

Forest sustainability in Latvia

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1. Introduction

The combustion of wood for energy purpose is not considered to contribute to the augmentation of greenhouse gases concentration in the atmosphere, as long as the CO₂ emissions released during the combustion of wood are balanced by the growth of new trees. It is therefore essential to investigate if the forests in the region where the wood used for energy purpose are managed in a sustainable way, avoiding resources associated with overexploitation of forests, land use change, depletion of carbon stocks, etc...

In this framework, literature research was carried out to produce a summary of forest management in Latvia, including general condition, management and sustainability assessment.

2. Latvia forests overview

2.1. Location and distribution

The Republic of Latvia, lying on the east shore of the Baltic Sea in north-eastern Europe, is bounded: on the north by Estonia and the Gulf of Riga (an inlet of the Baltic Sea); on the east by Russia; on the south by Belarus and Lithuania ; on west by the Baltic Sea. Latvia covers an area of about 64 590 km².

Like the other Baltic republics, the land is mostly low-lying plain with low hills and valleys, although some upland to the east rises above 200 m. There are numerous lakes, streams, marshes, and peat bogs, the result of past continental glaciations. The largest river is the Daugava (Western Dvina). Other major rivers are the Gauja, the Venta, and the Lielupe.

There are two administrative levels in Latvia. At regional levels, the country is divided into 26 districts, or counties (*rajons*), and 7 cities with county rights, thus creating 33 regional government areas (Figure 1). At the lowest level, there are about 600 municipalities (7 cities, about 70 towns and about 500 rural areas or *pagasts*), which are governed by elected municipality councils¹. The country can also be described on three statistical levels called NUTS (Nomenclature of Territorial Units for Statistics), which have been defined at the European level (see Table 1 and Figure 2).

Table 1 : Administrative regions and sub-regions of Latvia (NUTS I, NUTS II, NUTS III)

Level	Subdivisions			
NUTS 1 and 2	The whole country			
NUTS 3	Satistical Regions	Largest City	Area	Population* – (per km ²)
LV006	Rīga	Rīga	304 km ²	643,368 - (2,118/km ²)
LV007	Pierīga	Jūrmala	10,134 km ²	367,038 – (36/km ²)
LV003	Kurzeme	Liepāja	13,606 km ²	258,034 – (19/km ²)
LV005	Latgale	Daugavpils	14,550 km ²	286,238 – (20/km ²)
LV009	Zemgale	Jelgava	10,732 km ²	244,875 – (23/km ²)
LV008	Vidzeme	Valmiera	15,245 km ²	201,915 – (13/km ²)

Source : http://en.wikipedia.org/wiki/NUTS_of_Latvia and http://en.wikipedia.org/wiki/Statistical_regions_of_Latvia

¹ http://www.nsd.uib.no/european_election_database/country/latvia/administrative_divisions.html

Figure 1 : General map of Latvia



Source: Ezilon.com

Figure 2 : NTUTS 3 map of Latvia



Source: http://www.rudi-europe.net/uploads/media/Latvia_WP1_Report.pdf. Note : Rīgas Region is LV007 « Pierīga » and LV006 « Rīga » is only the red line around the Riga town.

According to the State Register of Forests, the total forest area cover 2,961,222 ha (45.8% of Latvia is forested). According to another estimation, “the forest cover makes 50.2% (the forest-covered area, 3,242,577 ha, expressed as a percent of the total land area)”². This area seems to include the forest infrastructure and gaps. The shows the figures estimated by FAO in 2010:

Table 2 shows the figures estimated by FAO in 2010:

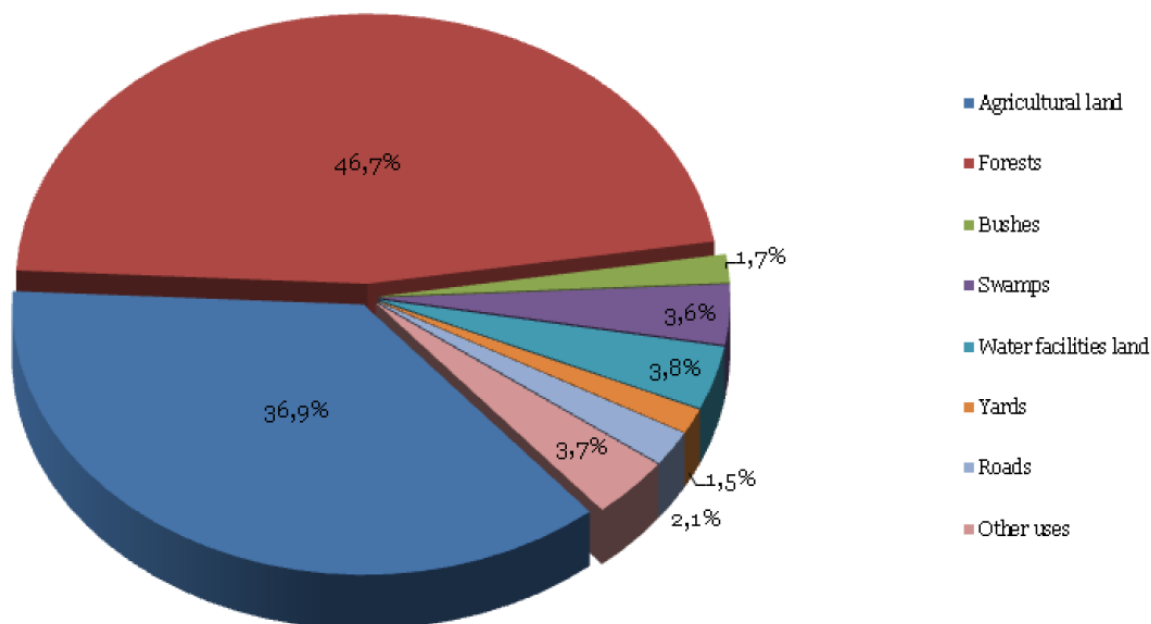
Table 2 : Forested area in Latvia

Area in 1000ha	Latvia
Forested Area	3,354
Other wooded land	113
Other land	2,762
...of which with tree cover	23
Inland water bodies	230
Total area	6,459

Source : GLOBAL FOREST RESOURCES ASSESSMENT 2010. COUNTRY REPORT. LATVIA

The following figure present the distribution of land uses in Latvia. Almost 50% of the area is devoted to forest land. The second main category is agricultural land.

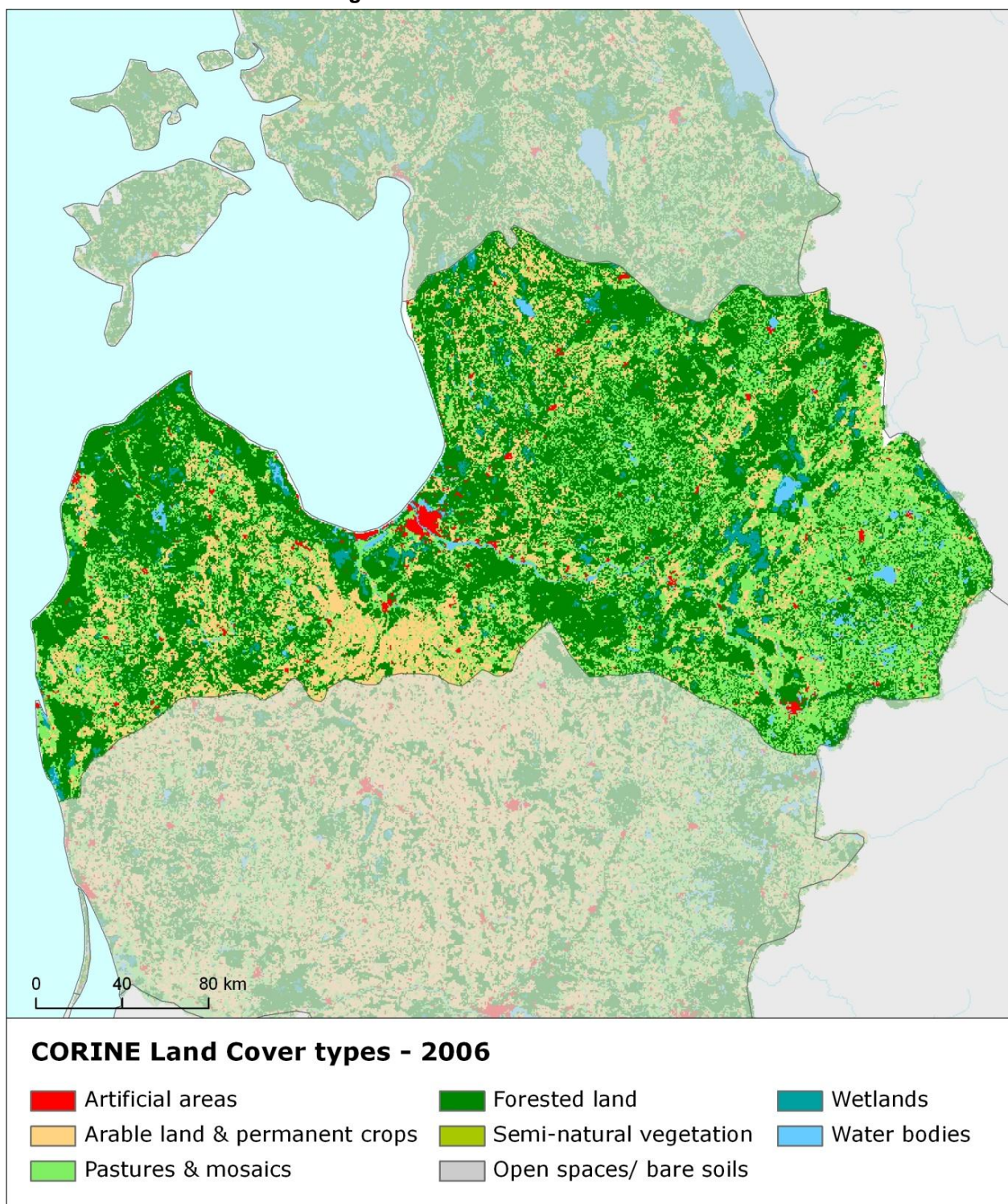
Figure 3 : Structure of land according to types of land Use in the Republic of Latvia



Source : http://www.vzd.gov.lv/files/land_report_2013.pdf Note : it is in % of total area registered in NRECIS on 01.01.2014

Figure 4Error! Reference source not found. presents the generalised continental land cover. As can be seen on this map, most of the forests are located along the coast and the rivers. This map also shows the dominance of forested areas and pastures.

