Food and Agriculture Organization of the United Nations

Global Forest Resources Assessment 2020

Report

Iceland

Rome, 2020

FAO has been monitoring the world's forests at 5 to 10 year intervals since 1946. The Global Forest Resources Assessments (FRA) are now produced every five years in an attempt to provide a consistent approach to describing the world's forests and how they are changing. The FRA is a country-driven process and the assessments are based on reports prepared by officially nominated National Correspondents. If a report is not available, the FRA Secretariat prepares a desk study using earlier reports, existing information and/or remote sensing based analysis.

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Introduction

Report preparation and contact persons

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

Name	Role	Email	Tables
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Introductory text

The work in this report is by the Climate Change department of the Iceland Forest Research (IFR). IFR is the research division of the Iceland Forest Service (IFS), the official forestry agency in Iceland (https://www.skogur.is/). One of the main projects of the Climate Change department is a National Forest Inventory and annual Green House Gas reporting of Forest and Forestry to the UNFCCC.

February 2019

Arnór Snorrason

1 Forest extent, characteristics and changes

1a Extent of forest and other wooded land

National Data

Data sources + type of data source eg NFI, etc

	References to sources of information	Variables		Years	Additional comments
1	Data from a sample plot inventory of the settlement area of Reykjavík city	Estimates of canopy cover of trees reaching more than 5 m at maturity	2008		Work conducted by IFR
2	Data from a sample plot inventory (SPI) of forest and woodland in Iceland	Area estimates for cultivated forests are built on sample plot inventory	2005-2016		Work conducted by IFR
3	FAOSTAT	Total surface area, water bodies	N/A		N/A
4	Landmælingar Íslands (E: National land survey of Iceland). CORINE landcover classification for 2000, 2006, 2012 and 2018 Responsible: Kolbeinn Árnason kolbeinn@lmi.is	Urban settings, Class no. 112	2000, 2006, 2012 and 2018		As an estimate for Other land with tree cover
5	Remapping of the natural birch woodland	Area estimate built on field mapping	2010-2014		Work conducted by IFR

National classification and definitions

National class	Definition
Natural birch woodland (NBW)	All land dominated by self-regenerated mountain birch (Betula pubescens) of natural origin. The mean height can vary from 0.3 m to more than 10.0 m.
Cultivated forests (CF)	Forests originating from plantation/seeding of trees of both exotic and native species and natural regeneration and expansion of these.
Other land with trees	A part of urban areas with canopy coverage of trees reaching 5 m or more at maturity 10% or more.

Forest definition and classification

A general official classification of forests and woodlands has been defined in accordance to the demand of the Kyoto protocol of the UNFCCC. (See: http://unfccc.int/national_reports/ initial_reports_under_the_kyoto_protocol/items/3765.php

To define area as a forest it has to pass these minimum requirements:

- tree crown cover: 10 percent
- minimum land area: 0.5 hectare
- tree height: 2 meters

Further IFR has added practical requirements that are in accordance to international definitions:

- minimum width of forest: 20 m
- maximum permanent gap in forest. 0.5 ha

In the NFI sample plot inventory (SPI) these definitions are incorporated. The inventory is also constructed in such a manner that classes can be broken up based on international definitions of forest, such as the FAO definition with minimum 5 m height at maturity.

The two traditional woodland classes of Iceland are the two main strata of the NFI-SPI with different sample intensity both in space and time. These classes are the self-regenerated birch woodlands of natural origin (natural birch woodlands: NBW) and human induced plantations/seedings of both native tree species and exotics (cultivated forest: CF). CF has a sampling grid of 0.5 x 1.0 km and the NBW has a sampling grid of 1.5 x 3.0 km. One fifth of plots is measured every year when the inventory is ongoing. The CF inventory is continuous with 5 years intervals between remeasurements but the NBW inventory is discrete with 10 years interval between measurements. All plots are permanent.

The new mapping project of NBW (2010-2014) is used to classify forests and other wooded land after the FAO classification but the CF is classified by the SPI data.

As in FRA2015 a part (Corine class 112) of urban areas is defined as; Other land with tree cover. This is an expert estimate based on data from a sample plot inventory conducted by IFI in 2008 in Reykjavík city which is the biggest urban area in Iceland. A mean canopy cover of the whole area was estimated at 9.9 %.

Forest area

There have been two geographical surveys on NBW: one in 1972- 1975 and a second in 1987-1991. Both where based on in-field delineation of polygons with woodland cover connected with optical estimates of mean height classes and canopy cover etc.

In the latter survey some field measurements were done that partially improved the first survey, but it was not a repetition of the former one and can therefore not give any possibilities of time series estimation. A geographical analysis of NBW resulted in 115.4 kha of natural birch woodland. In that figure, CF within NBW was excluded for the first time (4 kha) (Traustason & Snorrason 2008).

The first SPI was conducted in the NBW in 2005-2009. Although it gives the best information about the characteristics of the NBW it didn't cover all woodlands and cannot be used to estimate the area of the NBW. A new mapping of the NBW was done in 2010-2014. A new analysis of the old data sampled in 1987-1991 and the new mapping of NBW have been published (http://timarit.is/view_page_init.jsp?issId=392346&pageId=6780248&lang=is&q=birki%20birki). The results from this work are used to estimate the area change of forest and other wooded land for the NBW. The results have already been used in the NIR of Iceland to the UNFCCC since 2013.

NBW was in the new analysis estimated to be 138.3 kha in 1989. Mean annual increase in area between 1989 and 2012 was estimated 0.6 kha. 7.6 % of the NBW is classified as reaching 5 m height or more at maturity. Natural birch woodland meeting the FRA2015 definition for forest are estimated 10.5 kha in 1990 and 11.4 kha in 2010. Same figures for other wooded land were 127.7 kha and 138.1 kha respectively.

As in FRA2015 SPI was used to estimate the area of CF. Small part of the CF cannot be classified as FAO defined forest (equal or higher than 5 m at maturity) and is classified as Other Wooded Land. In the SPI possible height at maturity is assessed in three classes < 2m, 2-5m and >5 m

In the field the age of the plantations in the plots are estimated so it is possible to extract information of different area of CF at different times as requested in all tables.

A sample plot inventory of trees in the urban area of Reykjavik showed that mean canopy cover of trees was 9.9% of the total urban area of the city. Most of the trees are growing in private gardens in areas defined in the CORINE land classification system as "Discontinuous urban fabric": Corine class 112. It is an expert estimate that in these areas canopy cover will exceed well over 10% and can be defined as Other land with tree cover.

