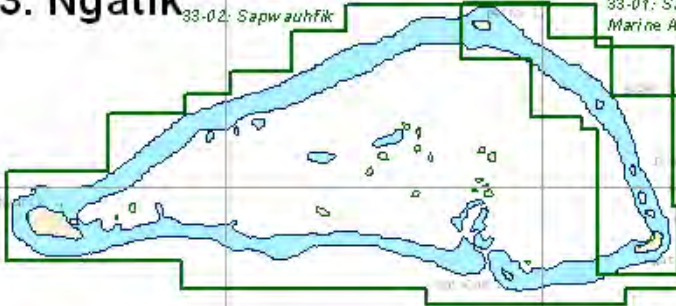
## 34. Pakin



34-01: Pakin At

## 33. Ngatik

33-02: Sapwauhfik



33-01: Sapwauhfik  
Marine ABS

## 38. Pingalep



38-01: Pingali

## 37. Mokil

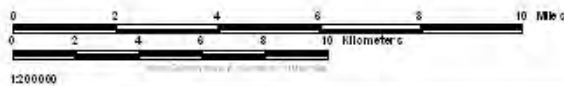


37-01: Mwoakilloa ABS

## 35. And



35-01: And ABS



The  
Nature  
Conservancy

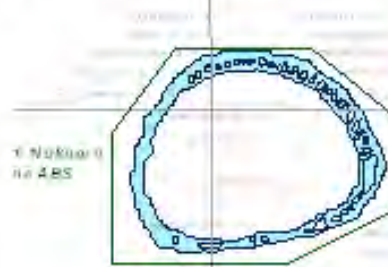
Map P-5b: Areas of biodiversity significance, Outer Islands of Pohnpei



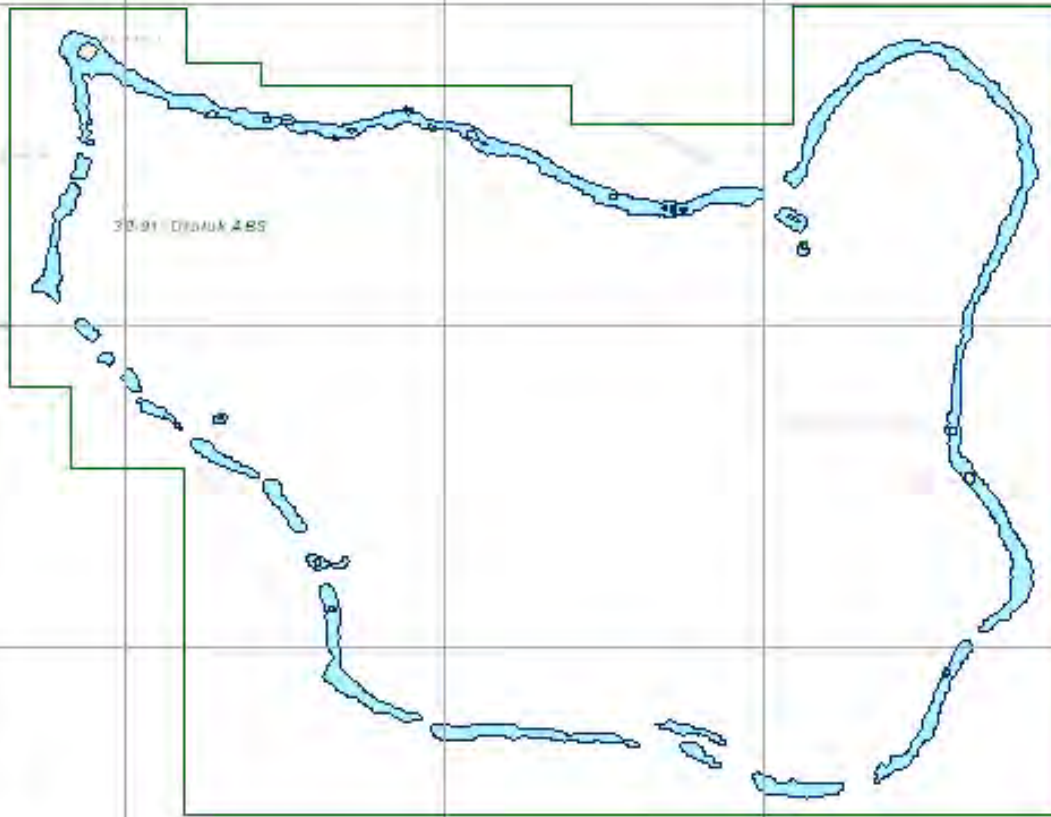
### 29. Minto Reef



### 31. Nukuoro



### 30. Oroluk



Map P-5c: Areas of biodiversity significance, Outer Islands of Pohnpei

## **Biosecurity**

Invasive alien species (IAS) have caused major biodiversity losses and ecosystem disturbance on islands worldwide. Islands are very vulnerable to biological invasions. IAS have directly or indirectly caused or contributed to the decline and extinction of many birds, reptiles, mammals and plants. Exotic invasive ants disrupt traditional outdoor lifestyles and cause harm to people and their crops. Invasive weeds compete with other plants for space, nutrients; and some overgrow and kill useful plants. Snakes like the brown tree snake in Guam cause significant economic losses due to power outages and biodiversity losses as a result of the extinction of several native bird species. In addition, feral pigs cause serious damage to people's gardens resulting in crop loss.

Islands present unique opportunities to manage Invasive species. Three main ways of managing IAS are prevention, eradication, or control. Preventing invasions of terrestrial species should be more achievable on islands than at land-locked sites. Eradication should be considered if an IAS is newly introduced and not wide spread.

Many invasive species in neighboring countries are not present in the FSM. Therefore a high priority must be given to prevention of the introduction of such invasive species.

Pohnpei State Forestry has stated that it has limited capacity to detect, monitor and control invasive plants and animals and pests early on, and need capacity building in this area. They will, however work with CSP and PIST on this issue.

The Pohnpei Invasive Species Taskforce (PIST) has identified a list of invasive species which have a potential for causing biodiversity losses and ecosystem disturbances. False kava, Mile-A-Minute, Chain of Love, Ivy Gourd, Honolulu Rose, and the Feral Pigeon have been identified for eradication. The Kerosene Tree, Tilapia and White Fly are currently being assessed.

In addition, assistance is needed to assess the impact of invasive vines, especially *Merremia peltata* that grow up in disturbed areas and then grow over adjacent trees, smothering them. Large areas of Pohnpei's uplands are covered with these vines.

The PIST Strategic Action Plan (SAP) establishes goals, objectives, activities, collaborators, timeframe, funding sources and estimated costs for control of specific species. The PIST SAP is divided into 4 thematic areas: Effective Coordination, Funding and Resources, Law and Policy and Government and Public Support. Work plans have been developed to address terrestrial plants, marine invasive species and feral pigeons. These work plans are linked to the goals and objectives of the PIST SAP and carry through to the end of 2008. For more details see PIST SAP in Appendix.

