Forestry Department
Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES ASSESSMENT

COUNTRY REPORTS

FEDERATED STATES OF MICRONESIA

FRA2005/043
Rome, 2005

The Forest Resources Assessment Programme

Sustainably managed forests have multiple environmental and socio-economic functions important at the global, national and local scales, and play a vital part in sustainable development. Reliable and up-to-date information on the state of forest resources - not only on area and area change, but also on such variables as growing stock, wood and non-wood products, carbon, protected areas, use of forests for recreation and other services, biological diversity and forests' contribution to national economies - is crucial to support decision-making for policies and programmes in forestry and sustainable development at all levels.

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Forest Resources Assessment Programme. This country report forms part of the Global Forest Resources Assessment 2005 (FRA 2005), which is the most comprehensive assessment to date. More than 800 people have been involved, including 172 national correspondents and their colleagues, an Advisory Group, international experts, FAO staff, consultants and volunteers. Information has been collated from 229 countries and territories for three points in time: 1990, 2000 and 2005.

The reporting framework for FRA 2005 is based on the thematic elements of sustainable forest management acknowledged in intergovernmental forest-related fora and includes more than 40 variables related to the extent, condition, uses and values of forest resources. More information on the FRA 2005 process and the results - including all the country reports - is available on the FRA 2005 Web site (www.fao.org/forestry/fra2005).

The Global Forest Resources Assessment process is coordinated by the Forestry Department at FAO headquarters in Rome. The contact person for matters related to FRA 2005 is:

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Contents

1 Table T1 – Extent of Forest and Other wooded land

1.1 FRA 2005 Categories and definitions

Category	Definition
Forest	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.
Other wooded land	Land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.
Other land	All land that is not classified as "Forest" or "Other wooded land".
Other land with tree cover (Subordinated to "Other land")	Land classified as "Other land", spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.

1.2 National data

1.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
MacLean, C. D., C. D. Whitesell, T. G. Cole, and K. E. McDuffie. 1988. Timber Resources of Kosrae, Pohnpei, Truk, and Yap, Federated States of Micronesia. Resource Bulletin PSW-24, USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, in cooperation with Pacific Northwest Forest and Range Experiment Station, Portland, OR, Berkeley, CA.	H	Forest land area	1983	
Falanruw, M. C., C. D. Whitesell, T. G. Cole, C. D. MacLean, and A. H. Ambacher. 1987. Vegetation survey of Yap, Federated States of Micronesia. Resource Bulletin PSW-RB-21, USDA Forest Service, Berkely, CA.	H	Forest land area	1976	

Falanruw, M. C., T. G. Cole, A. H. Ambacher, K. E. McDuffie, and J. E. Maka. 1987. Vegetation Survey of Moen, Dublon, Fefan, and Eten, State of Truk, Federated States of Micronesia. Resource Bulletin PSW-20, Pacific Southwest and Pacific Northwest Forest and Range Experiment Stations, USDA Forest Service, Berkeley, CA.	H	Forest land area	1976	
MacLean, C. D., T. G. Cole, C. D. Whitesell, M. V. Falanruw, and A. H. Ambacher. 1986. Vegetation survey of Pohnpei, Federated States of Micronesia. PSW-18, Pacific Southwest Forest and Range Experiment Station, USDA Forest Service.	H	Forest land area	1983	
Whitesell, C. D., C. D. MacLean, M. C. Falanruw, T. G. Cole, and A. H. Ambacher. 1986. Vegetation Survey of Kosrae, Federated States of Micronesia. Resource Bulletin PSW-RB-17, U.S.D.A. Forest Service, Berkeley, CA.	H	Forest land area	1983	

1.2.2 Classification and definitions

National class	**Definition**
Agroforest	Land where planted fruit trees and other agricultural plants are cultured among forest trees.
Nonforest land	Land that has never supported forests or land that formerly supported forests buy is developed for Nonforest use.
Other forest land	Forest land incapable of producing trees of merchantable size ($\geq$ 12.5 cm dbh) because of adverse site conditions or land that is physically unsuited for the production of continuous crops of industrial wood because of rocky or steep terrain.
Secondary vegetation	A vegetation type characterized by small, fast-growing trees and vines, usually weedy invaders.
Timberland	Forest land capable of producing at least 1.4 cubic meters per hectare (20 ft^3/acre) per year of industrial wood and not withdrawn from timber utilization.

