

GLOBAL FOREST RESOURCES ASSESSMENT 2015

COUNTRY REPORT

Puerto Rico

Rome, 2014

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Global Forest Resources Assessment (FRA). This country report is prepared as a contribution to the FAO publication, the Global Forest Resources Assessment 2015 (FRA 2015).

The content and the structure are in accordance with the recommendations and guidelines given by FAO in the document Guide for country reporting for FRA 2015 (<http://www.fao.org/3/a-au190e.pdf>). These reports were submitted to FAO as official government documents.

The content and the views expressed in this report are the responsibility of the entity submitting the report to FAO. FAO may not be held responsible for the use which may be made of the information contained in this report.

TABLE OF CONTENTS

Report preparation and contact persons.....	4
1. What is the area of forest and other wooded land and how has it changed over time?	8
2. What is the area of natural and planted forest and how has it changed over time?	16
3. What are the stocks and growth rates of the forests and how have they changed?	24
4. What is the status of forest production and how has it changed over time?	40
5. How much forest area is managed for protection of soil and water and ecosystem services?	45
6. How much forest area is protected and designated for the conservation of biodiversity and how has it changed over time?	50
7. What is the area of forest affected by woody invasive species?	53
8. How much forest area is damaged each year?	56
9. What is the forest area with reduced canopy cover?	60
10. What forest policy and regulatory framework exists to support implementation of sustainable forest management SFM?	61
11. Is there a national platform that promotes stakeholder participation in forest policy development?	63
12. What is the forest area intended to be in permanent forest land use and how has it changed over time?	64
13. How does your country measure and report progress towards SFM at the national level?	67
14. What is the area of forest under a forest management plan and how is this monitored?	69
15. How are stakeholders involved in the management decision making for publicly owned forests?	71
16. What is the area of forest under an independently verified forest certification scheme?	72
17. How much money do governments collect from and spend on forests?	74
18. Who owns and manages the forests and how has this changed?	76
19. How many people are directly employed in forestry?	80
20. What is the contribution of forestry to Gross Domestic Product (GDP)?	82
21. What is forest area likely to be in the future	83

Report preparation and contact persons

Contact persons

The present report was prepared by the following person(s)

Name (FAMILY NAME, first name)	Institution/address	Email	Tables
Brandeis, Thomas	US Forest Service, 4700 Old Kingston Pike, Knoxville, TN, 37934 USA	tjbrandeis@fs.fed.us	1a, 1b, 2a, 2b, 2c, 3a, 3b, 3c, 3d, 3e,
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Introductory Text

Place an introductory text on the content of this report

(The following introduction is excerpted from Brandeis, T.J., Turner, J.A., 2013. Puerto Rico's Forests, 2009. Resource Bulletin SRS-191. U.S. Department of Agriculture Forest Service, Southern Research Station, Asheville, NC, p. 85.)

This report presents the results of the fourth forest inventory of the islands of the Commonwealth of Puerto Rico. Inventory methods and specific objectives have evolved since the first forest inventory in 1980 that had a strong focus on answering questions regarding the island's capacity to produce timber (see Birdsey and Weaver, 1982; Brandeis *et al.*, 2007 for an overview of those changes). But the primary goal has remained the same; assess and monitor the status of the resource and provide that information to all stakeholders. The annualized inventory methods first applied during the third forest inventory which began 2001 (see Brandeis *et al.*, 2007) were a major change from the periodic inventories of 1980 and 1990. These annualized methods have been further refined and improved for this fourth inventory which began in 2006. Additionally, the remeasurement of the same plots and trees that were measured during the third forest inventory allows us to make accurate estimates of change over the intervening 5-year period for the first time. The estimates of net tree growth, removals and mortality made in this report provide unique first-time, insights into subtropical forest dynamics and the continuing changes in Puerto Rico's forests.

This report summarizes and interprets those results, supplementing the tables and data that can be downloaded from the internet. We discuss recent trends in Puerto Rico's forest area, the patterns of forest ownership, biomass carbon and wood volume stored in the forests, net growth, removals and mortality, forest stand structure, tree species composition and forest health issues.

As with the previous forest inventory, forests on mainland Puerto Rico, Vieques and Culebra were sampled and measured (see Brandeis *et al.*, 2007 for details on the sampling design). Mona Island was added with the installation of permanent forest inventory and monitoring plots in 2008. Smaller islands, such as Desecheo, Caja de Muertos, etc. are still not included in the inventory. We continue to use the Holdridge life zones (Holdridge, 1967) as described in detail by Ewel and Whitmore (1973) as broad depictions of forest types and convenient categories for the presentation of the results.

An area must have a minimum of 10% canopy cover of trees, or that had such tree cover previously, and is not undergoing development for a nonforest use to be considered forested by the FIA program. We also require

that the forest have a minimum area of 1 acre or be in a strip at least 120 feet wide. More details on how we define forest can be found in Brandeis et al. (2007) and the FIA field manual (U.S. Department of Agriculture Forest Service, 2011). Previously we used a combination of aerial photograph interpretation and classified satellite imagery to estimate forested acreage (Brandeis *et al.*, 2007; Kennaway and Helmer, 2007; Helmer and Ruzycski, 2008). Currently we only use aerial photograph interpretation to assign plots to meaningful strata so that stratified estimation methods can be used to reduce the variance of our estimates and land area stratification estimates based on satellite imagery (see Reams *et al.*, 2005; Scott *et al.*, 2005; and Woudenberg *et al.*, 2010 for more information on the stratified estimation approach used by FIA).

The FIA sampling and field plot designs have remained essentially unchanged since the previous forest inventory (U.S. Department of Agriculture Forest Service, 2011). We increased the number of plots on Vieques and Culebra to reduce the variance around our estimates for those islands. We also extended our sampling grid to include Mona Island and installed permanent plots there for the first time. We remeasured all plots from the previous inventory except for a small percentage that could not be relocated, usually due to a major change in the forest like land clearing. When the previously installed plot could not be relocated, a new plot was installed where the field crew believed the plot should have been. Table 1 presents the numbers of sampling points and permanent plots measured in the 2009 forest inventory.

On the remeasured plots, all previously tallied trees were relocated and remeasured. New ingrowth trees were also noted, measured and added to the inventory. Trees that died since the last inventory were noted, measured if still standing, and the cause and date of death estimated. All trees on the plots that were harvested or removed as part of land clearing were also accounted for and their estimated removal dates recorded.

We again assessed indicators of forest health with an assessment of tree crown condition. The FIA methods for assessing and analyzing these forest health indicators are described in detail in the FIA field manual (U.S. Department of Agriculture Forest Service, 2007c, a, b) and forest health indicator technical documents (O'Neill *et al.*, 2005; Smith and Conkling, 2005).

How we process data collected on forest inventory plots in Puerto Rico changed considerably since 2004. Previously it was necessary to use custom computer programming and statistical analyses to take into account the islands' unique tree species, forest types and locally-developed volume and biomass equations, as described in Brandeis et al. (2007). Since that time, all of this Caribbean-specific information has been incorporated into the National Information Management System (NIMS) and the FIA Database (FIA DB) which provide consistent data processing, formatting and storage for the FIA program nationwide (Woudenberg *et al.*, 2010). Processing the Caribbean islands data through NIMS provides us with a wider variety of more accurate forest parameter estimates than were previously possible with the simpler custom programming. These changes in how the data were processed, however, also result in minor, statistically insignificant differences in the results presented previously for the third forest inventory and those presented in this report.

No changes were made to the volume and biomass equations and methods described in Brandeis et al. (2007). We use the same suite of allometric equations that predicts total aboveground tree biomass using the measured diameter at breast height (d.b.h.) and total tree height. However, we did make a change to the methods for estimating live tree belowground biomass and carbon. Rather than use the stand-level regression equations from Cairns et al. (1997) that were used for the third forest inventory estimates, we used an aboveground to belowground biomass ratio used in the FIA biomass expansion factor methodology called the Component Ratio Method (CRM). Unlike the dry and green biomass weight estimates made in each FIA region using locally developed allometric equations, the CRM estimates are made use a nationally consistent methodology. Finally, the dry biomass estimates are multiplied by 0.5 to derive a carbon estimate. Detailed description of the CRM,

conversion coefficients and ratios can be found in Smith et al. (2002), Jenkins et al. (2003a, b) and Heath et al. (2008).

Literature cited

Birdsey, R.A., Weaver, P.L., 1982. The forest resources of Puerto Rico. In. USDA Forest Service Southern Forest Experiment Station, New Orleans, Louisiana, p. 56.

Brandeis, T.J., Helmer, E.H., Oswalt, S.N., 2007. The Status of Puerto Rico's Forests, 2003. In. USDA Forest Service, Southern Research Station, Asheville, NC, p. 75.

Cairns, M.A., Brown, S., Helmer, E.H., Baumgardner, G.A., 1997. Root biomass allocation in the world's upland forests. *Oecologia* 111, 1-11.

Ewel, J.J., Whitmore, J.L., 1973. The ecological life zones of Puerto Rico and the US Virgin Islands. In. USDA Forest Service Institute of Tropical Forestry, Río Piedras, Puerto Rico, p. 72.

Heath, L.S., Hansen, M.H., Smith, J.E., Smith, W.B., Miles, P.D., 2008. Investigation into calculating tree biomass and carbon in the FIABD using a biomass expansion factor approach. In: McWilliams, W., Moisen, G.G., Czaplewski, R. (Eds.), *Forest Inventory and Analysis Symposium*. USDA Forest Service, Rocky Mountain Research Station, Park City, UT, p. 26.

Helmer, E.H., Ruzycki, T.S., 2008. Map of land cover and forest formations for Mona Island, Puerto Rico. In. U.S.D.A. Forest Service, International Institute of Tropical Forestry, Río Piedras, PR.

Holdridge, L.R., 1967. *Life zone ecology*. Tropical Science Center, San José, Costa Rica.

Jenkins, J.C., Chojnacky, D.C., Heath, L.S., Birdsey, R.A., 2003a. Comprehensive database of diameter-based biomass regressions for North American tree species. In. USDA Forest Service, Northeastern Research Station, Newtown Square, PA, p. 45.

Jenkins, J.C., Chojnacky, D.C., Heath, L.S., Birdsey, R.A., 2003b. National-scale biomass estimators for United States tree species. *Forest Science* 49, 12-35.

Kennaway, T., Helmer, E., 2007. The Forest Types and Ages Cleared for Land Development in Puerto Rico. *GIScience & Remote Sensing* 44, 356-382.

O'Neill, K.P., Amacher, M.C., Perry, C.H., 2005. Soils as an indicator of forest health: a guide to the collection, analysis, and interpretation of soil indicator data in the Forest Inventory and Analysis Program. In. U.S. Department of Agriculture, Forest Service, North Central Research Station, St. Paul, MN, p. 53.

Reams, G.A., Smith, W.D., Hansen, M.H., Bechtold, W.A., Roesch, F.A., Moisen, G.G., 2005. The forest inventory and analysis sampling frame. In: Bechtold, W.A., Patterson, P.L. (Eds.), *The Enhanced Forest Inventory and Analysis Program - National Sampling Design and Estimation Procedures*. General Technical Report SRS-80. USDA Forest Service, Southern Research Station, Asheville, NC, pp. 11-26.

Scott, C.T., Bechtold, W.A., Reams, G.A., Smith, W.D., Westfall, J.A., Hansen, M.H., Moisen, G.G., 2005. Sample-Based Estimators Used by the Forest Inventory and Analysis National Information Management System. In: Bechtold, W.A., Patterson, P.L. (Eds.), *The Enhanced Forest Inventory and Analysis Program - National Sampling Design and Estimation Procedures*. General Technical Report SRS-80. USDA Forest Service, Southern Research Station, Asheville, NC, pp. 43-67.

Smith, J.E., Heath, L.S., Jenkins, J.C., 2002. Forest volume-to-biomass models and estimates of mass for live and standing dead trees in U.S. forests. In. USDA Forest Service, Northeastern Research Station, Newtown Square, PA, p. 57.

Smith, W.D., Conkling, B.L., 2005. Analyzing forest health data. In. USDA Forest Service, Southern Research Station, Asheville, NC, p. 33.