## **Wildfires**

Wildfires are not common in Pohnpei with its high rainfall. Reoccurring fires are man induced along roadsides when fires set in grasslands and small farm lots get out of control and burn into adjacent forest area. During periods of extreme drought, such as the ENSO related drought of 1983-1984, however, considerable areas of savannas as well as forested areas were burnt. It is estimated that wildfires affected over 50% of the Pohnpei upland forest, with some areas smoldering for weeks. Many people remember the impact of this period. As ENSO events are predicted to become more severe, a program to gather data on the incidence of wildfires is needed, as well as a contingency plan for years of severe drought,

and a Pohnpei State wildfire plans as well as program to work with communities to develop community wildfire protection plans (CWPPs).

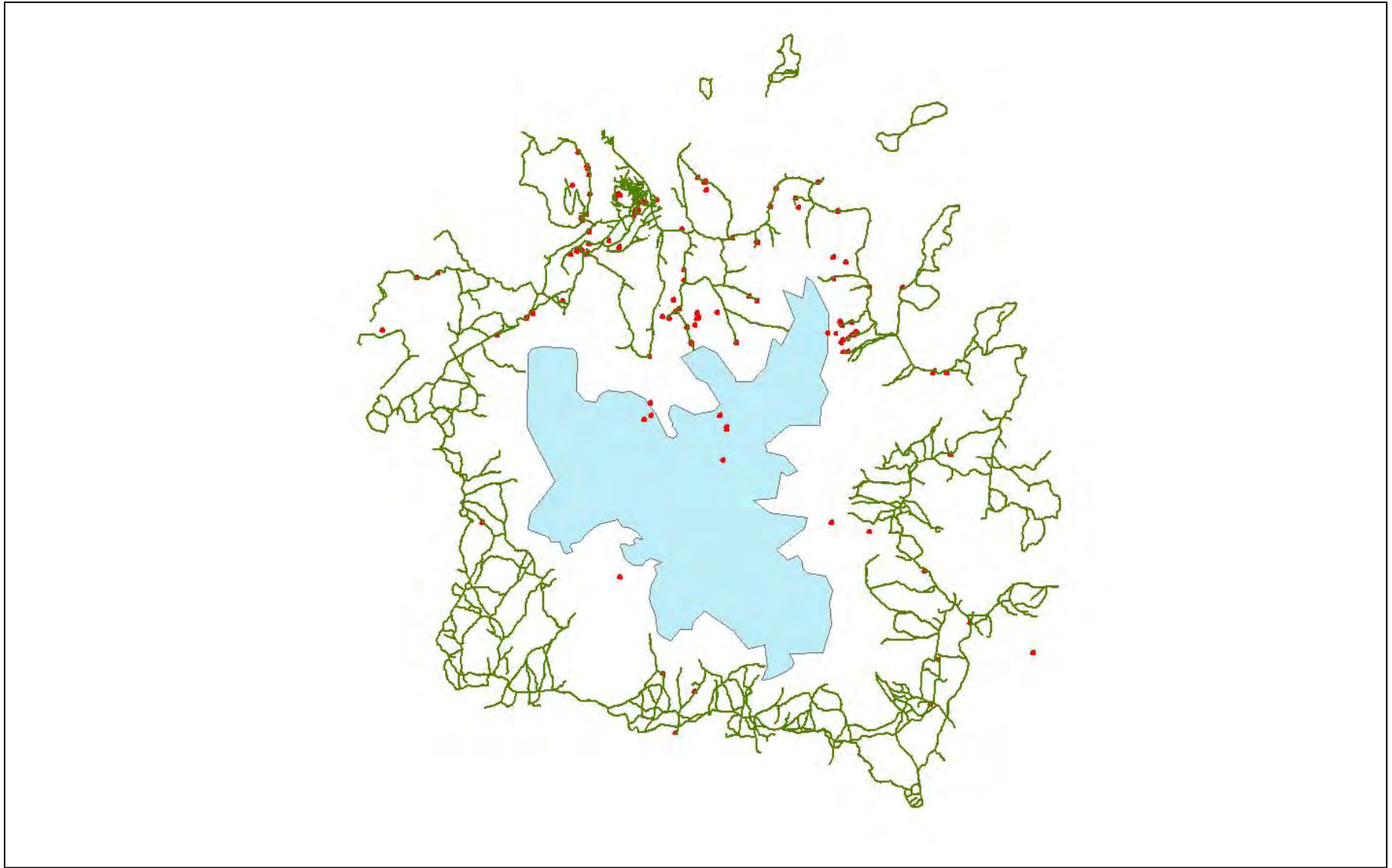
#### **D. Watershed**

The word “Watershed” in Pohnpei refers to the Pohnpei Watershed Reserve, at the interior of the island where many streams have their origins and where rainfall is highest. Maintaining forest cover on this area is a long-term goal in Pohnpei resource management. Map P-3 shows this watershed reserve. Map P-2 indicates that the condition of this watershed reserve is deteriorating. *Sakau* farming, road construction, squatting, wastes from small homestead piggeries, invasive species, and landslides impact this watershed. Map P-6 shows occurrences of targeted invasive species (as thus far detected by ground monitoring) with reference to roads and the watershed reserve, and Map P-7 shows private settlements within the watershed reserve.

