

Sustainability of State Forest Management

*Will the State Forest Management Centre (RMK)
leave to the next generations similar opportunities
for the use of state forests as we have now?*

Report of the National Audit Office to the
Riigikogu

Tallinn, 9 September 2010

Sustainability of State Forest Management

Will the State Forest Management Centre (RMK) leave to the next generations similar opportunities for the use of state forests as we have now?

Summary of the audit results

What did we audit?

37% of Estonian forests are state forests in the area of government of the Ministry of Environment and managed by the State Forest Management Centre (RMK). RMK started operation in 1999 and as a profit-making state agency it is the only legal entity of this type which is similar to a company by its nature. The Forest Act imposed on RMK all obligations of a forest owner and delegated to it also all rights of a forest owner.

The National Audit Office audited whether the state forests which belong to the area of government of the Ministry of the Environment are managed in a sustainable manner, i.e. whether also the next generations would be able to use the state forests in the similar manner. Or, in other words, would it be possible also in a few decades to cut similar timber in a similar volume as RMK has been able to do and whether the ecological condition of the forests will not deteriorate.

Why is it important for taxpayers?

If the cutting volume is too high, it reduces the area of old forests and maintaining the cutting volume leads to cutting increasingly younger forests. Decrease in the share of old forests reduces the value of forests and impairs the ecological condition of forests.

What were our findings and conclusions in the course of the audit?

According to the assessment of the National Audit Office, RMK does not manage state forests in a sustainable manner and is setting at risk the opportunities of the next generations for using the state forests. Within the last ten years, RMK has performed clear cutting in a larger area of state forests than it has been done in earlier decades. In some forest types, such as fertile spruce forests, RMK has already had to reduce considerably the cutting volume as the area of mature stands has decreased as a consequence of management. Continuation of cutting in the current volume would considerably reduce the area of old forests in better forest types (forests on more fertile soils) and therefore the ecological condition of the forests would deteriorate and the revenues gained from the state forests would decrease in the future.

The problem was caused by the failure of the Ministry of the Environment as the administrator of state assets to analyse the sustainability of the management of state forests or to create a legal framework which would ensure sustainable management. In the process of drafting and amendment of legislation regulating forest management,

the Ministry of the Environment has not analysed its effect on the species structure and age structure of forests, cohesion of protected areas and habitats and sites of species of protected categories II and III outside protected areas. Allowed ages for clear cut have been repeatedly lowered and already now the forests cut are increasingly younger and smaller.

- Most commercial clear cuts are performed in better forest types (forest types on more fertile soils), i.e. in mesotrophic (dry boreal), meso-eutrophic (fresh boreal) and nemoral forests which account for approximately a half of state forest land. If the clear-cut practice is continued in state forests in the current volume, the areas of old stands will considerably decrease in these forests already in the next decade. Old spruce stands (90+) and old aspen stands (40+) of commercial forests, i.e. forests without management restrictions would cease to exist in less than 20 years, old birch stands (70+) in less than 30 years and old pine stands (100+) in less than 50 years. Considering the age distribution and species distribution of state forests and for the alleviation of excessive cuttings of earlier years, the annual area of clear cuts in dry boreal, fresh boreal and nemoral forests should be considerably reduced: in pine-dominated forests by approximately 30%, in spruce-dominated forests approximately 40–50%, in birch-dominated forests approximately 50% and in aspen-dominated forests approximately 70% of the area planned for 2010.
- There is no legal framework which would ensure the fulfilment of the objectives of stable forest use as formulated both in the Forest Policy and in the Forest Act. If the effective legislation allows people to earn income from forest management at the expense of the future and by damaging the ecosystem, it is also done. The Ministry of the Environment has not analysed the processes going on in forest management from the aspect of objectives of long-term use of state forests. Legislation regulating forest management should be amended to require taking into account different forest types and the locations of the forests cut in harvest planning. The amended set of rules on forest management should ensure that the area of old forests of different forest types is not reduced and the cohesion of the network of protected areas is not damaged as a result of management.
- Reasons for unsustainable forest management are also inherent in the nature of RMK which is a commercial agency interested in earning profits and in increasing the income earned. This creates a conflict of interests for RMK between the planning and performance of cutting on the one hand and the obligation to ensure the preservation of state assets on the other hand. As RMK is financially dependent on revenues earned from the cutting and sale of timber, such a conflict of interests sets the sustainable management and ecological condition of state forests at risk. If the cutting volumes in more fertile forest types are reduced to sustainable levels, the sales of RMK will considerably decrease. However, leaving the cutting volumes on the current level would imply continuation of unsustainable management, which will bring about even more severe problems in the future than there are now. Therefore the Ministry of the Environment will have to analyse the methods of state forest management and find an optimum solution for state forest management in the conditions of decreasing revenues that would ensure the sustainable use of state forests, preservation of

state assets, ecological stability and provision of public services. National Audit Office recommends to reorganise the current profit-making state agency into one or more government agencies or state enterprises in which earning revenues would be separated from other public duties related to state forests.

Reply of the Minister of the Environment: The Minister of the Environment did not agree to any conclusions of the audit and his position is that management of state forests in his area of government proceeds from the objectives of the Forest Policy and the Forest Development Plan approved by the Parliament and is sustainable.