U.S. Department of Agriculture Forest Service, 2007a. Forest inventory and analysis national core field guide. Phase 3 field guide – crowns: measurements and sampling, Version 4.0. In. U.S. Department of Agriculture Forest Service, Forest Inventory and Analysis Program, Arlington, VA, p. 22.

U.S. Department of Agriculture Forest Service, 2007b. Forest inventory and analysis national core field guide. Phase 3 field guide – down woody materials, version 4.0. In. U.S. Department of Agriculture Forest Service, Forest Inventory and Analysis Program, Arlington, VA, p. 32.

U.S. Department of Agriculture Forest Service, 2007c. Forest inventory and analysis national core field guide. Phase 3 field guide – soil measurements and sampling, version 4.0. In. U.S. Department of Agriculture Forest Service, Forest Inventory and Analysis Program, Arlington, VA, p. 29.

U.S. Department of Agriculture Forest Service, 2011. Forest Inventory and Analysis National Core Field Guide. Volume I: Field Data collection procedures for Phase 2 plots, Version 4.0. In. USDA Forest Service, Knoxville, TN, p. 203.

Woudenberg, S.W., Conkling, B.L., O'Connell, B.M., LaPoint, E.B., Turner, J.A., Waddell, K.L., 2010. The Forest Inventory and Analysis database: Database description and user's manual version 4.0 for phase 2. In. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO, p. 336.

Desk Study?

Check "yes" if this survey is a Desk Study, "no" otherwise	
Desk Study?	no

1. What is the area of forest and other wooded land and how has it changed over time?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

1.1 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 ; 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".
...of which with tree cover (<i>sub-category</i>)	Land considered as "Other land", that is predominantly agricultural or urban lands use and has patches of tree cover that span 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. It includes bothe forest and non-forest tree species.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.
Forest expansion	Expansion of forest on land that, until then, was not defined as forest.
...of which afforestation (<i>sub-category</i>)	Establishment of forest through planting and/or deliberate seeding on land that, until then, was not defined as forest.
...of which natural expansion of forest (<i>sub- category</i>)	Expansion of forests through natural succession on land that, until then, was under another land use (e.g. forest succession on land previously used for agriculture).
Deforestation	The conversion of forest to other land use or the longterm reduction of the tree canopy cover below the minimum 10 percent threshold.
...of which human induced (<i>sub-category</i>)	Human induced conversion of forest to other land use or the permanent reduction of the tree canopy cover below the minimum 10 percent threshold.
Reforestation	Natural regeneration or re-establishment of forest through planting and/or deliberate seeding on land already in forest land use.
...of which artificial reforestation (<i>sub- category</i>)	Re-establishment of forest through planting and/or deliberate seeding on land already in forest land use.

1.2 National data

1.2.1 Data sources

References to sources of information	Variables	Years	Additional comments
---	-----------	-------	---------------------

1	Birdsey, R. A., and P. L. Weaver. 1982. The forest resources of Puerto Rico. Resource Bulletin SO-85, USDA Forest Service Southern Forest Experiment Station, New Orleans, Louisiana. pp. 56	Forest cover Volume	1980	Forest inventory report
2	Franco, P. A., P. L. Weaver, and S. Eggen-McIntosh. 1997. Forest resources of Puerto Rico, 1990. Southern Resource Bulletin SRS-22, USDA Forest Service Southern Research Station, Asheville, North Carolina. pp. 45	Forest cover Volume	1990	Forest inventory report
3	Brandeis, T. J., E. H. Helmer, and S. N. Oswalt. 2007. The Status of Puerto Rico's Forests, 2003. Resource Bulletin SRS-119, USDA Forest Service Southern Research Station, Asheville, NC. pp. 75	Forest cover Volume Biomass	2003	Forest inventory report
4	Brandeis, T. J., and J. A. Turner. 2013. Puerto Rico's Forests, 2009. Resource Bulletin SRS-191, USDA Forest Service Southern Research Station, Asheville, NC. pp. 85	Forest cover, Volume, Biomass	2009	Forest inventory report
5	US Forest Service, Forest Inventory and Analysis Database, version 5.1	Forest cover, Volume, Biomass	2004-2009	Forest inventory database, accessible through publically-accessible on-line tools such as Evaluator: http://apps.fs.fed.us/Evaluator/evaluator.jsp
6	FAOSTAT	Land area, inland water area	All	N/A

1.2.2 Classification and definitions

National class	Definition
Subtropical lower montane wet and rain forest	Found in areas with elevations between 700 and 1000 meters. Forest types and their typical species include the palo colorado forest type (<i>Cyrilla racemiflora</i> L., <i>Ocotea spathulata</i> Mez., <i>Micropholis chrysophylloides</i> Pierre, and <i>Micropholis garciniifolia</i> Pierre), the elfin forest type (<i>Eugenia borinquensis</i> Britton, <i>Tabebuia rigida</i> Urban, <i>Weinmannia pinnata</i> L., and <i>Calycogonium squamulosum</i> Cogn.), and the palm brake forest type (<i>Prestoea montana</i> (Graham) Nichols.).

Subtropical dry forest	Found in areas with 600 to 1100 mm of annual precipitation. <i>Bursera simaruba</i> (L.) Sarg., <i>Bucida buceras</i> L., <i>Cephalocereus royenii</i> (L.) Britton, and <i>Guaiacum officinale</i> L. are species typical of Puerto Rican dry forest. The more heavily-disturbed dry forest areas have numerous, smaller stemmed <i>Leucaena leucocephala</i> (Lam.) deWit, <i>Prosopis juliflora</i> (Sw.) DC., <i>Acacia macracantha</i> Humb. & Bonpl., and <i>Acacia farnesiana</i> (L.) Willd. individuals.
Subtropical moist forest	Found in areas with 1000 to 2200 mm of annual precipitation. The subtropical moist life zone is the most extensive on Puerto Rico and covers a wide variety of soil parent materials, topographic classes, and land uses that give rise to highly diverse species mixtures that typically include <i>Tabebuia heterophylla</i> (DC.) Britton, <i>Spathodea campanulata</i> Beauv., <i>Guarea guidonia</i> (L.) Sleumer, <i>Andira inermis</i> (W. Wright) Kunth ex DC., <i>Roystonea borinquena</i> O.F. Cook, <i>Mangifera indica</i> L., <i>Cecropia peltata</i> L., <i>Schefflera morototonii</i> (Aubl.) Maguire, Steyermark & Frodin, and species of the <i>Nectandra</i> , <i>Ocotea</i> , and <i>Coccoloba</i> genera.
Subtropical wet and rain forest	Found in areas with 2000 to 4000 mm of annual precipitation. <i>Dacryodes excelsa</i> Vahl., <i>Sloanea berteriana</i> Choisy, and <i>Manilkara bidentata</i> (A.DC.) are species indicative of the tabonuco forest type. <i>Cecropia peltata</i> L., <i>Schefflera morototonii</i> (Aubl.) Maguire, Steyermark & Frodin, and <i>Ochroma lagopus</i> Sw. are also common in wet forest stands in early stages of succession or recovery from disturbance. Wet forest shade coffee plantations hold species such as <i>Guarea guidonia</i> (L.) Sleumer, <i>Inga laurina</i> (Sw.) Willd., <i>Inga vera</i> Willd., and <i>Erythrina poeppigiana</i> (Walp.) O.F. Cook. Palm forest characterized by <i>Prestoea montana</i> (Graham) (Nichols.) occupies higher elevations falling in the subtropical rain forest zone.
Mangrove	Mangrove forests comprised of <i>Rhizophora mangle</i> L., <i>Avicennia nitida</i> Jacq., <i>Laguncularia racemosa</i> (L.) Gaertn. f., and <i>Conocarpus erectus</i> L. are found along the coastlines and estuaries.
Secondary	Forest land resulting from the abandonment of cropland or pasture, and forest resulting from regeneration of previously cutover or disturbed forest land
Abandoned coffee shade	Secondary forest land resulting from the abandonment of coffee production under shade trees.
Active coffee shade	A multi-story, multi-crop system used principally for the production of coffee. An upper story of shade trees is characteristic.
Upper mountain	This is the local “colorado” forest type with <i>Cyrilla racemiflora</i> usually, but not necessarily, dominant. Found in the subtropical lower montane wet forest life zone.
Palm	Nearly pure stands of <i>Prestoea montana</i> which form in upper mountain regions.
Dwarf	Also known as cloud forest or elfin woodland, the dwarf forest is found on the summits of the highest mountains and is characterized by densely packed, gnarled trees less than 7 meters tall.

Xeric scrub	Fine woody vegetation generally less than 10 meters tall at maturity, found under dry conditions typical of the subtropical dry life zone and certain serpentine and limestone soils.
Nonstocked	Land with only 5-9% stocking, where stocking is defined as the degree of occupancy of land by trees, measured by basal area or number of trees by size and spacing, or both, compared to a stocking standard; that is, the basal area or number of trees, or both, required to fully utilize the growth potential of the land.

1.2.3 Original data

Original forest area data comes from the USDA Forest Service inventories of Puerto Rico done in 1980 (Birdsey and Weaver 1982), 1990 (Franco et al. 1997) 2003 (Brandeis et al. 2007) and 2008 (Brandeis and Turner 2013).

Note that the Brandeis and Turner (2013) report and the FIA database (FIADB) contains the results from the fourth forest inventory of Puerto Rico dated as 2009. In this report, however, I will be referring to the fourth forest inventory as 2008. This was the date when the inventory finished on mainland Puerto Rico data, while the outlying islands of Vieques and Culebra were finished in 2009.

The forest definition used by the forest inventories at all four points in time was the same as that for FRA 2015 for all forest types and land cover classes. Forest types and land cover classes categories in 1990 were different from those used in 1980, 2003 and 2008, however.

The 1990 forest inventory used land cover classes instead of the Holdridge forest life zones and forest types used in 1980 and 2003. These land cover classes and associated forest areas appear in the original data table below.

Land cover class	1990 (ha)
Secondary	197,500
Abandoned coffee shade	39,700
Active coffee shade	13,800
Upper mountain	2,300
Palm	1,800
Dwarf	1,800
Xeric scrub	25,900
Mangrove	4,700
Total	287,500

Only the 1990 mangrove land cover class and mangrove forest type of 2003 and 2008 are all directly comparable. The original data below show forest area trends over the 28 year period covered by the 4 forest inventories.

Measured forest areas (ha)					
Forest type	Land area (ha)	1980	1990	2003	2008
Mangrove	n.a.	n.a.	4,700	6,915	6,029
Subtropical dry	119,929	40,500	n.a.	61,448	67,426
Subtropical moist	532,693	122,400	n.a.	217,684	227,708
Subtropical wet/rain	199,947	105,000	n.a.	155,032	159,937
Lower montane wet/rain	11,791	10,800	n.a.	10,699	8,770
Nonstocked	n.a.	n.a.	n.a.	4,472	2,921
Total	864,360	278,700	287,400	456,250	472,791

1.3 Analysis and processing of national data

1.3.1 Adjustment

Although there is a slight difference (4 ha) in the USDA Forest Service (886,996 ha) and FAOSTAT (887,000 ha) total land areas for Puerto Rico and outlying islands, a correction factor (1.00000451) was not applied to the estimates.

Note, however, that this report will only include the main island of Puerto Rico. The total land area in these tables will not equal the total land area for Puerto Rico in FAOSTAT because FAOSTAT include the outlying islands of Vieques, Culebra, Mona and others.

1.3.2 Estimation and forecasting

An annual rate of change was calculated for the period of 1980 to 2003. Then this rate of change was used to estimate forest cover in the year 2000. Another annual rate of change was calculated for the period of 2003 to 2008 and this rate of change was used to estimate forest cover in 2005, as well as predict forest cover in 2010 and 2015.

Survey unit	Annual change (ha/yr) 1980-1990	Annual change (ha/yr) 1980-2003	2000	Annual change (ha/yr) 2003-2008	2005	2010	2015
Mangrove	n.a.	0	7,920	-177	6,561	5,675	4,788
Subtropical dry	n.a.	911	64,694	1,196	63,840	69,818	75,796
Subtropical moist	n.a.	4,143	215,279	2,005	221,693	231,717	241,741
Subtropical wet/rain	n.a.	2,175	153,411	981	156,994	161,899	166,804
Lower montane wet/rain	n.a.	-4	8,783	-386	9,927	7,998	6,069
Nonstocked	n.a.	n.a.	n.a.	-310	3,851	2,301	750
Total	870	7,224	450,087	3,308	462,866	479,407	495,948

1.3.3 Reclassification

All of the national forest classes, (which are based on Holdridge life zones), fully correspond to the FRA forest category. The area of Other land was derived from total land area less area of forest.

