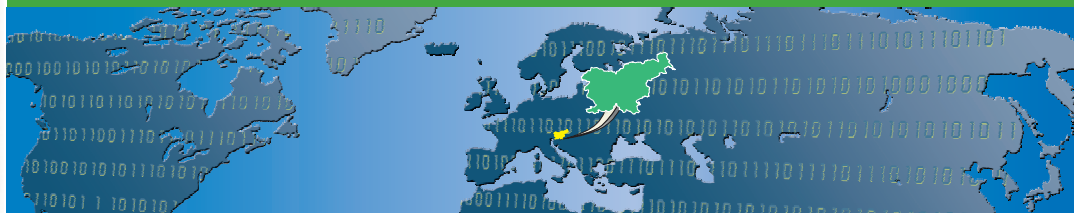




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STATISTIČNI URAD REPUBLIKE SLOVENIJE  
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# From tree to forest, from forest to wood

Ljubljana, October 2011



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# From tree to forest, from forest to wood

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## **From tree to forest, from forest to wood**

Authors: Špela Gale, Milena Lešić, Barbara Kutin Slatnar

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Photo: Urška Gale

## Foreword

The United Nations General Assembly declared 2011 as the International Year of Forests to raise awareness of sustainable management, conservation and sustainable development of all types of forests.

The Statistical Office is joining this effort with an occasional publication which summarizes key data and indicators on forests and forestry in Slovenia - they say a lot about the importance of the forest, the overall health condition of Slovenian forests, the attitude of the society towards the forest and its impact on forests, as well as the development potential of forestry activities and opportunities for education and employment in this profession. We also added the available information for the EU-27, presenting the selected data in the broader European context.

The publication is aimed at a wide range of readers, so we particularly seek to ensure that professional views are as understandable as possible. For a clearer presentation, the collected data and indicators are presented in simple tables, charts or maps, together with a short commentary. In an effort to make this publication well accepted, especially among young people who are interested in forestry, and for proper understanding we added at the end some definitions and a list of indigenous tree species growing in Slovenia.

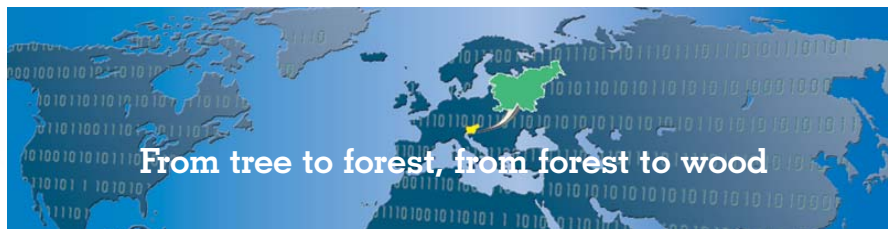
We invite you to see what statistics tell about the Slovenian forests and forestry.

Irena Križman  
Director-General





Photo: Dušan Jože Dimc



## From tree to forest, from forest to wood

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Photo: Josef Kahuda

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## The importance of forest in Slovenia

**Forest** is the most organized community of plants and animals in the living place, so it has special significance. It thrives wherever allowed by ecological factors and humans.

### Forests cover one third of the Earth's land surface

In 2009, forests covered 31% of the Earth, 42% of the European Union, and in Slovenia 58% of land area (or 1,186,104 hectares), making Slovenia the third most forested country in Europe (after Finland and Sweden).

### Forests for people: protect the areas covered by forests

The United Nations declared 2011 the International Year of Forests. Therefore, many governmental and non-governmental and research organizations in Slovenia are preparing in 2011 a variety of activities designed to raise awareness of sustainable forest management, the need to protect the areas covered by forests and the importance of sustainable development in such areas. The coordinator of these activities in Slovenia is the Ministry of Agriculture, Forestry and Food, and all activities are performed under the slogan *Forests for People*.

### Forest – a value and a source of many goods

Because of their wide range of functions, forests offer us a wide variety of goods - wood, forest fruits, a place for recreation and vacation, work - but also maintain clean drinking water and bind carbon dioxide and thus mitigate climate change. Forest is a shelter of many plant and animal species and an important element in preserving biodiversity. There are 69 indigenous tree species in our forests. How do we treat forests in Slovenia? What changes can be detected by statistics on forests and forestry in Slovenia?

### Many settlement names speak of the close relationship between man and forest

The close relationship between man and forest is interestingly reflected in the naming of many Slovenian settlements. Around 11% of the names of settlements originate from common names for forest (gozd, hosta, boršt), type of forest (brezje, hrastje, bukovje, which are names for birch, oak or beech grove) or the shape of forest (gaj, log, which are names for small wood) or the names of tree species (lipa, breza, which are names for lime and birch); among such names the most common are Brezje, Gaberje, Bukovje, Lipa, Log, Hrastje. In the list of Slovenian settlement names, those originating from common names for forest, such as Gozdec, Boršt, Hosta, Log, appear 78-times.



Photo: Miran Krapež



### Word cloud 1: Settlement names related to forests, having a common root, Slovenia, 2011



Source: SMA  
Image created by Wordle.

### A new publication: From tree to forest, from forest to wood

In the following pages we would like to present some of the most interesting data on forests and forestry in Slovenia in terms of different roles that the forests represent for the people. These data were prepared on the basis of different data sources. The collected material was divided into four sections with the following headings: Condition of Slovenian forests, Economic aspect of forests, Environmental and social aspects of forests, and Development opportunities in forestry. Within each section, we prepared a number of statistical indicators showing the multiple meanings of the forest and the possibilities for the sustainable management of forests. In the final chapter a few indicators suggesting future opportunities in the management of Slovenian forests were added.



Photo: Dušan Jože Dimc



Photo: Urška Gale

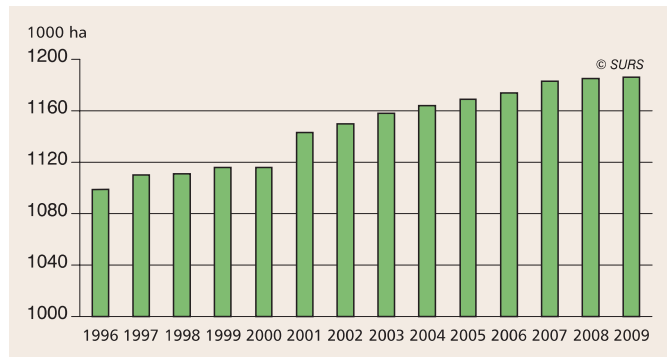


Photo: Miran Krapež

# 1 Condition of Slovenian forests

## 1.1 Forest area

**Chart 1: Forest area<sup>1)</sup>, Slovenia**



<sup>1)</sup> Other wooded land is not included.

Source: Slovenian Forest Service

**Table 1: Forests in total land area, Slovenia**

Year	Forest <sup>1)</sup>	%
1996	54.2	
2000	55.9	
2007	58.4	
2008	58,5	
2009	58.5	

<sup>1)</sup> Other wooded land is not included.

Source: Slovenian Forest Service

■ In the past ten years the forest area in Slovenia increased by almost 3%. According to the Slovenian Forest Service, in 2009 forests covered 1,186,104 hectares or 58.5% of the territory of Slovenia. Changes in the forest area are monitored also by the Ministry of Agriculture, Forestry and Food (MAFF) within the monitoring of land use change, in cooperation with the Slovenian Forest Service. According to these data, forests cover 1,213,945 hectares or 59.9% of the territory of Slovenia.

■ The area of forest and other wooded land in the 27 EU Member States in 2005 was - according to Eurostat - 177 million hectares or 42% of the total territory of the EU-27.

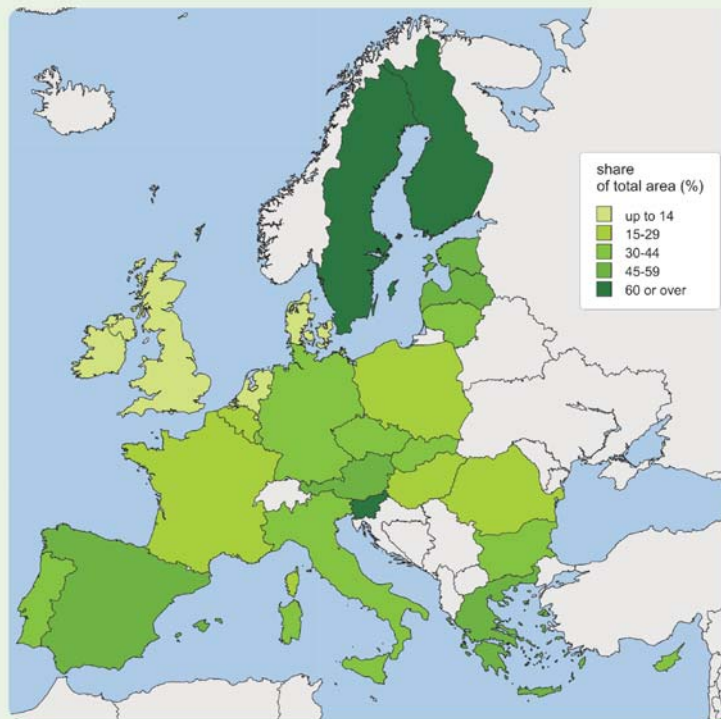
■ As regards the share of the area of forest and other wooded land, in 2005 Slovenia ranked third (65%), i.e. after Finland (77%) and Sweden (75%); of the 27 Member States Malta had the smallest share of land covered with forests (1%), followed by Ireland (10%), the Netherlands (11%) and the United Kingdom (12%).