Reference:

Bjorn Traustason and Arnor Snorrason. Spatial distribution of forest and woodlands in Iceland in accordance with the CORINE land cover classification. Icelandic Agricultural Science. 21. p 39-47.

Snorrason A, Traustason B, Eggertsson Ó, Kjartansson BÞ, Heiðarsson L & Ísleifsson R 2016. Náttúrulegt birki á Íslandi – ný úttekt á útbreiðslu þess og ástandi. Náttúrufræðingurinn 86, 97-111. [With extended English summary].

Original data

See: Reclassification chapter below

Analysis and processing of national data

Estimation and forecasting

Forest expansion, reforestation

In the NBW forest expansion has occurred in the period 1989 to 2012. The expansion is extrapolated through the reporting period.

The area of CF for both Forest and OWL of the year 2017-2020 was estimated by linear regression for the years 2010 to 2011.

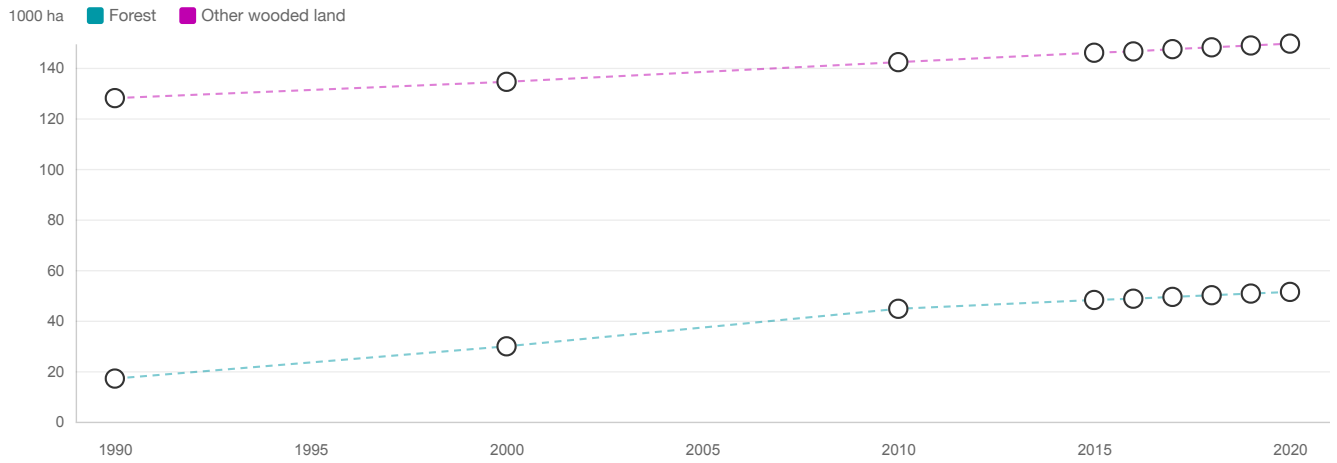
In the SPI there is a variable that describes the original status of the land transformed to cultivated forest. Reforestation after 1990 is to small to be reported.

Reclassification into FRA 2020 categories

Forest	1990	2000	2005	2010	2015	2016	2017	2018	2019	2020
NBF	10.509	10.937	11.151	11.365	11.580	11.622	11.665	11.708	11.751	11.794
CF	6.562	18.890	27.103	33.301	36.583	37.038	37.712	38.327	38.942	39.557
Sum	17.071	29.828	38.254	44.666	48.162	48.661	49.377	50.035	50.693	51.351

OWL	1990	2000	2005	2010	2015	2016	2017	2018	2019	2020
NBF	127.747	132.951	135.553	138.155	140.757	141.277	141.798	142.318	142.839	143.359

CF	0.240	1.484	2.886	4.066	5.185	5.185	5.560	5.766	5.972	6.178
Sum	127.987	134.435	138.439	142.221	145.942	146.463	147.358	148.084	148.811	149.537


1000 ha
Forest
Other wooded land
140
120
100
80
60
40
20
0
1990
1995
2000
2005
2010
2015
2020

FRA categories	Area (1000 ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Forest (a)	17.07	29.83	44.67	48.16	48.66	49.38	50.04	50.69	51.35
Other wooded land (a)	127.99	134.44	142.22	145.94	146.46	147.36	148.08	148.81	149.54
Other land (c-a-b)	**9 879.94**	**9 860.73**	**9 838.11**	**9 830.90**	**9 829.88**	**9 828.26**	**9 826.88**	**9 825.50**	**9 824.11**
Total land area (c)	**10 025.00**	**10 025.00**	**10 025.00**	**10 025.00**	**10 025.00**	**10 025.00**	**10 025.00**	**10 025.00**	**10 025.00**

The FAOSTAT land area figure for the year 2015 is used for all reference years

Climatic domain	% of forest area 2015	Override value
Boreal	**100.00**	100.00
Temperate	**0.00**	0.00
Sub-tropical	**0.00**	0.00
Tropical	**0.00**	0.00

Comments

1b Forest characteristics

National Data

Data sources + type of data source eg NFI, etc

See information in 1.a above

National classification and definitions

See information in 1.a above

Original data

See information in 1.a above

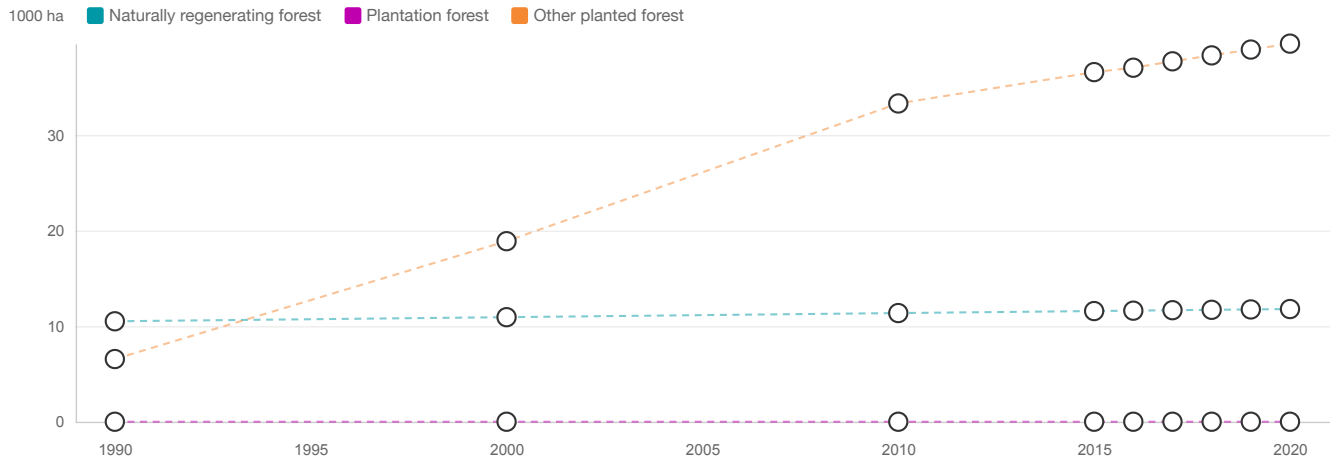
Analysis and processing of national data