1.2.3 Original data

Land class	Area (ha) 1983
Forest land:	
Timberland	24,326
Other forest:	
Steep	6,043
Scrub	601
Total forest land	30,970
Secondary vegetation	3,861
Agroforest	20,072
Nonforest	5,722
All lands	60,625

1.3 Analysis and processing of national data

1.3.1 Calibration

Calibration factor 1983 = (70,000/60,625) = 1.15463917525773

1983	Area (ha)	Calibrated Area (ha)
Total Forest	54,903	63,393
Other Land	5,722	6,607
Inland Water	0	0
	60,625	70,000

1.3.2 Estimation and forecasting

Only data for 1983 (MacLean et al. 1988) is reported at 1990.

1.4 Reclassification into FRA 2005 classes

1983	Area (ha)
Total Forest	54,903
Other Land	5,722
Inland Water	0
	60,625

The national classes of agroforest and secondary vegetation were combined with forest land classes timberland, steep and scrub forest.

1.5 Data for National reporting table T1

FRA 2005 Categories	Area (1000 hectares)		
	1990	2000	2005
Forest [1]	63.393	63.393	63.393
Other wooded land			
Other land	6.607	6.607	6.607
...of which with tree cover [2]			
Inland water bodies	0	0	0
TOTAL	70.000	70.000	70.000

[1] Forest area for FRA 2000 did not include the agroforest and secondary vegetation as defined above. It is included here because of the gradation between forest types and no quantitative threshold was defined.

[2] Area of "Other land with tree cover" is included in the area reported under "Other land" and should therefore be excluded when calculating the total area for the country.

1.6 Comments to National reporting table T1

Data reported for 1990 is from 1983 inventory. Forest land includes secondary vegetation and agroforest, which grade into forest land. FRA 2000 reported 30,000 ha closed forest, 4,000 ha secondary vegetation, and 20,000 ha of agroforest.

2 Table T2 – Ownership of Forest and Other wooded land

No quantitative data on ownership available.

From the Government of the Federated States of Micronesia (http://www.fsmgov.org/info/geog.html):

"*Land ownership in the FSM can best be characterized as one of small holdings. Most property is held as family trusts and land use rights are passed down from generation to generation within the extended family system. Subsurface property rights are synonymous with surface rights. There are no publicly-owned subsurface mineral or water rights in any of the states. Land ownership is limited by the Constitution to citizens only. Even domestic corporations which have non-citizen shareholders may not own land. Non-citizen individuals and corporations may lease either public or private lands. Special importance is attached to land in Micronesia both because of its short supply and its traditional importance. Leasing of private lands in particular can be time-consuming, due to fractional ownership and uncertain boundaries and titles. Many parcels of land are held by families or clans which may have different factions, all of whom assert interest in the land.*"

3 Table T3 – Designated function of Forest and Other wooded land

No data are available for designated function.

4 Table T4 – Characteristics of Forest and Other wooded land

No quantitative data are available for forest characteristics.

Delineation of forest characteristics according to FRA 2005 categories has not been attempted. No quantitative reference is made to human disturbance or alteration of ecological processes in the aerial-photo-based classifications.

5 Table T5 – Growing stock

5.1 FRA 2005 Categories and definitions

Category	Definition
Growing stock	Volume over bark of all living trees more than X cm in diameter at breast height (or above buttress if these are higher). Includes the stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm.
Commercial growing stock	The part of the growing stock of species that are considered as commercial or potentially commercial under current market conditions, and with a diameter at breast height of Z cm or more.

5.2 National data

5.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
MacLean, C. D., C. D. Whitesell, T. G. Cole, and K. E. McDuffie. 1988. Timber Resources of Kosrae, Pohnpei, Truk, and Yap, Federated States of Micronesia. Resource Bulletin PSW-24, USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, in cooperation with Pacific Northwest Forest and Range Experiment Station, Portland, OR, Berkeley, CA.	H	Timberland volume	1983	Timberland area represents 44% of total forest land area.

5.2.2 Classification and definitions

National class	Definition
Timberland volume	Volume of wood on land that is capable of producing at least 1.4 cubic meters per hectare per year of industrial wood.

5.2.3 Original data

Volume (m^3) of timber on timberland by state, 1983.					
Forest Type	**Pohnpei**	**Kosrae**	**Chuuk**	**Yap**	**All States**
Upland	2,007	163		45	2,215
Palm	248				248
Mangrove	403	119	5	71	598
Swamp	30	56			86
All Types	**2,688**	**338**	**5**	**116**	**3,147**

5.3 Analysis and processing of national data

5.3.1 Calibration

None. Timberland area represents 44% of forest land area in FSM for 1983.

5.3.2 Estimation and forecasting

None.

5.4 Reclassification into FRA 2005 classes

None.