Photo: Tomaž Devjak



Map 1: Forest area and other wooded land, EU-27, 2005

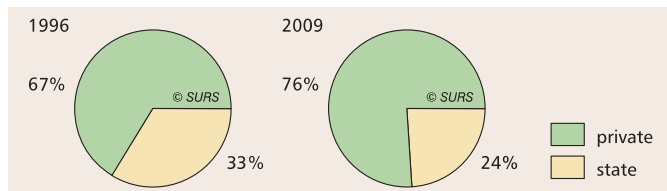


Source: Eurostat

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## 1.2 Forest ownership

**Chart 2: Forest ownership, Slovenia, 1996 and 2009**



Source: Slovenian Forest Service

**Table 2: Family farms with forest, Slovenia**

	Family farms with forest number	Forest area 1,000 ha
2000	76,670	395
2003	68,659	386
2005	68,935	377
2007	67,154	378

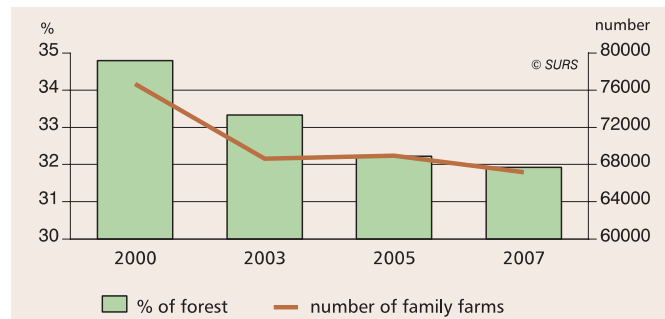
Source: SORS

■ In recent years, the ownership structure of forests in Slovenia was changing due to the processes of denationalization. In 1996, 33% of forests were state owned and 67% were privately owned. By 2009, the ownership structure changed in favour of private forests, which represented 76% of forests in the country, while state forests represented 24%. Since these data [source: the forest management plans for forest management units of the Slovenian Forest Service] are on average 5 years old, the recorded ownership of forests is slightly different from the real situation.

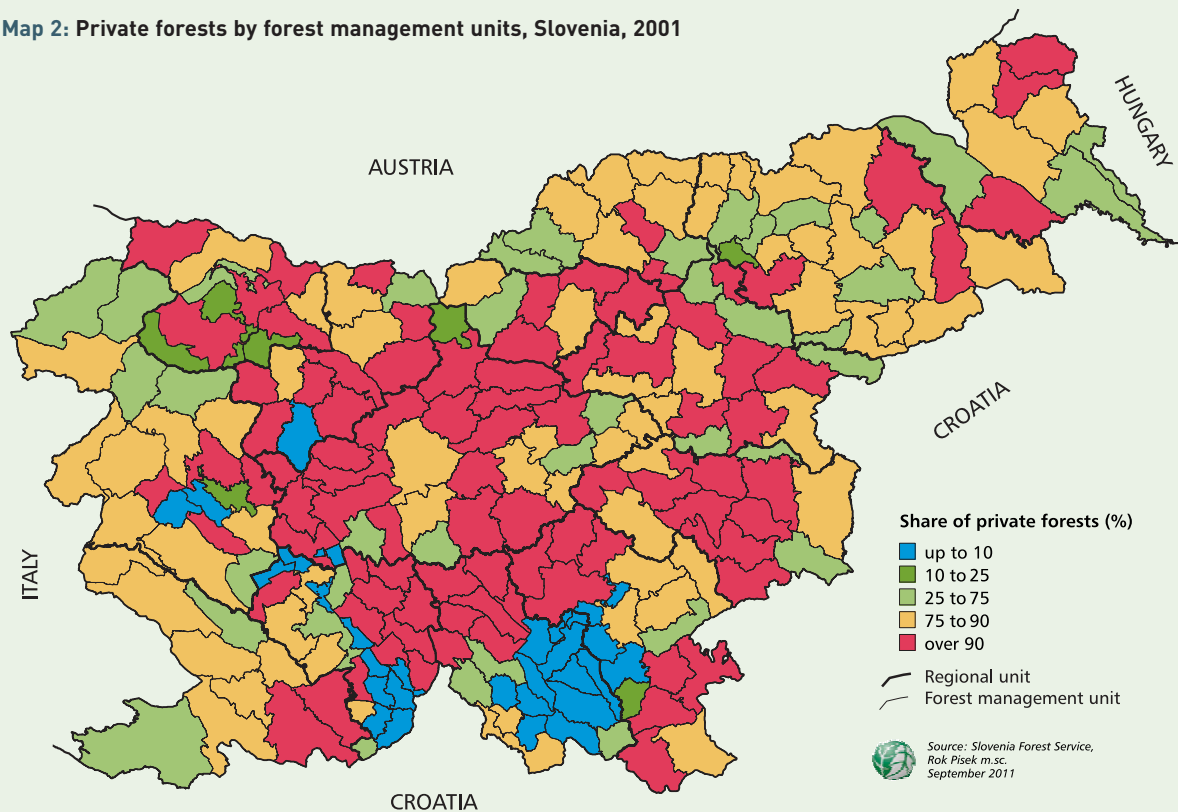
■ Private forests are mainly owned by agricultural holdings or so-called family farms (in 2007 around 42%). According to the Farm Structure Survey conducted in 2000, 2003, 2005 and 2007, the number of family farms that meet the criteria of European comparable farms is decreasing. The reason for this is the abandonment of farming on small family farms with forest. Therefore, the number of forest owners is not decreasing, but the number of such family farms that meet the criteria (definition) of European comparable farms, which are the subject of observation in the context of the mentioned statistical survey. In 2005 there were about 10% fewer family farms that had a forest and in 2007 about 12% fewer than in 2000.

■ The fall in the number of family farms with forest led to the corresponding decrease in the overall share of forest in the context of agricultural holdings: compared to 2000, in 2003 it was 1.5% lower and in 2007 2.9% lower.

**Chart 3: Family farms with forest and their forest area, Slovenia**

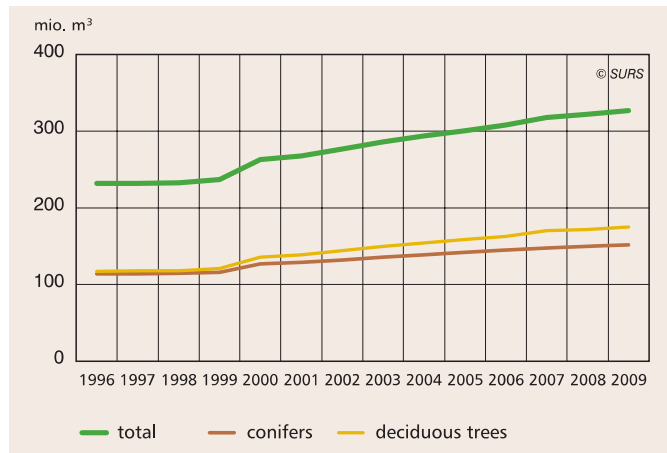


Source: SORS

**Map 2: Private forests by forest management units, Slovenia, 2001**

### 1.3 Growing stock

**Chart 4: Growing stock, Slovenia**



Source: Slovenian Forest Service

**Table 3: Growing stock structure, Slovenia**

	1996	2000	2007	2008	2009
Deciduous trees	51	52	53	53	53
Conifers	49	48	47	47	47

%

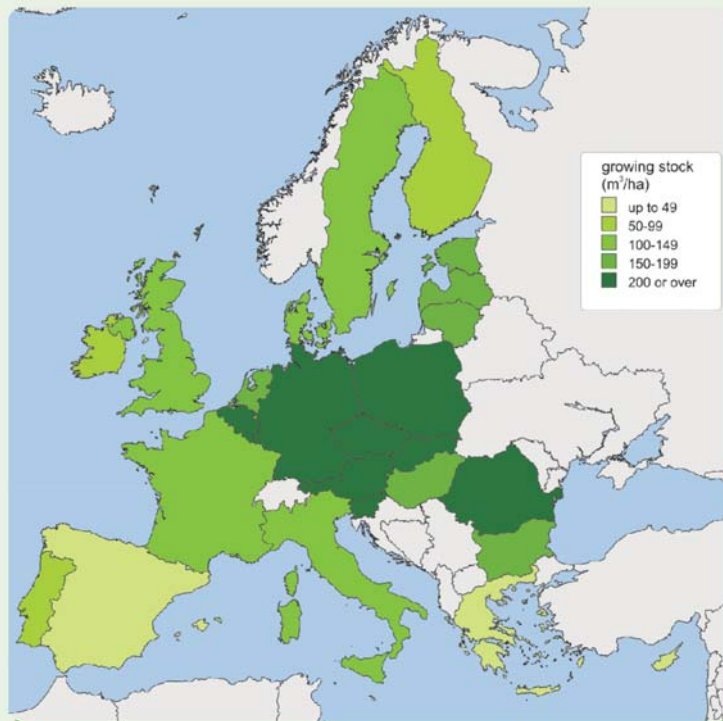
Source: Slovenian Forest Service

- Increasing forest area leads to increasing growing stock. According to the Slovenian Forest Service, in 2009 the growing stock increased by 1.6% over 2008; the amount of average growing stock per hectare increased by about as much. According to forest management plans, the growing stock was 327,458,500 m<sup>3</sup> in 2009, while volume per hectare was 276 m<sup>3</sup>/ha.
- The ratio in the structure of growing stock according to the type of trees is slightly changing: in 2009 there were 53% deciduous trees (a 2% rise over 1996), while conifers represented 47% (a 2% drop over 1996).
- As regards the volume of growing stock, with 275 m<sup>3</sup> per hectare Slovenia was in 2005 fifth among the Member States of the EU-27 with the highest growing stock.