Although according to the evaluation of the National Audit Office there will be no longer any old stands of better forest types (forest types on more fertile soils) after a few decades and stable forest use becomes impossible if such management practices are continued, the Minister of the Environment does not regard it possible to implement the recommendations of the National Audit Office. According to the evaluation of the Minister, following the recommendations would require changing the long-term development orientation stipulated in the Forest Policy. At the very moment the Minister also notes that the objective of the Estonian Forest Policy approved by the Parliament is to keep the average cutting volume within the limits which would ensure following the principle of stable use of forest resources .

Contents

Brief overview of the sector	Error! Bookmark not defined.
The current volume of clear cutting in state forests cannot be sustained in the long term	Error! Bookmark not defined.
Excessive clear cutting was performed in spruce stands already at the beginning of the period audited (2004–2009)	Error! Bookmark not defined.
Excessive clear cutting was started in superior pine stands in 2008	Error! Bookmark not defined.
In superior birch stands, clear cutting has been excessive during the entire period under review (2004–2009)	Error! Bookmark not defined.
In aspen stands, clear cutting has been excessive during the entire period under review (2004–2009)	Error! Bookmark not defined.
The proportion of clear cut areas and stands younger than 10 years is very high in state forests	Error! Bookmark not defined.
Unsustainable management of state forest has been caused by the inadequate work of the Ministry of the Environment and the nature of RMK	Error! Bookmark not defined.
Neither the Ministry of the Environment or any of its subunits has analysed the sustainability of the management of state forests	Error! Bookmark not defined.
Effective legislation does not exclude the management of forests at the expense of the future	Error! Bookmark not defined.
RMK is planning increasingly high annual revenues and cutting volumes without consideration for stable use of forests	Error! Bookmark not defined.
There is a conflict of interests between the current functions of RMK	Error! Bookmark not defined.
Recommendations of the National Audit Office and replies of the Minister of the Environment	Error! Bookmark not defined.
Characterisation of the audit	Error! Bookmark not defined.
Objective of the audit	Error! Bookmark not defined.
Criteria for making the evaluation and the methodology for simulation	Error! Bookmark not defined.
Earlier audits of the National Audit Office in the field of management of state forests	Error! Bookmark not defined.

Annex A: Site type groups	46
Annex B: Expert assessments of the methodology of the National Audit Office for the evaluation of the sustainability of cutting volumes	52
Annex C: Age distribution of commercial forests in state forests managed by RMK in 2006 and 2009 and in the future, if clear cuttings are performed in the volume planned for 2010	56
Annex D: Age distribution of state protection forests managed by RMK in 2006 and 2009 and in the future, if clear cuttings are performed in the volume planned for 2010	76
Annex E: Age distribution of state protected forests managed by RMK in 2006 and 2009 and in the future	96
Annex F: Age distribution of both managed and unmanaged state forests managed by RMK in 2006 and 2009 and in the future, if clear cuttings are performed in the volume planned for 2010	116
Annex G: Effect of lowering maturity ages on the calculation of the Annual Allowable Cut	136

Brief overview of the sector

Forests owned by the Republic of Estonia

1. Compared to most countries in the world, Estonia is very rich in forests according to the proportion of the forest area – a little more than a half of the Estonian land area is covered with forests, in total 2.2 mln ha. 40% of it is owned by the state, 43% is in private ownership and 17% of forests are growing on unlawfully expropriated land the ownership of which has not been determined yet (the so-called unreformed forests).¹ Although also unreformed, i.e. unreturned, unprivatised, uncommunalised and unnationalised lands are state lands, the forests growing on them are not actively managed and it makes no sense to evaluate the sustainability of management in these areas.

Regeneration cutting – cutting of an old forest and creation of preconditions for growing a new forest. Regeneration cutting can be clear-cut or shelterwood cutting. In the case of shelterwood cutting, old forest is cut in several stages within up to 10-40 years and young trees will start growing under the shelter of old trees.

2. Management of state forests is organised by the administrator of state forests. Forests owned by the Republic of Estonia predominantly belong to the area of government of the Ministry of the Environment². The optimum area allowed for annual **regeneration cutting** is established by the Minister of the Environment for each manager of state forests and separately for the areas of pine stands, spruce stands, birch stands and aspen stands cut according to the main species in the stand.

3. 815,000 ha, i.e. 37% of all Estonian forests are state forests in the area of government of the Ministry of the Environment and managed by the State Forest Management Centre (RMK). According to the Forest Act, a manager of state forests possesses all the rights of a forest owner arising from forest management and the manager shall perform all the duties imposed on the owner of forest by legislation. As most state forests are managed by RMK, this audit assessed only the management of forests managed by RMK (hereinafter: state forests).

Site type – forest area uniform by soil and flora, which is named after the most common plant. Site types which are similar by their soil composition and water regime are grouped into site type groups.

Main tree species – the economically most appropriate tree species considering the site conditions, composition and status. In most cases the main tree species is the majority tree species, i.e. the tree species with the highest total volume of stems as a proportion of the total volume of stems in the upper layer of the stand.

The economically most important forests are dry boreal, fresh boreal and nemoral forests

Forest types

4. According to the typology commonly used in Estonian forestry, there are ten main site type groups: alvar forests, heath forests, dry boreal forests (mesotrophic forests), fresh boreal forests (meso-eutrophic forests), nemoral forests, rich paludified forests, poor paludified forests, grass swamp forests, bog moss forests and full-drained peatland forests (see Annex A)³. A forest type is described according to its **site type** group and **main tree species**. As cutting is performed in different forest types, also the conditions for cutting and the quantity of timber and income earned from its sale will depend on it. On the other hand, different forest types are habitats and sites for different animal and plant species.