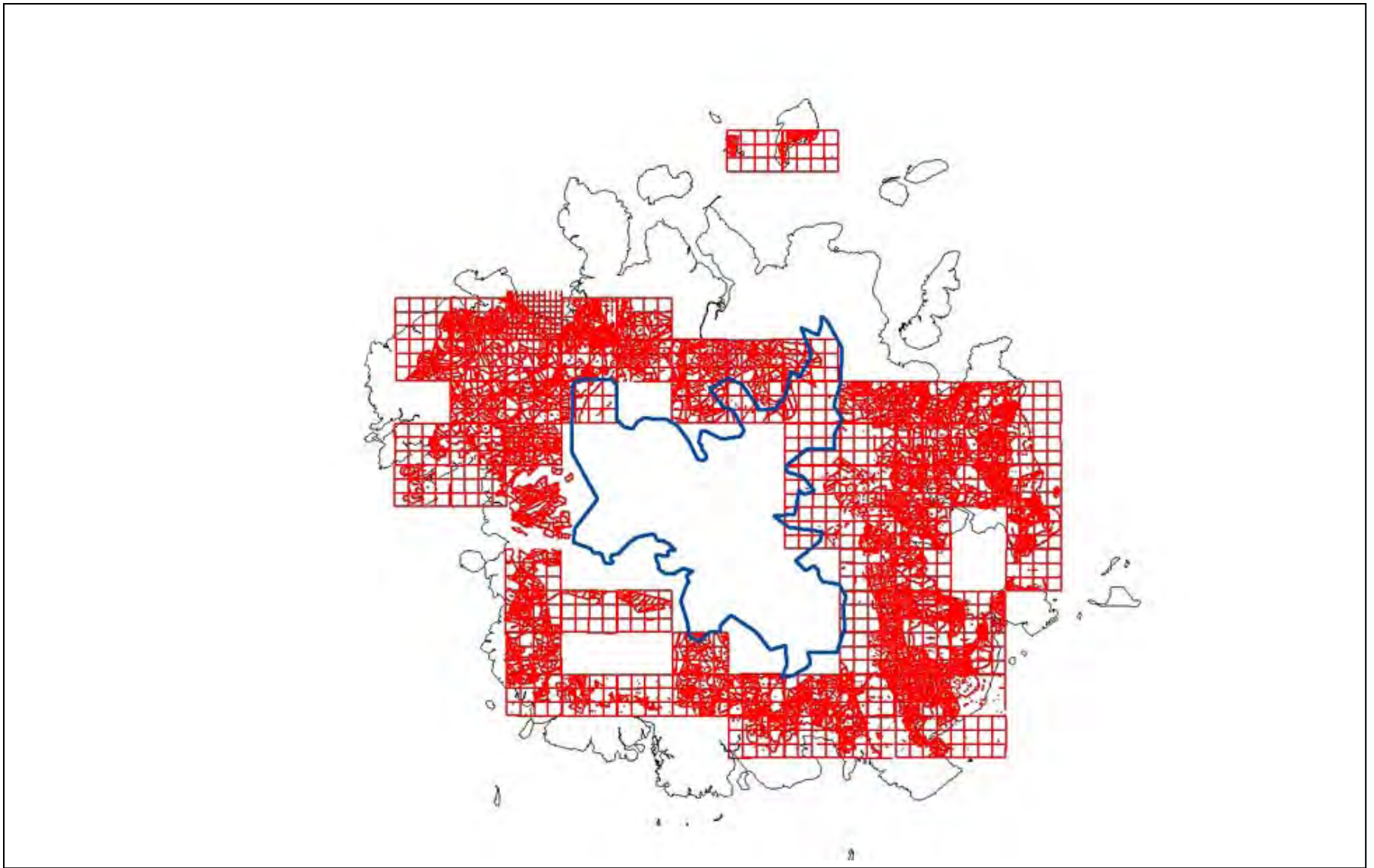
Condition and trend of the watershed reserve. The implementation attempt of the Pohnpei Watershed Reserve Boundary survey started in late 1989 & early 1990. The initial work was to get the GPS control points/coordinates on the ground before the actual survey, however, as the work progressed, we started to get a lot of resistance and misunderstanding among the community people especially in Nett Municipality. The team was virtually chased out of the forest in some of the communities in Nett. Therefore, Forestry decision was to stop this work and start a public concerted public awareness program that eventually reach over 165 communities on Pohnpei Island and the outer island. Thus, in 1991, the Pohnpei Watershed Steering Committee was created to give advice and help in carrying out the community awareness program. The membership included representatives from almost all offices and agencies that are involved in natural resource management, traditional leadership, consultants/NGO’s and others. After the island wide public awareness program was completed, the committee continued its’ function and changed the name to Pohnpei Resource Management Committee sometime in the mid 1990’s. This committee is chaired by the Lt. Governor of Pohnpei from early 2000 up to now.

The proposed corners of the boundary line on the ground have not change since the passage of the Watershed Law. At the moment, only U and Madolenihmw have completed the boundary survey on the ground and about 1.7 miles of boundary line in Kitti Municipality. The last actual boundary survey was done in 2003. Since then, most of the work done is focused on the larges watershed of Pohnpei which is in Nett Municipality. As a result of this work, Nett Municipal Government and the traditional leadership are in the process of reviewing and finalizing their watershed ordinance that will support the Pohnpei State Watershed especially in the management & enforcement responsibilities of the parties involved. The negotiations involved now for the watershed is not too much on the boundary line but rather in incidences where the line happens to intersect private lands in the critical watershed areas. It will be similar to that of Nett Municipality where we anticipate there will some slight changes or concerns to management and enforcement roles of the parties. However, Sokehs and Kitti have indicated their strong interest in putting the boundary line on the ground first and do the negotiation later where there is a need in the first Pohnpei Watershed Summit last March 2010.

Pohnpei has a watershed and mangrove protection act of 1987, but no completed and implemented plan. A Pohnpei Resource Management Committee chaired by the Lt. Governor of Pohnpei State was established to oversee the watershed reserve (Lipahi 2010). Pohnpei is interested in applying for a Forest Legacy project and has identified some potential areas.



*Map P-6: Occurrences of targeted invasive species (as thus far detected by ground monitoring) with reference to roads and the watershed reserve*



*Map P-7: Private settlements within the watershed reserve*

1. “Forest Legacy Map” This map shows sample of private land parcels that can be assessed for Forest Legacy Program. Some of these land parcels have been given certificates of title and some are only given the determination of land ownership. The Pohnpei State Watershed Law promulgates that the boundary line will only run on public lands. It also further states that should the line happens to transect a private land, it will then traverse around the boundary of the land on the upslope and then traverse back to the original watershed boundary coordinates on the other side. In other word, the Watershed Line will not run on any private land parcels and there will be no private land within the watershed area. Thus, all private land parcels that are bordering the watershed boundary are critically important as to the integrity of the watershed reserve. If these upland forested areas are altered and or developed into other services and uses, then, we can expect adverse impact on the ecological services of our watershed reserve. Therefore, these landowners can be potential candidates for the Forest Legacy Program. If these landowners are interested in the program, then, development and alteration of these areas can be avoided and our watershed ecological functions will not be disturbed and degraded.

### **E. Production & sustainable harvesting**

The integrity of Pohnpei’s culture is ultimately dependent on its natural resource base. Map P-4 indicates that Pohnpei’s natural resources are being exploited unsustainably. A second iteration of the FIA survey should show changes in surveyed plots. Since the government owns and operates the field trip ships, the government could control the exploitation of sea turtles, sea birds and coconut crabs by field trip ships. Production and sustainable harvesting efforts could be tied in with ecotourism.

A timber survey (MacLean et al 1988) and forest inventory assessment of Pohnpei (FIA 2009/10) have been conducted. While commercial milling of lumber is prohibited in Pohnpei (Liphai 2010), it would be helpful to have an analysis done to determine what, if any, level of timber harvest might be sustainable as the issue of timber harvest and sawmills is likely to arise and unsustainable cutting of trees could occur if such information is not readily available when such activities are first considered or initiated. A major concern is the over harvesting of mangroves. Metz (1996) describes a mangrove management plan and Devoe classifies areas of mangroves on the basis of their conservation and productivity values.

Map P-1 shows areas of mangroves and upland forest. The 1986 vegetation map also shows some 6 hectares plantation forest, 19,683 hectares of agroforest; 9,796 hectares of agroforest with coconuts and 124 hectares of coconut plantation.

### **F. “Urban” Forestry**

Trees provide shade and beauty to the urban areas where people live, work and play, and urban forestry is important to quality urban environments. There is interest in beautification of urban areas and a women’s organization has planted trees along the road in Kolonia. The Forestry nursery provides seedlings and saplings for such efforts. Roadside trees can sometimes pose a threat to utility lines and safety in urban and residential settings. There is a lack of trained arborists to properly prune trees, so trees in urban areas tend to be cut down instead of pruned. Trained arborists are needed to manage urban forest. Map P-2 shows urban areas, and Map P-7 shows road network.