Map 3: Growing stock, EU-27, 2005



Source: Eurostat

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Photo: Miran Krapež



Photo: Urška Gale

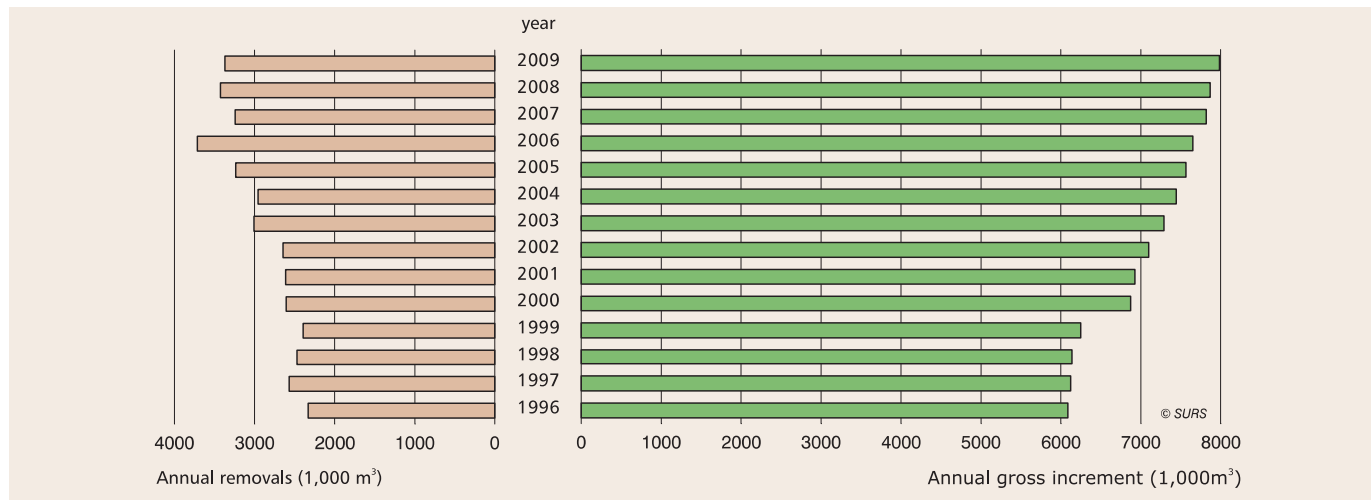


Photo: Dušan Jože Dimc

## 2 Economic aspect of forests

## 2.1 Annual gross increment and removals

Chart 5: Annual gross increment and removals, Slovenia

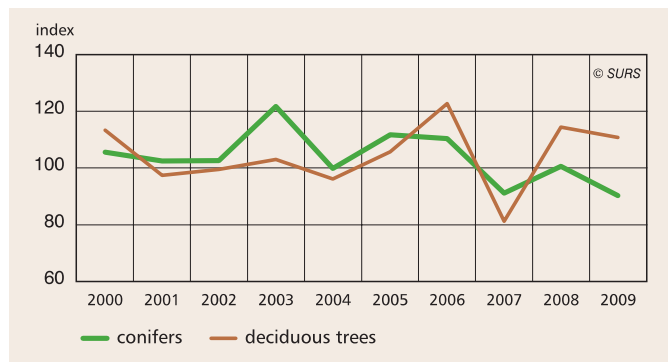


Source: Slovenian Forest Service

Table 4: Forest area, annual gross increment and removals, Slovenia

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Area (1,000 ha)	1,134.2	1,142.9	1,149.6	1,157.8	1,163.8	1,169.2	1,173.8	1,183.3	1,185.1	1,186.1
Annual gross increment (1,000 m³)	6,871.9	6,924.8	7,102.2	7,290.5	7,445.9	7,569.0	7,652.0	7,822.1	7,868.5	7,985.3
Annual removals (1,000 m³)	2,609.0	2,614.3	2,645.6	3,007.1	2,958.0	3,236.1	3,718.3	3,242.1	3,427.4	3,374.2

Source: Slovenian Forest Service

**Chart 6: Removals, Slovenia**

Source: Slovenian Forest Service, SORS

■ The forest area and the annual increment of wood increased in the 2000-2009 reference period. The annual gross increment in 2009 comprised nearly 8 million m<sup>3</sup> (about 16% increase over 2000). Tree removal varied in the 2000-2009 period: in 2009, it was more than 3 million m<sup>3</sup> (a 1.5% fall over 2008).

■ The ratio between removals of conifers and removals of deciduous trees differs between the years. The removal index values for conifers show that in the 2000-2009 period the removal of conifers mostly increased (the value of the index was higher than 100), except in 2004, 2007 and 2009 when it slightly decreased over the previous year (the index value was less than 100). The removal index values for deciduous trees indicate more pronounced variations than for conifers. The removal index value for deciduous trees peaked in 2006 and that for conifers in 2003.



Photo: Miran Krpež

## 2.2 Removal intensity

Chart 7: Removal intensity, Slovenia



Source: Slovenian Forest Service, SORS

■ Faster growth of removals than the growth of gross wood increment reflects in higher intensity of removals. The intensity of removals thus reflects the ratio between removals and gross increment. The intensity of removals varied between the years: the highest value was reached in 2006 (almost 49%) while in 2009 it was 1.3 percentage points lower than in 2008 (around 42%).

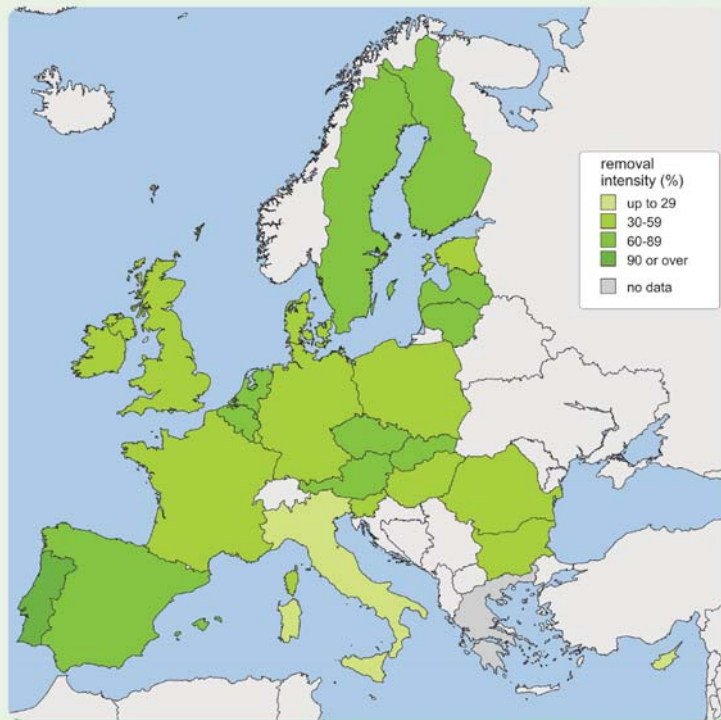
■ With the increase in forest area the annual wood increment was also increasing. In 2009, it reached nearly 8 million m<sup>3</sup> of wood or 1.5% more than in the previous year. In 2009, removals accounted for more than 3 million m<sup>3</sup> of wood or about 29% more than in 2000.

■ The removal intensity varied considerably between the EU-27 Member States in 2005: the highest removal intensity rates were recorded by Portugal, Sweden, Belgium and the Czech Republic, and the lowest by Malta, Cyprus and Italy. Higher removal intensity rates than the average of EU-27 in 2005 were recorded in Slovakia, Finland, Lithuania, Latvia, the Netherlands, Austria and Spain; with the removal intensity rate of 44% Slovenia at that time ranked in the group of countries in which the value of this indicator was lower than the average of EU-27. Approximately the same removal intensity rate as that in Slovenia was recorded in Romania, the United Kingdom and Germany.





Map 4: Removal intensity, EU-27, 2005



Source: Eurostat

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## 2.3 Value of output of the forestry industry

**Table 5: Output of the forestry industry, Slovenia**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	mio. EUR									
<b>Production total<sup>1)</sup></b>	<b>71.8</b>	<b>77.7</b>	<b>82.7</b>	<b>93.2</b>	<b>98.1</b>	<b>104.4</b>	<b>150.0</b>	<b>149.1</b>	<b>163.2</b>	<b>152.9</b>
Conifers, industrial roundwood	30.5	32.9	35.6	41.0	47.5	56.0	71.9	83.5	88.8	73.2
Deciduous trees, industrial roundwood	28.9	35.3	34.0	35.8	23.2	12.3	22.6	24.6	28.7	27.0
Wood fuel (including wood for charcoal)	7.6	4.2	4.1	5.1	11.0	18.0	25.6	25.9	28.7	30.9
Other products	0.6	0.7	0.6	0.6	0.5	0.6	0.7	0.7	0.6	0.5
Forestry services	4.1	4.6	8.4	10.8	15.9	17.4	29.2	14.5	16.4	21.4

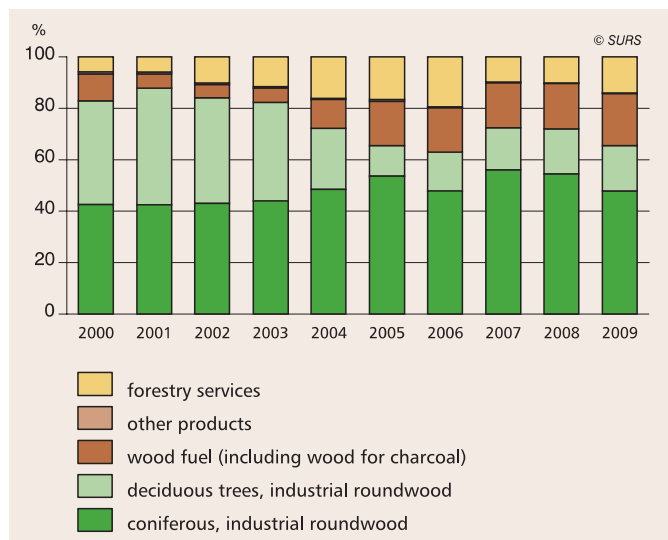
<sup>1)</sup> The figures are rounded, so the sum might not be totally correct.