1.4 Data

Table 1a

Categories		Area (000 hectares)				
		1990	2000	2005	2010	2015
	Forest	287	450.09	462.87	479.41	495.95
	Other wooded land	0	0	0	0	0
	Other land	569.36	406.27	393.49	376.95	360.41
	... of which with tree cover	N/A	N/A	N/A	N/A	N/A

CFRQ	Inland water bodies	8	8	8	8	8
	TOTAL	864.36	864.36	864.36	864.36	864.36

Table 1b

Categories		Annual forest establishment / loss (000 hectares per year)				...of which of introduced species (000 hectares per year)			
		1990	2000	2005	2010	1990	2000	2005	2010
CFRQ	Forest expansion	7.22	7.22	3.31	3.31	N/A	N/A	N/A	N/A
CFRQ	... of which afforestation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CFRQ	... of which natural expansion of forest	7.22	7.22	3.31	3.31	N/A	N/A	N/A	N/A
CFRQ	Deforestation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CFRQ	... of which human induced	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CFRQ	Reforestation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CFRQ	... of which artificial	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Tiers

Category	Tier for status	Tier for reported trend
Forest	Tier 3	Tier 3
Other wooded land	Tier 1	Tier 1
Forest expansion	Tier 3	Tier 3
Deforestation	Tier 1	Tier 1
Reforestation	Tier 3	Tier 3

Tier criteria

Category	Tier for status	Tier for reported trend
<ul style="list-style-type: none"> • Forest • Other wooded land • Afforestation • Reforestation • Natural expansion of forest • Deforestation 	Tier 3 : Data sources: Either recent (less than 10 years ago) National Forest Inventory or remote sensing, with ground truthing, or programme for repeated compatible NFIs Tier 2 : Data sources: Full cover mapping / remote sensing or old NFI (more than 10 years ago) Tier 1 : Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other

1.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trends

Forest	All of the national forest classes, (which are based on Holdridge life zones), correspond to the FRA forest category. The 1990 inventory used another set of classes and data for 1990 could therefore not be fully harmonized with the other reporting years.	Annual change for two periods of time were used, the 1980 to 2003 trends (which showed a steep increase in forest) and the 2003 to 2009 trend (which showed a reduced increase).
Other wooded land	The forest inventories did not quantify other wooded land, an unknown area of Other wooded land may be reported under the category Other land.	N/A
Other land	All land that did not meet the definition of forest was considered non-forest, or according the FRA terminology, other land. The reported area of Other land may contain an unknown area of Other wooded land.	N/A
Other land with tree cover	Again, no data available for other land with tree cover because these lands were not included in the forest inventories.	N/A
Inland water bodies	FAOSTAT figure reported. This figure is acceptable when only using mainland Puerto Rico in this report because Vieques, Culebra and Mona islands do not have appreciable amounts of inland water bodies.	N/A
Forest expansion	Forest expansion is prevalent and essentially entirely natural forest regeneration on abandoned agricultural land.	N/A
Deforestation	We cannot directly quantify deforestation at this time but hope to in the future.	N/A
Reforestation	There is very little, or practically no, forest planting on the island at this time.	N/A

Other general comments to the table

Note that the forest area estimates of 1980 and 1990 do not include the Puerto Rican islands of Vieques, Culebra, Mona and other smaller islands. These smaller islands were included in the 2003 and 2009 forest inventory, however. But because we do not have information on these smaller islands prior to 2003, for this report only the mainland Puerto Rico forest area estimates will be presented. Note, however, that this report will only include the main island of Puerto Rico. The total land area in these tables will not equal the total land area for Puerto Rico in FAOSTAT because FAOSTAT include the outlying islands of Vieques, Culebra, Mona and others. The data used to report on the forests in Puerto Rico in 1980 and 1990 have remained unchanged for FRA 2005, 2010 and now 2015. Previous FRA reports have used data from non-FIA sources, such as the FRA 2005 report which used Landsat ETM+ satellite image classifications done on imagery taken in 1991 and 2004 by Kennaway and Helmer (2007). This report used data entirely derived from 4 island-wide forest inventories; 1980, 1990, 2003 and 2008.

2. What is the area of natural and planted forest and how has it changed over time?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

2.1 Categories and definitions

Term	Definition
Naturally regenerated forest	Forest predominantly composed of trees established through natural regeneration.
Naturalized introduced species	Other naturally regenerated forest where the tree species are predominantly non-native and do not need human help to reproduce/maintain populations over time.
Introduced species	A species, subspecies or lower taxon occurring <i>outside</i> its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could occupy without direct or indirect introduction or care by humans).
Category	Definition
Primary forest	Naturally regenerated forest of native species where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Other naturally regenerated forest	Naturally regenerated forest where there are clearly visible indications of human activities.
...of which of introduced species (<i>sub-category</i>)	Other naturally regenerated forest where the trees are predominantly of introduced species.
...of which naturalized (<i>sub-sub category</i>)	Other naturally regenerated forest where the trees are predominantly of naturalized introduced species.
Planted forest	Forest predominantly composed of trees established through planting and/or deliberate seeding.
...of which of introduced species (<i>sub-category</i>)	Planted forest where the planted/seeded trees are predominantly of introduced species.
Mangroves	Area of forest and other wooded land with mangrove vegetation.
...of which planted (<i>sub-category</i>)	Mangroves predominantly composed of trees established through planting.

2.2 National data

2.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Birdsey, R. A., and P. L. Weaver. 1982. The forest resources of Puerto Rico. Resource Bulletin SO-85, USDA Forest Service Southern Forest Experiment Station, New Orleans, Louisiana. pp. 56	Forest cover, Volume	1980	Forest inventory report

2	Franco, P. A., P. L. Weaver, and S. Eggen-McIntosh. 1997. Forest resources of Puerto Rico, 1990. Southern Resource Bulletin SRS-22, USDA Forest Service Southern Research Station, Asheville, North Carolina. pp. 45	Forest cover, Volume	N/A	Forest inventory report
3	Brandeis, T. J., E. H. Helmer, and S. N. Oswalt. 2007. The Status of Puerto Rico's Forests, 2003. Resource Bulletin SRS-119, USDA Forest Service Southern Research Station, Asheville, NC. pp. 75	Forest cover, Volume, Biomass	N/A	Forest inventory report
4	Brandeis, T. J., and J. A. Turner. 2013. Puerto Rico's Forests, 2009. Resource Bulletin SRS-191, USDA Forest Service Southern Research Station, Asheville, NC. pp. 85	Forest cover, Volume, Biomass	2009	Forest inventory report
5	US Forest Service, Forest Inventory and Analysis Database, version 5.1	Forest cover, Volume, Biomass	2004-2009	Forest inventory database, accessible through publically-accessible on-line tools such as Evaluator: http://apps.fs.fed.us/Evaluator/evaluator.jsp

2.2.2 Classification and definitions

National class	Definition
Subtropical lower montane wet and rain forest	Found in areas with elevations between 700 and 1000 meters. Forest types and their typical species include the palo colorado forest type (<i>Cyrilla racemiflora</i> L., <i>Ocotea spatulata</i> Mez., <i>Micropholis chrysophylloides</i> Pierre, and <i>Micropholis garciniaefolia</i> Pierre), the elfin forest type (<i>Eugenia borinquensis</i> Britton, <i>Tabebuia rigida</i> Urban, <i>Weinmannia pinnata</i> L., and <i>Calycogonium squamulosum</i> Cogn.), and the palm brake forest type (<i>Prestoea montana</i> (Graham) Nichols.).
Subtropical dry forest	Found in areas with 600 to 1100 mm of annual precipitation. <i>Bursera simaruba</i> (L.) Sarg., <i>Bucida buceras</i> L., <i>Cephalocereus royenii</i> (L.) Britton, and <i>Guaiacum officinale</i> L. are species typical of Puerto Rican dry forest. The more heavily-disturbed dry forest areas have numerous, smaller stemmed <i>Leucaena leucocephala</i> (Lam.) deWit, <i>Prosopis juliflora</i> (Sw.) DC., <i>Acacia macracantha</i> Humb. & Bonpl., and <i>Acacia farnesiana</i> (L.) Willd. individuals.

Subtropical moist forest	Found in areas with 1000 to 2200 mm of annual precipitation. The subtropical moist life zone is the most extensive on Puerto Rico and covers a wide variety of soil parent materials, topographic classes, and land uses that give rise to highly diverse species mixtures that typically include <i>Tabebuia heterophylla</i> (DC.) Britton, <i>Spathodea campanulata</i> Beauv., <i>Guarea guidonia</i> (L.) Sleumer, <i>Andira inermis</i> (W. Wright) Kunth ex DC., <i>Roystonea borinquena</i> O.F. Cook, <i>Mangifera indica</i> L., <i>Cecropia peltata</i> L., <i>Schefflera morototonii</i> (Aubl.) Maguire, Steyermark & Frodin, and species of the <i>Nectandra</i> , <i>Ocotea</i> , and <i>Coccoloba</i> genera.
Subtropical wet and rain forest	Found in areas with 2000 to 4000 mm of annual precipitation. <i>Dacryodes excelsa</i> Vahl., <i>Sloanea berteriana</i> Choisy, and <i>Manilkara bidentata</i> (A.DC.) are species indicative of the tabonuco forest type. <i>Cecropia peltata</i> L., <i>Schefflera morototonii</i> (Aubl.) Maguire, Steyermark & Frodin, and <i>Ochroma lagopus</i> Sw. are also common in wet forest stands in early stages of succession or recovery from disturbance. Wet forest shade coffee plantations hold species such as <i>Guarea guidonia</i> (L.) Sleumer, <i>Inga laurina</i> (Sw.) Willd., <i>Inga vera</i> Willd., and <i>Erythrina poeppigiana</i> (Walp.) O.F. Cook. Palm forest characterized by <i>Prestoea montana</i> (Graham) (Nichols.) occupies higher elevations falling in the subtropical rain forest zone.
Mangrove	Mangrove forests comprised of <i>Rhizophora mangle</i> L., <i>Avicennia nitida</i> Jacq., <i>Laguncularia racemosa</i> (L.) Gaertn. f., and <i>Conocarpus erectus</i> L. are found along the coastlines and estuaries.
Secondary	Forest land resulting from the abandonment of cropland or pasture, and forest resulting from regeneration of previously cutover or disturbed forest land
Abandoned coffee shade	Secondary forest land resulting from the abandonment of coffee production under shade trees.
Active coffee shade	A multi-story, multi-crop system used principally for the production of coffee. An upper story of shade trees is characteristic.
Upper mountain	This is the local “colorado” forest type with <i>Cyrilla racemiflora</i> usually, but not necessarily, dominant. Found in the subtropical lower montane wet forest life zone.
Palm	Nearly pure stands of <i>Prestoea montana</i> which form in upper mountain regions.
Dwarf	Also known as cloud forest or elfin woodland, the dwarf forest is found on the summits of the highest mountains and is characterized by densely packed, gnarled trees less than 7 meters tall.
Xeric scrub	Fine woody vegetation generally less than 10 meters tall at maturity, found under dry conditions typical of the subtropical dry life zone and certain serpentine and limestone soils.
Nonstocked	Land with only 5-9% stocking, where stocking is defined as the degree of occupancy of land by trees, measured by basal area or number of trees by size and spacing, or both, compared to a stocking standard; that is, the basal area or number of trees, or both, required to fully utilize the growth potential of the land.

2.2.3 Original data

Original forest area data comes from the USDA Forest Service inventories of Puerto Rico done in 1980 (Birdsey and Weaver 1982), 1990 (Franco et al. 1997) 2003 (Brandeis et al. 2007) and 2008 (Brandeis and Turner 2013). Note that the Brandeis and Turner (2013) report and the FIA database (FIADB) has the fourth forest inventory of Puerto Rico dated as 2009. In this report, however, I will be referring to the fourth forest inventory as 2008. This was the date when the inventory finished on mainland Puerto Rico data, while the outlying islands of Vieques and Culebra were finished in 2009.