² <https://www.zm.gov.lv/en/valsts-meza-dienests/statiskas-lapas/forest-resources?nid=633#jump>

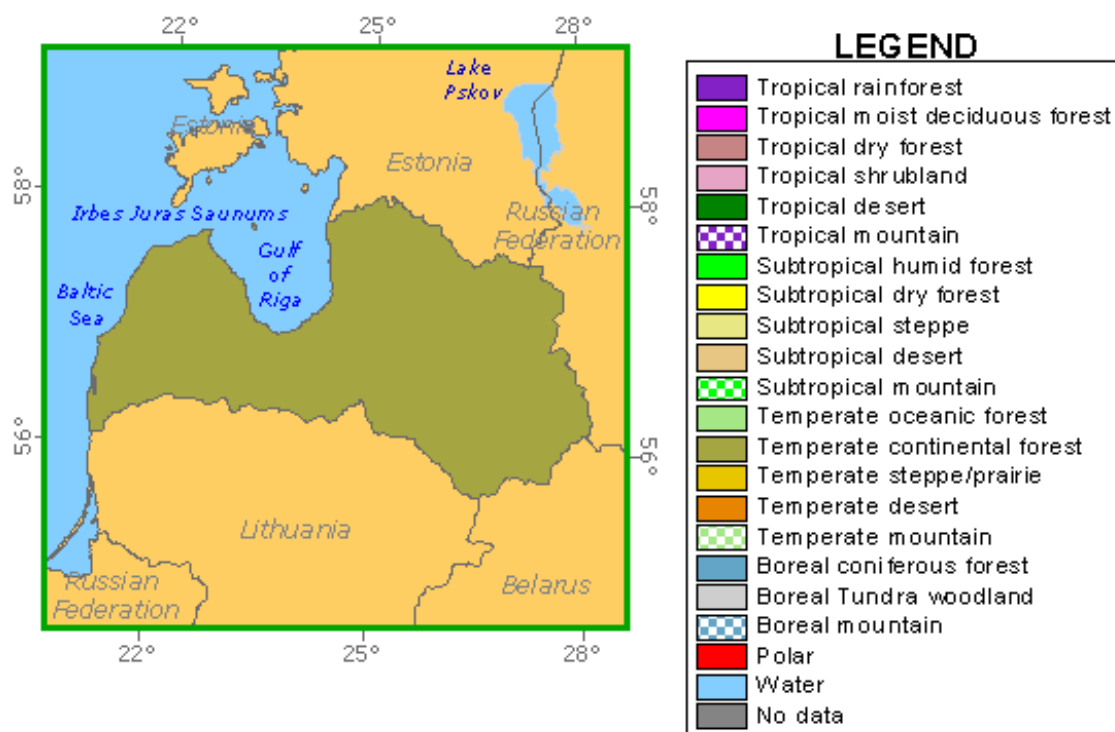
Figure 4 : Land cover in Latvia

Source: <http://www.eea.europa.eu/data-and-maps/figures/land-cover-2006-and-changes/latvia>

2.2. Ecological zones

Like much of Europe, Latvia's climate is moderated by the influence of the Atlantic Ocean. Latvia's weather features a temperate maritime climate, with mild summers, moderate winters, and high levels of humidity and precipitation³. Summer: June – August +13°C +19°C, average precipitation 195 mm. Winter: December – February -7°C 0°C average precipitation: 116 mm.

Figure 5 : Ecological zones in Latvia



Source : <http://www.fao.org/forestry/country/19971/en/lva/>

According to FAO, all of the country is considered as a temperate continental forest.

Deciduous trees dominate slightly in the Latvian forests (54.8% of the forest stand area). Forest is also occupied by coniferous (45.2% of the total forest stand area). Nevertheless this percentage varies depending on the region where the forest is located.

Table 3 : Forested area in Latvia

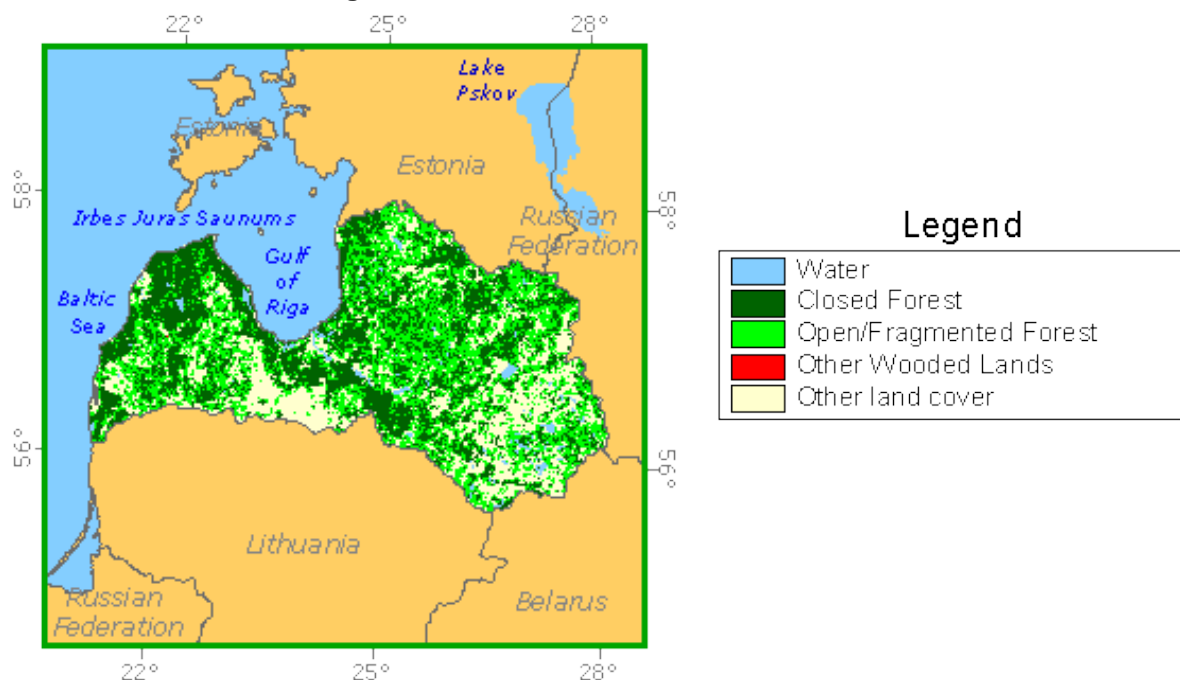
Region	Total area (thsd ha)	Forest stand (thsd ha)	Forest cover (%)	Coniferous trees area (thsd ha)	Coniferous trees (%)	Deciduous trees area (thsd ha)	Deciduous trees (%)
Pierīga	1,043.9	561.5	53.8	280.6	50.0	281.0	50.0
Vidzeme	1,524.5	850.5	55.8	383.5	45.1	467.0	54.9
Kurzeme	1,360.7	730.5	53.7	379.5	52.0	351.1	48.1
Zemgale	1,073.2	474.2	44.2	205.5	43.3	268.7	56.7
Latgale	1,455.0	580.9	39.9	194.6	33.5	386.2	66.5
LATVIA	6,457.3	3,197.5	49.5	1,443.7	45.2	1,753.8	54.8

Source : <http://data.csb.gov.lv>

³ http://www.latvia.lv/sites/default/files/faktu_lapa_latvia_in_brief_webam.pdf

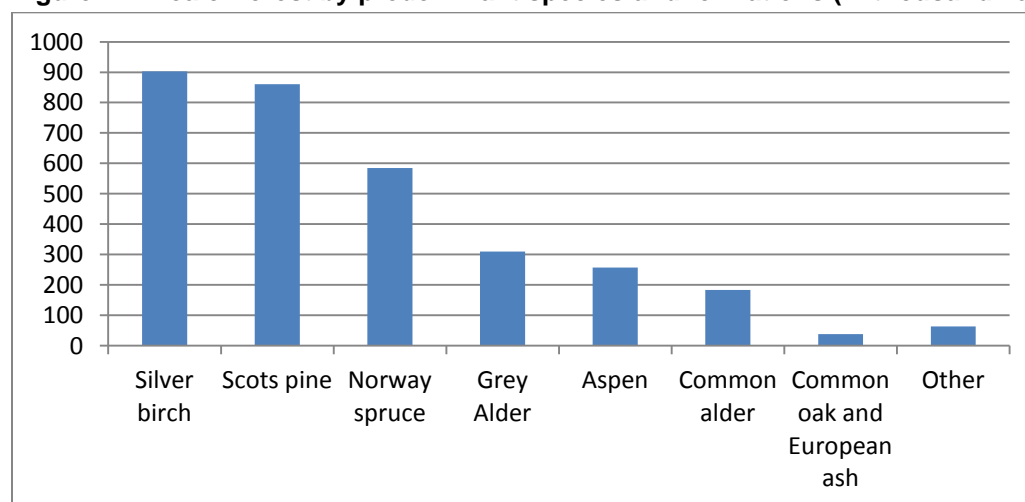
Figure 6 shows the forest types in Latvia. The majority of the closed forests are in the western of the country compared to fragmented forests which are largely in the east.

Figure 6 : Natural forest formations in Latvia



The repartition of the main tree species throughout the country is presented on Figure 7 and mapped on **Error! Reference source not found..** Three major tree species and formations are found in Latvian forests: the silver birch (*Betula pendula* and *Betula pubescens*), the scots pine (*Pinus sylvestris*) and the Norway spruce (*Picea abies*). Each of those species covers about 28.2%, 26.9% and 18.3% of the total forested area.

Figure 7 : Area of forest by predominant species and formations (in thousand ha)



Source : Meža resursi un meža statistiskā inventarizācija 2014 (<http://www.silava.lv/22/section.aspx/View/13>)

2.3. Forest ownership

The national statistical data center⁴ presents the figures on 1 April 2014 (Table 4). State owned 1,510 thousand ha compared with other forests for 1,750 thousand ha.

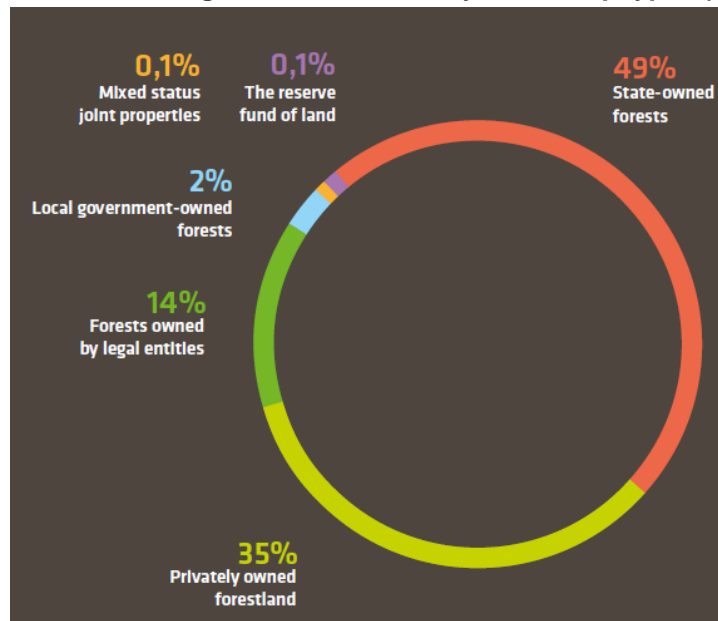
Table 4 : Forested area by ownership types

	1/04/2014	
	Thsd ha	%
State forests	1,509.9	46.3
Other forests	1,749.9	53.7
Total	3,259.8	100.0

Source : <http://data.csb.gov.lv>

Slightly different figures are available from other sources, as hereunder:

Figure 8 : Percentage of forested area by ownership types (2013)



Source : Latvian forest sector in facts and figures, 2014.

In state forests the conifers predominate, while in private forests the proportion of broadleaves is higher (birch, grey alder, aspen). These differences are explained by the private forests situated mainly on former farmlands, which have overgrown by broadleaves naturally⁵.