5. From the aspects of forest management, the most important type groups are mesotrophic or dry boreal, meso-eutrophic or fresh boreal and nemoral forests. In these forests the timber volume of mature stands are the largest and cutting of such forests is mostly most profitable. Due to the relatively dry ground the cuttings can be performed all the year round

¹ Adermann, V. 2008. Eesti metsad 2007. Metsavarude hinnang statistilisel valikmeetodil.

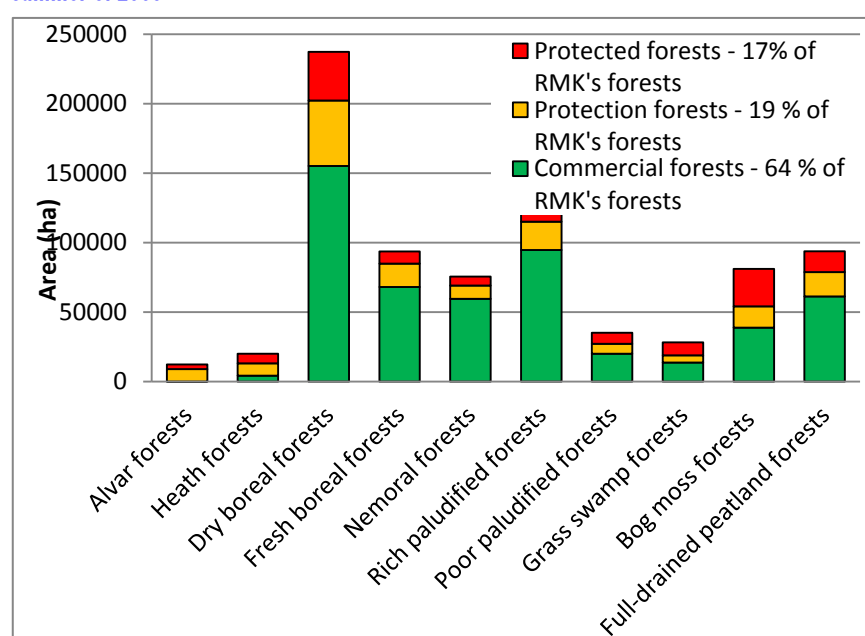
² Also the areas of government of the Ministry of Education and Research, Ministry of Agriculture and Ministry of Defence include state forests.

³ Lõhmus, E. 1984. Eesti metsakasvukohatüübid.

in such forests. In different peatland or paludified forests the cuttings can only be performed during cold winter and the income earned from cuttings is relatively low. Therefore the audit has mainly focused on dry boreal, fresh boreal and nemoral forests as the economically most important type groups.

6. Although with the Forest Act which became effective in 2007, forests are no longer divided into commercial forests, protection forests and protected forests, the National Audit Office has continued to use the concept of commercial forests in the meaning of forests with no management restrictions, protection forests in the meaning of managed zones of protected areas, i.e. forests with management restrictions, and protected forests in the meaning of unmanaged forests in order to draw better comparisons with previous years and allow better understanding. Also RMK has presented the information to the National Audit Office according to such classification.

Figure 1. Distribution of the state forests managed by RMK among site type groups in the summer of 2009



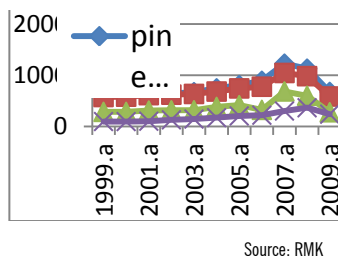
Source: RMK

Importance of old forests

7. Most income from forest management is earned from regeneration cuttings and the quantity of timber cut and the income earned largely depend on the age of the forest cut. If we exclude damaged forests, the rule of thumb is that the older are the forests cut, the higher income can be earned, as

- the timber quantity cut from old forests is higher;
- more logs, i.e. more expensive timber can be sold from older, i.e. thick and high trees than from younger trees.

Figure 2. Prices of pine timber in 1999–2009 (EEK/m³)



Old forests are irreplaceable for the ecosystem

Did you know that

at the beginning of the last century, 150-year-old and older forests accounted for 44% of the total forest area in Sweden but by now the proportion of 150-year-old and older forests is only 7%.

Source: www.borealforest.org

Older forests of up to 140 years currently account for ca 1% of the total forest land in Estonia.

Source: Eesti metsad 2007

Did you know that

In Finland, the estimated extinction debt of species which depend on old forests is approximately 1000 species.

Source: Hanski 2000

No research has been performed in Estonia in such a volume but we have the extinction debt as well.

8. Although the prices of firewood and smallwood have constantly risen in the recent years, the prices of large timber have always been considerably higher. According to the information published by RMK,⁴ the higher have been timber prices, the bigger has been the price spread between smallwood and large logs (see Figure 2). In some cases also clear cutting of young forests can be economically justified (e.g. for energy forests) but it depends on the specific situation in the market and other conditions. It is, however, not possible to forecast the exact demand for different types of timber in the society but there is no reason to believe that there will be no demand for full-sized timber. In many cases, for instance, in building log houses, large logs cannot be replaced with smallwood.