The Pohnpei urban and Community Forestry Advisory Council is made up of a subcommittee of the Pohnpei State Resource Management Committee formerly the Watershed Steering Committee.

Members of the sub-committee are appointed by the Chief of Forestry to renewable two-year terms; they will be replaced if they miss 4 consecutive meetings. Membership of the subcommittee (U&CF Council) currently includes:

- Mr. Valentine Santiago - CSP/Forestry
- Mayoriko Victor - U&CF Coordinator
- Kadalino Lorens - Division of Agriculture
- Gibson Santos - Natural Resource Conservation Service
- Jackson Phillip - College of Micronesia FSM
- Womens Rep. - *Vacant*
- Farmer - *Vacant*

The roles of the council are the following:

- Provide strategic leadership and advice
- Review & comment on draft U&CF annual proposals
- Review & approve projects to be funded with “flexible funding”
- Recruit, interview and help evaluate candidates for U&CF Coordinator
- Help with publicity, project planning, project monitoring, etc.

The council was consulted in one of their regular meeting in regards to the “SWARS”. After the explanation of the requirements of the new farm bill, the council then decided not to go ahead with the revision and update of the existing U&CF five year plan but rather start incorporating some of these requirements in annual project proposals. Some of the required information are stated above and especially the geospatial analysis/information. Some of the members also attended and participated in SWARS consultation with our larger cooperating/collaborating group. Some of the offices and agencies involved in the consultation are as follows; Division of Survey and Mapping, Conservation Society of Pohnpei, Environmental Protection Agency, Natural Resources Conservation Services, Division of Agriculture, FSM Resource Management, Division of Agriculture etc.

## **G. Capacity-building**

Table P-2 summarizes the numbers of Pohnpei Forestry staff, on-island cooperators and off island agencies and groups that are budgeted and/or mandated to provide assistance to the FSM. The proportion of funding sources is limited in comparison to the availability of technical and other advice. The small size of the Forestry staff in proportion to off-island advisory groups limits its capacity to absorb input from these groups, and to also fulfill commitments to local Government performance-based budgets and to serve communities. In contrast, however, the Conservation Society of Pohnpei, an NGO, is a relatively large and active organization that is able to tap both outside sources of funding and expertise. Strategies for increasing the capacity of Pohnpei Forestry are listed in Table P-3.

## **II. Resource Strategy**

### **Long-Term Desired Conditions**

Long-term objectives of Pohnpei Forestry are to finish demarcating the boundaries of the Pohnpei Watershed Reserve in the last three of Pohnpei's 5 Municipalities, enforce compliance, and establish a Forest Legacy program. The Public will be aware of the value and importance of forest resources and their ecological services, and the staff of Pohnpei Forestry will be able to provide information that communities need to wisely manage their forests. Communities will be engaged with the stewardship of forest resources, and assisted by Municipal officers. By 2020, at least 20% of the forest will be under effective management. The stewardship of agroforests will be intensified to prepare for an influx of Outer Island residents as sea levels rise.

A working second draft of the Pohnpei State Land Use and Zoning Master Plan (1996) refers to a Land Use and Zoning Act of 1993, with chapters on Conservation and Agriculture; and maps on existing land use, conservation and watersheds, parks and historic and cultural sites. Zones include: sustainable use, seasonal preserves, species preserves, watershed forest reserves, important watershed areas, and mangrove forests. The draft refers to a Mangrove Management plan of 1995 by the Division of Resource Management and a Watershed Forest Reserve and Mangrove Management Act. Also included are historic preservation sites that are to be left untouched. These could also serve as conservation areas.

### **Program Integration**

Program goals and objectives will be more focused and complementary across the different programs. Long term monitoring results will be more attainable as management efforts will be more effective and efficient holistically. All partners and stalk holders will be aware of the "SWARS" goals and objectives and can take part in the management accordingly to their areas of interest and capabilities. Program funds and resources will be mobilized and utilized according to the "SWARS" priorities and issues. All projects will be carried out for a common goal of protecting, conserving and enhancing our limited forest resources strategically to benefit all the people of Pohnpei.

### **Resources**

Table P-2 summarizes the resources available to Pohnpei Forestry in terms of 1) people and advisory groups and 2) Sources of financial support. Column 1 shows the number of Pohnpei's forestry staff, column 2 lists on-island cooperators, and column 3 lists off-island agencies and groups whose funding and/or mandates include assistance to the FSM. A comparison of the resources in line 1 (people and advisory groups), and line 2 (sources of financial support), shows that Pohnpei Forestry has a lot of on island cooperators and access to a lot of free technical advice but limited sources of financial support. The Region 5 State and Private Forestry Grant program is the only consistent source of support for land stewardship activities in the FSM, and enable considerable leveraging. It is thus important that the base level of S&P grant funding be maintained.<sup>11</sup>

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<sup>11</sup> At one time it was locally understood that S&P grants were to be decreased at the rate of 15% each year in order to fund the competitive grant program. It has since been learned (Friday, email of 3-29-2010) that the percentage taken out of "base" grants and awarded as competitive grants is flat at 15%.



**Table P-2: Resources**

<b>Resources: People &amp; Groups</b>		
<b>Forestry Staff</b>	<b>On-Island Cooperators</b>	<b>Off-island Advisory agencies &amp; Groups</b>
<p>Paid by Gov. Pohnpei Forestry has the following staff : Chief, Div. Forestry &amp; Marine Conservation (1); State Forester &amp; U&amp;CF coordinator (1), Ag rep / watershed coordinator (1), nurserymen (3), farm laborer Ag/Forestry (1),</p>	<p>Conservation Society of Pohnpei (CSP), EPA, NRCS, TNC, College of Micronesia-FSM CRE, Land Grant, IFCP- Island Food Community of PNI, Pohnpei Farmers Association (PFA), Local Governments, Traditional Leaders, SPC-Land Resource Staff (Invasive Control and Biosecurity Program), FSM Resources &amp; Development (R&amp;D), Office of Environment &amp; Emergency Management ( OEEM), Pohnpei Division of Agriculture, Pohnpei Invasive Species Taskforce (PIST), Micronesian Conservation Trust (MCT)</p>	<p>USFS PSW Station, NRCS, Univ. of Hawaii &amp; East-West Center, University of Guam, Water and Energy Institute (WERI), NOAA National Weather Service &amp; Coral Ecosystem Monitoring, UH/ UoG Sea Level Center, Palau International Coral Reef Center (PICRC), Pacific Is. Climate Change Cooperative (PICC)*<sup>12</sup>, Regional Invasive Species Invasive Species Council (RISC), Pacific Invasive Partnership (PII&amp;PILN) and a number of other Invasive species advisory groups; Commission of Regional Organizations in the Pacific (CROP) Agencies – Secretariat of the Pacific Community (SPC)*, South Pacific Regional Environment Program (SPREP), SOPAC; FAO, TNC, UNDP SGP, and a number of outside NGOs, and UN organizations including CBD, European Union, TNC Micronesia Challenge program, Venezuela Government, Japan Overseas Assistance (JICA), New York Botanical Garden, National Botanical Garden. and many others</p>
<p>Paid by S&amp;P funding Admin. Staff (1) Total: 7 staff, 3 Forestry staff paid by Government, 1 Forestry Admin. Staff paid by S&amp;P grant, and 3 staff shared with Marine Conservation or agriculture</p>		
<b>Resources: Financial</b>		
<p>Pohnpei State Government</p>	<p>MCT (for projects done with communities)</p>	<p>USFS Region 5 S&amp;P grant program***, GEF-UNDP (SLM)**, UNCCCD-Venezuela Fund</p>