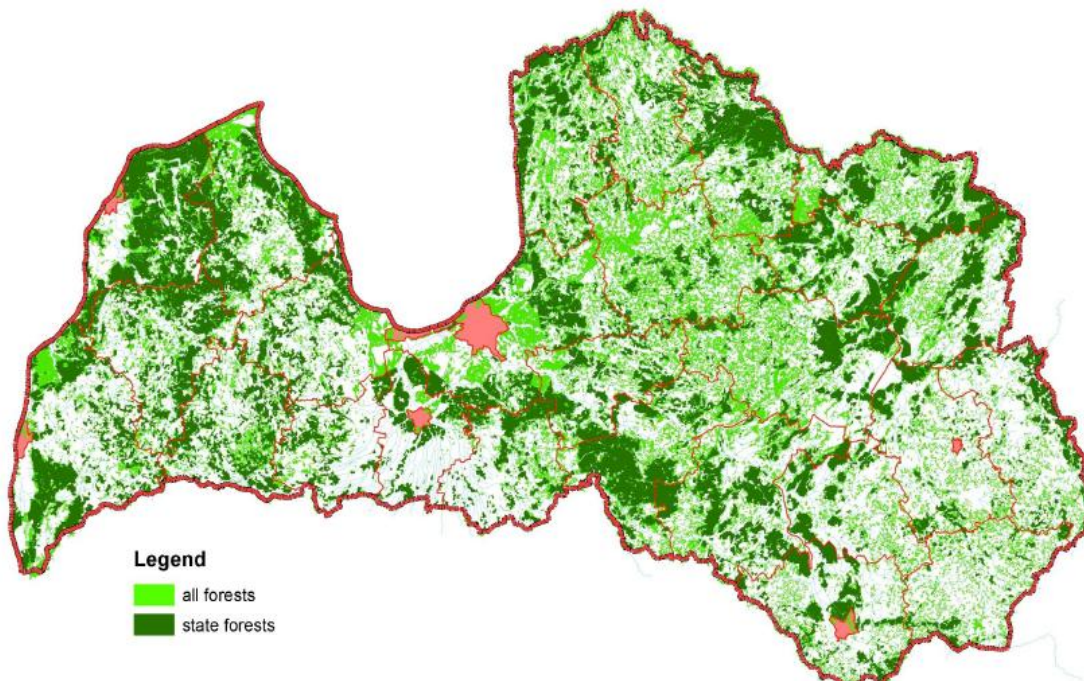
Average forest property area is 8 ha and 92% of forest owners own less than 20 ha of forests⁶.

Figure 9 shows the distribution of state forests and other in Latvia. When we compare with Figure 6, we see that state forest correspond to a majority of closed forests⁷.

⁴ <http://data.csb.gov.lv>

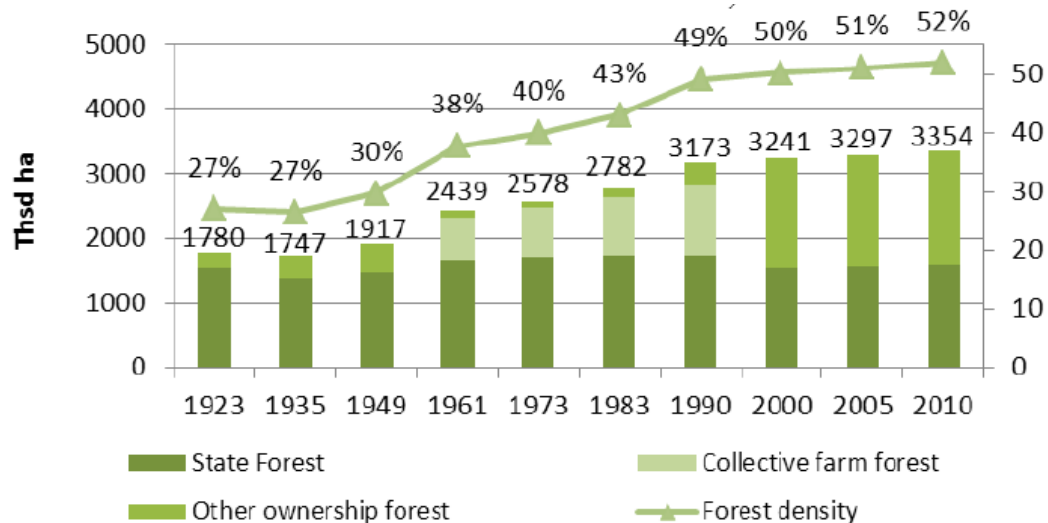
⁵ <http://www.latvianwood.lv>

⁶ Private Forestry and Ownership rights in Latvia (2013). Arnis Muižnieks, Latvian Forest Owners' Association.

Figure 9 : Forested area ownership

Source : Private Forestry and Ownership rights in Latvia (2013). Arnis Muižnieks, Latvian Forest Owners' Association.

Under soviet rule, a part of the forests was owned by collectivities (Figure 10). When there was the Soviet Union's dissolution and Latvia independence (1991), 50% of forestlands had been re-privatized. After the period the proportions between State and other were about fifty-fifty.

Figure 10 : Forested area ownership evolution

Source : Private Forestry in Latvia (2012). Aiga Grasmane & Arnis Muižnieks, Latvian Forest Owners' Association.

⁷ McDermott C., Cashore B., Kanowski P., 2012, Global Environmental Forest Policies: An International Comparison

2.4. Competent authorities

Ministry of Agriculture

The Ministry of Agriculture is the central body controlling the management of the Latvian forests. The ministry supervises the State Forest Service, which is responsible for the implementation of forest policies on all forest land. The ministry also controls the state-owned company Latvian State Forests, which manages nearly half of the forested land in Latvia.

State Forest Service

The State Forest Service is a state administration within the Ministry of Agriculture, which is responsible for pursuing a unified forest policy in all Latvia's forests, controlling observance of the provisions of statutory acts, and implementing support programmes, in the long term aimed at ensuring sustainable forest management. The SFS comprises the Central Office and the territorial units - the State Regional Forest Districts, functioning as forest authority for a definite territory, and the entities for performing special tasks. The Forest Research Station is an entity for performing special tasks, intended to manage the forests of scientific research and ensure the continuity of forest research.

The following functions are within the SFS jurisdiction:

- control in all the Latvia's forests of the observance of laws and regulations on forest management and utilisation;
- evaluate the legal effectiveness of forest management and utilisation laws;
- put forward proposals to the Ministry of Agriculture to increase the effectiveness of statutory acts, and participate in drafting the related laws and regulations, issue, as provided by the law, permits, certificates, licences, statements, and other documents;
- attest the sources of forest reproductive material and certify the forest reproductive material;
- follow up the situation with forest health and carry out forest monitoring;
- control the quality of forest inventory data;
- keep the State Register of Forests;
- test by an examination the hunters' proficiency and issue the hunter's certificates;
- keep a watch on forest fire safety and bring forest fires under control;
- administer the state and internationally financed support programmes related to forestry;
- keep the public informed of the situation with the forest and game animal resources and their utilisation;
- manage forest sites intended for long-term forestry research;
- provide information and consultancy to the forest owners on the forestry issues and the statutory provisions in forest management and utilisation⁸.

The Corporate Strategy of the State Stock Company (Latvijas Valsts meži)⁹

Latvian State Forests (LVM) is the largest forest manager in the country. The LVM goal in nature conservation and environment protection is: "to conserve biological diversity (genetic resources, rare and endangered species and ecosystems) and protect the related environmental values like soils, waters, and landscape".

⁸ <http://forestportal.efi.int/view.php?id=117&c=LV>

⁹ 5th NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY, Latvia 2014

Several tasks to achieve the goal are given in the strategy:

- In the forests under management systematically identify the sites essential for the conservation of protected species and habitats;
- Elaborate individual management plans for the forest areas having special management goals:
 - 8-10% of forests are managed for biodiversity conservation, excluding there any management or planning only the activities necessary for maintaining and enhancing the biodiversity;
 - 10-12% of forests are managed for protecting the environment components like waters, soils and landscape, and maintaining the forest's recreational values and cognition opportunities essential for the public;
- Works for the implementation of the model for landscape ecological planning;
- Assess and within limits possible reduce the impact of management activities on the environment, reducing to the minimum the use of chemical plant protection agents in forests; since 2005, the using in forest operations only biodegradable oils.

Latvian Forest Policy

Latvian Forest Policy¹⁰ (adopted in 1998) defines the long-term strategic and tactical goals and principles of forest sector development. The overall goal of the Policy is the sustainable management of forests and forest lands. The goal of the Policy particularly regarding biodiversity is the preservation and maintenance of biodiversity at the current level.

2.5. Overview of wood-related industry

Forestry sector contributes to 3.2% of the Gross domestic product in 2008¹¹. This contribution has declined from 2000 to 2008. Latvia has significantly less contribution to GDP in manufacture of paper and paper products compared with the level of manufacture of wood and articles in wood (Table 5).

Table 5 : Contribution of forest sector to GDP (Gross value added in % of total GVA) by sector and year in Latvia

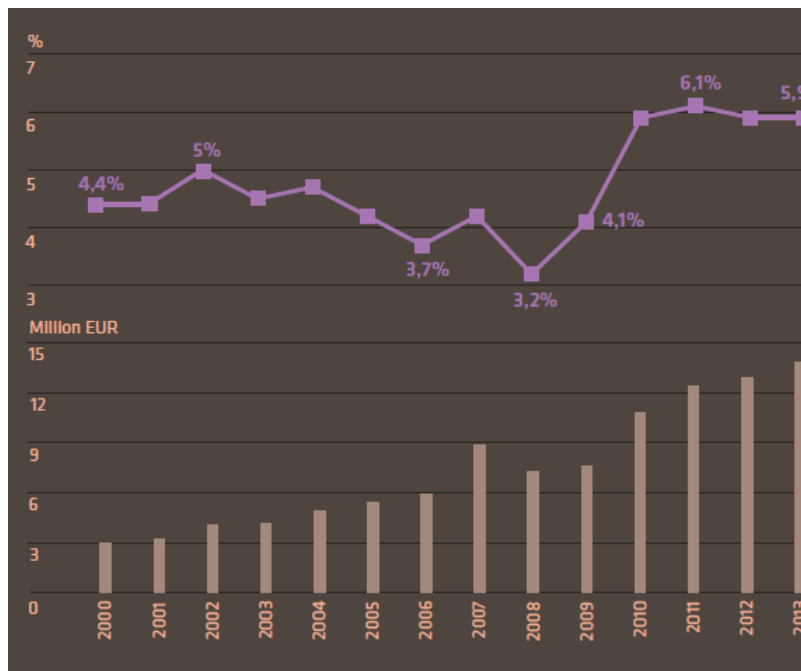
	2000	2005	2008
Forestry	1.6	1.4	1.3
Manufacture of wood and articles in wood	2.6	2.5	1.8
Manufacture of paper and paper products	0.2	0.2	0.1
Total forest sector	4.4	4.1	3.2

Source : <http://w3.unece.org>

After the crisis, share of GDP taken by forest sector has sharply increased to reach 6.1% in 2011 (Figure 11) and has slightly diminished in 2013 (5.9%).