The forest definition used by the forest inventories at all four points in time was the same as that for FRA 2015 for all forest types and land cover classes. Forest types and land cover classes categories in 1990 were different from those used in 1980, 2003 and 2008, however.

The 1990 forest inventory used land cover classes instead of the Holdridge forest life zones and forest types used in 1980 and 2003. These land cover classes and associated forest areas appear in the original data table below.

Land cover class	1990 (ha)
Secondary	197,500
Abandoned coffee shade	39,700
Active coffee shade	13,800
Upper mountain	2,300
Palm	1,800
Dwarf	1,800
Xeric scrub	25,900
Mangrove	4,700
Total	287,500

Only the 1990 mangrove land cover class and mangrove forest type of 2003 and 2008 are all directly comparable. The original data below show forest area trends over the 28 year period covered by the 4 forest inventories.

Measured forest areas (ha)					
Forest type	Land area (ha)	1980	1990	2003	2008
Mangrove	n.a.	n.a.	4,700	6,915	6,029
Subtropical dry	119,929	40,500	n.a.	61,448	67,426
Subtropical moist	532,693	122,400	n.a.	217,684	227,708
Subtropical wet/rain	199,947	105,000	n.a.	155,032	159,937
Lower montane wet/rain	11,791	10,800	n.a.	10,699	8,770
Nonstocked	n.a.	n.a.	n.a.	4,472	2,921
Total	864,360	278,700	287,400	456,250	472,791

2.3 Analysis and processing of national data

2.3.1 Adjustment

See topic 1 adjustment.

2.3.2 Estimation and forecasting

An annual rate of change was calculated for the period of 1980 to 2003. Then this rate of change was used to estimate forest cover in the year 2000. Another annual rate of change was calculated for the period of 2003 to 2008 and this rate of change was used to estimate forest cover in 2005, as well as predict forest cover in 2010 and 2015.

Survey unit	Annual change (ha/yr) 1980-1990	Annual change (ha/yr) 1980-2003	2000	Annual change (ha/yr) 2003-2008	2005	2010	2015
Mangrove	n.a.	0	7,920	-177	6,561	5,675	4,788
Subtropical dry	n.a.	911	64,694	1,196	63,840	69,818	75,796

Subtropical moist	n.a.	4,143	215,279	2,005	221,693	231,717	241,741
Subtropical wet/rain	n.a.	2,175	153,411	981	156,994	161,899	166,804
Lower montane wet/rain	n.a.	-4	8,783	-386	9,927	7,998	6,069
Nonstocked	n.a.	n.a.	n.a.	-310	3,851	2,301	750
Total	870	7,224	450,087	3,308	462,866	479,407	495,948

2.3.3 Reclassification

All of the national forest classes, (which are based on Holdridge life zones), correspond to the FRA forest category.

2.4 Data

Table 2a

Categories		Forest area (000 hectares)				
		1990	2000	2005	2010	2015
	Primary forest	0	0	0	0	0
	Other naturally regenerated forest	287	450.09	462.87	479.41	495.95
	... of which of introduced species	N/A	N/A	N/A	N/A	N/A
	... of which naturalized	N/A	N/A	N/A	N/A	N/A
	Planted forest	0	0	0	0	0
	... of which of introduced species	0	0	0	0	0
TOTAL		287.00	450.09	462.87	479.41	495.95

Table 2b

Primary forest converted to (000 ha)		
1990-2000	2000-2010	2010-2015

Other natural regeneration	Planted	Other land	Other natural regeneration	Planted	Other land	Other natural regeneration	Planted	Other land
0	0	0	0	0	0	0	0	0

Table 2c

Categories	Area (000 hectares)				
	1990	2000	2005	2010	2015
Mangroves (forest and OWL)	4.7	7.92	6.56	5.76	4.79
... of which planted	0	0	0	0	0

Tiers

Category	Tier for status	Tier for reported trend
Primary forest	Tier 3	Tier 3
Other naturally regenerated forest	Tier 3	Tier 3
Planted forest	Tier 3	Tier 3
Mangroves	Tier 3	Tier 3

Tier Criteria

Category	Tier for status	Tier for reported trend
Primary forest/Other naturally regenerated forest/Planted forest	<p>Tier 3 : Data sources: Recent (less than 10 years) National Forest Inventory or remote sensing with ground truthing or data provided by official agencies or programme for repeated compatible NFIs</p> <p>Tier 2 : Data sources: Full cover mapping/ remote sensing or old NFI (more than 10 years)</p> <p>Tier 1 : Other</p>	<p>Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status)</p> <p>Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status)</p> <p>Tier 1 : Other</p>

2.5 Comments

Category	Comments related to data definitions etc	Comments on reported trend
Primary forest	Although there is some forest in Puerto Rico that could be considered primary forest, we cannot quantify it due to its fragmentation and unknown history.	Comments on the general forest area trends apply. We can say that the amount of primary forest converted to non-forest is almost certainly zero.

Other naturally regenerating forest	Almost all forest in Puerto Rico is naturally regenerated secondary forest that has been impacted by human activities. The reported area may contain an unknown area of Planted forest. Note that the forest area estimates of 1980 and 1990 do not include the Puerto Rican islands of Vieques, Culebra, Mona and other smaller islands. These smaller islands were included in the 2003 forest inventory. Therefore, for this report only the mainland Puerto Rico forest area estimates will be presented.	Comments on the general forest area trends apply. The annual change in forest area from 1980 to 2003 and from 2003 to 2009 were used to estimate an annual rate of change
Planted forest	There are planted forests in Puerto Rico, but they are of such a minor extent that they are not captured as separate quantities by the forest inventory.	N/A
Mangroves	Mangrove forest is found along the coast of mainland Puerto Rico.	The 1990 mangrove estimate is the least accurate of the forest inventories, and probably is an underestimate of mangrove area. There may or may not have been an increase of mangrove forest from 1990 to 2000. We have observed, however, a decrease in mangrove forest area from 2003 to 2008. That trend was used to estimate and forecast 2005, 2010 and 2015 values.

Other general comments to the table

N/A

3. What are the stocks and growth rates of the forests and how have they changed?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

3.1 Categories and definitions

Category	Definition
Growing stock	Volume over bark of all living trees with a minimum diameter of 10 cm at breast height (or above buttress if these are higher). Includes the stem from ground level up to a top diameter of 0 cm, excluding branches.
Net Annual Increment (NAI)	Average annual volume of gross increment over the given reference period less that of natural losses on all trees, measured to minimum diameters as defined for "Growing stock".
Above-ground biomass	All living biomass above the soil including stem stump branches bark seeds and foliage.
Below-ground biomass	All 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.
Dead wood	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 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 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	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 the minimum diameter for dead wood (e.g. 10 cm) lying dead in various states of decomposition above the mineral or organic soil.
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a soil depth of 30 cm.

3.2 National data

3.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	Birdsey, R. A., and P. L. Weaver. 1982. The forest resources of Puerto Rico. Resource Bulletin SO-85, USDA Forest Service Southern Forest Experiment Station, New Orleans, Louisiana. pp. 56	Forest cover, Volume	1980	Forest inventory report

2	Franco, P. A., P. L. Weaver, and S. Eggen-McIntosh. 1997. Forest resources of Puerto Rico, 1990. Southern Resource Bulletin SRS-22, USDA Forest Service Southern Research Station, Asheville, North Carolina. pp. 45	Forest cover, Volume	1990	Forest inventory report
3	Brandeis, T. J., E. H. Helmer, and S. N. Oswalt. 2007. The Status of Puerto Rico's Forests, 2003. Resource Bulletin SRS-119, USDA Forest Service Southern Research Station, Asheville, NC. pp. 75	Forest cover, Volume, Biomass	2003	Forest inventory report
4	Brandeis, T. J., and J. A. Turner. 2013. Puerto Rico's Forests, 2009. Resource Bulletin SRS-191, USDA Forest Service Southern Research Station, Asheville, NC. pp. 85	Forest cover Volume Biomass	2009	Forest inventory report
5	US Forest Service, Forest Inventory and Analysis Database, version 5.1	Forest cover, Volume, Biomass	2004-2009	Forest inventory database, accessible through publically-accessible on-line tools such as Evalidator: http://apps.fs.fed.us/Evalidator/evaluator.jsp

3.2.2 Classification and definitions

National class	Definition
Growing stock	Living trees of commercial species classified as sawtimber, poletimber, saplings, and seedlings. For a tree to be considered growing stock, one-third or more of the gross volume in its saw-log section must meet grade, soundness, and size requirements for commercial logs, or the tree must have the potential to meet these requirements if it is poletimber size with 12.5 cm # d.b.h. # 27.5 cm. However, for this report I am using the FIA all live tree category, which does not exclude trees that do not meet grade requirements. This category is more similar to the FRA growing stock definition.
Growing stock volume	For FIA, the m3 volume of sound wood in growing-stock trees at least 12.5 cm d.b.h. from a 30-cm stump to a minimum 10-cm top d.o.b. of the central stem, measured inside of bark. A correction factor to convert inside bark volume to outside bark volume was not applied to these estimates.

Aboveground biomass and carbon, live	<p>=1 inch, and dead trees with a diameter ≥ 5 inches. Calculated for both timber and woodland species. Smith, J.E.; Heath, L.S. 2008. Forest sections of the land use change and forestry chapter, and Annex. In: US Environmental Protection Agency, Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006. EPA 430-R-08-005. http://www.epa.gov/climatechange/ghgemissions/usinventoryreport/archive.html " /> IPCC forest carbon pool 1 is derived from 2 components (one condition-level component and one tree-level component): 1. Carbon in understory aboveground. Carbon (tons per acre) in the aboveground portions of seedlings and shrubs. Estimated from models based on geographic area, forest type, and live tree carbon density (Smith and Health 2008). 2. Carbon in the aboveground portion of the tree. The carbon in the aboveground portion, excluding foliage, of live trees with a diameter ≥ 1 inch, and dead trees with a diameter ≥ 5 inches. Calculated for both timber and woodland species. Smith, J.E.; Heath, L.S. 2008. Forest sections of the land use change and forestry chapter, and Annex. In: US Environmental Protection Agency, Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006. EPA 430-R-08-005. http://www.epa.gov/climatechange/ghgemissions/usinventoryreport/archive.html</p>
Aboveground biomass and carbon, standing dead	<p>Total oven-dry biomass in kilograms of all standing dead aboveground tree parts, including stem, stump, branches, bark, seeds, and foliage, as estimated from regression equations that predict aboveground biomass from individual tree d.b.h. and total height measurements, only for trees at least 12.5 cm d.b.h. Standing dead tree biomass and carbon is considered part of the FRA dead wood category.</p>
Belowground biomass and carbon	<p>=1 inch, and dead trees with a diameter ≥ 5 inches. Calculated for both timber and woodland species. Smith, J.E.; Heath, L.S. 2008. Forest sections of the land use change and forestry chapter, and Annex. In: US Environmental Protection Agency, Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006. EPA 430-R-08-005. http://www.epa.gov/climatechange/ghgemissions/usinventoryreport/archive.html " /> IPCC forest carbon pool 2 is derived from 2 components (one condition-level component and one tree-level component): 1. Carbon in understory aboveground. Carbon (tons per acre) in the aboveground portions of seedlings and shrubs. Estimated from models based on geographic area, forest type, and live tree carbon density (Smith and Health 2008). 2. Carbon in the aboveground portion of the tree. The carbon (pounds) in the aboveground portion, excluding foliage, of live trees with a diameter ≥ 1 inch, and dead trees with a diameter ≥ 5 inches. Calculated for both timber and woodland species. Smith, J.E.; Heath, L.S. 2008. Forest sections of the land use change and forestry chapter, and Annex. In: US Environmental Protection Agency, Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006. EPA 430-R-08-005. http://www.epa.gov/climatechange/ghgemissions/usinventoryreport/archive.html</p>

Down woody material	Woody pieces of trees and shrubs that have been uprooted (roots no longer support growth) or severed from their root system, are not self-supporting, and are lying on the ground. This includes both coarse woody debris and fine woody debris. Coarse woody debris is down pieces of wood with a minimum small-end diameter of at least 8 cm and a length of at least 0.9 m (excluding decay class 5). Coarse woody material pieces must be detached from a bole and/or not be self-supported by a root system, and must have a lean angle of more than 45 degrees from vertical. Fine woody debris is down pieces of wood with a diameter # 8 cm, not including foliage or bark fragments. Down woody material biomass and carbon is considered part of the FRA dead wood category.
Coarse woody debris	Down pieces of wood with a minimum small-end diameter of at least 8 cm and a length of at least 0.9 m (excluding decay class 5). Coarse woody material pieces must be detached from a bole and/or not be self-supported by a root system, and must have a lean angle of more than 45 degrees from vertical.
Fine woody debris	Down pieces of wood with a diameter # 8 cm, not including foliage or bark fragments. These pieces of down wood comprise the medium (0.7-8 cm diameter) and small fuel-hour classes (0-0.6 cm diameter), also.