\*<sup>1</sup> PICC is a newly formed cooperative including the U.S. Fish & Wildlife Service, U.S. Geological Survey, National Parks Service, National Oceanic & Atmospheric Administration (NOAA), NRCS, U.S. Forest Service, U.S. Army, Office of Hawaiian Affairs, Hawaii’ Department of Land and Natural Resources, University of Hawaii, The Nature Conservancy, Kamehameha Schools & Hawaii Conservation Alliance

\*The SPC has an on-island Land Resources Division and is expecting a forester.

\*\*The Sustainable Land Management (SLM) is a 3-year program to enhance ongoing efforts.

\*\*\*Pohnpei State has been successful in getting 3 S&P competitive grants. One of the challenges of this program is that the disbursement of funds for reimbursable grants must be authorized by a Congressional Resolution. This has resulted in considerable delays. Now that all parties are aware of the requirement, it may be possible to initiate Congressional approval with the initial competitive proposal or Letter of Funding Advice.

### **General Strategies for Addressing Threats**

On a small island such as Pohnpei, all areas are important as ecosystems are closely linked in a small area and there is little leeway for ecological mistakes. Once ecosystems are disrupted, they are difficult to re-establish. It is thus important to link ecosystem integrity with the production of food and other goods and services for people, especially in this era of climate change and sea level rise. Map P-1 addresses multiple issues. It is color-coded to indicate the appropriate general strategies and activities throughout Pohnpei. In general, these are: Enhance the warm colored areas (red agroforests and orange areas of secondary vegetation), and protect and conserve the cool colored areas (green forests and blue mangroves that are important for biodiversity and ecosystem services).

Table P-3 lists Strategies by FSM Issues, Funding, and Cooperators & Performance Measures and shows how S&P funding will leverage additional funding and actions.

**Table P-3: Strategies by FSM Issues, Funding, Cooperators & Performance Measures**

POHNPEI ISSUES:	Strategies & activities for 5-yr SWARS Plan	Resources / Funding		Main Cooperators	Performance Measures
		S&PF	Others		
All issues	Awareness raising	CE		CSP, Department of Education, Municipal Governments	Public is aware of natural resource issues and makes wise decisions for their sustainable use
	Obtain up to date aerial photos, especially of Pohnpei Outer Islands  Mapping & change detection	R5	SOPAC? TNC & CI?		Updated vegetation maps, updated analysis of forest trends in Pohnpei and baseline images for resource assessments of Outer Islands and scanned images to share with communities for developing community stewardship plans
A) Food Security	A.1. Establish comprehensive, intensive agro-forestry program that will promote utilize and sustain agro-biodiversity A.2. Identifying food production technologies for atolls and coastal areas affected by salt water intrusion and climate change A3. Inventory of traditional crops and varieties A4. Establish Gene banks A5. Identifying best practices for sustainable food production	CFHP, CFHP-IP, FRM/ FSP, CE, Western Competitive Grants...	FAO, GEF-UNDP, JICA, UNCCCD-Venezuela Gov't.	FSM Div. of Agriculture, COM-FSM Land Grant Program, Pohnpei Farmers Associations, SPC, IFCP	A.1. Enhancement and expansion of existing agro-forestry systems. A.2. On-site trials conducted A3. Inventory of traditional crops conducted  A4. Gene banks established A5. Guidelines on best practices developed
B) Coastal Stabilization	B.1. Enhance costal vegetation, especially mangroves to reduce coastal erosion B.2. Enhance the capacity to conduct	U&CF, FRM/FSP, CE	SOPAC, TNC, Pohnpei Marine Resources	Local Municipal Governments, Resources Management Committees, Dept. of	B.1. Increase in coastal vegetation, reduce coastal erosion B.2. EIAs conducted

	EIA for dredging sites B.3. Enforcement and awareness B.4. To protect and maintain natural landscapes and ecosystems as roads are climate proofed			Transportation & Infrastructure, Office of the Attorney General, Pohnpei EPA, SPC, DLN&R, OEA-Agriculture Division, FSM DR&D	B.3. Enforcement and awareness raising in all municipalities B.4. Development of a sustainably developed climate-proof projects
C) Biodiversity	C.1. Establish conservation easements* C.2. Establish and monitor protected forest areas. C.3. Establish and monitor Forest Legacy Areas. C.4. Improve and strengthen Bio-Security quarantine protocols. C.5. Support implementation of the Pohnpei Invasive Species Taskforce (PIST) Strategic Action Plan: to prevent degradation of natural and working forests (agroforests).-Request assistance with control/eradication for invasive species that are more difficult to control C.6. Develop a Pohnpei State wildfire plan and program with contingency plan for years of extreme drought and begin working with communities to develop Community Wildfire Protection Plans (CWPPs)	Forest Legacy  FRM/ FSP, Forest Legacy, CFHP, CFHP-IP, Cooperative Fire (FAM) CE, Western Competitive Grants...	NOAA, TNC, GEF-UNDP (SLM); MCT	TNC, Pohnpei Division of Agriculture, FSM Div. of Agriculture, FSM National Weather Station, CSP, TNC, SPC	C.1. Easements established % land area protected under Micronesian Challenge C.2. Existence and enactment of 'Protected Forest Areas' C.3. Existence and enactment of 'Forest Legacy Areas'. C.4. Increase in capacity of bio-security quarantine officers; and decrease in bio-security quarantine non-compliance incidents. C.5. Establishment of a permanent 'Invasive Control Program'. Availability of data/information on control of especially aggressive vines and invasive species C.6. Existence of a wildfire plan and program with annual reports on wildfires and contingency plan for years with severe drought.