9. Higher cutting ages also require relatively less reforestation costs. The younger are the clear cut forests, the more frequently the clear cut areas have to be reforested and young forests improved. If clear cutting is performed, for instance, in forests which are 100 years old, the costs of reforestation and young forest improvement have to be born once every 100 years. But if clear cutting is performed, for instance, in forests which are 50 years old, the costs of reforestation and young forest improvement have to be born twice in the course of 100 years. Although also clear cutting of young forests yields an income from which the reforestation expenses can be paid, it is not possible to avoid the increase in long-term forest management costs caused by cutting younger forests.

10. From ecological aspects, constant existence of old forests is extremely important. Richness of life in forests depends on the age of forests as the aging of forests enables the appearance of elements which are characteristic of natural forests: standing dry trees, fallen stems overgrown with moss, hollow trees, etc. which are preconditions for the population diversity. Although not all forests which have attained maturity may be valuable for biodiversity, a decrease in the area of old forests usually leads to the deterioration of the ecological condition of forests.

11. Protected old forests fulfil nature conservation objectives effectively only if they have been joined into an ecological network. Protected areas are joined into a network by old stands in commercial forests, therefore also commercial forests have an important ecological role. As a consequence of the decrease in the area of old forests, the role of commercial forests decreases as a part of the green network, and the network of protected areas has to be considerably complemented to maintain its function.

12. If old forests are cut as a consequence of changes in land use or forest management, and communities of protected areas are turned into isolated „islands“, the isolated populations of many species may no longer be viable. In such a case these species are destined to dying out although they are still represented in protected areas (the so-called extinction debt). According to research results, due to the considerable decrease in and fragmentation of the area of habitats, the genetic diversity has decreased in communities where the richness in species has not yet

⁴ http://www.rmkk.ee/files/Metsamaterjali_hinnad_al_1999uus.xls

shown any signs of decrease, and this may be the first sign of the future disappearance of species⁵.

13. For instance, the habitats of the flying squirrel are old mixed forests with the majority of spruces and with old hollow aspens. Flying squirrels have a relatively settled way of life and their activities remain around their nest tree, therefore they spread very slowly. Open areas, including larger clear cut areas and very young stands are mostly insurmountable obstacles for a flying squirrel. The flying squirrel is deemed to be a declining species in Estonia, particularly due to the decrease in the number of appropriate habitats and the area of natural range⁶. Goshawk which also depends on old spruce stands was a common species in Estonia during the second half of last century. Its number remained stable in 1971–1990 but has by now decreased by a half, being similar to the number of the rare lesser spotted eagle. The decline in the number of goshawk is deemed to be caused by forest management, due to both the destruction of habitats and to damaging of the habitats of the species that goshawk feeds on (forest is the most important feeding ground for goshawk). The number of goshawks declined also in Scandinavia decades ago when forest management became more intensive but the decrease in its number in Estonia has been two or three times more dramatic than in Scandinavia⁷.

Did you know that

Estonian forests are the main habitat for 30% and a possible habitat for approximately 45% of the endangered species known to us.

Source: Klein, L. 2007. Elurikkuse kaitstus Eestis.

14. Protection of species has been organised in Estonia with the assumption that forests located outside protected areas are habitats and sites for the protected species. The Nature Conservation Act provides that in order to ensure a favourable status, the protection of at least 50 per cent of known habitats or sites of species of the protected category II (such as capercaillie, goshawk, white-backed woodpecker, etc.) shall be ensured by formation of protected areas and the protection of at least 10 per cent of known habitats or sites of species of the protected category III (e.g. wood ants, stock dove, Ural owl, etc.) shall be ensured by formation of protected areas. Thus the legislator has taken into account that protected species should have sufficient habitats also outside protected areas. If the area of old forests decreases outside protected areas, the situation of species of protected categories II and III which depend on old forests will considerably deteriorate and these species will become even more endangered. As young forests are less rich in species compared to old forests, the decrease in the area of old forests may set at risk also species that have not been placed under protection.

⁵ Helm, A., Oja, T., Saar, L., Takkis, K., Talve, T. & Pärtel, M. (2009) Human influence lowers plant genetic diversity in communities with extinction debt. *Journal of Ecology*, 97, 1329–1336.

⁶ <http://loodus.keskkonnainfo.ee/w5/index.php?option=loadarticle&task=view&contid=-551892899>

⁷ Nellis, R., Lelov, E. Kanakull vajab metsarahu. Eesti Loodus, märts 2005, lk-d 118–124; http://www.eoy.ee/projektid/al2006/EL_03-12.pdf

According to the evaluation of the Ministry of the Environment, 80% of key forest habitats in Estonia do not have a favourable status

Maturity age – theoretical age of a stand after which according to calculations the current increment of value (e.g. of timber volume or timber sales revenues) of a growing stand is lower than the average increment. In other words, the maturity age of a stand is the theoretical moment when planting a new forest would yield more value in the long term than letting the same forest grow longer.

On the basis of theoretical maturity ages the authorities establish administrative maturity ages, i.e. **cutting maturities**, which also serve as a basis for the calculation of the Annual Allowable Cut (ACC), i.e. annual area of regeneration cuttings.

15. Estonia as a EU Member State has taken the commitment of pursuing the objective of the Nature Directive, i.e. to ensure the favourable status of key habitat types and species in the whole country, i.e. not only in the protected areas. According to the report presented by the Ministry of the Environment to the European Commission, the status of 80% of Estonian key forest habitats is not favourable. The Natura 2000 network of protected areas is not sufficient in Estonia at present to ensure the fulfilment of the objective of the Nature Directive. Whereas the cohesion of the current network of protected areas, i.e. its functioning as an ecological network has not been analysed or evaluated yet.