5.5 Data for National reporting table T5

FRA 2005 Categories	Volume (million cubic meters over bark)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Growing stock	3.147	NDA	NDA	NDA	NDA	NDA
Commercial growing stock	NDA	NDA	NDA	NDA	NDA	NDA

Specification of country threshold values	Unit	Value	Complementary information
1. Minimum diameter at breast height of trees included in Growing stock (X)	cm	12.5	
2. Minimum diameter at the top end of stem (Y) for calculation of Growing stock	cm	22.5	
3. Minimum diameter of branches included in Growing stock (W)	cm		
4. Minimum diameter at breast height of trees in Commercial growing stock (Z)	cm		
5. Volume refers to "Above ground" (AG) or "Above stump" (AS)	AG / AS	AS	
6. Have any of the above thresholds (points 1 to 4) changed since 1990	Yes/No		
7. If yes, then attach a separate note giving details of the change	Attachment		

5.6 Comments to National reporting table T5

Volume is reported only for timberland in the FSM. Timberland area represents 44% of forest land area in FSM for 1983. Thus, full volume on forest land would be expected to be much higher.

6 Table T6 – Biomass stock

6.1 FRA 2005 Categories and definitions

Category	Definition
Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.
Below-ground biomass	All living biomass of live roots. Fine roots of less than 2mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead wood biomass	All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.

6.2 National data

6.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Penman, J., M. Gytarsky, T. Hiraishi, T. Krug, D. Kruger, R. Pipatti, L. Buendia, K. Miwa, T. Ngara, K. Tanabe, and F. Wagner, editors. 2003. Good Practice Guidance for Land Use, Land-Use Change and Forestry. Intergovernmental Panel on Climate Change, National Greenhouse Gas Inventories Programme, Institute for Global Environmental Strategies (IGES), Hayama, Kanagawa, Japan,.	M	Conversion factors for biomass from stem volume	2003	
MacLean, C. D., C. D. Whitesell, T. G. Cole, and K. E. McDuffie. 1988. Timber Resources of Kosrae, Pohnpei, Truk, and Yap, Federated States of Micronesia. Resource Bulletin PSW-24, USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, in cooperation with Pacific Northwest Forest and Range Experiment Station, Portland, OR, Berkeley, CA.	H	Volume on most productive forest lands	1983	Inventory does not cover all lands, but accounts for approximately 44% of the forested lands.

6.2.2 Classification and definitions

National class	Definition
Timberland biomass	Biomass of wood on land that is capable of producing at least 1.4 cubic meters per hectare per year of industrial wood.

Note: If different national data sources use different classes and definitions, a table such as above is needed for each relevant data source.

6.2.3 Original data

Timberland volume from table 5 was used as the basis for biomass. Data from 1983 was placed into 1990 column.

6.3 Analysis and processing of national data

Biomass was calculated using total stem volumes from table 5 and an average wood density (0.5), biomass expansion factor (3.4; tropical broadleaf), and aboveground to belowground ratio estimator (0.24; Primary tropical/sub-tropical moist forest).

6.4 Data for National reporting table T6

FRA 2005 Categories	Biomass (million metric tonnes oven-dry weight)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Above-ground biomass	1.5735					
Below-ground biomass	0.3776					
Dead wood biomass	NDA					
TOTAL	1.9511	NDA	NDA	NDA	NDA	NDA

Thresholds used by the country are the following:
Same as table 5.

6.5 Comments to National reporting table T6

Volume is reported only for timberland in the FSM. Timberland area represents 44% of forest land area in FSM for 1983. Thus, full biomass on forest land would be expected to be much higher than reported.

7 Table T7 – Carbon stock

7.1 FRA 2005 Categories and definitions

Category	Definition
Carbon in above-ground biomass	Carbon in all living biomass above the soil, including stem, stump, branches, bark, seeds, and foliage.
Carbon in below-ground biomass	Carbon in all living biomass of live roots. Fine roots of less than 2 mm diameter are excluded, because these often cannot be distinguished empirically from soil organic matter or litter.
Carbon in dead wood biomass	Carbon in all non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
Carbon in litter	Carbon in all non-living biomass with a diameter less than a minimum diameter chose by the country for lying dead (for example 10 cm), in various states of decomposition above the mineral or organic soil. This includes the litter, fumic, and humic layers.
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a specified depth chosen by the country and applied consistently through the time series.

7.2 National data

7.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Penman, J., M. Gytarsky, T. Hiraishi, T. Krug, D. Kruger, R. Pipatti, L. Buendia, K. Miwa, T. Ngara, K. Tanabe, and F. Wagner, editors. 2003. Good Practice Guidance for Land Use, Land-Use Change and Forestry. Intergovernmental Panel on Climate Change, National Greenhouse Gas Inventories Programme, Institute for Global Environmental Strategies (IGES), Hayama, Kanagawa, Japan,.	M	Conversion factors for biomass from stem volume	2003	
MacLean, C. D., C. D. Whitesell, T. G. Cole, and K. E. McDuffie. 1988. Timber Resources of Kosrae, Pohnpei, Truk, and Yap, Federated States of Micronesia. Resource Bulletin PSW-24, USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, in cooperation with Pacific Northwest	H	Volume on most productive forest lands	1983	Inventory does not cover all lands, but accounts for approximately 44% of the forested lands.