Source: SORS

**Table 6: Purchase prices of raw wood categories, Slovenia**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	EUR/m <sup>3</sup>									
<b>Roundwood, conifers</b>	<b>25</b>	<b>27</b>	<b>28</b>	<b>26</b>	<b>33</b>	<b>36</b>	<b>41</b>	<b>50</b>	<b>55</b>	<b>50</b>
Sawlogs and veneer logs	31	33	36	35	38	41	46	55	60	56
Pulpwood, round and split	12	12	12	12	14	14	16	20	20	20
Other industrial roundwood	21	16	15	20	24	29	30	33	36	33
<b>Roundwood, deciduous trees</b>	<b>57</b>	<b>49</b>	<b>47</b>	<b>52</b>	<b>59</b>	<b>50</b>	<b>54</b>	<b>57</b>	<b>64</b>	<b>56</b>
Sawlogs and veneer logs	76	80	76	81	78	58	66	69	79	72
Pulpwood, round and split	14	14	14	14	11	16	26	32	33	29
Other industrial roundwood	26	27	26	26	29	32	34	40	37	30
<b>Wood fuel (conifers and deciduous trees)</b>	<b>14</b>	<b>14</b>	<b>14</b>	<b>14</b>	<b>15</b>	<b>19</b>	<b>26</b>	<b>33</b>	<b>31</b>	<b>31</b>

Source: SORS

**Chart 8: Structure of forestry production, Slovenia**

Source: SORS

- The forestry industry covers cultivation, removals, gathering of other goods from forest and forestry services.
- The production value of the forestry industry was mostly increasing in the 2000-2009 period. In 2000 it amounted to EUR 72 million, in 2009 to EUR 153 million (i.e. it more than doubled), but it was around 6% lower in 2009 than in 2008.

- In the 2000-2009 period, the average purchase price of coniferous roundwood was increasing until 2008, but the purchase price of deciduous roundwood varied between the years, and in 2009 it was about the same as in 2000.

- The average purchase prices of raw wood categories varied in the 2000-2009 period; after 2005 the prices of coniferous roundwood markedly increased, mainly due to more expensive sawlogs and veneer logs. The average purchase price of coniferous roundwood fell again in 2009 and reached EUR 50 per m<sup>3</sup>. The average prices of deciduous roundwood were higher than the prices of coniferous roundwood throughout the period, in 2009 the average price slightly decreased to EUR 56 per m<sup>3</sup>.

- In the structure of the production of the forestry industry the coniferous and deciduous industrial roundwood (it includes sawlogs and veneer logs, round and split pulpwood and other industrial roundwood) predominated in the 2000-2009 period but the share kept decreasing. In 2000 it amounted to 83% and in 2009 to 66% (i.e. it decreased by almost 18 percentage points). The share of wood fuel rose the most in the observed period, mainly due to a lower share of deciduous industrial roundwood. The share of forestry services varied; in 2009 it reached 14% of the total production of the forestry industry.



## 2.4 Value of intermediate consumption in the forestry industry

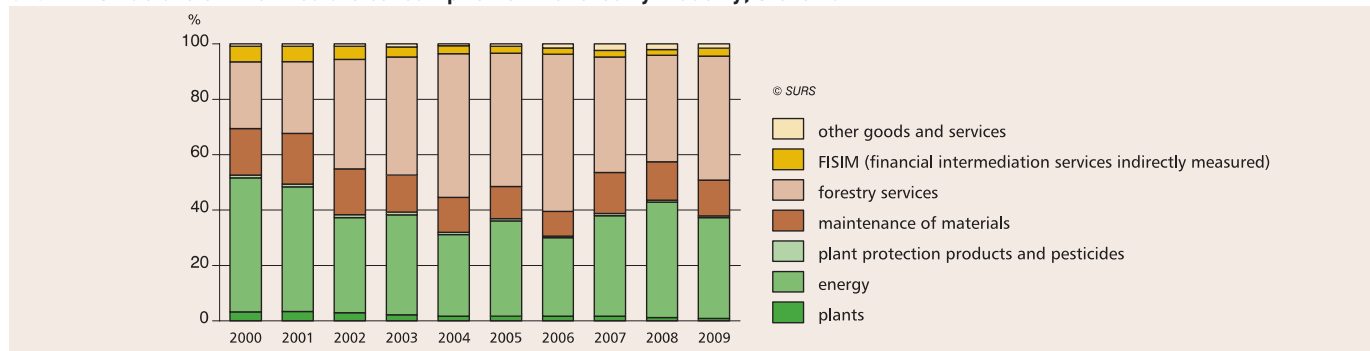
**Table 7: Intermediate consumption of the forestry industry, Slovenia**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	mio. EUR									
<b>Intermediate consumption<sup>1)</sup></b>	<b>17.2</b>	<b>17.6</b>	<b>21.1</b>	<b>25.3</b>	<b>30.6</b>	<b>36.2</b>	<b>51.6</b>	<b>34.7</b>	<b>42.7</b>	<b>47.9</b>
Plants	0.6	0.6	0.6	0.6	0.5	0.6	0.9	0.6	0.5	0.5
Energy	8.3	7.9	7.3	9.1	9.0	12.5	14.6	12.6	17.8	17.4
Plant protection products and pesticides	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.2
Maintenance of materials	2.9	3.2	3.5	3.4	3.8	4.2	4.7	5.2	5.9	6.2
Forestry services	4.1	4.6	8.4	10.8	15.9	17.4	29.2	14.5	16.4	21.4
FISIM (financial intermediation services indirectly measured)	1.0	1.0	1.0	0.9	0.8	0.9	1.2	0.8	0.9	1.4
Other goods and services	0.2	0.2	0.2	0.2	0.2	0.3	0.7	0.8	0.9	0.7

<sup>1)</sup> The figures are rounded, so the sum might not be totally correct.

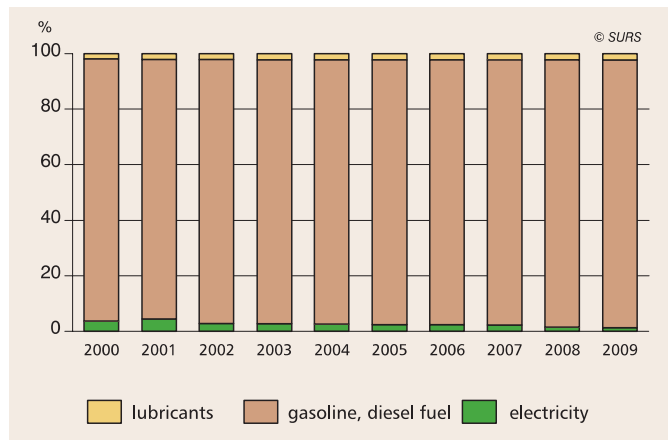
Source: SORS

**Chart 9: Structure of intermediate consumption of the forestry industry, Slovenia**



Source: SORS

**Chart 10: Structure of energy consumption in intermediate consumption, Slovenia**



Source: SORS

■ To the total value of intermediate consumption, which influences the value added of the forestry industry, the growth in the value of forestry services contributed the most in the 2000-2009 period. These services reached their highest value in 2006 (EUR 29.2 million). In addition to the forestry services, maintenance of materials and energy consumption also significantly affected the value of intermediate consumption; the value of energy consumption grew fastest in the 2000-2009 period; in 2009 it reached more than EUR 17 million.

■ The value of forestry services in intermediate consumption mainly accounted for the largest share in the 2000-2009 period. Since 2000, its share increased by almost 21 percentage points and in 2009 it was almost 45%. The share of energy consumed reached the highest value in 2000, more than 48%, then it slowly declined and in 2009 it was just over 36%.

■ Of all fuel consumed in forestry industry, gasoline and diesel fuel were used the most. In 2009, they contributed 96.5% to the total value of energy consumption. Their share was stable throughout the period, only consumption of electricity was gradually decreasing; since 2000, when it was nearly 4%, its share decreased by 2.5 percentage points by 2009.



Photo: Barbara Kutin-Slatnar

## 2.5 Export and import of wood

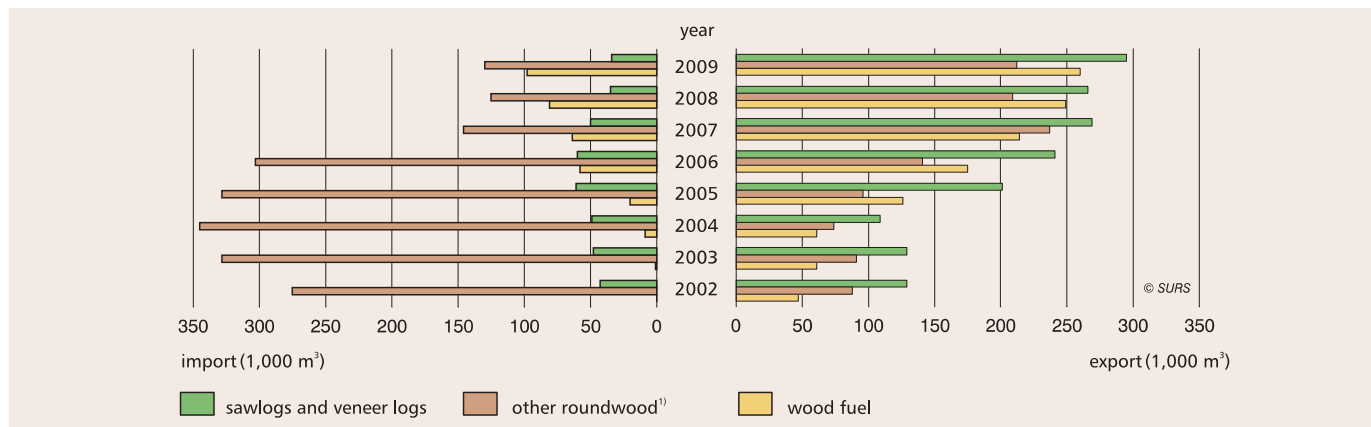
**Table 8: Export and import of roundwood, Slovenia**

Year	Export	Import
2005	423	409
2006	557	421
2007	720	260
2008	724	241
2009	767	262

1.000 m<sup>3</sup>

Source: SORS

**Chart 11: Export and import of roundwood, Slovenia**



<sup>1)</sup> Other roundwood includes pulpwood, round and split and other industrial roundwood.