Estimation and forecasting

See information in 1.a above

Reclassification into FRA 2020 categories

All Cultivated Forest are classified as Other planted forest. Plantation forest as defined by FAO does not exist.


1000 ha
Naturally regenerating forest
Plantation forest
Other planted forest
30
20
10
0
1990
1995
2000
2005
2010
2015
2020

FRA categories	Forest area (1000 ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Naturally regenerating forest (a)	10.51	10.94	11.37	11.58	11.62	11.67	11.71	11.75	11.79
Planted forest (b)	**6.56**	**18.89**	**33.30**	**36.58**	**37.04**	**37.71**	**38.33**	**38.94**	**39.56**
Plantation forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
…of which introduced species	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other planted forest	6.56	18.89	33.30	36.58	37.04	37.71	38.33	38.94	39.56
Total (a+b)	**17.07**	**29.83**	**44.67**	**48.16**	**48.66**	**49.38**	**50.04**	**50.69**	**51.35**
Total forest area	**17.07**	**29.83**	**44.67**	**48.16**	**48.66**	**49.38**	**50.04**	**50.69**	**51.35**

Comments

1c Primary forest and special forest categories

National Data

Data sources + type of data source eg NFI, etc

-

National classification and definitions

-

Original data

-

Analysis and processing of national data

Estimation and forecasting

-

Reclassification into FRA 2020 categories

-

FRA categories	Area (1000 ha)				
	1990	2000	2010	2015	2020
Primary forest	0.00	0.00	0.00	0.00	0.00
Temporarily unstocked and/or recently regenerated			22.44	24.39	26.33
Bamboos	0.00	0.00	0.00	0.00	0.00
Mangroves	0.00	0.00	0.00	0.00	0.00
Rubber wood	0.00	0.00	0.00	0.00	0.00

Comments

Specific forest categories listed in table 1e does not exist in Iceland except category "Temporary unstocked and/or recently regenerated". 2020 estimate is an extrapolation of 2010 and 2015 estimates. Natural Birch Forest cannot be defined as Primary forest as they have been under continuous use since human settlement.

1d Annual forest expansion, deforestation and net change

National Data

Data sources + type of data source eg NFI, etc

See information in 1.a above

Deforestation is only allowed by exception given by the Icelandic Forest Service. A register of allowed deforestation is hold by the Icelandic Forest Service.

National classification and definitions

See information in 1.a above

Original data

See information in 1.a above

Analysis and processing of national data

Estimation and forecasting

Calculated as the average of estimates 1990 and 2000, 2000 and 2010, 2010 and 2015, 2015 and 2020.

Reclassification into FRA 2020 categories

See information in 1.a above

FRA categories	Area (1000 ha/year)			
	1990-2000	2000-2010	2010-2015	2015-2020
Forest expansion (a)	1.28	1.48	0.70	0.64
…of which afforestation	1.23	1.44	0.66	0.60
…of which natural expansion	0.04	0.04	0.04	0.04
Deforestation (b)	0.00	0.00	0.00	0.00
Forest area net change (a-b)	**1.28**	**1.48**	**0.70**	**0.64**

Comments

Annual deforestation is known but to small to be reported. (4 to 5 ha annually in the period 1990 – 2015).

1e Annual reforestation

National Data

Data sources + type of data source eg NFI, etc

See information in 1.a above

National classification and definitions

See information in 1.a above

Original data

See information in 1.a above

In the SPI there is a variable that describes the original status of the land transformed to cultivated forest including reforestation. Reforestation after 1990 is too small to be reported here.

Analysis and processing of national data

Estimation and forecasting

See information in 1.a above

Reclassification into FRA 2020 categories

See information in 1.a above

FRA categories	Area (1000 ha/year)			
	1990-2000	2000-2010	2010-2015	2015-2020
Reforestation	0.00	0.00	0.00	0.00

Comments

Annual reforestation is known but to small to be reported. (2 to 3 ha annually in the period 1990 – 2015).

1f Other land with tree cover

National Data

Data sources + type of data source eg NFI, etc

See information in 1.a above

National classification and definitions

-

Original data

See information in 1.a above

Urban settings class 112 (Discontinuous urban fabric) in Corine land cover mapping is used:

	2000	2006	2012	2018
Urban settings (class 112):	9011	9957	10385	10700

Analysis and processing of national data

Estimation and forecasting

For 1990 same figure as estimated in the FRA2015 is used. For 2000 original data is used. For 2010 and 2015 interpolation is used. For 2020 extrapolation 2012 and 2918 data are used.

Reclassification into FRA 2020 categories

No reclasification

FRA categories	Area (1000 ha)				
	1990	2000	2010	2015	2020
Palms (a)	0.00	0.00	0.00	0.00	0.00
Tree orchards (b)	0.00	0.00	0.00	0.00	0.00
Agroforestry (c)	0.00	0.00	0.00	0.00	0.00
Trees in urban settings (d)	7.60	9.01	10.24	10.54	10.86
Other (specify in comments) (e)	0.00	0.00	0.00	0.00	0.00
Total (a+b+c+d+e)	**7.60**	**9.01**	**10.24**	**10.54**	**10.86**
Other land area	**9 879.94**	**9 860.73**	**9 838.11**	**9 830.90**	**9 824.11**

Comments

Other classes than Trees in urban settings doesn't exist.