3.2.3 Original data

Volume:

Data from the previous forest inventories for mean growing stock volume, inside bark in cubic meters, by forest type is presented below.

Measured forest volume (cubic meters)					
Forest type	Land area (ha)	1980	1990	2003	2008
Mangrove	n.a.	n.a.	n.a.	260,329	91,983
Subtropical dry	119,929	n.a.	n.a.	1,044,328	1,231,989
Subtropical moist	532,693	n.a.	n.a.	13,438,964	17,017,657
Subtropical wet/rain	199,947	n.a.	n.a.	14,603,340	16,661,607
Lower montane wet/rain	11,791	n.a.	n.a.	1,089,989	873,430

Nonstocked	n.a.	n.a.	n.a.	13,737	8,762
Total	864,360	5,433,800	9,729,065	30,450,686	35,885,428

Growing stock volume for the top ten species in 2003 and 2008, using the 2003 forest inventory as the basis for the ranking, is presented below.

Common name	2003	2008
African tuliptree	7,056,461	9,442,711
mango	2,266,887	2,573,170
American muskwood	2,250,842	2,487,109
pumpwood	1,650,793	2,335,004
cabbagebark tree	1,142,048	1,109,562
swamp mahogany	853,811	1,044,786
sacky sac bean	743,746	867,141
Antilles calophyllum	646,888	717,849
river koko	610,527	694,638
candletree	580,196	689,516
Remainder	12,648,487	13,923,941
Total	30,450,686	35,885,428

Biomass:

The original data for above and below ground live tree (as estimated for the 1990 forest inventory and measured by the 2003 and 2008 forest inventories) appears below.

Biomass (million metric tonnes oven-dry weight) (CRM times 2; divided 1 million)					
	1990	2003	2008		
Above-ground biomass	24.834	29.85	34.87		
Below-ground biomass	3.644	5.92	6.91		
Dead wood	6.84	5.63	2.71		
TOTAL	35.319	41.40	44.49		

Carbon:

Original data on forest carbon in live and dead standing trees (as estimated for the 1990 forest inventory and measured by the 2003 and 2008 forest inventories) is as follows.

Measured forest carbon					
Carbon (Million metric tonnes) (CRM divided by 1 million)					
	1990	2003	2008		
Carbon in above-ground biomass	12.42	14.93	17.43		
Carbon in below-ground biomass	1.82	2.96	3.46		
Sub-total: Living biomass	14.24	17.89	20.89		
Carbon in dead wood	3.42	5.63	2.71		
Carbon in litter	3.60	5.87	7.71		

Sub-total: Dead wood and litter	7.02	11.50	10.42		
Soil carbon	n.a.	n.a.	n.a.		
TOTAL	21.26	29.39	31.31		

3.3 Analysis and processing of national data

3.3.1 Adjustment

See topic 1.

3.3.2 Estimation and forecasting

Volume:

Forest area for each forest type was estimated and forecast as described in the documentation.

Survey unit	Projected forest volumes (cubic meters)				
	2000	Annual change (m3/ yr) 2003-2008	2005	2010	2015
Mangrove	361,337	-33,669	192,991	24,645	-143,701
Subtropical dry	931,731	37,532	1,119,392	1,307,054	1,494,716
Subtropical moist	11,291,748	715,739	14,870,441	18,449,134	22,027,827
Subtropical wet/rain	13,368,381	411,653	15,426,647	17,484,913	19,543,179
Lower montane wet/ rain	1,219,924	-43,312	1,003,365	786,806	570,247
Nonstocked	16,722	-995	11,747	6,771	1,796

Total	27,189,842	1,086,948	32,624,583	38,059,324	43,494,065
-------	------------	-----------	------------	------------	------------

Volume values for the top ten species in terms of growing stock volume are presented below.

Common name	Projected forest volumes (cubic meters)			2010	2015
	2000	Annual change (m3/yr) 2003-2008	2005		
African tuliptree	5,624,710	477,250	8,010,961	10,397,212	12,783,463
mango	2,083,118	61,256	2,389,400	2,695,683	3,001,965
American muskwood	2,109,082	47,253	2,345,349	2,581,616	2,817,883
pumpwood	1,240,267	136,842	1,924,478	2,608,689	3,292,900
cabbagebark tree	1,161,540	-6,497	1,129,053	1,096,567	1,064,081
swamp mahogany	739,226	38,195	930,201	1,121,176	1,312,151
sacky sac bean	669,709	24,679	793,104	916,499	1,039,894
Antilles calophyllum	604,312	14,192	675,273	746,233	817,194
river koko	560,060	16,822	644,171	728,282	812,393
candletree	514,603	21,864	623,924	733,245	842,565
Remainder	11,883,215	255,091	13,158,668	14,434,122	15,709,576
Total	27,189,842	1,086,948	32,624,583	38,059,324	43,494,065

Net annual growth for the period of 2003 to 2008 is below.

		Projected forest growth (cubic meters)				
Annual change (m ³ /yr) 1980-1990	Annual change (m ³ /yr) 1980-2003	2000	Annual change (m ³ /yr) 2003-2008	2005	2010	2015
183,945,001	n.a.	n.a.	2,360,632	n.a.	n.a.	n.a.

Biomass:

Below are the data used to estimate and project the biomass numbers.

Projected forest biomass (million metric tons)						
Survey unit	Annual change 1990-2003 (Mmt/yr)	2000	Annual change 2003-2008 (Mmt/yr)	2005	2010	2015
Above-ground biomass	0.39	28.69	1.00	31.86	36.87	41.89
Below-ground biomass	0.18	5.40	0.20	6.32	7.31	8.29
Dead wood	-0.09	5.91	-0.58	4.46	1.55	n.a.
TOTAL		40.00		42.64	45.73	50.18

Carbon:

		Projected forest carbon (million metric tons)		

Survey unit	Annual change 1990-2003 (Mmt/yr)	2000	Annual change 2003-2008 (Mmt/yr)	2005	2010	2015
Carbon in above-ground biomass	0.19	14.35	0.50	15.93	18.44	20.94
Carbon in below-ground biomass	0.09	2.70	0.10	3.16	3.65	4.15
Sub-total: Living biomass		17.05		19.09	22.09	25.09
Carbon in dead wood	0.17	5.12	-0.58	4.46	1.55	n.a.
Carbon in litter	0.18	5.35	0.37	6.61	8.44	10.27
Sub-total: Dead wood and litter		10.47		11.07	9.99	10.27
Soil carbon	n.a.	n.a.				
TOTAL		27.51		30.16	32.08	35.36

3.3.3 Reclassification

The total volume figures above are equivalent to total growing stock as defined in FRA categories.

National and FRA categories for above-ground and below-ground biomass are the same. The national down woody materials, (consisting of coarse and fine woody debris) and standing dead trees, fall within the FRA dead wood category.

3.4 Data

Table 3a

Category		Growing stock volume (million m ³ over bark)									
		Forest					Other wooded land				
		1990	2000	2005	2010	2015	1990	2000	2005	2010	2015
	Total growing stock	11.525	27.19	32.625	38.059	43.494	N/A	N/A	N/A	N/A	N/A
	... of which coniferous	0	0.053	0.085	0.117	0.149	N/A	N/A	N/A	N/A	N/A
	... of which broadleaved	11.525	27.137	32.539	37.942	43.345	N/A	N/A	N/A	N/A	N/A

Table 3b

Category/Species name			Growing stock in forest (million cubic meters)			
Rank	Scientific name	Common name	1990	2000	2005	2010
1 st	<i>Spathodea campanulata</i>	African tuliptree	1.109	5.625	8.011	10.397
2 nd	<i>Mangifera indica</i>	mango	0.234	2.083	2.389	2.696
3 rd	<i>Guarea guidonia</i>	American muskwood	1.282	2.109	2.345	2.582
4 th	<i>Cecropia schreberiana</i>	pumpwood	0.812	1.24	1.924	2.609
5 th	<i>Andira inermis</i>	cabbagebark tree	0.382	1.162	1.129	1.097
6 th	<i>Eucalyptus robusta</i>	swamp mahogany	0	0.739	0.93	1.121
7 th	<i>Inga laurina</i>	sacky sac bean	0.399	0.67	0.793	0.916
8 th	<i>Calophyllum antillanum</i>	Antilles calophyllum	0.201	0.604	0.675	0.746
9 th	<i>Inga vera</i>	river koko	0.82	0.56	0.644	0.728
10 th	<i>Dacryodes excelsa</i>	candletree	0.11	0.515	0.624	0.733
Remaining			6.176	11.883	13.161	14.434

TOTAL			11.52	27.19	32.62	38.06
-------	--	--	-------	-------	-------	-------

THE PRE-FILLED VALUES FOR GROWING STOCK REFER TO THE FOLLOWING THRESHOLD VALUES (SEE TABLE BELOW)

Item	Value	Complementary information
Minimum diameter (cm) at breast height of trees included in growing stock (X)	12.5 cm	N/A
Minimum diameter (cm) at the top end of stem for calculation of growing stock (Y)	10.0 cm	N/A
Minimum diameter (cm) of branches included in growing stock (W)	n.a.	Branch volume not included
Volume refers to above ground (AG) or above stump (AS)	AS	Volume excludes a 30cm tall stump

PLEASE NOTE THAT THE DEFINITION OF GROWING STOCK HAS CHANGED AND SHOULD BE REPORTED AS GROWING STOCK DBH 10 CM INCLUDING THE STEM FROM GROUND LEVEL UP TO A DIAMETER OF 0 CM, EXCLUDING BRANCHES.