Source: SORS

■ By 1999, both the export and import of roundwood in Slovenia varied. From 1999 until 2004, Slovenia was a net importer of roundwood. Then from 2005 to 2009 the export of roundwood kept increasing each year, while import was decreasing. The structure of imports in 2009 was dominated by pulpwood, round and split, and other industrial roundwood (lower quality wood), with an 87% share.

■ In the structure of exports in 2009 sawlogs and veneer logs accounted for almost 39%. According to external trade data, the export of coniferous logs dominated (export to Austria). Also the export of wood for fuel was increasing; in 2009 the wood for fuel was mainly exported to Italy.



Photo: Miran Krapež



Photo: Urška Gale



Photo: Miran Krapež

### 3 Environmental and social aspects of forests

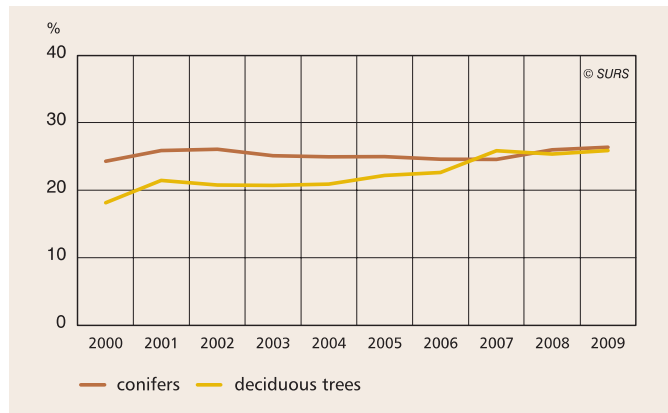
### 3.1 Health condition of forests

**Table 9: Average crown defoliation of trees, Slovenia**

Year	Total	%
2005	23.5	
2006	23.3	
2007	25.4	
2008	25.7	
2009	26.1	

Source: Slovenian Forestry Institute

**Chart 12: Average crown defoliation of trees, Slovenia**



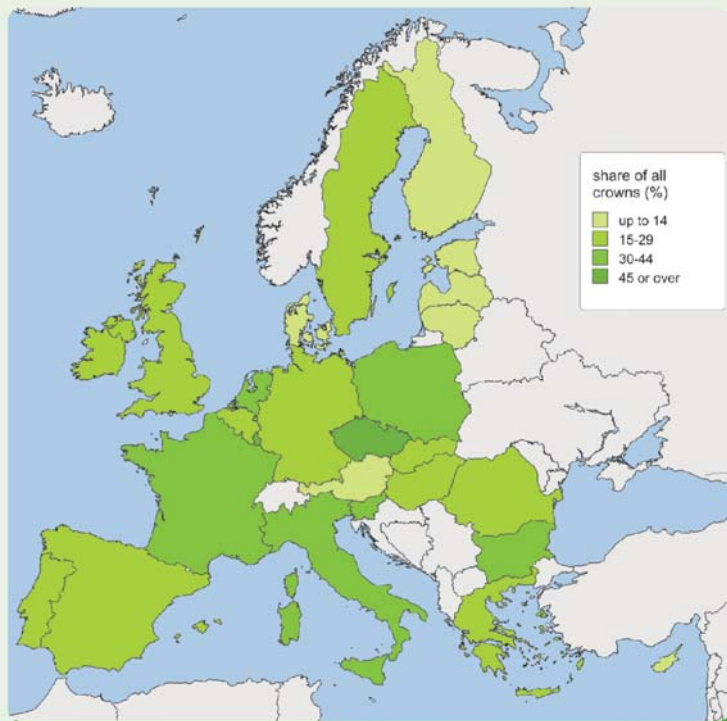
Source: Slovenian Forestry Institute

- A basic indicator for the assessment of tree health is the crown defoliation index, which expresses the visually estimated share (in %) of missing assimilation organs (leaves, needle leaves), compared to a reference normal tree of the same social class, the same tree species and from the same habitat. It is estimated at 5% accuracy. A damaged tree is a tree with a defoliation rate higher than 25%.
- The average defoliation rate of trees in 2009 was about 26% (nearly 0.5 percentage point higher than in 2008). Average defoliation of conifers and that of deciduous trees were similar; in conifers it was just over 26%, and in deciduous trees just under 26%.
- In the 2000-2009 period the average crown defoliation increased by 5.5 percentage points (in the 2005-2009 period by 2.6 percentage points).
- In 2005 the average crown defoliation index (i.e. the share of trees with defoliation higher than 25%) in Slovenia was 30.6% and was thus above the EU-27 average of 24%.





Map 5: Average crown defoliation of trees, EU-27, 2005



Source: Eurostat

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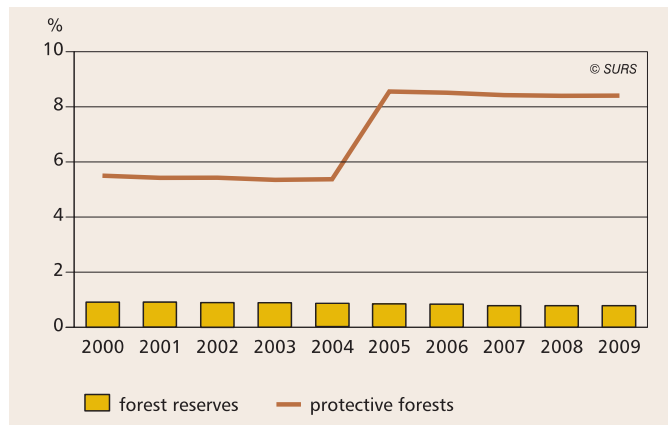
### 3.2 Special purpose forests

**Table 10: Protective forests and forest reserves, Slovenia**

Year	Protective forests	Forest reserves
	1,000 ha	
2000	62.2	10.5
2005	99.9	9.8
2007	100.1	9.6
2008	100.1	9.6
2009	99.7	9.6

Source: MAFF

**Chart 13: Protective forests and forest reserves, Slovenia**



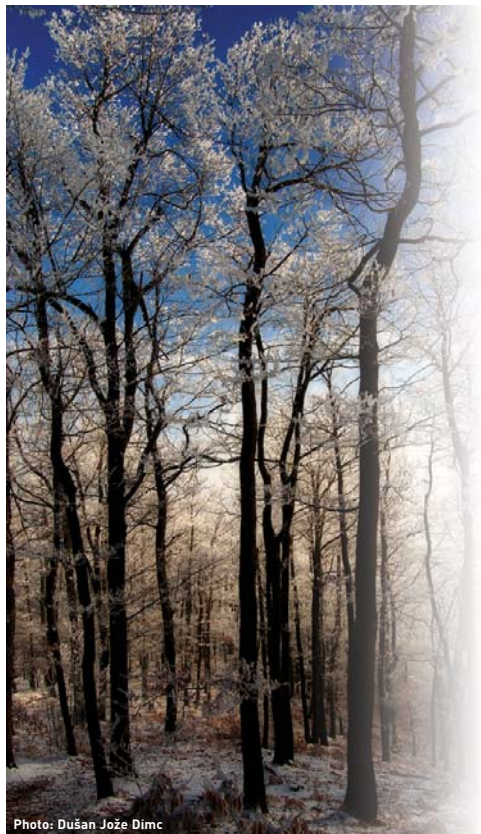
Source: MAFF

■ The area of protective forest in Slovenia in 2009 consisted of 99,743 ha, which is 60% more than in 2000, when it covered 62,154 ha).

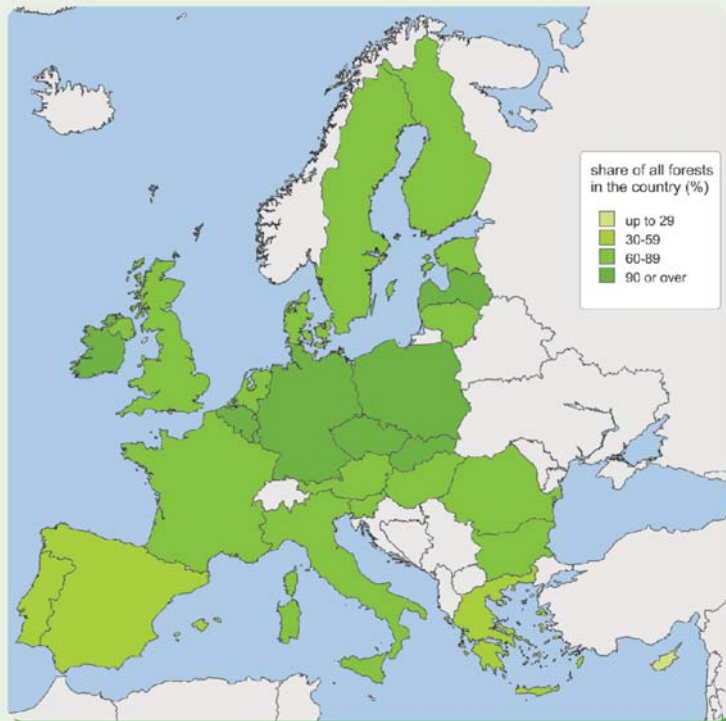
■ In 2009, Slovenia had 9,619 ha of forest reserves and forests that are left to natural development. They are important for biodiversity conservation in forests and for research, analysis and monitoring of natural forest development and protection of natural values.

■ In 2005, the share of forests available for wood supply, i.e. multi-purpose forests and special purpose forests where forest management measures are allowed, in the EU-27 was about 73% of the total forest area. The largest shares of forests available for wood supply were recorded in Germany (99%), Luxembourg (97%) and Belgium (96%) and the lowest in Cyprus (11%), Spain (37%), Portugal (52%) and Greece (53%).

■ Slovenia was with the 88% share of forests available for wood supply among the Member States of the EU-27 with larger shares of such forests.