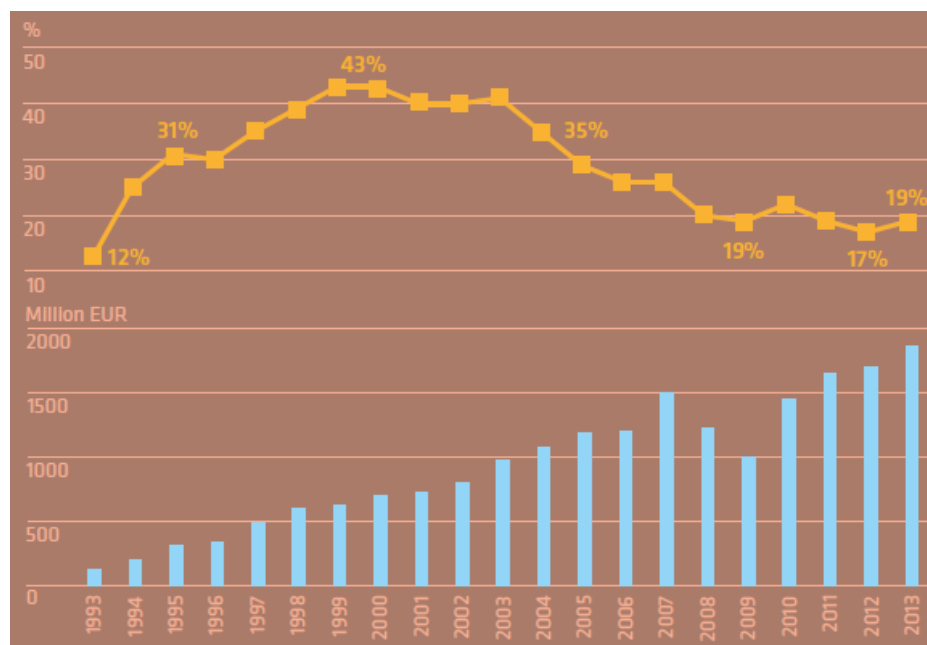
¹⁰<https://www.zm.gov.lv/mezi/statiskas-lapas/nozares-strategijas-politikas-dokumenti/latvijas-meza-politika?nid=328#jump>

¹¹contribution of forest sector to GDP indicated as gross value added of forestry in percentage of total gross value added

Figure 11 : Value of the forest sector and its proportion in GDP (actual prices)

Source : Latvian forest sector in facts and figures, 2014.

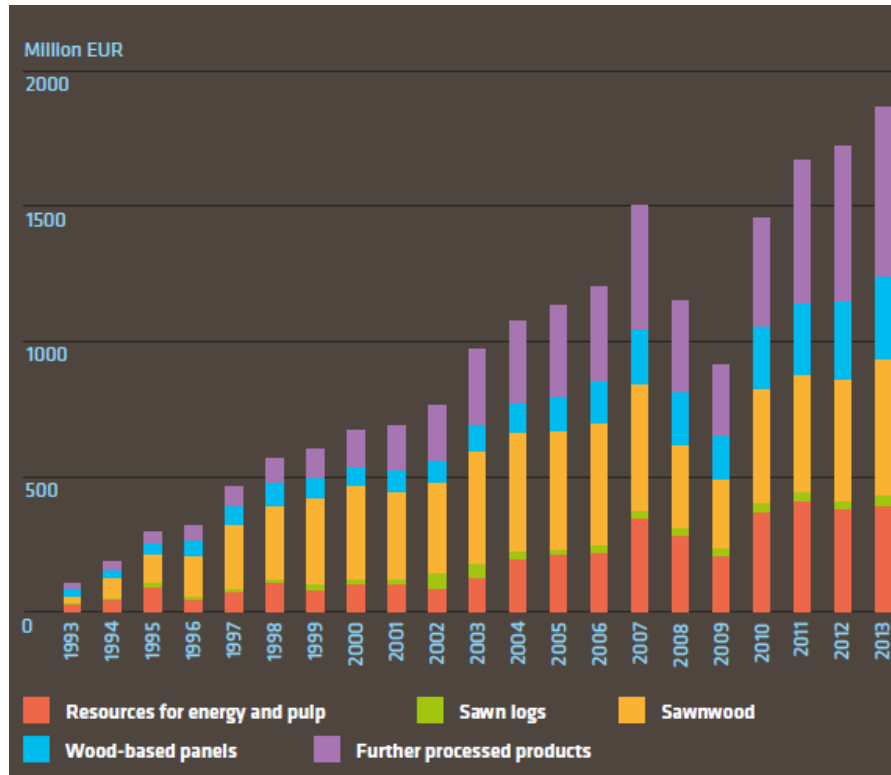
In the percentage of total exports the highest importance of forest industry was from 1999 to 2003 – above 40% of total exports were forest industry's products; since then it has decreased, however, the exports absolute value in million EUR has increased significantly (Figure 12). This industry has had the quickest recovery from the global economic crisis.

Figure 12: Forest industry exports in million EUR and as share of total exports in Latvia

Source : Latvian forest sector in facts and figures, 2014.

The structure of the exportation can be summarized on the Figure 13. The tree main sectors of exportation are further processed products, sawnwood and resources for energy and pulp. Sawn logs are small represented. The total forest exportation reaches about 1900 million EUR in 2013. Latvia has more exports of round wood and less exports of different secondary goods. The EU is the major trade partner of Latvia (generally Great Britain, Germany and Scandinavian countries). Out of the total volume of export 88.9 % goes to the EU member states¹².

Figure 13: Forest sector export development



Source : Latvian forest sector in facts and figures, 2014.

The structure of the exportation can be summarized on the **Error! Reference source not found..**

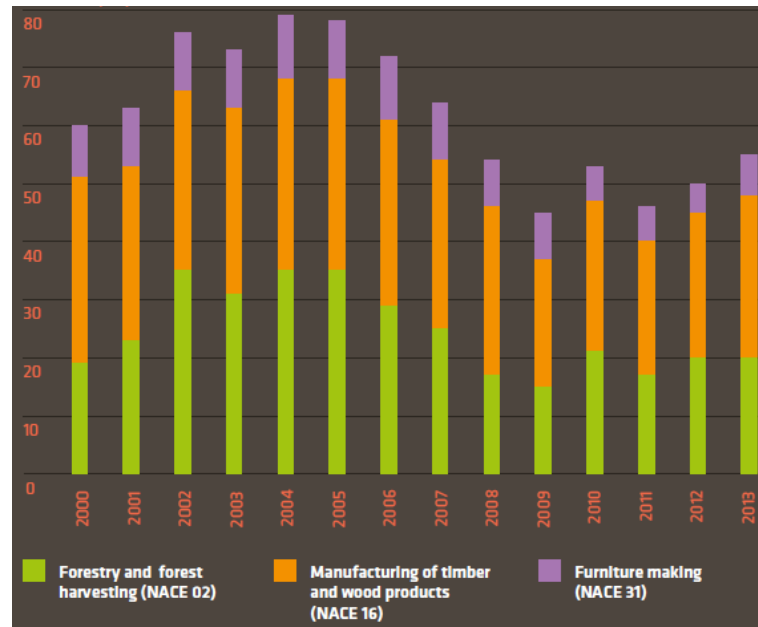
The foreign trade balance of the Latvian wood industry is positive and it has reached the value of 1.3 billion EUR in year 2013.

In Latvia, the small and medium size enterprises predominate in the wood-processing sector (specialized on niche products: gardening, decking, boarding, wooden packaging, carpentry and joinery products etc). The big manufacturers are oriented on market where the volume of consumption is high (construction timber, impregnated timber products, building materials and components)¹¹.

¹² Vaivade A., 2013. The analysis of sustainable forest management in Latvia and Finland. Master Thesis within the main profile of Energy, Natural Resources and the Environment. NORWEGIAN SCHOOL OF ECONOMICS.

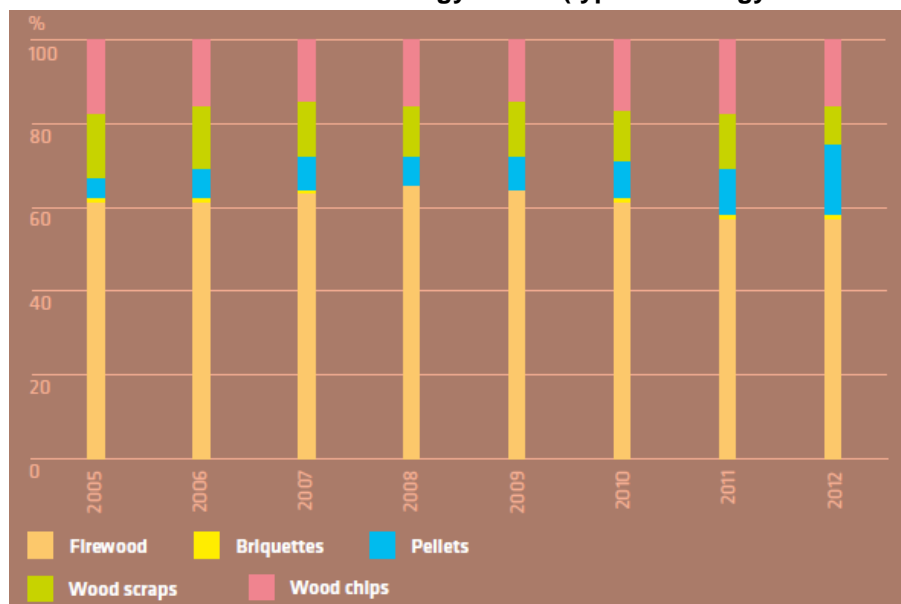
The employment rate in forestry in Latvia has decreased from 2004 to 2009. Starting with slight increase from 2000 (around 60,000 employed persons) to 2004 (almost 80,000 employed persons) and followed by decrease at higher rate to reaching about 45 000 employees in 2009 (caused partially by global economic crisis in 2008 and 2009). From 2011 to 2013, the employment seems to increase again and generates in 2013 about 55,000 employees (Figure 14).

Figure 14 : Number of people employed in the forest sector (in thousands people)



Source : Latvian forest sector in facts and figures, 2014.

According to Vaivade A., 2013 and Ministry of Economics of Republic of Latvia, “Latvia has the highest energy production from wood relatively to total national primary energy consumption in EU, which was slightly over 30% in year 2011. It is followed by Finland with the second highest percentage of approx. 20% and then Sweden with about 16%. Most part of renewable energy in Latvia comes exactly from forests. Renewable energy sources in 2012 accounted for 36.3% of total primary energy balance and the two most commonly used forms of renewable energy were fuel wood (27.6%) and hydro resources (7.0%)”. Contribution of firewood to the energy sector can be seen of the Figure 15.

Figure 15 : Contribution of forest to the energy sector (types of energy-wood in total output)

Source : Latvian forest sector in facts and figures, 2014.