2 Forest growing stock, biomass and carbon

2a Growing stock

National Data

Data sources + type of data source eg NFI, etc

	References to sources of information	Variable(s)	Year(s)	Additional comments
1	Data from a sample plot inventory (SPI) of forests and woodlands in Iceland*	stem volume of sample trees	2005-2017	Work conducted by IFR.
2	Data from tree sample inventory of natural birch woodland	stem volume of sample trees	1987	Work conducted by IFR
3	Single tree volume functions for eleven tree species in Icelandic Forestry **	stem volume /tree	2001-2002	Used in the calculation of growing stock in the SPI

* Same references and sources as for Chapter 1 above

** Published references:

Snorrason A & Einarsson S F 2006. Single tree biomass- and stem volume functions for eleven tree species used in Icelandic forestry. Icelandic Agricultural Sciences 19. p 15-24.

National classification and definitions

National class	Definition
Growing stock	National classification is identical to the classification used in FRA2015. Volume over bark of all living trees more than or equal to 10 cm in diameter at breast height (or above buttress if these are higher). Includes the stem from stump height up to a top diameter of 0 cm, not including branches.

Original data

In FRA2015 it was required to use 10 cm as a minimum for d1.3. In this submission same minimum diameter is used.

Cultivated forest: A total growing stock and annual increment of trees with d1.3 ≥ 10 cm for all inventory year of the SPI of the CF (2005-2012) is used for years 1990, 2000 and 2010. Growing stock measured for inventory year of the SPI of the CF (2013-2017) is used for ther reporting year 2015.

Natural birch woodland: A total growing stock and annual increment of trees with d1.3 ≥ 10 cm was calculated for all inventory year of the SPI of the NBW (2005-2009).

Analysis and processing of national data

Estimation and forecasting

Cultivated forest: Estimation of year 2020 is done by combination of nonlinear regression function and extrapolation (weight 50%/50%) for conifers and by linear regression for deciduous species. Values for year 2016-2019 are done by interpolation between year 2015 and 2020.

Natural birch woodland: Annual increment measurement (0.65% of the growing stock of year 2009) from the period 2005-2009 are used to estimate the growing stock of the year before and after the period up to 2015. Estimation of 2020 is done by regression of values from the other reporting years. Values for year 2016-2019 are done by interpolation between year 2015 and 2020.

Reclassification into FRA 2020 categories

See information in 1.a above

FRA categories	Growing stock m³/ha (over bark)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Naturally regenerating forest	2.85	2.74	2.64	3.45	3.44	3.43	3.42	3.40	3.39
Planted forest	3.05	3.71	8.71	12.85	14.31	15.91	17.22	18.49	19.72
…of which plantation forest									
…of which other planted forest	3.05	3.71	8.71	12.85	14.31	15.91	17.22	18.49	19.72
Forest	2.93	3.35	7.39	10.59	11.71	12.76	13.79	14.99	15.97
Other wooded land	0.23	0.22	0.21	0.21	0.20	0.20	0.20	0.20	0.20

FRA categories	Total growing stock (million m³ over bark)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Naturally regenerating forest	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04
Planted forest	0.02	0.07	0.29	0.47	0.53	0.60	0.66	0.72	0.78
…of which plantation forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
…of which other planted forest	0.02	0.07	0.29	0.47	0.53	0.60	0.66	0.72	0.78
Forest	0.05	0.10	0.33	0.51	0.57	0.63	0.69	0.76	0.82
Other wooded land	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Comments

Growing stock of diameters in breast height 10 cm or more. As reported in earlier submissions.

2b Growing stock composition

National Data

Data sources + type of data source eg NFI, etc

See information in 2.a above

National classification and definitions

See information in 2.a above

Original data

See information in 2.a above

Analysis and processing of national data

Estimation and forecasting

In table 2 b only the six most common species are reported although it was theoretically possible to calculate values for more species. When using SPI, breaking the data down more can lead to false results so it is better not to report species with growing stock estimates less than ten thousand cubic meters.

For the same reason it did not add any information to the table to calculate calibrated figures for year 2000 and 1990.

Reclassification into FRA 2020 categories

See information in 2.a above

The growing stock of Native birch plantation are added to the growing stock of natural birch forest and reported as the growing stock of the only native trees species, downy birch.

FRA categories	Scientific name	Common name	Growing stock in forest (million m³ over bark)				
			1990	2000	2010	2015	2020
Native tree species							
#1 Ranked in terms of volume	Betula pubescens	Downy birch			0.06	0.06	0.09
#2 Ranked in terms of volume							
#3 Ranked in terms of volume							
#4 Ranked in terms of volume							
#5 Ranked in terms of volume							
#6 Ranked in terms of volume							
#7 Ranked in terms of volume							
#8 Ranked in terms of volume							
#9 Ranked in terms of volume							
#10 Ranked in terms of volume							
Remaining native tree species					0.00	0.00	0.00
Total volume of native tree species			–	–	**0.06**	**0.06**	**0.09**
Introduced tree species							
#1 Ranked in terms of volume	Larix sibirica	Siberian larch			0.07	0.12	0.19
#2 Ranked in terms of volume	Pinus contorta	Lodgepole pine			0.05	0.09	0.16
#3 Ranked in terms of volume	Picea sitchensis	Sitka spruce			0.06	0.09	0.14
#4 Ranked in terms of volume	Populus trichocarpa	Black cottonwood			0.04	0.08	0.13
#5 Ranked in terms of volume	Picea abies	Norway spruce			0.03	0.04	0.06
Remaining introduced tree species					0.02	0.03	0.05

FRA categories	Scientific name	Common name	Growing stock in forest (million m³ over bark)				
			1990	2000	2010	2015	2020
Native tree species							
Total volume of introduced tree species			–	–	**0.27**	**0.45**	**0.73**
Total growing stock			–	–	**0.33**	**0.51**	**0.82**

Comments

2c Biomass stock

National Data

Data sources + type of data source eg NFI, etc

#	References to sources of information	Variable(s)	Year(s)	Additional comments
1	Data from a sample plot inventory (SPI) of forests and woodlands in Iceland*	ABG biomass of all trees measured on sample plots	2005-2017	Work conducted by IFR.
2	Data from tree sample inventory of natural birch woodland	ABG biomass of sample trees	1987	Work conducted by IFR
3	Single tree biomass functions for eleven tree species in Icelandic Forestry **	biomass ABG /tree	2001-2002	Used in the calculation of biomass of measured plots in SPI and the growth potential project
4	***	root/shoot ratio	1998-2001	Used to estimate root/shoot ratio
5	****	biomass of other vegetation	2002-2003	

* and ** Same references and sources as for Table 2a

*** and ****Snorrason A., Sigurdsson B.D., Gudbergsson G., Svavarsdottir K., Jonsson Th.H. (2002). Carbon sequestration in forest plantations in Iceland, Icel. Agric. Sci. 15 (2002) 79-91.