Map 6: Forests available for wood supply, EU-27, 2005



Source: Eurostat

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### 3.3 Wood, a renewable energy source

**Table 11: Consumption of wood and wood waste for energy purposes, Slovenia**

	2002	2003	2004	2005	2006	2007	2008	2009	TJ
<b>Consumption, total</b>	<b>15,800.0</b>	<b>16,953.0</b>	<b>17,109.5</b>	<b>17,369.5</b>	<b>17,321.2</b>	<b>17,560.5</b>	<b>19,256.3</b>	<b>22,164.0</b>	
Production of electricity and heat	488.1	614.6	890.7	841.2	843.2	794.5	2911.9	1854.4	
Final consumption of wood	15,311.9	16,338.4	16,218.8	16,528.3	16,478.0	16,765.9	16,344.5	20,309.6	

Source: SORS

**Table 12: Production of electricity and final energy consumption, Slovenia**

	2002	2003	2004	2005	2006	2007	2008	2009	
									GWh
<b>Production of electricity, total</b>	<b>14,600.0</b>	<b>13,821.0</b>	<b>15,272.0</b>	<b>15,117.0</b>	<b>15,115.0</b>	<b>15,043.0</b>	<b>16,398.0</b>	<b>16,401.0</b>	
from renewable energy sources	3,414.0	3,085.0	4,223.0	3,580.0	3,706.0	3,382.0	4,310.0	4,910.0	
<b>from wood and other solid biomass</b>	<b>83.8</b>	<b>98.1</b>	<b>92.5</b>	<b>81.6</b>	<b>75.5</b>	<b>62.8</b>	<b>232.4</b>	<b>119.6</b>	
									TJ
<b>Final energy consumption, total</b>	<b>199,040</b>	<b>207,121</b>	<b>212,941</b>	<b>216,960</b>	<b>218,928</b>	<b>217,253</b>	<b>231,069</b>	<b>204,776</b>	
from renewable energy sources	16,634	18,051	18,414	18,922	18,365	18,184	18,416	18,176	
<b>from wood and other solid biomass</b>	<b>16,578</b>	<b>17,676</b>	<b>17,940</b>	<b>18,345</b>	<b>17,545</b>	<b>16,977</b>	<b>16,710</b>	<b>16,116</b>	

Source: SORS

**Chart 14: Production of electricity, Slovenia**

<sup>1)</sup> Renewable energy sources.

Source: SORS

■ Consumption of wood and wood waste for energy purposes was increasing until 2009, when it reached the highest value, that is 15% higher than in 2008 (more than 22,000 TJ in 2009). Final wood consumption (which includes the consumption of wood in households and in manufacturing, construction and mining) contributed the most to the total value; in 2009 it amounted to more than 20,000 TJ.

■ The total production of electricity varied in the 2002-2009 period. In 2009 it was 12% higher than in 2002; it amounted to 16,400 GWh, of which 30% was produced from renewable energy sources. Of these, 96% of electricity was produced in hydroelectric plants, and more than 2% from wood and other solid biomass. The share of renewable energy sources in final energy consumption stood at 9% in 2009; the majority was represented by wood for heating and household consumption.

■ Electricity production from wood and other solid biomass reached the highest value in 2008, when it amounted to 232 GWh. In 2009 it declined significantly, but in comparison with 2002 it increased by almost 43%. Final energy consumption from wood was increasing until 2005, then it began to decline and in 2009 it reached the lowest value since 2005; in comparison with 2008 it fell by 3.6%.



Photo: Rok Pisek

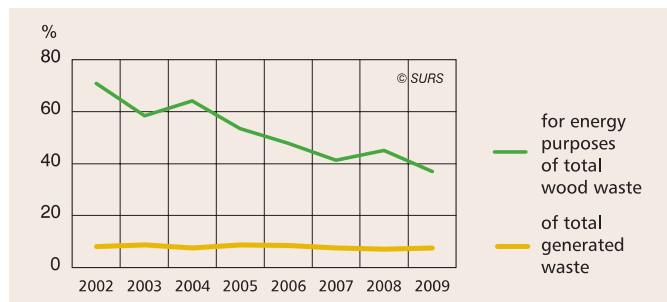
### 3.4 Wood waste

**Table 13: Generated waste, Slovenia**

	2002	2003	2004	2005	2006	2007	2008	2009
	1,000 t							
<b>Waste total</b>	<b>4,928.9</b>	<b>5,520.2</b>	<b>6,555.5</b>	<b>6,099.2</b>	<b>6,680.9</b>	<b>7,035.6</b>	<b>7,034.2</b>	<b>6,760.4</b>
Wood waste	390.4	476.4	472.8	516.0	672.6	500.0	480.7	494.7
for energy purposes	277.2	278.6	303.5	276.7	328.1	206.6	217.0	182.7

Source: SORS

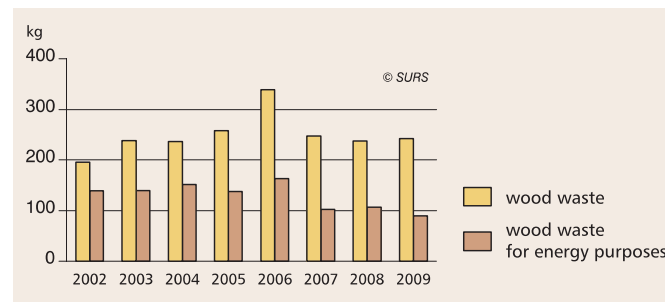
**Chart 15: Wood waste, Slovenia**



Source: SORS

■ The annual amount of generated wood waste was increasing in the 2002-2006 period; after 2007 it decreased to less than 500,000 tonnes. The maximum amount of wood waste for energy purposes was recorded in 2006. In 2009 it reached its lowest level (44% less than in 2006), mainly due to the increase in further processing of wood waste (recycling).

**Chart 16: Generated wood waste per capita, Slovenia**



Source: SORS

■ The share of wood waste for energy purposes in all the wood waste generated declined significantly from 2002 to 2009, namely by as much as 34 percentage points. The share of wood waste in all generated waste varied around 8% in the 2002-2009 period. In 2009 it increased by 0.5 percentage point over 2008.

■ The amount of generated wood waste per capita in Slovenia was decreasing after 2006 (i.e. until 2008). In 2009 it increased again by almost 2% over 2008.

### 3.5 Diversity of fauna and flora

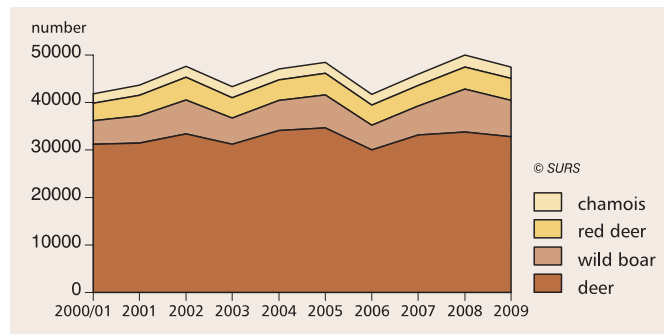
**Table 14: Plant and animal species dependent on forest by number and endangerment, Slovenia**

	Endangered species dependent on forest	All species dependent on forest	All endangered species	All species in Slovenia
Plants	47	950	330	3,000
Amphibians	11	17	18	19
Reptiles	10	10	20	20
Birds	46	95	116	365
Mammals	25	70	29	79

Source: Perko, F. (2004): Forest and Forestry of Slovenia

- Forests in Slovenia are rich in natural values. They are distinguished by high biodiversity of plant and animal habitats. Because of the preserved forests Slovenia is one of the few European countries where in nature the three large European predators (brown bear, wolf and lynx) are always found. Slovenian forests also are the home of high shares of amphibians and mammals.
- In the forests of Slovenia the most numerous animal species are hoofed herbivores. Deer and wild boars are the most numerous and to a lesser extent red deer and chamois. Red deer and chamois live in the Julian Alps, the Kamnik Alps and the Karavanke and in some forested areas of Pohorje and the Dinarides; and red deer also in the sub-alpine world and in Prekmurje.

**Chart 17: Hunting<sup>1)</sup> of the most numerous forest animals, Slovenia**



<sup>1)</sup> Until 2001 the data show the reference period from 1st April to 31st March of the next year; from 2002 the data show the calendar year.

Source: Slovenian Forest Service

- The abundance of wild herbivores in Slovenia was increasing since the Second World War until the early 1990s, especially that of deer and red deer; then the population of these two species dropped slightly.
- On average for the entire country, in 2000 the planned taking of the most numerous species of forest animals was realized within the allowed margins determined in hunting management plans.
- A comparison of several years of hunting showed that in absolute terms hunting of all herbivorous species was stagnant; as regards wild boars, multi-year variations in the realization of hunting were more pronounced.