D) Watershed	D.1. Adopt and Develop Mangrove & Watershed Management Program. D.2. Delineation of watershed boundaries in Sokehs, Nett and Kitt <sup>13</sup> D.3. Effectively manage and maintain native forest cover in watershed areas. D.4. Establish and manage 'Pohnpei Protected Watershed Areas' (include enforcement and rehabilitation/reforestation programs). D. 5. Erosion and sedimentation monitoring D.6. Develop guidelines and approach to demarcating and monitoring watershed areas, including the use of GIS.	FRM/ FSP, U&CF, CE, Forest Legacy, CFHP, Western Competitive Grants...	TNC, JICA, Wallace Research Foundation, GEF-UNDP (SLM)	Dept. of Transportation & Infrastructure, Office of the Attorney General, Dept. of Health Services-Sanitation Unit, Local Municipal Governments, CSP,	D.1. Adoption of management plan and development of management regulations. D.2. Watershed boundaries delineated D.3. Increase in native forest cover in watershed areas; improvement in water quality. D.4. Existence of legally declared 'Protected Watershed Areas'. D.5. Watershed sedimentation assessments D.6. Guidelines developed
E) Production & Sustainable Harvesting	E.1. Determine amount of sustainable harvest for both upland and mangrove harvest E.2. Continue implementation of Community Reforestation Projects/ Tree Planting Projects. E.3. Assist communities establish timber lots	FRM/ FSP, CE, Western Competitive Grants...	MCT, SLM, Venezuela Gov't., FAO	Resource Management Committees, CSP, SPC, FAO, COM-FSM Land Grant Program	E.1. Upland/Mangrove harvest determined and program in place to limit unsustainable timber harvest E.2. Decrease in upland forest and mangrove gaps. E.3. Timber lots developed

<sup>13</sup> "Forest Legacy Map" This map shows sample of private land parcels that can be assessed for Forest Legacy Program. Some of these land parcels have been given certificates of title and some are only given the determination of land ownership. The Pohnpei State Watershed Law promulgates that the boundary line will only run on public lands. It also further states that should the line happens to transect a private land, it will then traverse around the boundary of the land on the upslope and then traverse back to the original watershed boundary coordinates on the other side. In other word, the Watershed Line will not run on any private land parcels and there will be no private land within the watershed area. Thus, all private land parcels that are bordering the watershed boundary are critically important as to the integrity of the watershed reserve. If these upland forested areas are altered and or developed into other services and uses, then, we can expect adverse impact on the ecological services of our watershed reserve. Therefore, these landowners can be potential candidates for the Forest Legacy Program. If these landowners are interested in the program, then, development and alteration of these areas can be avoided and our watershed ecological functions will not be disturbed and degraded.

F) Urban Forestry	F.1. Develop and implement community forest stewardship plans. <sup>14</sup> F.2. Establish/ expand public and private Nurseries. F.3. Establish and observe ‘ARBOR DAY’ F.4. Continue to implement outreach activities during Earth Day, Environment Day, Biodiversity Day, etc...	U&CF, FRM/ FSP, CE	SLM, Venezuela Govt, Pohnpei State government	SPC, Local Municipal Governments, PMCs, CSP, TNC, SPC, PNI Agriculture,	F.1. Existence of community forest plans. F.2. Existence of private nurseries; increase in seedling production and distribution. F.3. Adoption an observance of a state ‘Arbor Day’. F.4. Evident observation of environmental awareness-raising events.
G) Capacity Building	G1. ICS Training & Certification G2. Tree Worker Training & Certification G3. Arborist Training & Certification (ISA) G4. Develop ‘Staff Development Plans’ G5. Develop ‘Forest Conservation Capacity-Building Network’ that will serve as a vehicle for announcing or obtaining information on funding or training opportunities. G6. EIA Training G7. Assist Communities with development of natural resources stewardship plans.	Cooperative Fire, U&CF, CE, CFHP, FSP, ‘Western Competitive Grants’	JICA, TNC...	Office of the Attorney General, Local Municipal Governments, Resource Management Committees, PUC, SPC, Pohnpei State Legislature, COM	G.1. Development of ICS Training Program and existence of ICS Certified personnel G.2. Development of a Tree-Worker Training Program and existence of certified tree workers. G.3. Development of an Arboriculture Training Program and existence of certified arborists. G.4. Staff development plans in place. G.5. Improved dissemination of

<sup>14</sup> Forest Stewardship “Resource Management Plans. Pohnpei State Forestry is still committed to working with its partners in developing written Resource Management Plans to meet the program standards. In collaboration with CSP, local governments, and communities, we have developed two different mangrove management plans & one terrestrial management plan for three communities. There are two in Kitti and one in Madolenihmw. As part of our SWARS consultation with our U&CF Council, there has been some revision on the selection and requirements of project proposals. Some of the new information that are being inserted for e.g. Community demographic information, land area/map, land use type, historical sites, socio-economics, invasive species, etc. We believe that including these kinds of information will improve on monitoring & evaluating project progress and impact, and at the same time use to develop a management/land use plan.

	<p>G8. GIS Training and equipment for utilization of old and new aerial photos, remote sensing, spatial imagery, geo-database development,</p> <p>G.9. Grant writing and project management</p> <p>G.10. Promote Natural resource management as a worthy career and place greater priority in natural resource programs including additional positions</p>				<p>information on training or funding opportunities; increase in the number of training opportunities participated in; increase in funds received through grants.</p> <p>G.6. Development of EIA Training Program; Application of EIA Training in Development Projects.</p> <p>G.7. Development and existence of stewardship plans.</p> <p>G.8. Increase in availability and practical use of GIS Maps.</p> <p>G.9. Enhanced capacity in grant writing and management</p> <p>G.10. Increased number of staff working in natural resource stewardship fields</p>
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- C.1. Strategy: Establish Conservation Easements

Regarding Forest Legacy: the current approach is to observe Kosrae’s experience with the Forest Legacy program and consider preparing a Forest Legacy Assessment of Need (as an amendment to the SWARS) in 2011 or later.

Potential Forest Legacy Area / specific parcels (high value):

- Land parcels extending into watershed areas such as Kepine?
- Nanpil water dam
- Ant atoll and Nanpei estate is a possibility for a Forest Legacy (FL) funded conservation easement. The owners are currently exploring the protection of several of the islands.
- Some historic/cultural sites have been identified and mapped. There may be opportunities to combine these sites with high quality forest for acquisition through FL.

Threats:

- a. Agriculture is biggest threat to forest due to clearing and conversion to agriculture.
- b. People are moving inland away from the coast. This is impacting forest directly through the clearing of forests for homes and agriculture and indirectly through the construction of roads and the additional changes that follow.
- c. The municipal watershed is being encroached upon by private ownerships (Nett). This may be a potential area for FL funding.
- d. Invasive species are impacting the forest. CSP has been mapping the location of some invasives.
- e. Fire is a threat during years with extreme ENSO related droughts.
- f. Mangrove is being cut and mangrove areas being filled to expand building areas. State permits are required for this but are not issued uniformly.

Land ownership:

- a. Communication with and education of landowners about the FL program will be essential if FL is to succeed in Pohnpei.
- b. Watersheds are not well defined in terms of ownership. Some land ownership will be in conflict when eventually mapped.
- c. Complex land ownership by large extended families will complicate land acquisition
- d. Mangroves are owned by the state.
- e. State owns all rivers and streams, including a 50' buffer on each side. Negative impacts by private activities are still occurring in these areas.
- f. Threat of transfer of state owned lands to private ownership. Maximum area that can be privately owned through state transfer is one hectare making ownership more complex. Settlement in watershed areas (Nett and Kitti) but no certificate of title. There may be a possibility to relocate to squatters to other public lands such as Palikir.