****Sigurdsson, Bjarni D., Borgthor Magnusson, Asrun Elmarsdottir and Brynhildur Bjarnadottir (2005). Effects of afforestation on biomass, carbon stock and composition of ground vegetation: a chronosequence study in Iceland. Annals of Forest Science 62, 881-888.

National classification and definitions

National class	Definition
Biomass stock	FRA 2010 default definitions are used. – Same as FRA2015

Original data

Annual biomass estimates are produced to meet the requirements of the carbon reporting of UNFCCC. They cannot be used directly in this report as they follow the country wise (CW) definition of forest that is not equal to the FAO definition. The FAO definition and CW are different only in one point, that is height at maturity. The CW definition uses 2 m as minimum height at maturity instead of 5 m height at maturity as in the FAO definition. In SPI it is possible, as for the area, to break up the data by mature height classes so direct information on biomass stock of trees above ground and below ground can be reported.

Data sources and assessment methods are similar as for T3 with few exceptions. The exceptions are:

1. Instead of stem volume functions, functions for total biomass above ground (stump) are used to estimate the biomass (Snorrason & Einarsson 2006).
2. All trees regardless of size are included in the estimate. No minimum size of trees is used.
3. Country specific root/shoot ratio found in in-country research is used to estimate below ground biomass (Snorrason et.al. 2002). The ratio is: 0.25. Note that fine-roots are excluded and the stump is included in the belowground estimate.
4. Dead wood biomass is excluded. If international definition of dead wood is followed the occurrence is very rare. Dead wood has been measured in SPI but not yet estimated.
5. Above ground biomass of other vegetation than trees is estimated and added to above ground biomass of trees. Average of 12 measurement plots was 3 tonnes/ha (Snorrason et.al. 2002). Other research with ca. 50 measurements gave biomass in other vegetation than trees around 3.6 tonnes/ha (Sigurdsson et.al. 2005). Above ground biomass in other vegetation than trees is estimated to be 3.4 tonnes/ha.

Analysis and processing of national data

Estimation and forecasting

Biomass stock in 2016-2020 is don by extrapolation of the measured 2010 to 2015 increase.

Reclassification into FRA 2020 categories

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FRA categories	Forest biomass (tonnes/ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Above-ground biomass	19.62	14.19	15.63	19.86	20.72	21.46	22.21	22.94	23.66
Below-ground biomass	4.91	3.55	3.91	4.96	5.18	5.37	5.55	5.74	5.91
Dead wood									

Comments

Biomass stock is of all dimensions of trees as in earlier submissions. Dead wood stock has not yet been done.

2d Carbon stock

National Data

Data sources + type of data source eg NFI, etc

#	References to sources of information	Variable(s)	Year(s)	Additional comments
1	Same references as for biomass stock			See references for biomass stock
2	* & **	C-stock in litter	1998-2003	Research results of C-stock measurements of litter in forest in Iceland.
3	*** & ****	C-stock in organic soils	1998-2002	Results of C-stock measurements in organic soils in Iceland.
4	*****	C-stock in inorganic forest soils	2001-2003	Research results of C-stock measurements in inorganic forest soils in Iceland.
5				

*Snorrason A., Sigurdsson B.D., Gudbergsson G., Svavarsdottir K., Jonsson Th.H. (2002). Carbon sequestration in forest plantations in Iceland, Icel. Agric. Sci. 15 (2002) 79-91.

**Sigurdsson, Bjarni D., Borgthor Magnusson, Asrun Elmarsdottir and Brynhildur Bjarnadottir (2005). Effects of afforestation on biomass, carbon stock and composition of ground vegetation: a chronosequence study in Iceland. Annals of Forest Science 62, 881-888.

***Oskarsson, H., Arnalds, O., Gudmundsson, J. and Gudbergsson, G., 2004 Organic carbon in Icelandic Andosols: geographical variation and impact of erosion. Catena 56, 225–238.

****Arnalds, O., 2004. Volcanic soils of Iceland. Catena 56, 3 –20.

National classification and definitions

National class	Definition
Carbon stock	FRA 2010 default definitions are used.
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	Same as FRA2015
Carbon in dead wood	
Carbon in litter	
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a 30 cm depth

Original data

The same data sources and assessment methods are used as in biomass tables with some additions. They are:

1. Results from in-country research are used to estimate C-stock in litter. An average for 12 measurements for litter was 6.0 tonnes C/ha (Snorrason et.al. 2002). Because the litter is more or less concentrated to the area below the trees the litter area is decreased at same ratio as the tree-cover area of both NBW and CF. All open areas in forest are excluded. In CF a 14% of the area are without tree growth. Same figure for NBW is 29%
2. The same in-country results give 1.5 tonnes C/ha in other vegetation than trees, a similar mean value as found by Sigurdsson et.al. 2005. They are used to estimate C-stock in other vegetation than trees. A total area of both NBW and CF is used.
3. Inorganic soils of Iceland are mostly volcanic soils (Andosols). The in-country research mentioned before gave 81 tonnes C/ha for 0-30 cm depth although total C-stock down to bedrock was higher or 148 tonnes C/ha (Snorrason et.al. 2002). This figure is similar to extensive measurement of the C-content of various soil types in Iceland (Oskarsson et.al. 2004) where mean value in brown andisols was around 70 tonnes C/ha. Brown andisol is the main type of inorganic soil in Iceland. New research of the C-stock of both NBW and CF showed higher figures especially for West Iceland where precipitation is higher than in East Iceland. Mean values for 0-30 cm depth were ca. 150 tonnes C/ha in West Iceland but ca. 80 tonnes C/ha in East Iceland (Sigurðsson et.al. 2008). Here the moderate figure of 81 tonnes C/ha will be used for all inorganic soils of the both NBW and CF.
4. A minor part (3%) of CF and NBF is on organic soils. C-stock for 0-30 cm depth is estimated to ca. 200 tonnes C/ha according to published research results (Oskarsson et.al. 2004 & Arnalds 2004).

Analysis and processing of national data

Estimation and forecasting

Same methods as in chapter 2c. Following the IPCC Good Practice Guidance, we calculated the Carbon Stock of AGB and BGB by multiplying biomass values with 0.5.