Maturity age of forests

16. The terms **cutting maturity** and **maturity age** are used in forestry. There are several theoretically calculated maturity ages (volume maturity, price maturity, etc.). The estimated biological maturity age of trees is 250–500 years for the Norway spruce and 300–600 years for the Scots pine⁸. When talking about maturity age, mostly the price maturity or profit maturity is meant which both depend on the market prices of particular timber. As timber prices are constantly changing, neither price maturity nor profit maturity are absolute values. Whereas according to the methodology of calculation of both the price maturity and profit maturity, forests continue to grow revenues even decades after the attainment of the theoretical maturity age. By leaving the forest to grow, the forest owner reinvests its current selling price in order to sell the production at a higher price in the future.⁹

17. The maturity ages used for the determination of the forest stages and for the calculation of the Annual Allowable Cut have been changed to a considerable extent during the last decades. For instance, the maturity ages taken into use after Estonia regained its independence were 10...40 years lower than the ages which had been used to indicate maturity in the earlier decades. The maturity ages were changed last in 2006 with a Ministry of the Environment Regulation¹⁰, with which the maturity was reduced by 10...20 years again in comparison to the ages effective earlier¹¹ (see Table 1). This means that considerably younger forests are currently regarded as mature compared to the situation 4 years ago, when mature forests were already younger than 20 years ago. Or, in other words – clear cutting is performed in increasingly younger forests.

⁸ www.borealforests.org

⁹ Lõhmus, E. Metsatulu optimeerimine Eestis enamlevinud kasvukohatüüpide puistutes. Eesti Metsanduse ja Looduskaitse Instituut, Tartu, 1994.

¹⁰ Regulation No. 88 of the Minister of the Environment of 27.12.2006 Rules of Forest Management.

¹¹ Metsa korraldamise juhend. Keskkonnaministri 17.03.1999. a määrus nr 25.

Table 1. Maturity ages of the four main tree species according to stands with a main tree species and the quality classes (of sites) effective until the end of 2006 and since 2007

Main tree species	Ia (...2006/2007...)	I (...2006/2007...)	II (...2006/2007...)	III (...2006/2007...)	IV. (...2006/2007...)	V. (...2006/2007...)	Va (...2006/2007...)
pine	90/90	90/90	100/90	120/100	130/110	140/120	140/120
spruce	70/80	80/80	90/80	100/90	100/90	100/90	100/90
birch	60/60	70/60	70/70	80/70	70/70	70/70	70/70
aspen	50/30	50/40	50/40	50/50	50/50	50/–	50/–

Source: Minister of the Environment regulations

18. Different legislative acts and their recurrent amendment has made the concept of maturity more complicated as the age which allows regeneration cutting has not always been in conformity with the maturity age established. For instance, in 1993–2004 the legislative acts allowed and have allowed again from 2007 to perform regeneration cutting also before reaching the maturity age according to the maturity diameters of stands which have also been recurrently changed.

19. It is theoretically possible to find a maturity age for each particular stand which would yield maximum economic benefit from the cutting. Unfortunately it can only be done proceeding from known timber prices and forest management costs. As the future prices of different types of timber and costs of forest management are not known at present, it is not correct to say that the maturity ages or diameters calculated now would be optimal also decades from now. Besides, calculation of the maturity age does not take into account socio-economic or ecological effects of changes in the age distribution of forests and the resulting differences in cutting volumes.

20. The general rule is that if the area of old forests decreases, it is necessary to cut increasingly younger forests to maintain the cutting volumes and to obtain the same timber quantities, but since their resources in hectares are lower, the cutting will have to be performed on a larger area to obtain the same timber quantity. This in its turn will create a situation where middle-aged forests have less opportunities to grow old, therefore the area of old forests will decrease even more. Planning of forest management cannot only proceed from maturity age as a tool for maximisation of economic benefits from a particular stand but it requires taking into account many more circumstances and making compromises.

Did you know that

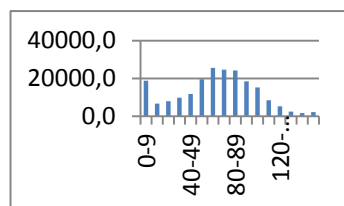
In 1987, the UN World Commission on Environment and Development (WCED), also known as the Brundtland Commission) prepared the report *Our Common Future* in which sustainable development was first defined:

„Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs“.

The current volume of clear cutting in state forests cannot be sustained in the long term

21. According to the internationally recognised definition, sustainable development is development which constantly ensures both the well-being of people and the ecological balance. The respective basic principle in forest management is constant and stable use of forests. This was set also as one of the forestry development goals in the Estonian forest policy

Figure 3. Age distribution of pine forests of RMK in commercial forests as of 2009 (ha)



Source: RMK

Did you know that

„Until 1961, harvest cuttings were performed in Estonia by exceeding the Annual Allowable Cut. This is one of the reasons for the abnormal age structure of our forests. /-/ Performance of additional cutting in the form of f ill-considered precuts cannot be allowed.“

Source: Tali järv, A. Metsanduse hetkeseisust. Eesti Mets, mai 1992

Aggregate statistics on state forests provide little information on the future cutting opportunities

in 1997¹². The principle of constant and stable forest use has been formulated, for instance, in the international FSC Forest Management Standard¹³ as the prohibition to exceed the level of harvest of forest products that could be sustained permanently. RMK has the FSC Certificate since 2002 and this implies that RMK has made the commitment to follow all requirements of the FSC standard.