3. Sustainability of Latvia forest

3.1. Evolution of forest area and risk of conversion

In the very beginning, some 1000 years ago, forests covered around 80% of land. It was mixed forests with birch, pine and spruce species (same common species are most in nowadays forests). As population increased, more areas were used for agricultural production and the forest areas decreased dramatically, when in year 1920 it was only 23% of Latvia remained forestland. In Soviet period percentage increased again, as many forested areas were left unkempt and thrived, it grown up to 47% at the end Soviet times and afterwards it kept on increasing slowly¹³. Between 1935 and 2005, forest area in Latvia has increased 1.7 times, and the growing stock 3.3 times. This increase is due to natural factors favouring forest growth (soils, climatic conditions, and human activities), less land used for farming, and more forests established on surplus farmlands. The higher growing stock is explained by an increase in the forest-covered area, the annual removals below the annual increment, and purpose oriented management activities like stand tending and the use of genetically improved planting stock for forest regeneration¹⁴.

According to EUROSTAT, forested area has increased in recent years:

- between 1990 and 2000, Latvia gained about 68.000 ha of forest a year (+0.21%/year).
- between 2000 and 2010 the forest's increase was a little bit quicker, with 0.35%/year.

Table 6 : Forest area evolution from 1990 to 2010

Area (1000 hectares)	Period			
	1990	2000	2005	2010
Forest	3,173	3,241	3,297	3,354
Other wooded land	115	123	118	113
Total area	6,549	6,549	6,549	6,549
Percentage of forested area	48.45%	49.49%	50.34%	51.21%
Evolution of forest area (between period)	/	68	56	57
Annual change	/	6,8	11,2	11,4
Annual rate change	/	0.21%	0.35%	0.35%

Source : Calculated from <http://appsso.eurostat.ec.europa.eu>

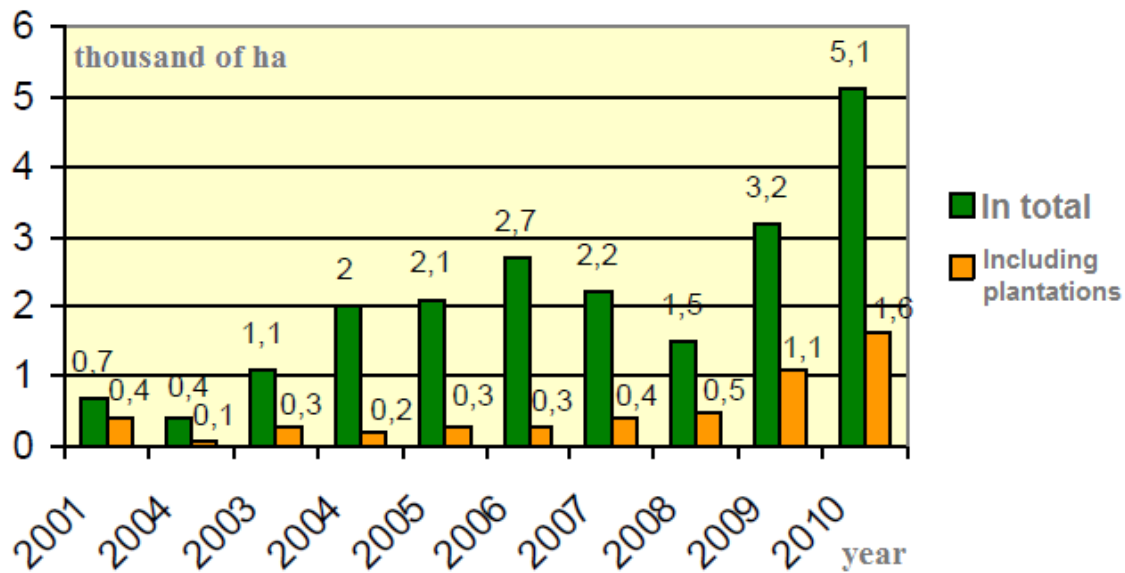
In Latvia the surface of forests¹⁵ has been increasing from approximately 2000 ha in 2004 – 2005 to more than 5000 ha in 2010. In year 2010 more than 1500 ha were specially created plantation forests (Figure 16).

¹³ <http://www.baltictimes.com/news/articles/28529/>

¹⁴ <http://www.latvianwood.lv/default.aspx?tabid=2&id=40&lang=2> (accessed 10/12/2014)

¹⁵ the sum of forests planting, seeding and the promotion of natural recuperation in the lands not used for agriculture

Figure 16 : Forest increment in Latvia 2011 – 2010



Source: Ministry of Agriculture of Republic of Latvia

There are regulations of forest regeneration in Latvia. The species that are subject to natural regeneration are in their order of importance : birch, aspen, grey alder and less pine, spruce and black alder. On the other hand planting/seedling concerns only the three valuable species : pine, spruce and birch.

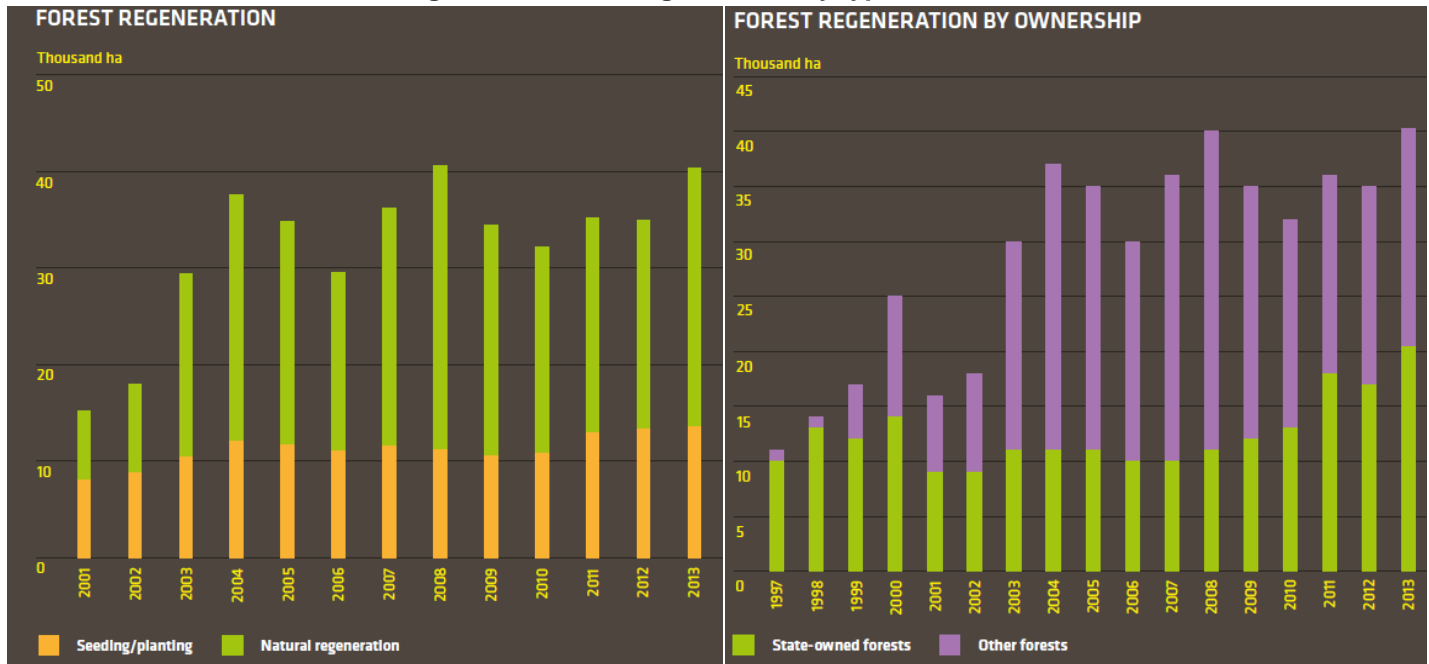
Figure 17 : Forest regeneration by species and by the type of regeneration in 2013

Species	Natural regeneration (ha)	Seedling/ planting (ha)	Total (ha)
Pine	1682,15	6825,47	8507,62
Spruce	1071,65	5394,59	6466,24
Birch	9856,24	1139,49	10995,73
Aspen	7752,04	8,2	7760,24
Grey alder	5310,28	4,5	5314,78
Black alder	1022,72	45,5	1068,22
Oak, Ash	59,17	20,7	79,87
Other	67	5,9	72,9

Source : Latvian forest sector in facts and figures, 2014.

When we look at the Figure 18, we see that seedling/planting remains stable over the 10,000 ha per year with a slight increase from 2011 to 2013. Natural regeneration has increased since 2003 and fluctuates around a value of 30 to 40,000 ha. In terms of the owners, other forests regeneration (with a large proportion of private owners) were very low in 1997-1999 and largely increased after 1999 (introduction of the Latvian forest policy). State forest regeneration is mainly the only growth before the 2000's, but declined thereafter. A constant augmentation has been observed since 2006 to 2013.

Figure 18 : Forest regeneration by types and owners



Source : Latvian forest sector in facts and figures, 2014.

The FSC risk assessment platform www.globalforestregistry.org considers that Latvia is at low risk in terms of conversion of forest to other land uses, because the following criterion is verified at the country level:

- There is no net loss AND no significant rate of loss (> 0.5% per year) of natural forests and other naturally wooded ecosystems such as savannahs taking place in the eco-region in question.

3.2. Living wood volumes and removals

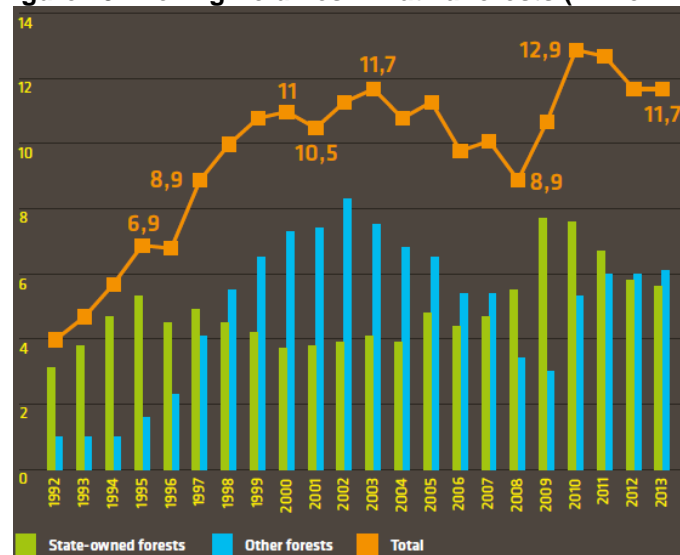
Table 7 shows the evolution volume of live trees in Latvia (1990 to 2010). According to the available data, the growing stock volume has consistently increased between 1990 and 2010. The growing stock in other wooded lands remains small compared to the growing stock in forests and remained stable since 1990. Since 1990, increment in forests available for wood supply increase and in the other hand the felling in forests available for wood supply largely increased from 1990 to 2000 and decreased after 2005 to 2010. Therefore the felling in percent of net increment increased by 55.71% for the period 1990-2010 and stabilised slightly above the European value. We can see than even with an important felling in percent of net increment, these felling are compensated by a large growing stock of forests.