Reclassification into FRA 2020 categories

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FRA categories	Forest carbon (tonnes/ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Carbon in above-ground biomass	9.81	7.09	7.82	9.93	10.36	10.73	11.11	11.47	11.83
Carbon in below-ground biomass	2.45	1.77	1.95	2.48	2.59	2.68	2.78	2.87	2.96
Carbon in dead wood									
Carbon in litter	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Soil carbon	84.73	84.73	84.73	84.73	84.73	84.73	84.73	84.73	84.73

Soil depth (cm) used for soil carbon estimates	30.00

Comments

3 Forest designation and management

3a Designated management objective

National Data

Data sources + type of data source eg NFI, etc

#	References to sources of information	Variable(s)	Year(s)	Additional comments
1	New data from the sample plot inventory of forest and woodland in Iceland*	Classification and area estimates build on sample plots	2005-2017	Work conducted by IFR.
2	Remapping of the natural birch woodland (NBW)*	Area estimate built on field mapping	2010-2014	Work conducted by IFR.

* Same references and sources as for Chapter 1

National classification and definitions

Natural birch forests: The forest part (reaching 5 m or more in height) of the natural birch woodland are as the other wooded land often not fenced and therefore used for grazing of domestic animals, mostly sheep. In more recent times they are also partially used for recreation and can therefore be classified as woodland for social services. The most important role in protection of soil and water and conservation of biodiversity. A small part of the natural birch forest (800 ha) owned by the Icelandic Forest Service (IFS) is selectively cut regularly and the wood sold mostly as firewood for open fireplaces for amenity use. A small part is under natural conservation in national parks and there also used for recreation. The conclusion is that NBF are as whole with the designated function of protection of soil and water except the wood usage part described above.

Cultivated forest: The data variable from the SPI used to describe the primary designated function of forest is a classification variable that describes the usage of the forest.

Original data

Table of the relationship between classes for data variable from the SPI in CF used to describes the usage of the forest and the variables describing the primary designated management objective of forest in Table 3a.

	Production	Multible use	Protection of soil and water	Conservation of biodiversity	Social services	Other	No/unknown
Multible		x					
Wood producton	x						
Land reclamation			x				
Recreation					x		
Summerhouse					x		
Trial field						x	
Seed production	x						
Cristmaas tree	x						
Shelter forest			x				
Natural conservation				x			
Other							x
Undefinded							x

Analysis and processing of national data

Estimation and forecasting

2020 values are estimated by extrapolation of 2010 to 2015 values.

Reclassification into FRA 2020 categories

In the latter table for ***Total area with designated management objective*** definitions are used as below:

1. Production: All forest defined as Forest available for wood supply (reported in SoEF2020)
2. Protection of soil and water: Forest defined in table ***Primary designated management objective*** as; Protection of soil and water, Social Services and Multiple use.
3. Conservation of biodiversity: Forest defined in table ***Primary designated management objective*** as Conservation of biodiversity and in table ***3b Forest area within protected areas and forest area with long-term management plans*** as; Forest area within protected areas.

Primary designated management objective

FRA 2020 categories	Forest area (1000 ha)				
	1990	2000	2010	2015	2020
Production (a)	2.90	8.38	14.36	16.59	17.87
Protection of soil and water (b)	10.03	11.71	14.41	14.85	15.39
Conservation of biodiversity (c)	0.06	0.06	0.13	0.16	0.17
Social Services (d)	2.05	4.59	5.97	6.11	6.60
Multiple use (e)	1.92	4.86	9.56	10.15	10.98
Other (specify in comments) (f)	0.06	0.17	0.17	0.17	0.18
None/unknown (g)	**0.05**	**0.06**	**0.07**	**0.13**	**0.16**
Total forest area	**17.07**	**29.83**	**44.67**	**48.16**	**51.35**

Total area with designated management objective

FRA 2020 categories	Forest area (1000 ha)				
	1990	2000	2010	2015	2020
Production	5.60	14.36	24.33	27.16	29.51
Protection of soil and water	14.00	21.16	29.94	31.11	32.98
Conservation of biodiversity	0.41	0.53	0.73	0.77	
Social Services	3.97	9.45	15.53	16.26	17.58
Other (specify in comments)	0.06	0.17	0.17	0.17	0.18

Comments

Other = Forestry trials/research areas.

3b Forest area within protected areas and forest area with long-term management plans

National Data

Data sources + type of data source eg NFI, etc

	References to sources of information	Variables	Years	Additional comments
1	New data from the sample plot inventory of forest and woodland in Iceland	Classification and area estimates build on sample plots	2005-2017	Work conducted by IFR. Data from 5 years of the first cycle for NBW.
2	Remapping of the natural birch woodland (NBW)	Area estimate built on field mapping	2010-2015	Work conducted by IFr.
3	Maps over National parks and when they were launched	Area merging the map of forest	1990-2017	Maps from The Environment Agency of Iceland

National classification and definitions

-

Original data

Only small part of the Natural birch forest can be defined as under conservation. These are forest areas that are in a national parks. Their conservation is not designated primarily for conservation of biological diversity.

Analysis and processing of national data

Estimation and forecasting

It is not possible to forecast the development of forest area within protected areas so values for the year 2018-2020 are left empty.

Other forecasting is as for Chapter 1a.

Reclassification into FRA 2020 categories

Forest area with management plans include almost all forest areas of the Icelandic Forest Service, the Farmers afforestation projects that are managed with long term forestry planning and the forest area of the Forestry associations that has also been planned. 1800 ha of the natural birch forest is under the regime of the Icelandic Forest Service and under long term management plans. Forest of the National parks can be defined as under long term management plan which is protection. In short, all forest except Natural birch forest mentioned above can be defined as forest area with long-term forest management plan.

FRA categories	Area (1000 ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Forest area within protected areas	0.35	0.48	0.60	0.61	0.61	0.61			
Forest area with long-term forest management plan	8.71	21.17	35.70	38.99	39.45	40.12	40.13	40.74	41.36
…of which in protected areas	0.35	0.48	0.60	0.61	0.61	0.61			

Comments

4 Forest ownership and management rights

4a Forest ownership

National Data

Data sources + type of data source eg NFI, etc

	References to sources of information	Variables	Years	Additional comments
1	New data from the sample plot inventory of forest and woodland in Iceland	Classification and area estimates build on sample plots	2005-2017	Work conducted by IFR. Data from 5 years of the first cycle for NBW.
2	Remapping of the natural birch woodland (NBW)	Area estimate built on field mapping	2010-2014	Work conducted by IFR.
3	Incomplete and unofficial cadastral map of Iceland	Area merging the map of forest	2000-2004	

National classification and definitions

-

Original data

The data variable from the SPI used to describe the ownership of forest is a classification variable that identifies the ownership of the forest in the plot. These data are used to classify Cultivated Forest into ownership categories.