Table 3c

Category		Net annual increment (m ³ per hectare and year)				
		Forest				
		1990	2000	2005	2010	2015
	Net annual increment	N/A	N/A	5.1	4.924	4.76
	... of which coniferous	N/A	N/A	0.029	0.028	0.027
	... of which broadleaved	N/A	N/A	5.071	4.896	4.733

Table 3d

Category		Biomass (million metric tonnes oven-dry weight)									
		Forest					Other wooded land				
		1990	2000	2005	2010	2015	1990	2000	2005	2010	2015
	Above ground biomass	24.83	28.69	31.86	36.87	41.89	N/A	N/A	N/A	N/A	N/A
	Below ground biomass	3.64	5.4	6.33	7.31	8.29	N/A	N/A	N/A	N/A	N/A
	Dead wood	6.84	5.67	4.16	1.26	1.26	N/A	N/A	N/A	N/A	N/A

TOTAL	35.31	39.76	42.35	45.44	51.44	.00	.00	.00	.00	.00
-------	-------	-------	-------	-------	-------	-----	-----	-----	-----	-----

Table 3e

Category		Carbon (Million metric tonnes)									
		Forest					Other wooded land				
		1990	2000	2005	2010	2015	1990	2000	2005	2010	2015
	Carbon in above ground biomass	12.42	14.35	15.93	18.44	20.94	N/A	N/A	N/A	N/A	N/A
	Carbon in below ground biomass	1.82	2.7	3.16	3.65	4.15	N/A	N/A	N/A	N/A	N/A
	<i>Subtotal Living biomass</i>	14.24	17.05	19.09	22.09	25.09	N/A	N/A	N/A	N/A	N/A
	Carbon in dead wood	3.42	4.88	4.16	1.26	1.26	N/A	N/A	N/A	N/A	N/A
	Carbon in litter	3.6	5.35	6.61	8.44	10.27	N/A	N/A	N/A	N/A	N/A
	<i>Subtotal Dead wood and litter</i>	7.02	10.23	10.77	9.7	8.63	N/A	N/A	N/A	N/A	N/A
	Soil carbon	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL		21.26	27.28	29.86	31.79	36.62	.00	.00	.00	.00	.00

Tiers

Variable/category	Tier for status	Tier for trend
Total growing stock	Tier 3	Tier 3
Net annual increment	Tier 3	Tier 3
Above ground biomass	Tier 3	Tier 3
Below ground biomass	Tier 3	Tier 3
Dead wood	Tier 3	Tier 3
Carbon in above-ground biomass	Tier 3	Tier 3
Carbon in below ground biomass	Tier 3	Tier 3

Carbon in dead wood and litter	Tier 3	Tier 3
Soil carbon	N/A	N/A

Tier criteria

Category	Tier for status	Tier for reported trend
Total growing stock	Tier 3: Data sources Recent 10 years National Forest Inventory or remote sensing with ground truthing or programme for repeated compatible NFI 10 years Domestic volume functions Tier 2: Data sources/registers and statistics modelling or old NFI 10 years or partial field inventory Tier 1: Other data sources	Tier 3: Estimate based on repeated compatible tiers 3 (tier for status) Domestic growth functions Tier 2: Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 tier for status Tier 1: Other
Net annual increment	Tier 3: Scientifically tested national volume and growth functions Tier 2: Selection of volume and growth functions as relevant as possible Tier 1: Other	Tier 3: Confirmation/adjustment of functions used through scientific work Tier 2: Review work done to seek alternative functions Tier: 1 Other
Biomass	Tier 3: Country-specific national or sub-national biomass conversion expansion factors applied or other domestic or otherwise nationally relevant biomass studies Tier 2: Application of country specific national or sub-national biomass conversion factors from other country with similar climatic conditions and forest types Tier 1: International/regional default biomass expansion factors applied	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other
<ul style="list-style-type: none"> • Carbon in above ground biomass • Carbon in below ground biomass • Carbon in dead wood and litter • Soil carbon 	Tier 3: Country-specific national or sub-national biomass conversion expansion factors applied Tier 2: Application of country specific national or sub-national biomass conversion factors form from other country with similar climatic conditions and forest types Tier 1: International/regional default biomass expansion factors applied	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other

3.5 Comments on growing stock biomass and carbon

Category	Comments related to data definitions etc	Comments on the reported trend
----------	--	--------------------------------

Total growing stock	<p>Growing stock represents all species of trees with DBH > 12.5 cm except for palms and tree ferns. Diameter at breast height (DBH) refers to diameter over bark measured at a height of 1.30 m above ground level or 30 cm above buttresses if these are higher than 1 m. Mean per hectare growing stock outer bark volume was estimated for dry, moist, wet, lower montane and mangrove forest types. Mean per hectare volume values for each forest type were then multiplied by the number of hectares of each respective forest type for the years 1990, 2000, 2005 and 2010. Forest area for each forest type was estimated and forecast as described in the documentation for table T1. Projection was not done by life zone for 1990 because that forest inventory did not present values for these forest types See table 1 documentation for more details.</p>	<p>Rather than use the growing stock volume figures presented in the 1990 forest inventory report of Franco et al. (1997), I have chosen to back-project the 1990 growing stock volume using the 2003 forest inventory per hectare growing stock volume values. (That is, I multiplied the total 1990 forest acreage by the 2003 average growing stock volume per hectare value.) This was done because the 1990 forest inventory did not measure forest that was considered "non-productive" like subtropical dry forest, so field data was skewed toward forests with greater growing stock volume. The 2003 inventory results included all lands and therefore the growing stock volume per hectare values from 2003 more accurately reflect island-wide volume levels. This estimation and forecasting assumes no change in per hectare values over the time periods. It also assumes there has been no change in mangrove areas or mangrove forest per hectare growing stock volumes.</p>
Growing stock of broadleaved coniferous	Essentially all growing stock in Puerto Rico is broadleaved.	N/A
Growing stock composition	I used the growing stock composition from the 2003 inventory, then estimated and forecast those species volumes.	N/A
Net annual increment	Annual average removals as calculated by NIMS, divided by the average acreage (2003 forested acres plus 2008 forested acres, divided by 2).	N/A
Above-ground biomass	Component Ration Method biomass estimates used here.	N/A
Below-ground biomass	Component Ratio Method biomass estimates used here (0.27 times the AGB)	N/A
Dead wood	Standing dead and coarse woody debris summed.	N/A
Carbon in above-ground biomass	All carbon estimates are biomass multiplied by 0.5.	N/A
Carbon in below-ground biomass	All carbon estimates are biomass multiplied by 0.5.	N/A
Carbon in dead wood	All carbon estimates are biomass multiplied by 0.5.	N/A
Carbon in litter	Fine woody materials and leaf litter summed. All carbon estimates are biomass multiplied by 0.5.	N/A
Soil carbon	We do not have estimates of soil carbon at this time.	N/A

Other general comments to the table

N/A

4. What is the status of forest production and how has it changed over time?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

4.1 Categories and definitions

Term	Definition
Primary designated function	The primary function or management objective assigned to a management unit either by legal prescription documented decision of the landowner/manager or evidence provided by documented studies of forest management practices and customary use.
Non wood forest product (NWFP)	Goods derived from forests that are tangible and physical objects of biological origin other than wood.
Commercial value of NWFP	For the purpose of this table, value is defined as the commercial market value at the forest gate.
Category	Definition
Production forest	Forest area designated primarily for production of wood, fibre, bio-energy and/or non-wood forest products.
Multiple use forest	Forest area designated for more than one purpose and where none of these alone is considered as the predominant designated function.
Total wood removals	The total of industrial round wood removals and woodfuel removals.
...of which woodfuel	The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

4.2 National data

4.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

4.2.2 Classification and definitions

National class	Definition
N/A	N/A
N/A	N/A

N/A	N/A
N/A	N/A

4.2.3 Original data

--

4.3 Analysis and processing of national data

4.3.1 Adjustment

--

4.3.2 Estimation and forecasting

--

4.3.3 Reclassification

--

4.4 Data

Table 4a

Categories		Forest area (000 hectares)				
		1990	2000	2005	2010	2015
	Production forest	N/A	N/A	N/A	N/A	N/A
	Multiple use forest	N/A	N/A	N/A	N/A	N/A

Table 4b

Rank	Name of product	Key species	Commercial value of NWFP removals 2010 (value 1000 local currency)	NWFP category
1 st	N/A	N/A	N/A	N/A
2 nd	N/A	N/A	N/A	N/A
3 rd	N/A	N/A	N/A	N/A
4 th	N/A	N/A	N/A	N/A
5 th	N/A	N/A	N/A	N/A
6 th	N/A	N/A	N/A	N/A

7 th	N/A	N/A	N/A	N/A
8 th	N/A	N/A	N/A	N/A
9 th	N/A	N/A	N/A	N/A
10 th	N/A	N/A	N/A	N/A
TOTAL			.00	

2010	
Name of local currency	N/A

Category
Plant products / raw material
1 Food
2 Fodder
3 Raw material for medicine and aromatic products
4 Raw material for colorants and dyes
5 Raw material for utensils handicrafts construction
6 Ornamental plants
7 Exudates
8 Other plant products
Animal products / raw material
9 Living animals
10 Hides skins and trophies
11 Wild honey and beeswax
12 Wild meat
13 Raw material for medicine
14 Raw material for colorants
15 Other edible animal products

16 Other non-edible animal products

Table 4c Pre-filled data from FAOSTAT

Year	FRA 2015 category (1000 m ³ u.b.)	
	Total wood removals	...of which woodfuel
1990	N/A	N/A
1991	N/A	N/A
1992	N/A	N/A
1993	N/A	N/A
1994	N/A	N/A
1995	N/A	N/A
1996	N/A	N/A
1997	N/A	N/A
1998	N/A	N/A
1999	N/A	N/A
2000	N/A	N/A
2001	N/A	N/A
2002	N/A	N/A
2003	N/A	N/A
2004	N/A	N/A
2005	N/A	N/A
2006	N/A	N/A
2007	N/A	N/A
2008	N/A	N/A
2009	N/A	N/A
2010	N/A	N/A
2011	N/A	N/A

Tiers

Category	Tier for status	Tier for reported trend
Production forest	N/A	N/A
Multiple use forest	N/A	N/A

Tier Criteria

Category	Tier for status	Tier for reported trend
Production forest Multiple use forest	Tier 3: Updated including field verifications national forest maps including functions Tier 2: Forest maps older than 6 years including forest functions Tier 1: Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other

4.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Production forest	N/A	N/A
Multiple use forest	N/A	N/A
Total wood removals	N/A	N/A
Commercial value of NWFP	N/A	N/A

Other general comments to the table
N/A

5. How much forest area is managed for protection of soil and water and ecosystem services?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

5.1 Categories and definitions

Category	Definition
Protection of soil and water	Forest area designated or managed for protection of soil and water
...of which production of clean water (<i>sub-category</i>)	Forest area primarily designated or managed for water production, where most human uses are excluded or heavily modified to protect water quality.
...of which coastal stabilization (<i>sub-category</i>)	Forest area primarily designated or managed for coastal stabilization.
...of which desertification control (<i>sub-category</i>)	Forest area primarily designated or managed for desertification control.
...of which avalanche control (<i>sub-category</i>)	Forest area primarily designated or managed to prevent the development or impact of avalanches on human life assets or infrastructure.
...of which erosion, flood protection or reducing flood risk (<i>sub-category</i>)	Forest area primarily designated or managed for protecting communities or assets from the impacts of erosion riparian floods and landslides or for providing flood plain services.
...of which other (<i>sub-category</i>)	Forest area primarily designated or managed for other protective functions.
Ecosystem services, cultural or spiritual values	Forest area primarily designated or managed for selected ecosystem services or cultural or spiritual values.
...of which public recreation (<i>sub-category</i>)	Forest area designated or managed for public recreation.
...of which carbon storage or sequestration (<i>sub-category</i>)	Forest area designated or managed for carbon storage or sequestration.
...of which spiritual or cultural services (<i>sub-category</i>)	Forest area designated or managed for spiritual or cultural services.
...of which other (<i>sub-category</i>)	Forest area designated or managed for other ecosystem services.

5.2 National data

5.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A

3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

5.2.2 Classification and definitions

National class	Definition
N/A	N/A

5.2.3 Original data

--

5.3 Analysis and processing of national data

5.3.1 Adjustment

--

5.3.2 Estimation and forecasting

--

5.3.3 Reclassification

--

5.4 Data

Table 5a

Categories		Forest area (1000 hectares)				
		1990	2000	2005	2010	2015
	Protection of soil and water	N/A	N/A	N/A	N/A	N/A
	... of which production of clean water	N/A	N/A	N/A	N/A	N/A
	... of which coastal stabilization	N/A	N/A	N/A	N/A	N/A

	... of which desertification control	N/A	N/A	N/A	N/A	N/A
	... of which avalanche control	N/A	N/A	N/A	N/A	N/A
	... of which erosion, flood protection or reducing flood risk	N/A	N/A	N/A	N/A	N/A
	... of which other (please specify in comments below the table)	N/A	N/A	N/A	N/A	N/A

Other

N/A

Table 5b

Categories	Forest area (1000 hectares)				
	1990	2000	2005	2010	2015
Ecosystem services, cultural or spiritual values	N/A	N/A	N/A	N/A	N/A
...of which public recreation	N/A	N/A	N/A	N/A	N/A
...of which carbon storage or sequestration	N/A	N/A	N/A	N/A	N/A
...of which spiritual or cultural services	N/A	N/A	N/A	N/A	N/A
...of which other (please specify in comments below the table)	N/A	N/A	N/A	N/A	N/A

Tiers

Category	Tier for reported trend	Tier for status
Protection of soil and water	N/A	N/A
Ecosystem services, cultural or spiritual values	N/A	N/A

Tier criteria

Category	Tier for status	Tier for reported trend
----------	-----------------	-------------------------

Protection of soil and water	Tier 3: High reliability data derived either from high intensity sample survey or data obtained from national or state agencies responsible for regulations or legislation relating to soil and water protection. Tier 2: Approaches based on low intensity or incomplete sample-based surveys or studies that provide data for specific areas that is extrapolated through statistical analysis to national level estimates. Tier 1: Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other
<ul style="list-style-type: none"> • Cultural or spiritual values • Public recreation • Spiritual or cultural services • Other 	Tier 3: High reliability data derived either from high intensity sample survey or data obtained from national or state agencies responsible for regulations. Tier 2: Approaches based on low intensity or incomplete sample-based surveys or studies that provide data for specific areas that is extrapolated through statistical analysis to national level estimates. Tier 1: Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other

5.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Protection of soil and water	N/A	N/A
Production of clean water	N/A	N/A
Coastal stabilization	N/A	N/A
Desertification control	N/A	N/A
Avalanche control	N/A	N/A
Erosion, flood protection or reducing flood risk	N/A	N/A
Other protective functions	N/A	N/A
Ecosystem services, cultural or spiritual values	N/A	N/A
Public recreation	N/A	N/A
Carbon storage or sequestration	N/A	N/A
Spiritual or cultural services	N/A	N/A
Other ecosystem services	N/A	N/A

Other general comments to the table

N/A

6. How much forest area is protected and designated for the conservation of biodiversity and how has it changed over time?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

6.1 Categories and definitions

Category	Definition
Conservation of biodiversity	Forest area designated primarily for conservation of biological diversity. Includes but is not limited to areas designated for biodiversity conservation within the protected areas.
Forest area within protected areas	Forest area within formally established protected areas independently of the purpose for which the protected areas were established.