22. The Forest Act provides that the owner of a forest is required to manage the forest only in such a way which does not endanger the forest as an ecosystem and which is in accordance with the principles of the sustainable use of forest. According to the forest planning guidelines¹⁴ the cutting volume of state forests has to be planned proceeding from the principle of stable use.

23. The precondition for the constant and stable use of forests, i.e. sustained maintenance of cutting volumes, is preservation of the same area of mature forests through the ages. Ideally, this would mean uniform age distribution of forests among all forest types. The age distribution of Estonian state forests is not uniform, however (see, for instance, Figure 3) as it has been influenced by the two wars of the last century and other reasons, therefore the areas of clear cuttings and reforestation have varied greatly during the different decades of the last 100 years. Therefore it is more complicated to ensure the principle of stable forest use than just cutting a similar timber quantity every year. For the sustainable management of forests it is necessary to plan cuttings and perform them in such a volume which would avoid a decrease in the area of old forests and make the age distribution of forests more uniform as a result of management.

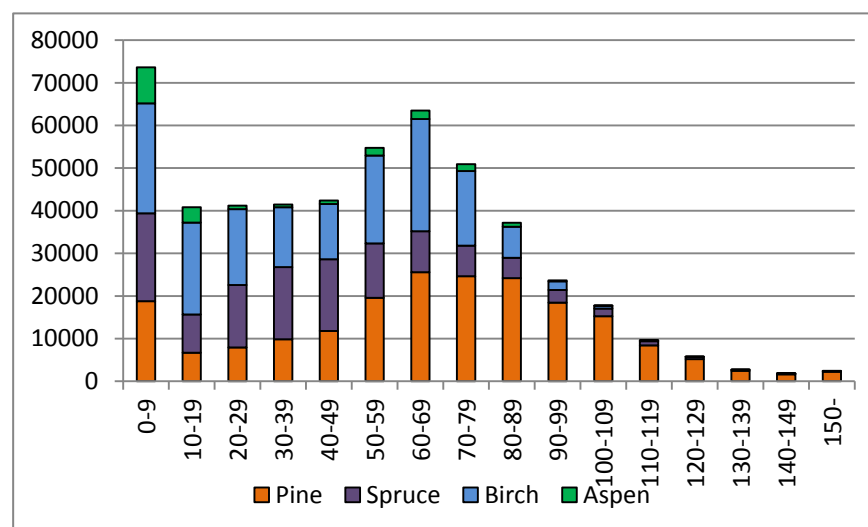
24. Even according to the aggregate statistics on state forests the distribution of forests by the main tree species and age is not uniform (see Figure 4) but presenting only general information makes a better impression of the situation of state forests as it actually is. Distribution of the area of forests by stands of different main tree species and by site types is even more uneven and the differences are mutually offsetting if areas of all forest types are presented together. The National Audit Office analysed forest management by forest types (see Annex B, C, D, E and F) as this reveals significant differences in forest management and in the preservation of the stability of ecosystems. Among other things, the age distribution of forest types means that in the case of unsustainable management, negative consequences appear at different times.

¹² Approval of the Estonian Forest Policy. Decision of Riigikogu on 11.06.1997; <https://www.riigiteataja.ee/ert/act.jsp?id=73663>

¹³ FSC Principles and Criteria for Forest Stewardship. http://www.fsc.org/fileadmin/web-data/public/document_center/international_FSC_policies/standards/FSC_STD_01_001_V4_0_EN_FSC_Principles_and_Criteria.pdf

¹⁴ Metsa korraldamise juhend. Keskkonnaministri 16.01.2009. a määrus nr 2.

Figure 4. Distribution of stands among age classes in forests without management restrictions, i.e. commercial forests managed by RMK as of 2009, by the four most common main tree species (ha)



Source: RMK

25. In order to evaluate the sustainability of the cutting activities of RMK, the National Audit Office simulated possible future scenarios for the development of the age structure of state forests of different forest types if RMK continues cutting in the same volume¹⁵. The simulation was based on the area of clear cutting performed in 2004, area of clear cutting performed in 2008, annual average areas of clear cutting calculated on the basis of areas of clear cutting performed in 2004–2008, and information on clear cuttings planned for 2009 and 2010. Relatively similar simulation results were obtained with the use of different cutting statistics. The report describes the simulation results which were based on the clear cutting areas planned for 2010, i.e. the most recent information. The simulation essentially consists of the deduction of the ten-fold annual area of clear cutting, i.e. theoretical result of 10 years of management, from the area of stands which have reached as a minimum the lowest age acceptable for clear cutting: in pine-dominated forests from the area of 90-year-old and older forests, in spruce-dominated forests from the area of 80-year-old and older forests, in birch-dominated forests from the area of 60-year-old and older forests, and in aspen-dominated forests from the area of 30-year-old and older forests. As the age which allows clear cutting depends on the quality class and is actually often higher than the lowest age described here which allows clear cutting (see Table 1), the model used shows the area of mature stands now and in the future somewhat larger than it actually is. According to the simulated management result, in 10 years from now, the area of stands which have attained the lowest age for allowing clear cutting (e.g. 90 years) or are older will be equal to the area of stands which are 10 years older than the lowest age for allowing clear cutting (e.g. 100 years or older). For instance, 10 years later the area of 90-year-old and older pine stands would equal to the area of 100-year-old and older pine stands. If the cutting volume of 10 years is higher than the area of stands which have

¹⁵ The methodology of simulation has been described in more detail in the audit characterisation (p. 40), and the more exact results of simulation have been presented in Annexes C, D, E and F to the report.