Table 7 : Evolution of wood volume from 1990 to 2010 (volume in 1000m³)

	1990	2000	2005	2010
Growing stock in forests and on other wooded land	452.900	548.100	571.000	634.900
Growing stock of forests	451.000	546.000	569.000	633.000
Growing stock of other wooded land	1.900	2.100	2.000	1.900
Growing stock in forests available for wood supply	418.000	507.000	527.000	584.000
Increment in forests available for wood supply	16.500	17.666	18.044	18.333
Felling in forests available for wood supply	5.299	15.516	16.359	12.421
Felling in percent of net increment	32,12%	87,83%	90,66%	67,75%
Felling in percent of net increment for EU 28	56,10%	61,00%	65,0%	62,70%

Source : <http://epp.eurostat.ec.europa.eu>

According to Vaivade A. (2013) the level of felling in state forests was around 4 million m³ every year from 1991 to 2007, when after economic crisis it increased almost twice (Figure 19),. At the same time, the increase from 1995 to 2000 in private forests was more than 4 times, leading to dramatically large overall increase in the first decade after independence restoration in 1990. From 2005 to 2010 the increase in felling volumes were by 15%, however, felling volumes were lower from 2006 to 2008, reaching the lowest bottom in 21st century in year 2008, when economic crisis started. As the increment has increased, the levels of felling increased, because by the low, in commercial forests it is allowed to harvest only 48% of annual growth to sustain long term perspective.

Figure 19 : Felling Volumes in Latvia forests (million m³)

Source : Latvian forest sector in facts and figures, 2014

The felling from total growing stock is only about 2% a year (Figure 20). This figure is largely lower than observed in the 1920-1960 period. The extraction of timber from the increase in growing stock is slightly above 60% in nowadays.

Figure 20 : Felling intensity from total growing stock

Source: Ministry of Agriculture of Republic of Latvia

According to Vaivade A. (2013), “the problem is that the felling by itself has been done in not-sustainable way. Clean cut (complete deforestation in particular area) is in too high level in Latvia, as for example, in each of the years 2009 and 2010, 1.5% of state owned forest area was felled by clear cutting. In Latvia the levels are so high that it leads to the situation when by calculations after 8 years there would be 15% of state forests under age of 10 years and after 30 years almost half of state forests would be under 30 years”.

There was a continuous increase of timber harvested between 1993 and 1999 (**Error! Reference source not found.**). Round-woods removed were constant in the last fifteen years (about 12 million m³ removed per year). We only note that removals have been affected by the crisis in 2008 because the values are lower this year.

3.3. Protection of ecosystems and biodiversity

In Latvia the Cabinet of Ministers has created the Rules for Protection of Environment in Forest Management in 2001, which describes how the protective zones must be created and managed at the beginning and additional actions when harvesting is in process¹⁶.

The evolution of protected areas between 2004 to 2013 is presented in the Table 8. State owner's protection gained 58,000 ha in ten years compared with 25,200 ha for all of the other owners. The total protected areas increases by years showing the interest of Latvia to protect the forests (518,200 ha in 2013).

¹⁶ Vaivade A., 2013. The analysis of sustainable forest management in Latvia and Finland. Master Thesis within the main profile of Energy, Natural Resources and the Environment. NORWEGIAN SCHOOL OF ECONOMICS.

Table 8 : Nature protection of forest areas (thsd ha)

		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
STATE	Forests in strict nature reserves	8	8	7.7	8.4	8	8.3	8.3	8.6	8.7	8.6
	Forests in national parks	44	44	44.4	49.3	50.7	50.9	50.7	50.7	50.8	50.8
	Forests in nature reserves	60	73	75.1	74.2	74.1	75	80.1	83.7	84.8	84.7
	Forests in nature parks	19	33	32.7	32.5	31.2	31.3	31.3	31.2	31.2	31.1
	Forests in protected landscape areas	15	27	29.8	30.8	30.8	30.8	33.1	35.9	35.8	35.8
	Forests in natural monuments	-	-	-	-	-	-	-	-	-	2.2
	Environment and natural resources protection forest	64	64	65.1	66	61.6	61.4	65.5	63.4	63	63.9
	Forests in microreserves	-	-	-	-	-	-	-	-	36.8	35.5
	Special protection forest areas and biologically valuable forests	53	32	22.2	22.3	16.6	15	14.3	14.2	11.5	11.4
	Forests in Ziemeļvidzeme biosphere reserve area	3	3	2.5	2.5	2.4	2.4	2.4	-	-	-
	Total protected areas for State owner	266	284	279.5	286	275.4	275.1	285.7	287.7	322.6	324
OTHER	Forests in strict nature reserves	0	0	0.9	0.8	0.8	0.8	0.8	0	0	0.1
	Forests in national parks	33	33	33	37.8	51.6	50.4	51.5	52.1	52	52.6
	Forests in nature reserves	12	15	14.5	14.8	15	15.5	18.6	20.3	20.7	21.3
	Forests in nature parks	19	45	45.8	43.4	30.3	30.8	31.2	31.9	31.8	32.2
	Forests in protected landscape areas	42	40	39.8	42.5	42.9	44	45.6	46.2	46.3	46.6
	Forests in natural monuments	-	-	-	-	-	-	-	-	-	1.3
	Environment and natural resources protection forest	56	53	47	44	41.8	40.1	36.6	35.3	35.2	35.7
	Forests in microreserves	-	-	-	-	-	-	-	-	2.6	2.6
	Special protection forest areas and biologically valuable forests	7	5	4.1	4.2	2.7	2.7	2.5	2.4	1.1	1.8
	Forests in Ziemeļvidzeme biosphere reserve area	0	0	0.5	0.5	0.5	0.5	0.5	-	-	-
	Total protected areas for other owners	169	191	185.6	188	185.6	184.8	187.3	188.2	189.7	194.2
Total protected areas		435	475	465.1	474	461	459.9	473	475.9	512.3	518.2

Source : <http://data.csb.gov.lv>

Altogether in Latvia there are 683 specially protected nature areas certified by law or regulations of the Cabinet of Ministers on Specially Protected Nature Territories¹⁷. There is information given below about all specially protected nature areas that are found in the particular administrative territory:

4 national parks. *Strict nature reserves are territories untouched by human activities or nearly natural, in which territories unhindered development of natural processes shall be ensured in order to protect and study rare or typical ecosystems and parts thereof. Strict nature reserves shall have zones in which all natural resources are completely excluded from economic and other activities.*

¹⁷ http://www.daba.gov.lv/public/eng/protected_areas/

1 biosphere reserves. Biosphere reserves are broad territory in which landscapes and ecosystems of international significance are located. The goal of establishing biosphere reserves is to ensure the preservation of natural diversity and to promote sustainable social and economic development of the territory.

42 nature parks. Nature parks are territories that represent the natural, cultural and historical values of a particular area, and that are suitable for recreation, education and the instruction of society. Organisation of recreation and economic activities in nature parks shall be carried out by ensuring the preservation of the natural, cultural and historical values located in such parks.

9 protected landscape areas. Protected landscape areas are territories remarkable for original and diverse landscapes and special beauty. The goals of such territories are to protect and preserve the cultural environment and landscapes characteristic of Latvia in all their diversity, as well as to ensure the preservation of environment appropriate for recreation of society and for tourism, and use of environment friendly management methods.

261 nature reserves. Nature reserves are nature territories little transformed or transformed in varying degrees by human activities, which territories include habitats of specially protected wild plant and animal species, and specially protected biotopes.

4 strict nature reserves. Strict nature reserves are territories untouched by human activities or nearly natural, in which territories unhindered development of natural processes shall be ensured in order to protect and study rare or typical ecosystems and parts thereof. Strict nature reserves shall have zones in which all natural resources are completely excluded from economic and other activities.

7 marine protected areas. Marine protected areas are locations in the territorial sea, exclusive economic zone or continental shelf of the Republic of Latvia, which are established for the protection of protected biotopes and specially protected species habitat, as well as migratory bird significant feeding and wintering places.

355 nature monuments. Nature monuments are separate, isolated natural formations: protected trees, dendrological plantings, avenues, geological and geomorphological nature monuments and other natural rarities having scientific, cultural and historical, aesthetic or ecological value.

Microreserves. Territories designate for the protection of rare species and their habitats. In microreserves similarly to specially protected natural territories certain actions that may threaten the rare species or their habitats are restricted or prohibited.

333 Natura 2000 sites. Include 333 territories – 4 national parks, 4 strict nature reserves, 239 nature reserves, 37 nature parks, 9 protected landscape areas, 7 marine protected areas, 9 nature monuments and 24 microreserves. Terrestrial territories cover 12% or 787729 ha of the whole terrestrial area of the country. The protection and management regimes are various – from minor restrictions in landscape areas to absolute prohibition of any management in nature reserves.

There locations are given at the following figures.