6.2 National data

6.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

6.2.2 Classification and definitions

National class	Definition
N/A	N/A

6.2.3 Original data

--

6.3 Analysis and processing of national data

6.3.1 Adjustment

6.3.2 Estimation and forecasting

6.3.3 Reclassification

6.4 Data

Table 6

Categories		Forest area (000 hectares)				
		1990	2000	2005	2010	2015
	Conservation of biodiversity	N/A	N/A	N/A	N/A	N/A
	Forest area within protected areas	N/A	N/A	N/A	N/A	N/A

Tiers

Category	Tier for status	Tier for reported trend
Conservation of biodiversity	N/A	N/A
Forest area within protected areas	N/A	N/A

Tier criteria

Category	Tier for status	Tier for reported trend
<ul style="list-style-type: none"> Conservation of biodiversity Forests within protected areas 	Tier 3: Data obtained from national or state agencies responsible for conservation and protected area or legislation relating to area protection. Tier 2: Studies that provide data for specific areas that is extrapolated through statistical analysis to national level estimates Tier 1 Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other

6.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Conservation of biodiversity	N/A	N/A
Forest area within protected areas	N/A	N/A

Other general comments to the table
--

N/A

7. What is the area of forest affected by woody invasive species?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

7.1 Categories and definitions

Category	Definition
Invasive species	Species that are non-native to a particular ecosystem and whose introduction and spread cause, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health.

7.2 National data

7.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

7.2.2 Classification and definitions

National class	Definition
N/A	N/A

7.2.3 Original data

--

7.3 Analysis and processing of national data

7.3.1 Adjustment

--

7.3.2 Estimation and forecasting

7.3.3 Reclassification

7.4 Data

Table 7

Scientific name of woody invasive species	Forest area affected (000 ha)	
	2005	2010
N/A	N/A	N/A
Total	N/A	N/A

Tiers

Category	Tier for status	Tier for reported trend
Invasive species	N/A	N/A

Tier Criteria

Category	Tier for status	Tier for reported trend
----------	-----------------	-------------------------

Invasive species	Tier 3: Systematic assessment in forest inventory or other survey (e.g. by conservation department) within the last 5 years) Tier 2: Systematic assessment in forest inventory or other survey (e.g. by conservation department conducted more than 5 years ago) Tier 1: Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other
------------------	--	---

7.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Invasive species	N/A	N/A

Other general comments to the table
N/A

8. How much forest area is damaged each year?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

8.1 Categories and definitions

Category	Definition
Number of fires	Number of fires per year
Burned area	Area burned per year
Outbreaks of insects	A detectable reduction in forest health caused by a sudden increase in numbers of harmful insects.
Outbreaks of diseases	A detectable reduction in forest health caused by a sudden increase in numbers of harmful pathogens, such as bacteria, fungi, phytoplasma or virus.
Severe weather events	Damage caused severe weather events, such as snow, storm, drought, etc.

8.2 National data

8.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

8.2.2 Classification and definitions

National class	Definition
N/A	N/A

8.2.3 Original data

--

8.3 Analysis and processing of national data

8.3.1 Adjustment

8.3.2 Estimation and forecasting

8.3.3 Reclassification

8.4 Data

Table 8a

Category		000 ha, number of fires									
		2003		2004		2005		2006		2007	
		000 ha	#	000 ha	#	000 ha	#	000 ha	#	000 ha	#
	Total land area burned	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	... of which forest area burned	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Category		2008		2009		2010		2011		2012	
		000 ha	#	000 ha	#	000 ha	#	000 ha	#	000 ha	#
	Total land area burned	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	... of which forest area burned	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 8b

Outbreak category	Description/name	Year(s) of latest outbreak	Area damaged (000 hectares)
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Outbreak category
1 Insects
2 Diseases
3 Severe weather events

Tiers

Category	Tier for status	Tier for trend
Area affected by fire	N/A	N/A
<ul style="list-style-type: none"> • Insects • Diseases • Severe weather events 	N/A	N/A

Tier criteria

Category	Tier for status	Tier for reported trend
Burned area	Tier 3 : National fire monitoring routines Tier 2 : Remote sensing surveys Tier 1 : Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other
<ul style="list-style-type: none"> • Insects • Diseases • Severe weather events 	Tier 3 : Systematic survey (e.g. via inventory or aerial damage assessment) Tier 2 : Management records Tier 1 : Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other

8.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
----------	--	--------------------------------

Burned area	N/A	N/A
Insects	N/A	N/A
Diseases	N/A	N/A
Severe weather events	N/A	N/A

Other general comments to the table
N/A

9. What is the forest area with reduced canopy cover?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

Category	Definition
Reduction in canopy cover	Forest that has undergone a reduction of canopy cover of more than 20% between the years 2000 and 2010 within the forest canopy cover range of 30-80% as detected by the MODIS VCF sensor.

Table 9

Category	Area of forest with reduced canopy cover (000 ha)
Reduction in canopy cover	N/A

Tiers

Category	Tier for reported trend
Reduction in canopy cover	N/A

Tier criteria

Category	Tier for reported trend
Reduction in canopy cover	Tier 3 : Remote sensing with ground truthing and/or Landsat imagery Tier 2 : Remote sensing using Modis (using pre-filled data provided by FAO) Tier 1 : Expert opinion

Comments

Category	Comments related to data definitions etc
Reduction in canopy cover	N/A

Other general comments

--

10. What forest policy and regulatory framework exists to support implementation of sustainable forest management SFM?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

10.1 Categories and definitions

Category	Definition
Policies supporting sustainable forest management	Policies or strategies that explicitly encourage sustainable forest management.
Legislation and regulations supporting sustainable forest management	Legislation and regulations that govern and guide sustainable forest management, operations and use.

10.2 National data

10.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

10.2.2 Classification and definitions

National class	Definition
N/A	N/A

10.2.3 Original data

--

10.3 Data

Table 10

Category				
	National	Sub-national		
		Regional	Provincial/State	Local
Policies supporting sustainable forest management				
... of which, in <u>publicly</u> owned forests				
... of which, in <u>privately</u> owned forests				
Legislation and regulations supporting sustainable forest management				
... of which, in <u>publicly</u> owned forests				
... of which, in <u>privately</u> owned forests				

10.4 Comments

Variable / category	Comments related to data definitions etc
Policies supporting sustainable forest management	N/A
Legislation and regulations supporting sustainable forest management	N/A

Other general comments

--

11. Is there a national platform that promotes stakeholder participation in forest policy development?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

11.1 Categories and definitions

Category	Definition
National stakeholder platform	A recognized procedure that a broad range of stakeholders can use to provide opinions, suggestions, analysis, recommendations and other input into the development of national forest policy.

11.2 National data

11.2.1 Data sources

	References to sources of information	Years	Additional comments
1	N/A	N/A	N/A
2	N/A	N/A	N/A
3	N/A	N/A	N/A
4	N/A	N/A	N/A

Table 11

Is there a national platform that promotes or allows for stakeholder participation in forest policy development?	
---	--

11.3 Comments

Category	Comments related to data definitions etc
National stakeholder platform	N/A

Other general comments

--

12. What is the forest area intended to be in permanent forest land use and how has it changed over time?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

12.1 Categories and definitions

Category	Definition
Forest area intended to be in permanent forest land use	Forest area that is designated or expected to be retained as forest and is highly unlikely to be converted to other land use.
...of which permanent forest estate (<i>sub-category</i>)	Forest area that is designated by law or regulation to be retained as forest and may not be converted to other land use.

12.2 National data

12.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

12.2.2 Classification and definitions

National class	Definition
N/A	N/A

12.2.3 Original data

--

12.3 Analysis and processing of national data

12.3.1 Adjustment

12.3.2 Estimation and forecasting

12.3.3 Reclassification

12.4 Data

Table 12

Categories		Forest area 2010 (000 ha)
	Forest area intended to be in permanent forest land use	N/A
	... of which permanent forest estate	N/A

Tiers

Category	Tier for status
Forest area intended to be in permanent forest land use	N/A
Permanent forest estate	N/A

Tier Criteria

Category	Tier for status
Forest area intended to be in permanent forest land use	Tier 3 : National or sub-national land use plans strategy documents or other reports within the past 10 years Tier 2 : National or sub-national land use plans strategy documents or other reports within the past 20 years Tier 1 : Other
Permanent forest estate	Tier 3 : National or sub-national land use plans strategy documents or other reports within the past 10 years Tier 2 : National or sub-national land use plans strategy documents or other reports within the past 20 years Tier 1 : Other

12.5 Comments

Category	Comments related to data definitions etc
Forest area intended to be in permanent forest land use	N/A
Permanent forest estate	N/A

Other general comments

--

13. How does your country measure and report progress towards SFM at the national level?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

13.1 Categories and definitions

Category	Definition
Forest area monitored under a national forest monitoring framework	Forest area monitored by a national monitoring framework or systems that provide measurement based periodic monitoring of forest extent and quality.
Forest reporting at national scale	National reporting of forest extent and characteristics that includes some measure of progress toward sustainable forest management.

13.2 National data

13.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	US Forest Service, Forest Inventory and Analysis Program	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

13.2.2 Classification and definitions

National class	Definition
N/A	N/A

13.3 Data

Table 13a

Category	% of total forest area	Most recent year	Check all boxes that apply					
			Continuous	Periodic	Permanent ground plots	Temporary ground plots	Aerial/remote sensing sample based	Aerial/remote sensing full coverage
Forest inventory	100	2009		yes	yes			yes
Other field assessments	N/A	N/A						
Updates to other sources	N/A	N/A						
Expert estimate	N/A	N/A						

Table 13b

Type of forest reporting used at national scale	Check boxes that apply
1 Criteria and Indicators reporting	yes
2 Periodic national state of the forest report	yes
3 Other (please document)	
4 None	

Other type of forest reporting

N/A

13.4 Comments

Category	Comments
N/A	N/A
N/A	N/A
N/A	N/A

Other general comments

The US Forest Service Forest Inventory and Analysis program includes Puerto Rico in its assessments. Puerto Rico is done as a periodic forest inventory repeated every 5 years. This inventory includes a network of permanent plots and full land cover mapping.