Ownership classification of Natural birch forest is done by merging of cadastral map and the birch forest map.

Analysis and processing of national data

Estimation and forecasting

-

Reclassification into FRA 2020 categories

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FRA categories	Forest area (1000 ha)			
	1990	2000	2010	2015
Private ownership (a)	11.33	20.38	33.89	37.12
…of which owned by individuals	10.10	16.77	28.29	31.07
…of which owned by private business entities and institutions	1.24	3.61	5.60	6.05
…of which owned by local, tribal and indigenous communities	0.00	0.00	0.00	0.00
Public ownership (b)	5.74	9.45	10.78	11.04
Unknown/other (specify in comments) (c)	**0.00**	**0.00**	**0.00**	**0.00**
Total forest area	**17.07**	**29.83**	**44.67**	**48.16**

Comments

4b Holder of management rights of public forests

National Data

Data sources + type of data source eg NFI, etc

-

National classification and definitions

-

Original data

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Analysis and processing of national data

Estimation and forecasting

-

Reclassification into FRA 2020 categories

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FRA categories	Forest area (1000 ha)			
	1990	2000	2010	2015
Public Administration (a)	5.74	9.45	10.78	11.04
Individuals (b)				
Private business entities and institutions (c)				
Local, tribal and indigenous communities (d)				
Unknown/other (specify in comments) (e)	**0.00**	**0.00**	**0.00**	**0.00**
Total public ownership	**5.74**	**9.45**	**10.78**	**11.04**

Comments

5 Forest disturbances

5a Disturbances

National Data

Data sources + type of data source eg NFI, etc

References to sources of information	Variables	Years	Additional comments
Digital maps of severly affected natural birch woodland	Affected NW	N/A	Field assessment (Hallgrímsson et.al. 2006)

Iceland Forest Research does annually monitor outbreaks and damages caused by insect, diseases. Since FRA2010 no severe outbreak of insects and plant diseases has occurred. Although wind-throws are increasing with higher heights of plantations no severe storm damage has still not occurred.

National classification and definitions

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Original data

Description/name	Year(s) of latest outbreak	Area damaged (1000 hectares)
Larvae defoliation leading to dieback and mortality of Betula and Salix species. Insects groups Lepidoptera.	2005	0.811
Broom moth (Ceramica pisi) outbreak larvae defoliation leading to dieback and increased mortality og seedlings and small trees (All tree species affected).	2008	N/A
Green spuce aphid (Elatobium abietinum) causing defoliation leading to decreased growth and rarely to mortality (species affected (Picea sitchensis, P. glauca, P. engelmannii)).	2003	N/A
Poplar rust (Melampsora larici-populina) infestation damage to foliage in late summer leading to poor hardiness and frost damage dieback next winter of black cottonwood (Populus trichocarpa).	2000	N/A

Analysis and processing of national data

Estimation and forecasting

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Reclassification into FRA 2020 categories

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FRA categories	Area (1000 ha)																	
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Insects (a)	0.00	0.00	0.00	0.00	0.00	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diseases (b)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Severe weather events (c)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other (specify in comments) (d)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total (a+b+c+d)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.81**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total forest area	**29.83**	–	–	–	–	–	–	–	–	–	**44.67**	–	–	–	–	**48.16**	**48.66**	**49.38**

Comments

5b Area affected by fire

National Data

Data sources + type of data source eg NFI, etc

References to sources of information	Variables	Years	Additional comments
Data from The Icelandic Institute Of Natural History (INH)	Area of wildfires	2006-2017	INH does report wildfires by mapping the area of each fire.
New GIS database built on the natural birch woodlands survey and spatial information of CF*	Area of NW and CF	2005-2017	Conducted by IFR.

National classification and definitions

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Original data

INH started to register and map all wildfires after a vast fire in 2006. Before that time no systematic registration was carried out. When merging the wildfire maps and the forest area map it is possible to estimate forest and woodland fires. Forest and woodland fires are rare but they do occur. The area burned each time is small. As an example there was a wildfire in an afforestation area in 2008. 9,1 ha of CF was burned in that fire.

Analysis and processing of national data

Estimation and forecasting

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Reclassification into FRA 2020 categories

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FRA categories	Area (1000 ha)																	
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total land area affected by fire							6.70	0.01	0.12	0.01	0.01	0.00	0.02	0.04	0.00	0.34	0.00	0.06
…of which on forest							0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Comments

5c Degraded forest

Does your country monitor area of degraded forest		No
If "yes"	What is the national definition of "Degraded forest"?	
	Describe the monitoring process and results	

Comments

6 Forest policy and legislation

6a Policies, Legislation and national platform for stakeholder participation in forest policy

National Data

Data sources + type of data source eg NFI, etc

References to sources of information	Variables	Years	
http://www.althingi.is/ lagas/143a/1955003.html	General forest act.	1955	
http://www.althingi.is/ lagas/143a/2006095.html	Special forest act for private afforestation projects subsidized by the state	2006	
http://www.skogur.is/media/ ymislegt/Stefna-skogar.pdf	National policy for the forest and forestry for the 21th century.	2013	

National classification and definitions

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Original data

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Indicate the existence of	Boolean (Yes/No)	
	National	Sub-national
Policies supporting SFM	Yes	No
Legislations and regulations supporting SFM	Yes	No
Platform that promotes or allows for stakeholder participation in forest policy development	Yes	No
Traceability system(s) for wood products	No	No

Comments

National policy for the forest and forestry for the 21th century was made by commission consisting of members designated by NGO's as the Icelandic Forest Association and the Forest Owner Association. A new forest act is under hearing and everyone can commend on the draft. Alþingi the Icelandic parlament gets special comment from NGO's as the Icelandic Forest Association, Forest Owner Association and Nature Conservation Organisations. Its support SFM as the Forest act from 1955. Icelandic Forest Service was merged to the region afforestation programs so Sub-national bodies do not exist any longer.

6b Area of permanent forest estate

National Data

Data sources + type of data source eg NFI, etc

-

National classification and definitions

-

Original data

-

FRA 2020 categories	Forest area (1000 ha)					
	Applicable?	1990	2000	2010	2015	2020
Area of permanent forest estate	No					

Comments

Forest is by the general forest act protected against uncontrolled clearcutting but that can vaguely be interpreted as intention of permanent forest coverage. The forestry act in Iceland does not designate any areas permanently as forest area. So, no forests are classified hereunder.