## **Long-Term monitoring of outcomes of activities in priority forest landscape areas and how actions will be revised when needed**

This SWARS is a living document that will be updated as warranted. GIS capacity will continue to be developed and resultant maps will be utilized in future updates. Should updated aerial photography become available, new vegetation maps for Pohnpei will be developed and an assessment of current conditions and trends of forest resources will be conducted. Aerial imagery will also be made available to community groups developing community stewardship plans. Aerial imagery of Pohnpei Outer Islands will provide a baseline for natural resource assessment. The availability of LIDAR imagery would enable the development of elevation profiles that are critical to planning for adaptation to sea level rise. Priority landscape areas for specific issues will be monitored and strategic actions will be revised as needed.

Program goals and objectives will be more focused and complementary across the different programs. Long term monitoring results will be more attainable as management efforts will be more effective and efficient holistically. All partners and stakeholders will be aware of the “SWARS” goals and objectives and can take part in the management accordingly to their areas of interest and capabilities. Program funds and resources will be mobilized and utilized according to the “SWARS” priorities and issues. All projects will be carried out for a common goal of protecting, conserving and enhancing our limited forest resources strategically to benefit all the people of Pohnpei.

### ***List of Pohnpei Maps***

- P-1: Vegetation of Pohnpei
- P-2: Tikitiklahn wahl en Pohnpei
- P-3: Priority areas for agroforestry for food security (spatial analysis)
- P-4: Priority areas for coastal stabilization (spatial analysis)
- P-5a: Areas of biological significance in Pohnpei State
- P-5b: Areas of biological significance in Outer Islands of Pohnpei
- P-5c: Areas of biological significance and Outer Islands of Pohnpei
- P-6: Occurrences of targeted invasive species
- P-7: Private settlements within the watershed reserve

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## ***Appendices***

### **Process of Developing Pohnpei State SWARS**

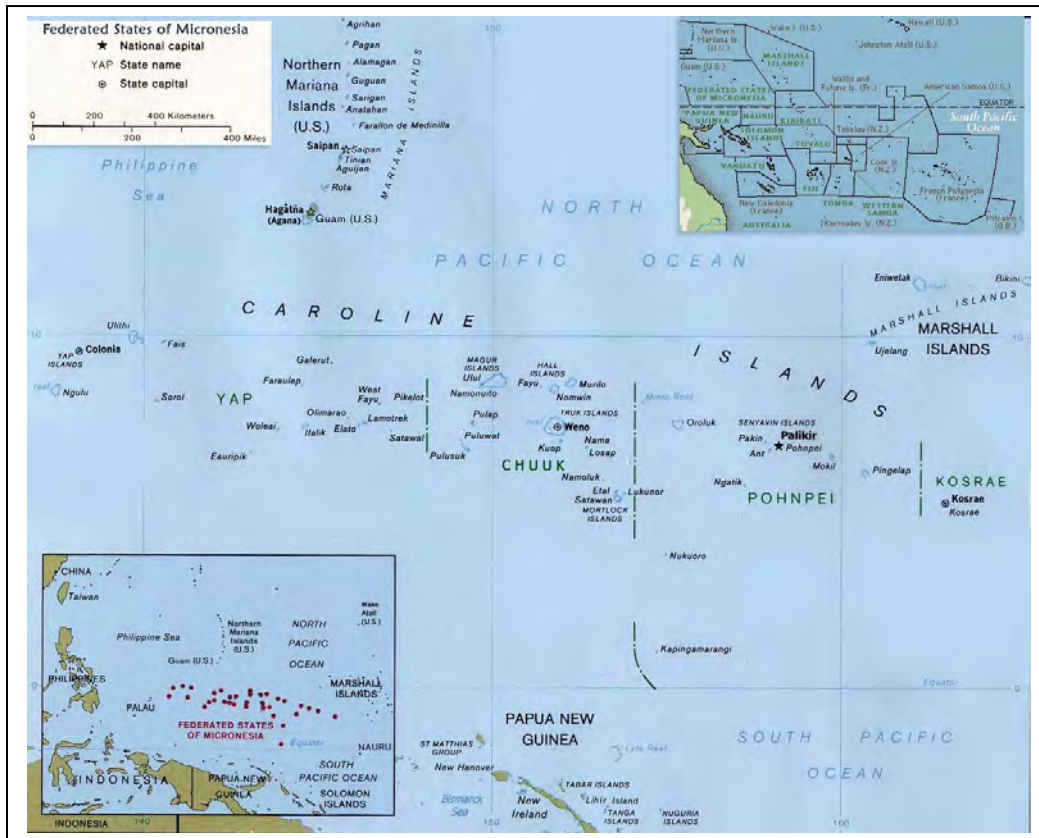
The process of developing the Pohnpei State SWARS was initiated in March 9, 2009 in an introductory workshop on the SWARS and geospatial analysis, and the identification of 7 crosscutting issues for the FSM. This was followed by several consultations with stakeholders at the State level, and workshops conducted by National Government staff, Gibson Susumu of the Division of Resource Management and Development, and Alissa Takesy, the Protected Areas Network Coordinator, to identify natural resource values and threats. These issues were shared with GIS specialists to initiate maps. Training in geospatial analysis was held in Hawaii, and later at the College of Micronesia in Pohnpei and in Chuuk for forestry and GIS personnel from FSM States. Katie Friday, serving as liaison between Region 5 S&P and the FSM developed an outline for the FSM SWARS and conducted interviews to initiate written SWARS. Margie Falanruw was then tasked with working with all four States of the FSM to complete the first draft of the FSM SWARS in time for the PIC meeting in Chuuk in March 8-12, 2010. The current draft Pohnpei SWARS is based on materials that were made available at the writing team workshop on 15 & 16 February 2010, and additional input on June 10 & 14 2010.

## VI. FOREST LEGACY – ASSESSMENT OF NEED

### Introduction

The Federated States of Micronesia (FSM) is a young independent nation. FSM was a United Nations Trust Territory of the Pacific Islands (TTPI) administered by the United States of America until the two nations signed a Compact of Free Association in 1986 leading to the trusteeship termination by the United Nations in 1991. The Compact treaty established a special relationship with the United States and provides economic support to FSM.

FSM is the largest and most diverse part of the greater Micronesian region, and is comprised of four States, which include from west to east: Yap, Chuuk, Pohnpei and Kosrae. All but Kosrae State includes more than one island, and each state has considerable autonomy within the Federation, particularly with respect to land tenure and land management. The total landmass of the FSM is 438 square miles (702 km<sup>2</sup>) with a declared Exclusive Economic Zone (EEZ) covering over 1 million square miles (1.6 million km<sup>2</sup>). FSM comprises 607 islands with land elevation ranging from sea level to about 2,500 feet (760 m). The archipelago lies in a broad east-west swath across 1.6 million square kilometers of the western Pacific Ocean above the equator between 1.0-9.90 N and 138.2-162.60 E (see Figure 1). The northeast trade wind belt heavily influences the tropical climate of FSM. Trade winds prevail from December through April and periods of weaker winds and doldrums occur from May through November.