14. What is the area of forest under a forest management plan and how is this monitored?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

14.1 Categories and definitions

Category	Definition
Forest area with management plan	Forest area that has a long-term documented management plan, aiming at defined management goals which is periodically revised
...of which for production (<i>sub-category</i>)	Forest management plan mainly focused on production
...of which for conservation (<i>sub-category</i>)	Forest management plan mainly focused on conservation
Monitoring of forest management plans	Government monitoring of forest management plan implementation conducted through field visits or audits of forest management plan performance

14.2 National data

14.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

14.3 Data

Table 14a

Forest plan type	Forest area 2010 (000 ha)
Forest area with management plan	N/A
... of which for production	N/A
... of which for conservation	N/A

Table 14b

Indicate which (if any) of the following are required in forest management plans in your country	
1 Soil and water management	

2 High conservation value forest delineation	
3 Social considerations community involvement	

Table 14c

Percent of area under forest management plan that is monitored annually	N/A
--	------------

Tiers

Category	Tier for status
Forest area with management plan	N/A
Percent of area under forest management plan that is monitored annually	N/A

Tier criteria

Category	Tier for status
Forest area with management plan	Tier 3 : Reports that describe national records 5 years old or less that contain long-term forest monitoring plans Tier 2 : Industry or other records indicating the presence of a long-term forest management plan Tier 1 : Other
Percent of area under forest management plan that is monitored annually	Tier 3 : Government documentation of monitoring extent Tier 2 : Reports from forest managers or other documental sources Tier 1 : Other

14.4 Comments

Category	Comments
Forest area with management plan	N/A
N/A	N/A
N/A	N/A

Other general comments

--

15. How are stakeholders involved in the management decision making for publicly owned forests?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

15.1 Categories and definitions

Category	Definition
Stakeholder involvement	Stakeholder involvement is defined as significant inputs into at least one aspect of forest management at the operational scale

Table 15

Please indicate the type of stakeholder involvement in forest management decision making required in your country	
1. Planning phase	
2. Operations phase	
3. Review of operations	

Tiers

Category	Tier for status
Type of stakeholder inputs	N/A

Tier criteria

Category	Tier for status
Type of stakeholder inputs	Tier 3 : Government (national or sub-national) documentation of stakeholder inputs Tier 2 : Government (national or subnational) requirement but stakeholder inputs not documented Tier 1 : Other

15.2 Comments

Category	Comments
N/A	N/A
N/A	N/A
N/A	N/A

Other general comments

--

16. What is the area of forest under an independently verified forest certification scheme?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

16.1 Categories and definitions

Category	Definition
FSC certification	Forest area certified under the Forest Stewardship Council certification scheme
PEFC certification	Forest area certified under the Programme for the Endorsement of Forest Certification scheme
Other international forest management certification	Forest area certified under an international forest management certification scheme with published standards and is independently verified by a third-party, excluding FSC and PEFC certification.
Certified forest area using a domestic forest management certification scheme	Area certified under a forest management certification scheme with published standards that are nationally recognized and independently verified by a thirdparty

16.2 Data

Table 16a

International forest management certification		Forest area (000 ha)						
		2000	2001	2002	2003	2004	2005	2006
	FSC	0	0	0	0	0	0	0
	PEFC	0	0	0	0	0	0	0
	Other	0	0	0	0	0	0	0
		2007	2008	2009	2010	2011	2012	
	FSC	0	0	0	0	0	0	
	PEFC	0	0	0	0	0	0	
	Other	0	0	0	0	0	0	

Table 16b

Domestic forest management certification		Forest area (000 ha)						
		2000	2001	2002	2003	2004	2005	2006
	N/A	0	0	0	0	0	0	0
	N/A	0	0	0	0	0	0	0
	N/A	0	0	0	0	0	0	0

		2007	2008	2009	2010	2011	2012	
		0	0	0	0	0	0	
		0	0	0	0	0	0	
		0	0	0	0	0	0	

Tier criteria

Category	Tier for status
International forest management certification	Tier 3: International forest management scheme records maintained by the certifying organization for the reporting year Tier 2: International forest management scheme records reported by the certifying organization for a period 2 years prior to the reporting year Tier: 1 Other
Domestic forest management certification	Tier 3: National registry reports for domestic forest management certification maintained by the certifying organization for the reporting year Tier 2: Domestic forest management scheme records reported by the certifying organization for a period 2 years prior to the reporting year Tier: 1 Other

Tiers

Category	Tier for status
International forest management certification	N/A
Domestic forest management certification	N/A

16.3 Comments

Category	Comments related to data definitions etc
Certified forest area using an international forest management certification scheme	N/A
Domestic forest management certification	N/A

Other general comments

--

17. How much money do governments collect from and spend on forests?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

17.1 Categories and definitions

Category	Definition
Forest revenue	All government revenue collected from the domestic production and trade of forest products and services. For this purpose revenue include: <ul style="list-style-type: none"> • <u>Goods</u> : roundwood; sawnwood; biomass; woodbased panels; pulp and paper and non-wood forest products. • <u>Services</u> : including concession fees and royalties, stumpage payments, public timber sales revenue taxes and charges based on forest area or yield, taxes on domestic trade and export of forest products, special levies on forestry activities and payments into forest related funds, other miscellaneous inspection, licence and administrative fees levied by forest administrations, permit and licence fees for recreation and other forest related activities.
Public expenditure on forestry	All government expenditure on forest related activities.

17.2 National data

17.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

17.3 Data

Table 17

Category	Revenues / expenditures (000 local currency)		
	2000	2005	2010
Forest revenue	N/A	N/A	N/A
Public expenditure on forestry	N/A	N/A	N/A
	2000	2005	2010
Name of Local Currency	N/A	N/A	N/A

17.4 Comments

Category	Comments related to data definitions etc
Forest revenue	N/A
Public expenditure on forestry	N/A
Other general comments	N/A

Other general comments

--

18. Who owns and manages the forests and how has this changed?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

18.1 Categories and definitions

Category	Definition
Public ownership	Forest owned by the State or administrative units of the public administration or by institutions or corporations owned by the public administration.
...of which owned by the state at national scale (<i>sub-category</i>)	Forest owned by the State at the national scale or administrative units of the public administration or by institutions or corporations owned by the public administration.
...of which owned by the state at the sub-national government scale (<i>sub-category</i>)	Forest owned by the State at the sub-national government scale or administrative units of the public administration or by institutions or corporations owned by the public administration.
Private ownership	Forest owned by individuals, families, communities, private cooperatives corporations and other business entities, private, religious and educational institutions, pension or investment funds, NGOs, nature conservation associations and other private institutions.
...of which individuals (<i>sub-category</i>)	Forest owned by individuals and families.
...of which private business entities and institutions (<i>sub-category</i>)	Forest owned by private corporations cooperatives companies and other business entities as well as private nonprofit organizations such as NGOs nature conservation associations, and private religious and educational institutions etc.
...of which local tribal and indigenous communities (<i>sub-category</i>)	Forest owned by a group of individuals belonging to the same community residing within or in the vicinity of a forest area or forest owned by communities of indigenous or tribal people The community members are coowners that share exclusive rights and duties and benefits contribute to the community development.
Unknown ownership	Forest area where ownership is unknown includes areas where ownership is unclear or disputed.
Categories related to management rights of public forests	Definition
Public Administration	The Public Administration (or institutions or corporations owned by the Public Administration) retains management rights and responsibilities within the limits specified by the legislation.
Individuals households	Forest management rights and responsibilities are transferred from the Public Administration to individuals or households through long-term leases or management agreements.
Private companies	Forest management rights and responsibilities are transferred from the Public Administration to corporations, other business entities private cooperatives, private nonprofit institutions and associations, etc., through long-term leases or management agreements.
Communities	Forest management rights and responsibilities are transferred from the Public Administration to local communities (including indigenous and tribal communities) through long-term leases or management agreements.
Other form of management rights	Forests for which the transfer of management rights does not belong to any of the categories mentioned above.

18.2 National data

18.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

18.2.2 Classification and definitions

National class	Definition
N/A	N/A

18.2.3 Original data

--

18.3 Analysis and processing of national data

18.3.1 Adjustment

--

18.3.2 Estimation and forecasting

--

18.3.3 Reclassification

--

18.4 Data

Table 18a

Categories	Forest area (1000 hectares)			
	1990	2000	2005	2010

CFRQ	Public ownership	N/A	N/A	N/A	N/A
CFRQ	... of which owned by the state at national scale	N/A	N/A	N/A	N/A
CFRQ	... of which owned by the state at the sub-national government scale	N/A	N/A	N/A	N/A
CFRQ	Private ownership	N/A	N/A	N/A	N/A
CFRQ	... of which owned by individuals	N/A	N/A	N/A	N/A
CFRQ	... of which owned by private business entities and institutions	N/A	N/A	N/A	N/A
CFRQ	... of which owned by local, tribal and indigenous communities	N/A	N/A	N/A	N/A
CFRQ	Unknown ownership	N/A	N/A	N/A	N/A
TOTAL		.00	.00	.00	.00

Tiers

Category	Tier for status	Tier for reported trend
Public ownership	N/A	N/A
Private ownership	N/A	N/A
Unknown ownership	N/A	N/A

Tier criteria

Category	Tier for status	Tier for reported trend
Ownership	Tier 3: National forestry statistics registers of land titles or maps on land ownership or all forest area under one ownership category that is five years old or less. Tier 2: National forestry statistics registers of land titles or maps on land ownership or questionnaires that are more than five years old. Tier 1: Other	Tier 3 : Estimate based on repeated compatible tiers 3 (tier for status) Tier 2 : Estimate based on repeated compatible tier 2 or combination tier 3 and 2 or 1 (tier for status) Tier 1 : Other

Table 18b - Holder of management rights of public forests

Categories	Forest area (000 hectares)			
	1990	2000	2005	2010

Public Administration	N/A	N/A	N/A	N/A
Individuals	N/A	N/A	N/A	N/A
Private companies	N/A	N/A	N/A	N/A
Communities	N/A	N/A	N/A	N/A
Other	N/A	N/A	N/A	N/A
TOTAL	.00	.00	.00	.00

Category	Tier for reported trend	Tier for status
Public Administration	N/A	N/A
Individuals	N/A	N/A
Private companies	N/A	N/A
Communities	N/A	N/A
Other	N/A	N/A

18.5 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Public ownership	N/A	N/A
Private ownership	N/A	N/A
Unknown ownership	N/A	N/A
Management rights	N/A	N/A

Other general comments to the table
N/A

19. How many people are directly employed in forestry?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

19.1 Categories and definitions

Category	Definition
Full-time equivalents (FTE)	A measurement equal to one person working full-time during a specified reference period.
Employment in forestry	Employment in activities related to production of goods derived from forests. This category corresponds to the ISIC/NACE Rev. 4 activity A02 (Forestry and logging).

19.2 National data

19.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

19.2.2 Classification and definitions

National class	Definition
N/A	N/A

19.2.3 Original data

--

19.3 Data

Table 19

Category	Employment (000 years FTE)
----------	----------------------------

		1990	2000	2005	2010
	Employment in forestry	N/A	N/A	N/A	N/A
	... of which female	N/A	N/A	N/A	N/A

19.4 Comments

Category	Comments related to data definitions etc	Comments on the reported trend
Employment in forestry	N/A	N/A

Other general comments to the table
N/A

20. What is the contribution of forestry to Gross Domestic Product (GDP)?

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

20.1 Categories and definitions

Category	Definition
Gross value added from forestry (at basic prices)	This category corresponds to the ISIC/NACE Rev. 4 activity A02 (Forestry and logging).

20.2 Data

Table 20 (Pre-filled data from UNdata/EUROSTAT)

Category	Million	Currency	Year for latest available information
Gross value added from forestry (at basic prices)	N/A	N/A	N/A

20.3 Comments

Category	Comments
N/A	N/A

Other general comments

--

21. What is forest area likely to be in the future

Documents for this question:

- [Guide for country reporting FRA 2015](#)
- [FRA 2015 Terms and Definitions](#)

21.1 Categories and definitions

Category	Definition
Government target/aspiration for forest area	Government target/aspiration for forest area for a specific year.
Forests earmarked for conversion	Forest area that is allocated/classified or scheduled to be converted into non-forest uses.

21.2 National data

21.2.1 Data sources

	References to sources of information	Variables	Years	Additional comments
1	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A

21.3 Data

Table 21a

Category	Forest area (000 ha)	
	2020	2030
Government target/aspiration for forest area	N/A	N/A

Table 21b

Category	Forest area (000 ha)
	2013
Forests earmarked for conversion	N/A

21.4 Comments

Category	Comments
Government target/aspiration for forest area	N/A

Forests earmarked for conversion	N/A
----------------------------------	-----

Other general comments

--