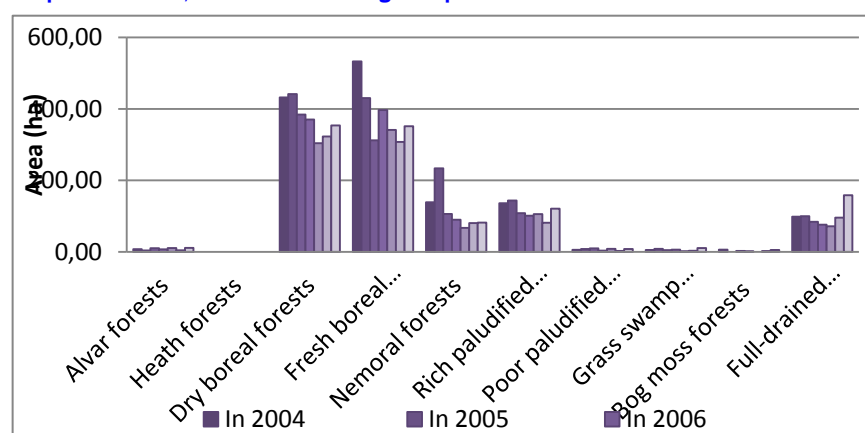
reached the lowest allowable age for clear cutting, the model shows the shortage of the area as a negative value.

Excessive clear cutting was performed in spruce stands already at the beginning of the period audited (2004–2009)

Spruce stands

26. According to the RMK cutting statistics, the average total volume of clear cuttings performed in spruce stands of both commercial and protected forests at the beginning of the period audited, i.e. in 2004–2005, was 1367 ha/a. In comparison, in 2004, RMK prepared the development plan for 2005–2008¹⁶ and indicated in it that the optimal total area of clear cutting in commercial and protection forests would be 1100 ha (see Table 3). Since 2006, annual areas of clear cutting in spruce stands have consistently decreased (see Figure 5).

Figure 5. Area of clear cuttings performed in state forests with spruce-dominated stands in the period audited, and the clear cutting area planned for 2010



Source: RMK

Maturity yield – area of mature stands divided to 10 years, i.e. stable annual area of clear cutting in the course of the next 10 years.

27. As a result of the analysis of the information entered in the Forest Register for 2006¹⁷ the National Audit Office made the conclusion that in 2006 there were no longer enough mature spruce stands in the forests managed by RMK to be able to perform clear cuttings in the volume planned in the Development Plan for 2005–2008. While the optimal area of regeneration cuttings to be performed in spruce stands of commercial forests was indicated as 1000 ha/a in the Development Plan, the **maturity yield** of spruce stands of commercial forests was 885 ha/a according to the information entered for 2006. The new optimal annual area of clear cuttings in spruce stands of commercial forests in the next RMK Development Plan for 2007–2010¹⁸ is 900 ha/a, i.e. 10% less than indicated in the previous development plan (see Table 3). This was despite the fact that new calculations were based on the lower maturity ages that became effective on 01.01.2007 compared to earlier ones¹⁹ (see Table 1).

¹⁶ RMK Development Plan 2005–2008. http://www.rmk.ee/files/arengukava_2005-2008.pdf

¹⁷ According to RMK, the first reliable overview of state forests was obtained in 2006. ;

¹⁸ RMK Development Plan for 2007–2010.

http://www.rmk.ee/files/RMK_arengukava_2007-2010.pdf

¹⁹ Although the maturity age of spruce stands of the Ia quality class increased, it did not have a significant effect as, for instance, according to the Forest Register information of

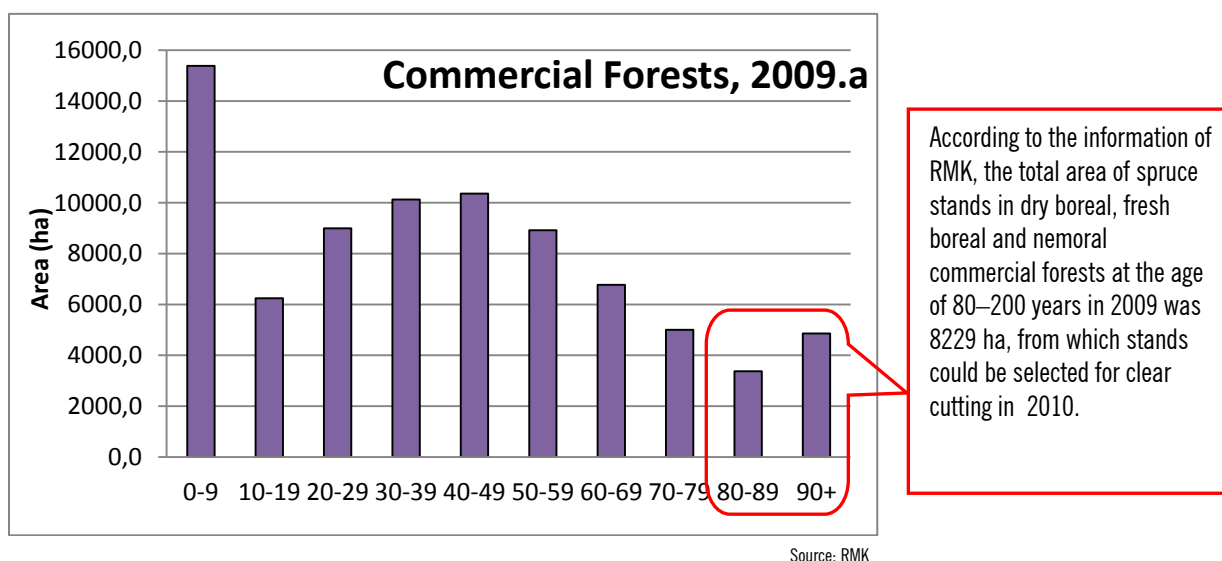
Even lowering of maturity ages did not make it possible to preserve the areas of clear cuttings in spruce stands