Figure 21 : Location of the protected area in Latvia

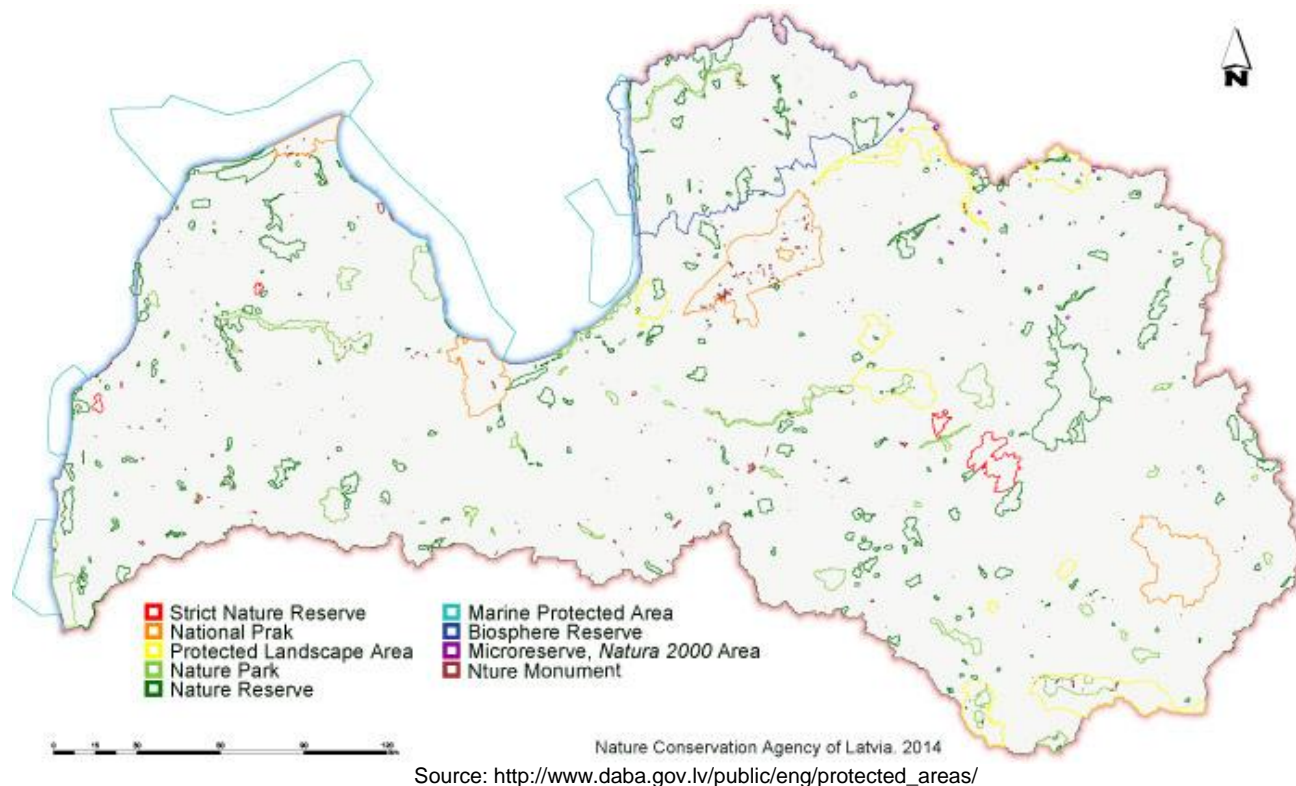
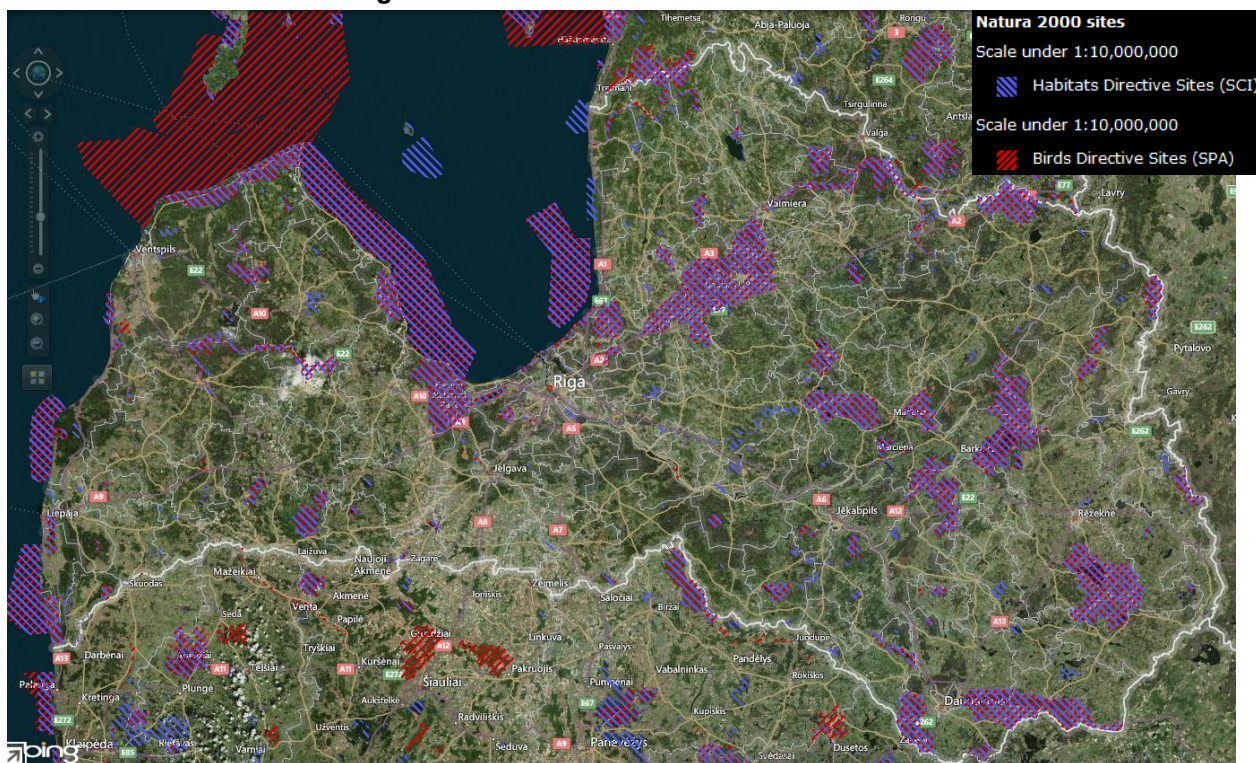


Figure 22 : Natura 2000 Network Viewer

Source : <http://natura2000.eea.europa.eu/#>

The proportion of primary forests is very small and they are mainly located in the strict and regulatory regime zones of Nature reserves and National parks¹⁸.

In Latvia, almost 20% from all forest lands are with the objective of management to sustain and expand the biodiversity. A list of specially protected environmental territories was established in 1993 and it has constantly been improved over the years¹⁸.

The MCPFE (Ministerial Conference on the Protection of Forests in Europe) has produced Assessment Guidelines for Protected and Protective Forest and Other Wooded Land in Europe. The total extend of forested protected area in Latvia register by MCPFE is around 496,000 ha (classes 1.1.-1.3 & 2.)¹⁹. This is about 14,8% of the forest land.

Table 9 : Identification of the MCPFE Classes

1. Main Management Objective "Biodiversity"	1.1: "No Active Intervention"
	1.2: "Minimum Intervention"
	1.3. "Conservation Through Active Management"
2. Main Management Objective: "Protection of Landscapes and Specific Natural Elements"	
3. Main Management Objective : "Protective Functions"	

Source: MCPFE assessment guidelines for protected and protective forest and other wooded land in Europe

¹⁸ Vaivade A., 2013. The analysis of sustainable forest management in Latvia and Finland. Master Thesis within the main profile of Energy, Natural Resources and the Environment. NORWEGIAN SCHOOL OF ECONOMICS.

¹⁹ The State of Mediterranean Forests 2013

When we compared by source provided by EU-27 DG Environment Natura 2000 network covers 403,000 ha of forests (i.e. about 12% of the country forests).

The information from <http://www.cbd.int> summarised the Protection of ecosystems and biodiversity²⁰.

National strategies and programs

Sustainable Development Strategy of Latvia until 2030 is the highest national long-term development planning document. Nature as a future capital is defined as one of the directions of strategic development. Sustainable Development Strategy of Latvia has several overall goals of the Strategy directly related to biodiversity:

- a) to ensure adequate activities for conservation of biodiversity and ecosystems;
- b) to ensure integration of environmental issues and to develop wide use of environmental policy instruments in other sectorial policies;
- c) to ensure public involvement in sustainable development processes.

The particular targets of the biodiversity conservation sector are:

- to maintain and restore diversity of ecosystems and their natural structures;
- to maintain and enable diversity of local wildlife species;
- to maintain genetic diversity of wildlife species as well as cultivated plants and domestic animals;
- to facilitate conservation of traditional landscape;
- to ensure sustainable use of natural resources.

National Development Plan of Latvia (2014–2020) was approved by the Government in 2012 and it is the highest medium-term development planning document. The objective of the plan is to facilitate a balanced and sustainable development of the country, as well as to ensure an increase of Latvia's competitiveness. The strategic goal of the National Development Plan (NDP) is – education and knowledge for the growth of the national economy and technological excellence. The priorities of the NDP are:

- An educated and creative individual;
- Technological excellence and flexibility of companies
- Development of science and research.

The chapter “Prerequisites for sure and sustained development” of NDP presents the most important areas for the achievement of the strategic objective, the chapter “Reasonably used and well-preserved natural environment” being among them. This chapter includes also several tasks related to biodiversity:

- 1) to facilitate the preservation and reasonable use of biological diversity and protected territories;
- 2) to promote the inclusion of the protected territories into the economic development determining different prohibited zones of economic activities and substantiating the socioeconomic decisions in their determination, as well as to attract financial resources for their management;
- 3) to encourage public participation in environmental protection and preservation by providing timely and true information to the local inhabitants about environmental quality and natural resources;

²⁰ 20 5th NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY, Latvia 2014

- 4) to facilitate the development of environmental education, as well as to foster education for sustainable development and to raise environmental awareness among the general public;
- 5) to support sustainable development of the natural environment for recreation purposes and to promote ecotourism;
- 6) to facilitate evaluation, mitigation and monitoring of the risks to nature, including climate change and industrial risks.

Declaration of the Intended Activities of the Cabinet of Ministers (adopted in 2014) is the document of political guidelines. In order to implement this Declaration the Cabinet of Ministers develops and approves the **Government Action Plan** (adopted in 2014) with particular tasks, time schedule and indicated responsible institutions. Tasks related to biodiversity conservation are:

- 1) Adopt environmental policy guidelines by defining the main objectives and activities for the development of the environmental policy during the next seven years;
- 2) To protect biodiversity, providing a single specially protected nature areas, as well as endangered species and habitats outside protected nature areas;
- 3) We will continue to implement

3.4. Protection of water

The MCPFE (Ministerial Conference on the Protection of Forests in Europe) has defined a quantitative indicator to assess the performances of the reporting countries in terms of conservation of the forests' protective functions, especially regarding soil and water (MCPFE class 3 as per Table 9). It is based on the surface of forest land specifically dedicated to protective functions, as defined by the following criteria²¹:

- The management is clearly directed to protect soil and its properties or water quality and quantity or other forest ecosystem functions, or to protect infrastructure and managed natural resources against natural hazards
- Forests and other wooded lands are explicitly designated to fulfil protective functions in management plans or other legally authorised equivalents
- Any operation negatively affecting soil or water or the ability to protect other ecosystem functions, or the ability to protect infrastructure and managed natural resources against natural hazards is prevented

Table 10 : Forest land dedicated to soil, water and other forest ecosystem functions as per MCPFE class 3

Year	Land dedicated to soil, water and other forest ecosystem functions (1000 ha)	Percentage of the forest land
2010	166.5	4.96%
2005	144.8	4.32%
2000	127.8	3.81%
1990	n.a.	n.a.

Source : Full State of Europe's Forests 2011 Report, by the Ministerial Conference on the Protection of Forests in Europe

²¹ MCPFE assessment guidelines for protected and protective forest and other wooded land in Europe
<http://www.unece.org/fileadmin/DAM/timber/publications/2002-guidelines-protected-forest.pdf>

3.5. Protection of soils

As described in the previous section, the MCPFE (Ministerial Conference on the Protection of Forests in Europe) has defined a quantitative indicator of to assess the performances of the reporting countries in terms of conservation of the forests' protective functions, especially regarding soil and water (MCPFE class 3 as per Table 9). The conservation areas are presented on Table 10.

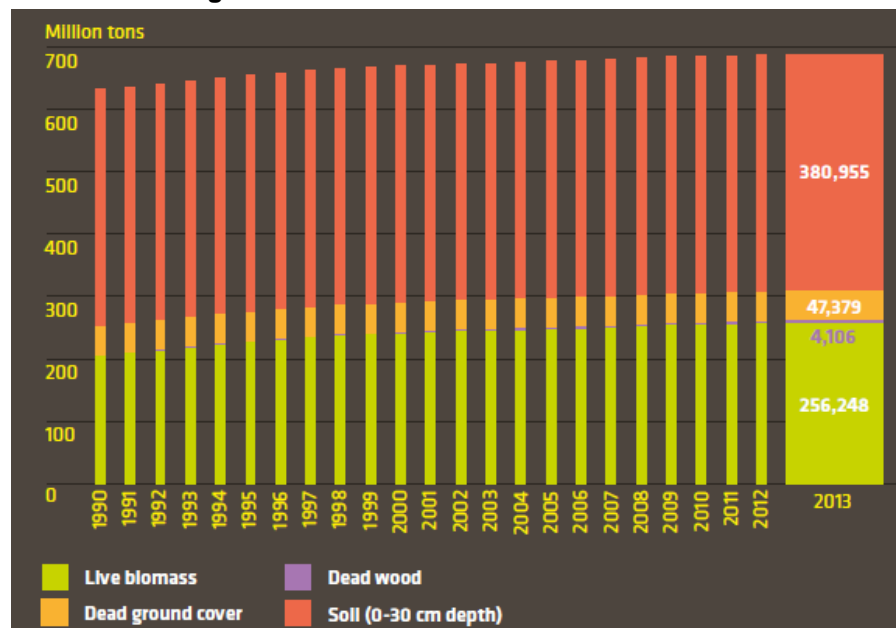
3.6. Protection of carbon stocks

In forest land the carbon stocks mainly includes:

- living above ground and below ground woody biomass,
- soil organic carbon,
- carbon in litter.