7 Employment, education and NWFP

7a Employment in forestry and logging

National Data

Data sources + type of data source eg NFI, etc

References to sources of information	Variables	Years	Additional comments
Information from institutions in the forest sector.	No. of person-years	1990, 2000, 2005	IFI sent questions to forestry actors in the country, other than the regional afforestation programs
Magnúsdóttir, L. 2013. Economic impact of the Regional Afforestation Programmes in Iceland during 2001-2010. Agricultural University of Iceland. Faculty of Environmental Sciences. MSc. Thesis. 122 p. [In Icelandic with English abstract].	No. of person-years for the regional afforestation programs	2005, 2010	N/A
Gunnarsson, E. 2011. Skógræktarárið 2010. (The forest year of 2010). Skógræktarritið 2011 2.tbl. p. 96-101.	No. of person-years in the forest sector	2010	Annual data of forest activities in Iceland gathered by the Icelandic Forest Association
Gunnarsson, E. 2016. Skógræktarárið 2015. (The forest year of 2015). Skógræktarritið 2016 2.tbl. p. 91-99.	No. of person-years in the forest sector	2015	Annual data of forest activities in Iceland gathered by the Icelandic Forest Association

National classification and definitions

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Original data

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FRA 2020 categories	Full-time equivalents (1000 FTE)											
	1990			2000			2010			2015		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
Employment in forestry and logging	0.12			0.12			0.14			0.12		
…of which silviculture and other forestry activities												
…of which logging												
…of which gathering of non wood forest products												
…of which support services to forestry												

Comments

Data from Statistic Iceland and Eurostat are erronous and incomplete and not used here. For forestry they report data only for 2010 = 0.182503 (1000 FTE). Subclassification and gender classification is not available.

7b Graduation of students in forest-related education

National Data

Data sources + type of data source eg NFI, etc

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Information from Agricultural University of Iceland	H		1990-2015	Information are given from professor Phd Bjarni Diðrik Sigurðsson bjarni@lbhi.is

National classification and definitions

-

Original data

7b Graduation of students in forest-related education (3 year average)												
		1990			2000			2010			2015	
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
Doctoral degree	0.67	0.00	0.67	0.67	0.33	0.33	1.00	0.67	0.33	0.33	0.00	0.33
Master's degree	0.33	0.00	0.33	1.33	1.00	0.33	1.33	1.00	0.33	1.33	0.67	0.67
Bachelor's degree	1.00	0.33	0.67	0.33	0.00	0.33	3.00	0.67	2.33	1.67	0.67	2.33
Technician certificate / diploma	0.33	0.00	0.33	0.67	0.00	0.67	2.00	1.00	1.00	1.33	1.00	0.33
Total	2.33	0.33	2.00	3.00	1.33	1.67	7.33	3.33	4.00	4.67	2.33	3.67

The data does cover both students from the Agricultural University of Iceland and abroad forestry educated Icelanders living in Iceland.

FRA 2020 categories	Number of graduated students											
	1990			2000			2010			2015		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
Doctoral degree	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00
Master's degree	0.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	2.00	1.00	1.00
Bachelor's degree	1.00	0.00	1.00	0.00	0.00	0.00	3.00	1.00	2.00	3.00	1.00	2.00
Technician certificate / diploma	0.00	0.00	0.00	1.00	0.00	1.00	2.00	1.00	1.00	1.00	1.00	0.00
Total	2.00	0.00	2.00	2.00	1.00	1.00	7.00	4.00	3.00	6.00	3.00	3.00

Comments

7c Non wood forest products removals and value 2015

National Data

Data sources + type of data source eg NFI, etc

References to sources of information	Variables	Years	Additional comments
Gunnarsson, E. 2016. Skógræktarárið 2015. (The forest year of 2015). Skógræktarritið 2016 2.tbl. p. 91-99.	No. of Christmas trees cut	2015	Annual data of forest activities in Iceland gathered by the Icelandic Forest Association

National classification and definitions

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Original data

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	Name of NWFP product	Key species	Quantity	Unit	Value (1000 local currency)	NWFP category
#1	Christmas tree	Pinus contorta	6 972	Number	69 720	6 Ornamental plants
#2						
#3						
#4						
#5						
#6						
#7						
#8						
#9						
#10						
All other plant products						
All other animal products						
Total					**69 720**	

Name of currency	

Comments

The value of each tree can vary as some are big outdoor trees but other are family trees. Estimated mean value of 10000 ISK each is an expert estimate.

8 Sustainable Development Goal 15

8a Sustainable Development Goal 15

SDG Indicator 15.1.1 Forest area as proportion of total land area 2015

Indicator	Percent							
	2000	2010	2015	2016	2017	2018	2019	2020
Forest area as proportion of total land area 2015	0.30	0.45	0.48	0.49	0.49	0.50	0.51	0.51

Name of agency responsible	Icelandic Forest Service

SDG Indicator 15.2.1 Progress towards sustainable forest management

Sub-Indicator 1	Percent						
	2000-2010	2010-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Forest area annual net change rate	4.12	1.52	1.03	1.46	1.32	1.28	1.29

Name of agency responsible	Icelandic Forest Service

Sub-Indicator 2	Forest biomass (tonnes/ha)							
	2000	2010	2015	2016	2017	2018	2019	2020
Above-ground biomass stock in forest	14.19	15.63	19.86	20.72	21.46	22.21	22.94	23.66

Name of agency responsible	Icelandic Forest Service

Sub-Indicator 3	Percent (2015 forest area baseline)							
	2000	2010	2015	2016	2017	2018	2019	2020
Proportion of forest area located within legally established protected areas	1.00	1.25	1.27	1.27	1.27	–	–	–

Name of agency responsible	Icelandic Forest Service

Sub-Indicator 4	Percent (2015 forest area baseline)							
	2000	2010	2015	2016	2017	2018	2019	2020
Proportion of forest area under long-term forest management plan	43.96	74.13	80.96	81.91	83.31	83.33	84.59	85.88

Name of agency responsible	Icelandic Forest Service

Sub-Indicator 5	Forest area (1000 ha)							
	2000	2010	2015	2016	2017	2018	2019	2020
Forest area under independently verified forest management certification schemes	0.00	0.00	0.00	0.00	0.00	0.00	–	–