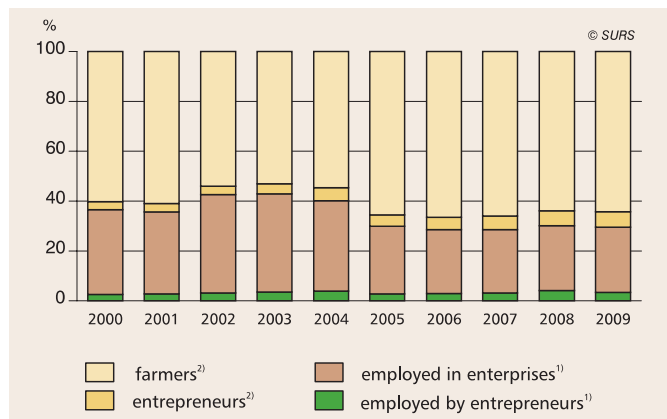
### 3.6 Gross value added and employment in forestry

**Table 15: Value of output and GVA in forestry industry, Slovenia**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Production (mio. EUR)	71.8	77.7	82.7	93.2	98.1	104.4	150.0	149.1	163.2	152.9
GVA (mio. EUR)	54.7	60.1	61.6	68.0	67.5	68.2	98.4	114.4	120.5	105.0
<b>GVA per employee (EUR)</b>	<b>10,639.9</b>	<b>11,936.0</b>	<b>10,905.9</b>	<b>13,096.2</b>	<b>14,511.4</b>	<b>11,381.3</b>	<b>16,794.1</b>	<b>18,942.6</b>	<b>19,520.4</b>	<b>17,356.9</b>

Source: SORS

**Chart 18: Structure of employment in forestry industry, Slovenia**



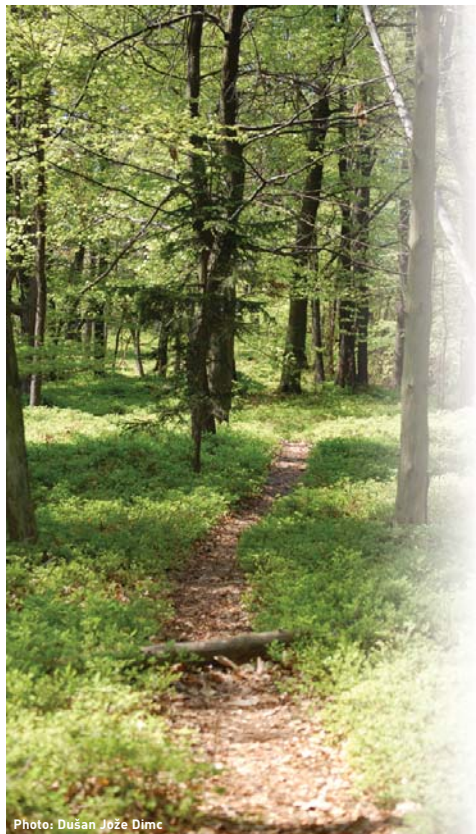
<sup>1)</sup> Salaried labour force.

<sup>2)</sup> Non-salaried labour force.

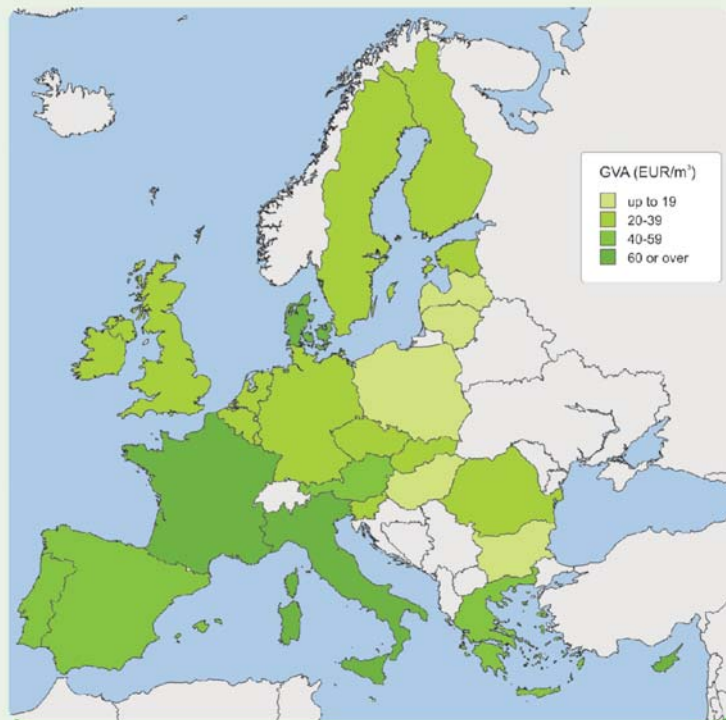
Source: SORS

■ Gross value added (GVA) in forestry is an indicator that enables a comparison of this economic activity with other activities of the national economy. In Slovenia the value of this indicator was mainly increasing between 2000 and 2009. In 2008 it reached more than EUR 120 million, but in 2009 it fell by 13% over 2008, thus amounting to EUR 105 million.

■ Employment in forestry is, in order to take into account part-time and seasonal work, measured in annual work units (AWU). Total labour force in forestry covers salaried and non-salaried labour force. In the structure of employment, the share of non-salaried labour force – which includes both farmers with forest and entrepreneurs – increased (in the 2000-2009 period it increased by 7 percentage points); in 2000 it amounted to 63.4%, in 2009 to 70.4%. Around 90% of the non-salaried labour force in the whole period was represented by farmers.



Map 7: GVA of the forestry industry, EU-27, 2005



Source: Eurostat

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Photo: Miran Krapež

## 4 Development opportunities in forestry



Photo: Miran Krapež



Photo: Grzegorz Blachowski



## 4.1 Productivity

**Table 16: Productivity in forestry industry, Slovenia**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AWU	5,137	5,033	5,645	5,189	4,653	5,994	5,858	6,037	6,173	6,051
Forests available for wood supply (1,000 ha)	1,061.6	1,070.2	1,077.0	1,085.2	1,091.1	1,059.5	1,064.2	1,073.5	1,075.4	1,076.7
Number of AWU/1,000 ha	4.8	4.7	5.2	4.8	4.3	5.7	5.5	5.6	5.7	5.6

Source: SORS

## 4.2 GVA per employee

**Table 17: GVA per employee in forestry industry, Slovenia**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
GVA in forestry (mio. EUR)	54.7	60.1	61.6	68.0	67.5	68.2	98.4	114.4	120.5	105.0
GDP (mio. EUR)	17,744.6	20,396.2	22,758.2	25,114.0	27,073.0	28,750.0	31,050.0	34,568.0	37,305.0	35,384.0
Employment (AWU)	5,137	5,033	5,645	5,189	4,653	5,994	5,858	6,037	6,173	6,051
<b>GVA per employee (EUR)</b>	<b>10,639.9</b>	<b>11,936.0</b>	<b>10,905.9</b>	<b>13,096.2</b>	<b>14,511.4</b>	<b>11,381.3</b>	<b>16,794.1</b>	<b>18,942.6</b>	<b>19,520.4</b>	<b>17,356.9</b>
<b>GVA/GDP (%)</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.2</b>	<b>0.2</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>	<b>0.3</b>

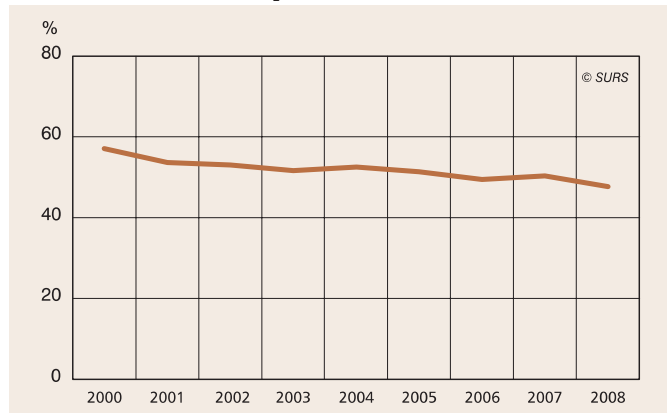
Source: SORS

## 4.3 CO<sub>2</sub> emissions

**Table 18: Trends in CO<sub>2</sub> emissions, Slovenia**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	
	Gg									
CO <sub>2</sub> total	15,176.9	16,094.4	16,240.8	15,990.8	16,345.2	16,626.1	16,805.8	16,930.4	17,899.8	
CO <sub>2</sub> including sinks	6,516.8	7,465.1	7,626.2	7,724.2	7,761.1	8,092.8	8,504.9	8,417.6	9,366.3	
% of the reduction due to sinks	57.1	53.6	53.0	51.7	52.5	51.3	49.4	50.3	47.7	

Source: Environmental Agency of the Republic of Slovenia

**Chart 19: Reduction of CO<sub>2</sub> emissions due to sinks, Slovenia**

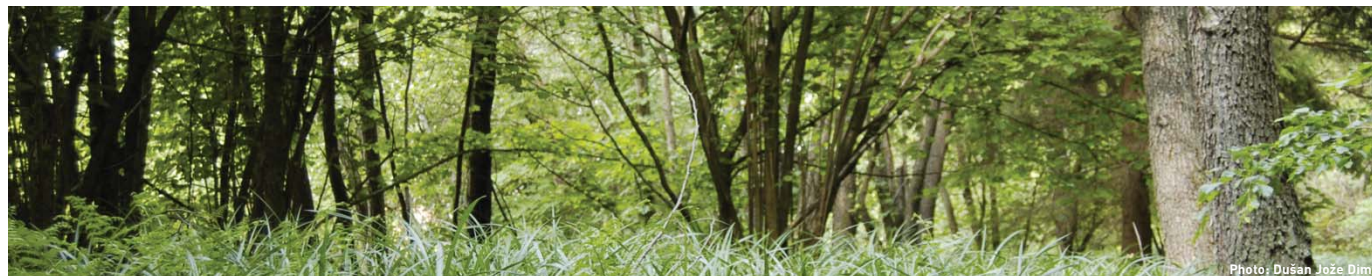
Source: Environmental Agency of the Republic of Slovenia

#### 4.4 Education in the field of wood-processing and forestry

**Table 19: Participants in education with educational attainment from the field of wood-processing and forestry, Slovenia**

	1999/00	2008/09
<b>Upper secondary education</b>		
<b>Youth – total</b>	<b>24,775</b>	<b>21,003</b>
Wood processing programs	841	477
Forestry programs	29	39
<b>Adults – total</b>	<b>5,966</b>	<b>4,396</b>
Wood processing programs	72	57
Forestry programs	10	2
<b>Tertiary education and post graduate programs</b>		
Number of programs	10	21
<b>Graduates – total</b>	<b>11,282</b>	<b>14,933</b>
Wood processing programs	50	80
Forestry programs	51	44