Most of the carbon in Latvia's forests is stored in the soil (381 million tonnes of carbon). Living biomass contained 256 million tonnes of carbon while the amount of carbon stored in litter and dead wood was heavily lower (47 and 4 million tonnes of carbon respectively).

Figure 23 : Carbon stocks in Latvian forests



Source : Latvian forest sector in facts and figures, 2014

Another data were reported by Latvia to the Ministerial Conference on the Protection of Forests in Europe (MCPFE) in the framework of Full State of Europe's Forests 2011 Report²². We can see a constant augmentation of carbon stock between 1990 and 2010 (Table 11).

²² http://www.foresteurope.org/full_SoEF

Table 11 : Estimated carbon stock in Latvian forests between 1990 and 2010

Year	Carbon in above-ground and below-ground living biomass		Carbon in deadwood and litter		Soil carbon
	Above-ground	Below-ground	Deadwood	Litter	
	Million metric tonnes				
2010	205,73	65,83	16,8	70,17	247,66
2005	184,93	59,18	16,11	64,34	245,03
2000	177,45	56,78	5,4	63,11	240,89
1990	146,58	46,9	5,1	61,56	235,79

Source : Full State of Europe's Forests 2011 Report, by the Ministerial Conference on the Protection of Forests in Europe

Carbon has increased for 30 years: in above-ground biomass it was 146.58 million metric tonnes of carbon in year 1990 and has increased up to 205.73 million metric tonnes of carbon in 2010, the levels in below ground-biomass at these years were 46.9 and 65.83 respectively (both estimates had increase by 40.4% in average). The most significant increase is for the carbon stock stored in the dead wood, as dead wood has increased by 229% from 1990 to 2010.

We can check the estimated release of CO₂ into the atmosphere from forestry and forest-related land use changes. Estimates are available in the National GHG Inventories submitted to UNFCCC by the parties of the Kyoto Protocol.

Based on those data, we can see that the Latvian forest has been a significant carbon sink during the period 2008 to 2012, mainly because of the appropriate management of the existing forest land, and also because of the afforestation resulting in the augmentation of forest land.

Table 12 : CO₂ emissions/removals from Latvian forestry and forest-related land use change

GREENHOUSE GAS SOURCE AND SINK ACTIVITIES	Net CO ₂ emissions/removals (Gg CO ₂)				
	2008	2009	2010	2011	2012
Afforestation and Reforestation	-19.02	-21.19	-23.15	-25.20	-27.34
Deforestation	1,317.70	1,271.80	1,228.89	1,215.93	1,190.10
Forest Management	-17,313.79	-15,284.03	-11,162.30	-11,480.09	-12,747.67
Cropland Management	NA	NA	NA	NA	NA
Grazing Land Management	NA	NA	NA	NA	NA
Revegetation	NA	NA	NA	NA	NA
Total	-16,015.1	-14,033.4	-9,956.56	-10,289.4	-11,584.9

Calculated from : UNFCC, national GHG inventories, Common Reporting Format, KP LULUCF Latvia 2012, version 2014

According to Vaivade A., 2013, “the stable increase in the area of forests and the resulting growing stock, the forest sector currently absorbs two times more CO₂ than all other sectors in Latvia emit. Latvia is also direct participant in the European Emission Trading Scheme and it sells their emission quotas every year. The funds received are then given for projects that are related with further improvements in renewable energy production, emission reductions by shifting from coal to fossil fuel usage etc”.

3.7. Protection of air quality

The main impact of forestry on air quality relates to fire. It includes wild fire (which are unintended) and prescribed fire (which is used as part of forest management under controlled conditions).

Forest fires impact on Latvian forests is less important compared with other factors except in the early 90s (see 3.1, page 21 and **Error! Reference source not found.**).

Prescribed burning is an important and useful silvicultural tool which can have different objectives:

- Prepare sites before seeding and planting
- Reduce hazardous fuels under tree stands to prevent wildfires
- Improve wildlife habitat
- Improve forage for grazing (through changes in underbush vegetation)
- Manage competing vegetation
- Control insects and disease
- Enhance appearance (refresh forest appearance, improve flowering....)
- Improve access (clear underbush before harvesting or other operations)

International Forest Fire News (IFFN) gives a summary of prescribed fires in Latvia : *"Slash and burn cultivation was maintained till 19th century. Today, fire is still used for burning of agricultural residues and grass lands during spring season. The use of prescribed as a management tool is not practiced in Latvia. However there have been experimental tests (e.g. Vidzeme and Zemgale) to apply prescribed fire within a project Management of Woodland Key Habitats in Latvia developed by State Forest Service of Latvia in collaboration with Regional Forestry Board of Östra Götaland (Sweden)"*²³.

3.8. Illegal logging

The FSC risk assessment platform www.globalforestregistry.org considers Latvia as at low risk in terms of illegal logging, because the following criteria are all verified:

- Evidence of enforcement of logging related laws in the district ²⁴
- There is evidence in the district demonstrating the legality of harvests and wood purchases that includes robust and effective system for granting licenses and harvest permits ²⁵
- There is little or no evidence or reporting of illegal harvesting in the district of origin ²⁶
- There is a low perception of corruption related to the granting or issuing of harvesting permits and other areas of law enforcement related to harvesting and wood trade ²⁷

²³ International Forest **Fire** News (IFFN) No. 38 (January-December 2009), p. 110-119. ISSN 1029-0864 (web) Collection and Mapping of Prescribed Burning Practices in Europe : A first approach.

²⁴ www.illegal-logging.info ; www.eia-international.org ; <http://www.ahec-europe.org/>

²⁵ www.illegal-logging.info ; www.eia-international.org ; <http://www.ahec-europe.org/>

²⁶ www.illegal-logging.info ; www.eia-international.org ; <http://www.ahec-europe.org/>

²⁷ <http://www.transparency.org/cpi2012/results>

3.9. Civil rights and traditional rights

The FSC risk assessment platform www.globalforestregistry.org considers Latvia as at low risk in terms of violation of civil and traditional rights, because the following criteria are all verified:

- There is no UN Security Council ban on timber exports from the country concerned
- The country or district is not designated a source of conflict timber (e.g. USAID Type 1 conflict)
- There is no evidence of child labor or violation of ILO Fundamental Principles and Rights at work taking place in forest areas in the district concerned
- There are recognized and equitable processes in place to resolve conflicts of substantial magnitude pertaining to traditional rights including use rights, cultural interests or traditional cultural identity in the district concerned
- There is no evidence of violation of the ILO Convention 169 on Indigenous and Tribal Peoples taking place in the forest areas in the district concerned

3.10. Forest certification

The main forest certification schemes used in Latvia are:

- PEFC (Programme for the Endorsement of Forest Certification), a global certification system that ensures sustainable forest management
- FSC (Forest Stewardship Council²⁸), which is specifically suitable for small private owners

According to Vaivade A., 2013, “one of the most significant developments in the certification process in Latvia has been the certification of all state-owned forests. This process was completed in January 2003 by Latvia’s new government institution for forest management – the State Joint Stock Company Latvia’s State Forests. Also the capital Riga’s municipal forests are certified, primarily under FSC, and a growing number of hectares of private forested land are coming under group certification through both FSC and PEFC. In 2011 more than 50% of Latvian forests, including all state-owned forests, were certified in accordance also with the PEFC system, and 15 companies in Latvia had already received certification of their delivery chains (also under PEFC). In 2004 – 88, but in 2011 already over 280 forest-sector enterprises and forest owners had certified their timber chain-of-custody systems according to the FSC requirements. The amount of forestland that has been certified on the basis of FSC requirements exceeds 793,000 hectares”.

Latvian PEFC forest management standard developed in 2010. The Latvian standard certified 1,683,641 hectares of forest. PEFC certifies 33 companies operating in the furniture industry, timber production, packaging and printing industry, wood products trade and pallet manufacturing²⁹.

Almost 800 000 hectares of forests are certified according FSC certification scheme. Private forest owners also have chosen FSC certification and the area of certified forests is growing every year³⁰.

²⁸ www.fsc.org

²⁹ <http://www.pefc.lv/>

³⁰ <http://www.fsc.lv>

4. Conclusions

Latvia's forest land is estimated to cover more than 3.35 million hectares, which is about 52% of the country land area. The broadleaf species are slightly dominant (a majority of Silver birch and Norway spruce) compared with softwoods (dominated by the Scott pine).

In 2011, as much as 35% of the forest land is private and owned by a very large number of individuals smallholders, while 51% of the forest land is public (49% State-owned and 2% local government). The rest is 0.1% for mixed status joint properties and 0.1% for the reserve fund of land. In state forests the conifers predominate, while in private forests the proportion of broadleaves is higher (birch, grey alder, aspen).

Natural expansion, less farmed areas, more forests established on surplus farmlands and forest plantation program helped to increased to forested area. According to FAO's Global Forest Resources Assessment, there has been an average annual increase by 0.35% (between 2000 and 2010).

The estimated volume of standing trees has increased since 1990 to reach more than 633,000,000 m³ in 2010. Even with an important felling in percent of net increment, these felling are compensated by a large growing stock of forests.

Because of the augmentation of the volume of live trees in the period 2005-2010, an increased of the estimated carbon stock in forests has been recorded. A 5% increase of soil carbon in forests was recorded between 1990 and 2010. To confirm this trend, the Latvian forests have been a significant carbon sink between 1990 and 2010, with the removal of over 11.6 million tonnes CO₂.

Latvia has various types of conservation lands dedicated to the protection of biodiversity, including biosphere reserves, national parks, nature parks, protected landscape areas, nature reserves, Natura 2000 and other protection status. According to the Ministerial Conference on the Protection of Forests in Europe, about 14.8% of the Latvian forests have a protection status in terms of biodiversity (MCPFE Classes 1.1-1.3 and Class 2). Protected areas as Natura 2000 have been accounted by EU-27 DG Environment and covers 403,000 ha of forests (i.e. about 12% of the country forests). According to Latvian government 518,200 ha of forests is under protection in 2013.

According to the Ministerial Conference on the Protection of Forests in Europe, forest land specifically dedicated to soil, water and other forest ecosystem functions (in accordance with MCPFE class 3 definition) covers about 4.96% of the forests in Latvia.

Even though controlled fires are used in forest management practices in Latvia, the use of fire is subject to permit and carefully monitored in order to preserve air quality.

The FSC risk assessment platform www.globalforestregistry.org considers Latvia is at low risk in terms of violation of illegal logging and in terms of violation of traditional and civil rights.

The forest certification systems are largely developed in Latvia, with 50.2% of the forest land certified PEFC and 23.9% under FSC certification.

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