Map AON-1: Map of Federated States of Micronesia

Seasonally May to November the rainfall is extremely high on the volcanic islands of Kosrae, Pohnpei and Chuuk, and can exceed 400 inches (1,016 cm) a year (SPREP, 1993 and Lindsay and Edward, 2000). The region is affected by storms and typhoons (hurricanes) that are generally more severe in the western islands, and by periods of drought and excessive rainfall associated with “El Nino”. The droughts of 1982-1983 and 1997-1998 were especially severe on terrestrial habitats, further increasing localized threats to biodiversity. Groundwater sources were taxed, agricultural systems damaged and problems associated with wildfires and invasive species were greatly aggravated. High mean water temperatures especially associated with low water spring tides caused coral bleaching and damage to inshore marine ecosystems (Falanruw, 2001).

The indigenous population is Micronesian with most of the people residing on the main islands of the State capitals. The 2000 FSM Census preliminary count of the population was 107,000. FSM National Census counts and reports are done in 10-year periods. Hence, the 2010 FSM Census count is currently in its initiation phase. Traditional, social and cultural institutions are still very strong in Micronesia. Micronesian society is based on the extended family, which is responsible for the family welfare, especially in relation to customary family land. Ownership of land and aquatic areas varies between States. In Kosrae and Pohnpei, land is both State and privately owned, while aquatic areas are managed by the State as public trusts. In Chuuk, most land and aquatic areas are privately owned and acquired through inheritance, gift or recently by purchase. In Yap, almost all land and aquatic areas are owned or managed by individual private estates and usage is subject to traditional control. In all States, land cannot be sold to non-citizens of FSM (Falanruw, 2001 and URS, 2001). These land and aquatic ownership patterns greatly influence the strategies and actions required to sustainably manage the biodiversity of the nation.

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

The national constitution of the FSM is the basis for all legal authority and decision making for the nation. The legislation and institutional framework of the Federated States of Micronesia includes, both National and individual State constitutions with each of the four States functioning as semi-autonomous governments. This structure makes allows each State to enact their own legislation in line with their powers as mentioned in the FSM Constitution to address all issues relating to the conservation of biodiversity.

Individual State environmental and biodiversity regulations are in different stages of development and are being amended as new issues arise. The responsibility for environmental issues is shared between the FSM National Government and the individual FSM State governments. This sharing of responsibility has at times resulted in legislation that appears duplicated at the State and National levels. It has also resulted in gaps in legislation and areas in

## Appendix II: State Forest Stewardship Coordinating Committee

Interest or agency required by law “if feasible”	Name, title, affiliation
Forest Service	Kathleen Friday, USFS
NRCS	NRCS Pohnpei Field Office
Farm Service Agency	Not in the FSM
Cooperative Extension Service	Jim Currie, Vice President, COM-FSM Cooperative Research and Extension
Local Government	Maheta Kilafwasru, Chairman, Council of Mayors, Kosrae State Pintas Kenneth, Mayor Rep, Chuuk State (Intend to add local government representatives from Pohnpei Municipal Government and Yap Traditional Leadership Focal Points)
Soil and Water Conservation District	(To be added when and if a Pohnpei or other S&WCD is established by USDA NRCS)
Consulting foresters	Francis Ruegorong, Waab Land & Wildlife Coordinator, Yap State Erick Waguk, State Forester, Kosrae State Basiente Atan, UCF Coordinator, Chuuk State (Intend to add Pohnpei State forester)
Forest products industry	Dr. Tholman F. Alik, Yela Environmental Landowners Authority, Kosrae State (Intend to add Yap, Chuuk, Pohnpei and Kosrae Farmers associations <sup>1</sup> and ecotourism representatives)
Private Forest landowners	Mr. Barton Musrasrik, Kosrae Farmers Representative (Intend to add Chuuk, Pohnpei and Yap Farmers representatives)
Land-trust organizations	Mr. Robinson H. Timothy, Principal Judge, Kosrae Land Court Kaster Sisam, Division of Land Management, Chuuk State (Intend to add Pohnpei and Yap State Land Commission Focal Points when designated)
State lead agency for Forest Legacy	Mr. Gibson Susumu, State Forester
Environmental/ Conservation organizations	Mr. Marston Luckymis, Acting Executive Director, Kosrae Conservation Safety Organization Bradford Mori, GIS Specialist, Chuuk EPA Curtis Graham, Chuuk Conservation Society Patterson Shed, Executive Director, CSP
State fish & wildlife agency	Robert Jackson, Director, Kosrae Island Resource Management Authority Romeo Osiena, Director, Department of Marine Resources, Chuuk State Yap State Department of Resources and Development [already represented by Francis Ruegorong, Waab Land & Wildlife

<sup>1</sup> Local farmers associations mostly practice agroforestry methods

	Coordinator, above, and Michael Gaan, Director, below] (Intend to add Pohnpei State Department of Land and Natural Resources Director)
Tribal representatives (chiefs)	Henry Nedlic, Traditional Chief, Chuuk State (Intend to add representatives from: Yap Council of Pilung and Tamol Chuuk Mayors Council Pohnpei Paramount Chiefs Council Kosrae Mayors Council)
Other (Departments of Agriculture)	Innocente Penno, Director Department of Agriculture, Chuuk State Julian Sivas, Chief of Forestry, Chuuk State Steven L. George, Director, DREA, Kosrae State Michael Gaan, Director, DLN&R, Yap State (intend to add Pohnpei Division of Agriculture)
Other	Furasi Bonocho, Department of Public Safety, Chuuk State

### Appendix III: List of Areas of Biological Significance for the Nation

ABS Site Type	Number of ABS sites	Area (Hectares)	Area (Sq. Miles)
<b>TERRESTRIAL SITES</b>			
Yap	3	651.94	2.52
Chuuk	9	4,328.06	16.71
Pohnpei	9	12,833.28	49.53
Kosrae	2	4,835.04	18.66
<b>TOTAL TERRESTRIAL</b>	<b>23</b>	<b>22,648.32</b>	<b>87.42</b>
<b>MARINE ONLY SITES</b>			
Yap	6	49,471.10	190.95
Chuuk	10	20,683.29	79.83
Pohnpei	5	12,480.50	48.17
Kosrae	1	54.52	0.21
<b>TOTAL MARINE</b>	<b>22</b>	<b>82,689.39</b>	<b>319.17</b>
<b>COASTAL MARINE SITES</b>			
Yap	21	24,007.43	92.66
Chuuk	20	77,089.91	297.55
Pohnpei	18	75,695.26	292.17
Kosrae	5	1,466.07	5.66
<b>TOTAL COASTAL MARINE</b>	<b>64</b>	<b>178,258.67</b>	<b>688.04</b>
<b>COASTAL FRESHWATER SITES</b>			
Yap	2	31.76	0.12
Chuuk	11	936.66	3.62
Pohnpei	3	5,283.09	20.39
Kosrae	4	1,904.89	7.35
<b>TOTAL COASTAL FRESHWATER</b>	<b>20</b>	<b>8,156.39</b>	<b>31.48</b>
<b>OVERALL TOTAL</b>	<b>130</b>	<b>291,752.77</b>	<b>1,126.11</b>