Forest and Range Experiment Station, Portland, OR, Berkeley, CA.				

7.2.2 Classification and definitions

National class	Definition
Timberland carbon mass	Carbon mass of wood on land that is capable of producing at least 1.4 cubic meters per hectare per year of industrial wood.

7.2.3 Original data

See table 5 and 6

7.3 Analysis and processing of national data

Carbon stocks were estimated by applying a carbon content of 50% to the biomass stocks presented in table T6.

7.4 Data for National reporting table T7

FRA 2005 Categories	Carbon (Million metric tonnes)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Carbon in above-ground biomass	0.78675					
Carbon in below-ground biomass	0.18882					
Sub-total: Carbon in living biomass	0.97557					
Carbon in dead wood	NDA					
Carbon in litter	NDA					
Sub-total: Carbon in dead wood and litter	NDA					
Soil carbon to a depth of _____ cm	NDA					
TOTAL CARBON	0.97557	NDA	NDA	NDA	NDA	NDA

7.5 Comments to National reporting table T7

Volume is reported only for timberland in the FSM. Timberland area represents 44% of forest land area in FSM for 1983. Thus, full carbon mass on forest land would be expected to be much higher than reported.

8 Table T8 – Disturbances affecting health and vitality

No quantitative data are available for disturbances.

The distance between the east-west extreme islands in the FSM extends more than 2700 km. The disturbance regimes, vegetation, and cultures are distinctly different across this distance. Islands toward the western Pacific, such as the Yap islands, are susceptible to typhoons. Islands toward the eastern Pacific, such as Kosrae and Chuuk, tend to have very low frequency of major storms. In Kosrae, citrus canker has been a major disease problem.

9 Table T9 – Diversity of tree species

9.1 FRA 2005 Categories and definitions

Category	Definition
Number of native tree species	The total number of native tree species that have been identified within the country.
Number of critically endangered tree species	The number of native tree species that are classified as "Critically endangered" in the IUCN red list.
Number of endangered tree species	The number of native tree species that are classified as "Endangered" in the IUCN red list.
Number of vulnerable tree species	The number of native tree species that are classified as "Vulnerable" in the IUCN red list.

9.2 Data for National reporting table T9

FRA 2005 Categories	Number of species (year 2000)
Native tree species	NDA
Critically endangered tree species	0
Endangered tree species	0
Vulnerable tree species	4

9.3 Comments to National reporting table T9

From IUCN red list of vulnerable tree species in the FSM:
Heritiera longipetiolata
Metroxylon amicarum
Parkia korom
Pericopsis mooniana

10 Table T10 – Growing stock composition

10.1 FRA 2005 Categories and definitions

List of species names (scientific and common names) of the ten most common species.

10.2 National data

10.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
MacLean, C. D., C. D. Whitesell, T. G. Cole, and K. E. McDuffie. 1988. Timber Resources of Kosrae, Pohnpei, Truk, and Yap, Federated States of Micronesia. Resource Bulletin PSW-24, USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, in cooperation with Pacific Northwest Forest and Range Experiment Station, Portland, OR, Berkeley, CA.	M	Timberland volume	1983	Timberland area represents 44% of total forest land area.

10.3 Data for National reporting table T10

FRA 2005 Categories / Species name (Scientific name and common name)	Growing Stock in Forests (million cubic meters)	
	1990	2000
Clinostigma ponapensis	0.955	
Campnosperma brevipetiolata	0.681	
Myristica insularis	0.196	
Elaeocarpus carolinensis	0.166	
Parinari laurina	0.158	
Horsfieldia nunu	0.140	
Bruguiera gymnorhiza	0.127	
Xylocarpus granatum	0.107	
Sonneratia alba	0.099	
Rhizophora apiculata	0.058	
Remainder of species	0.460	
TOTAL	3.147	**NDA**

10.4 Comments to National reporting table T10

Volume is reported only for timberland in the FSM. Timberland area represents 44% of forest land area in FSM for 1983. Thus, full volume on forest land would be expected to be much higher. Additionally, species that occur more frequently in less productive areas will be underrepresented in this sample.

11 Table T11 – Wood removal

No quantitative data are available.

12 Table T12 – Value of wood removal

No quantitative data are available.

13 Table T13 – Non-wood forest product removal

No quantitative data are available.

14 Table T14 – Value of non-wood forest product removal

No quantitative data are available.

15 Table T15 – Employment in forestry

No quantitative data are available.