Source: SORS



- **Compared to some other EU-27 Member States, relatively large labour input in forestry in Slovenia may reflect landscape diversity and more sustainable modes of exploitation of the forest.** Employment in forestry – expressed by the number of annual work units (AWU) – ranged between 5,000 AWU and 6,000 AWU in the 2000–2009 period, except in 2004. After 2007 the number of employees exceeded 6,000 AWU. Productivity of the forestry industry – which is expressed by the number of AWU per area of forests available for wood supply – was decreasing since 2004, as in 2009 1.3 AWU more were required than in 2004. The number of employees increased by 0.8 AWU/1,000 ha in 2009 over 2000 and reached almost 6 AWU/1,000 ha of forests available for wood supply.
- **From the economic point of view, the forestry industry was not significant in Slovenia, but nevertheless social and environmental functions have to be also taken into account.** The share of gross value added in gross domestic product, which reflects the economic importance of each activity, was stable in the 2000–2009 period for forestry, but very low, even lower than 1%. Throughout this period, except in 2004 and 2005, it amounted to 0.3%. In the 2000–2009 period gross value added per employee – which is a measure of productivity of a certain industry – varied, in 2009 it fell by 11% over 2008.
- **Increasing of the removals in the context of sustainable forest management is still allowed in Slovenia.** The difference between potential and actual removals in 2009 showed only 66% realization.
- **Forests are an important source of carbon sinks (storage).** According to the Slovenian Forestry Institute, on average 1 hectare of forest in underground and aboveground wood mass in Slovenia annually accumulates 9 tonnes of CO<sub>2</sub>. According to the Environmental Agency of the Republic of Slovenia, the quantities of total CO<sub>2</sub> emissions in the 2000–2008 period increased. In 2008 the CO<sub>2</sub> emissions including sinks amounted to more than 9,000 gigagrams, which is 44% more than in 2000. The share of the reduction in CO<sub>2</sub> emissions due to sinks varied around 50%; in 2008 it fell slightly to around 48%.
- **Forestry and wood processing are interesting fields of study and a good employment opportunity.** The share of persons with completed upper secondary education programs concerning wood processing and forestry among all those who completed their education in all programs of upper secondary education in 2000 was 3% and in 2009 2%. The share of people with completed tertiary education in the programs of forestry and wood processing among all tertiary graduates in Slovenia in 2000 and in 2009 accounted for slightly less than 1%, although the number of different programs at the highest levels of education in these programs doubled. The data show that the interest in education on wood processing and forestry did not increase in the past ten years; detailed data show that it even slightly decreased. This presents an opportunity for stimulation of interest in these fields of education, which will also be important in the future in sustainable forest management and wood supply.

## Annex

## List of indigenous tree species in Slovenia with Latin and Slovenian names

1. *Abies alba* Mill. – navadna jelka
2. *Picea abies* (L.) Karst. – navadna smreka
3. *Larix decidua* Mill. – evropski macesen
4. *Pinus sylvestris* L. – rdeči bor
5. *Pinus nigra* Arnold – črni bor
6. *Pinus mugo* Turra – rušje
7. *Pinus cembra* L. – cemprin
8. *Juniperus communis* L. – navadni brin
9. *Juniperus oxycedrus* L. – rdečeplojni brin
10. *Taxus baccata* L. – tisa
11. *Laurus nobilis* L. – lovor
12. *Fagus sylvatica* L. – navadna bukev
13. *Quercus robur* L. – dob
14. *Quercus petraea* (Matt.) Liebl. – graden
15. *Quercus pubescens* Willd. – puhasti hrast
16. *Quercus cerris* L. – cer
17. *Quercus ilex* L. – črnika
18. *Quercus crenata* Lam. – oplutnik
19. *Castanea sativa* Mill. – pravi kostanj
20. *Betula pendula* Roth – navadna breza
21. *Betula pubescens* Ehrh. – puhasta breza
22. *Alnus glutinosa* (L.) Gaertn. – črna jelša
23. *Alnus incana* (L.) Moench – siva jelša
24. *Carpinus betulus* L. – navadni beli gaber
25. *Carpinus orientalis* Mill. – kraški beli gaber
26. *Ostrya carpinifolia* Scop. – navadni črni gaber
27. *Ulmus glabra* Huds. – gorski brest
28. *Ulmus carpinifolia* Gled. – poljski brest
29. *Ulmus laevis* Pallas – vez, dolgopeceljati brest
30. *Celtis australis* L. – navadni koprivovec
31. *Juglans regia* L. – navadni oreh <sup>11</sup>
32. *Prunus avium* L. – divja češnja
33. *Prunus mahaleb* L. – rešeljika
34. *Prunus padus* L. – čremsa
35. *Malus sylvestris* (L.) Mill. – lesnika
36. *Pyrus pyraeaster* (L.) Burgsd. – drobnica
37. *Pyrus spinosa* Forsk. – mandljevlistna hruška
38. *Sorbus aucuparia* L. – jerebika
39. *Sorbus aria* (L.) Crantz – mokovec
40. *Sorbus torminalis* (L.) Crantz – brek
41. *Sorbus domestica* L. – skorš
42. *Crataegus laevigata* (Poir.) DC. – navadni glog
43. *Crataegus monogyna* Jacq. – enovratni glog
44. *Cercis siliquastrum* L. – navadni jadikovec
45. *Laburnum alpinum* (Mill.) Bercht. & J. Presl. – alpski nagnoj
46. *Laburnum anagyroides* Medik. – navadni nagnoj
47. *Pistacia terebinthus* L. – terebint
48. *Acer pseudoplatanus* L. – gorski javor
49. *Acer platanoides* L. – ostrolistni javor
50. *Acer campestre* L. – maklen
51. *Acer monspessulanum* L. – trokrpi javor
52. *Acer obtusatum* Waldst. & Kit. ex Willd. – topokrpi javor
53. *Acer tataricum* L. – tatarski javor <sup>21</sup>
54. *Salix caprea* L. – iva
55. *Salix alba* L. – bela vrba
56. *Salix eleagnos* Scop. – siva vrba
57. *Salix fragilis* L. – krhka vrba
58. *Salix daphnoides* Vill. – volčinasta vrba
59. *Salix viminalis* L. – beka
60. *Salix triandra* L. – mandljasta vrba
61. *Populus nigra* L. – črni topol
62. *Populus alba* L. – beli topol
63. *Populus tremula* L. – trepetlika
64. *Tilia cordata* Mill. – lipovec
65. *Tilia platyphyllos* Scop. – lipa
66. *Ilex aquifolium* L. – navadna bodika
67. *Arbutus unedo* L. – jagodičnica
68. *Fraxinus excelsior* L. – veliki jesen
69. *Fraxinus ornus* L. – mali jesen
70. *Fraxinus angustifolia* Vahl – poljski jesen
71. *Phillyrea latifolia* L. – širokolistna zelenika

<sup>11</sup> Not indigenous in Slovenia but domesticated at least 3000 years ago.

<sup>21</sup> Probably extinct species.

Source: Brus R.

### Definitions of some of the used terms

**Forest** is land covered by forest trees in a stand or other forest vegetation, which provides any of the functions of the forest. In line with the legislation forest includes also any afforestation areas, which are defined as forest in the spatial part of the forest management plan. Complete definition of the forest is determined in the Forest Act.

**Other wooded land** is land covered by forest trees and other forest vegetation, measuring at least 0.25 hectare, that is not forest and that was not used for agricultural purposes in the past 20 years. Other wooded land includes also pens in the woods for breeding game and land under power lines in the forest with an area of at least 0.25 hectare.

**Forests available for wood supply** (Eurostat definition) are forests intended for the production of wood, for which there is no legal, economic or environmental constraints that would affect the supply of wood.

**Protective forests** are forests which protect land from landslides, soil leaching and breaking, forests on steep slopes or water banks, forests exposed to strong winds, forests which in torrential areas withhold excessive outflow of water and hence protect the land from erosion and landslides, forest belts which protect forests and land from wind, water, snowdrifts and avalanches, forests in agricultural and suburban landscape with distinct function of biodiversity conservation and forests at the upper limit of forest vegetation.

**Sustainable management** is a means of dealing with forest ecosystems based on forest care and ensures their conservation by increasing the diversity of indigenous plant and animal species and establishment of biological equilibrium.

**Gross value added** represents the category of the production account which enables the comparison within the national economy and international comparison. It equals the output of the forestry industry valued at basic prices less intermediate consumption valued at purchasers' prices.

**Gross domestic product** equals value added at basic prices by activities, increased by taxes on products, and reduced by subsidies on products. Thus it equals the sum of value added at basic prices of all domestic (resident) production units and net taxes on products (taxes less subsidies on products).

**Forestry labour input (employment)** is, in order to take into account part-time and seasonal work, measured in annual work units (AWU). One AWU is one person in full-time employment in forestry. Total labour force in forestry covers salaried and non-salaried labour force (employed and self-employed, including unpaid family members).

**European comparable agricultural holdings** are those having at least one hectare of utilised agricultural area, or less than 1 hectare of utilised agricultural area, but:

- at least 0.1 hectare of utilised agricultural area and 0.9 hectare of forest, or
- at least 0.3 hectare of vineyards and/or orchards, or
- at least 2 livestock units (LSU), or
- 0.15 to 0.3 hectare of vineyards/orchards and 1 or 2 LSU, or
- more than 50 beehives, or
- are market producers of vegetables, herbs, strawberries, mushrooms, flowers or ornamental plants.

### Statistical signs, abbreviations and units of measure

%	percent	RES	renewable energy sources
GDP	gross domestic product	AWU	annual work unit
GVA	gross value added	SORS	Statistical Office of the Republic of Slovenia
EU	European Union	ha	hectare
EU-27	all Member States of the European Union	Gg	gigagram
EUR	Euro	GWh	gigawatt hour
Eurostat	Statistical Office of the European Union	m <sup>2</sup>	square meter
SMA	Surveying and Mapping Authority of the Republic of Slovenia	m <sup>3</sup>	cubic meter
MAFF	Ministry of Agriculture, Forestry and Food of the Republic of Slovenia	mio.	million
		t	ton
		TJ	terajoule = 10 <sup>12</sup> joule

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