If the current management practices are continued, there will be no more old spruce stands in the better forest types of RMK commercial forests after 20 years from now

28. The critical reason for the reduction of clear cutting volumes is not placing forests under strict protection as the forests placed under protection had mostly been selected already years ago (areas of the Estonian Forest Conservation Area Network (EMKAV) by 2002 and NATURA 2000 network areas by 2004). According to the evaluation of the National Audit Office, the cutting volume of spruces was reduced because the cutting volumes planned for earlier years had considerably exceeded the level of sustainable use. Also the fact that the area of clear cutting of spruce stands began to decrease from 2006 shows that the cutting volume in spruce stands had been too high earlier to be able to maintain it permanently.

29. Although RMK has reduced the annual clear cutting area in spruce stands by 1/3 for 2009 in comparison with 2004, it is still too large and reduces potential cutting of fertile spruce stands. For instance, if clear cutting is continued in the volume planned by RMK for commercial forests in 2010²⁰, the total area of old spruce stands (90+) would be considerably smaller already in 10 years and in 20 years the problem would be even more important. The area of 80-year-old and older spruce stands (forests from among which the stands to be cut should be selected) in dry boreal, fresh boreal and nemoral forests would be 21% less in 2029 than it was in 2009 (see Figure 6 and 7).

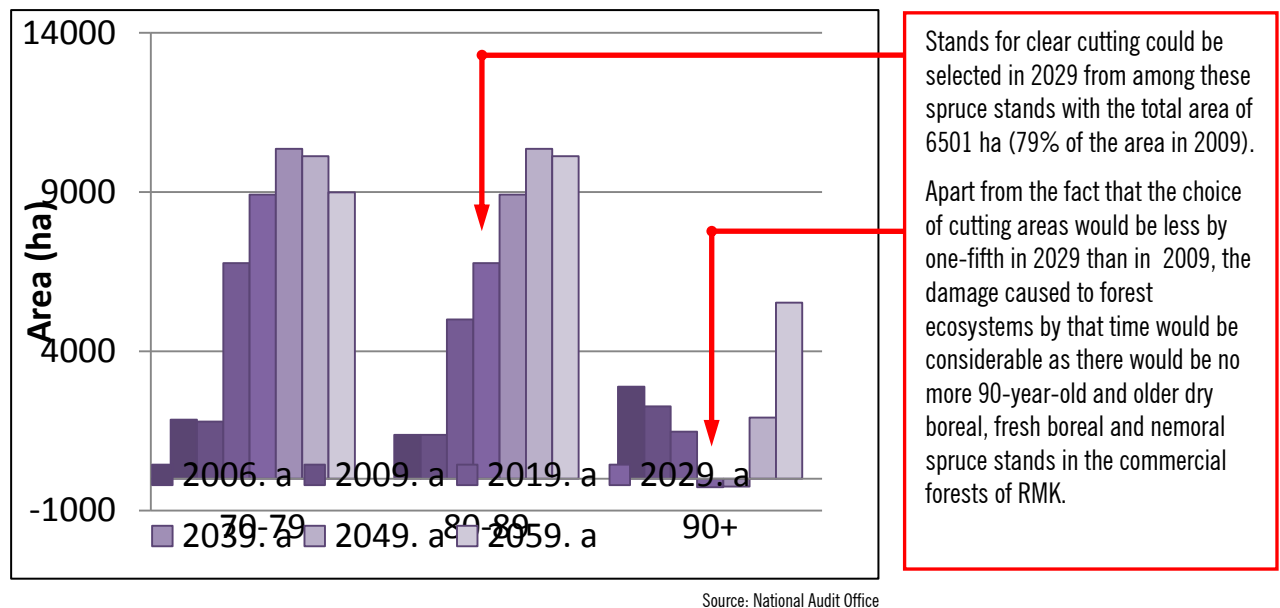
Figure 6. Area of spruce stands in dry boreal, fresh boreal and nemoral state owned commercial forests by age classes in 2009



2006, spruce stands of quality class Ia accounted for only 2% of the spruce stands of commercial forests of RMK.

²⁰ The simulation is based on cuttings planned in 2009 for 2010. The Supervisory Board of RMK approved the supplementary budget for 2010 on 09.04.2010, increasing timber sales and also the related cutting volume. Therefore the analysis performed in the audit has taken into account lower cutting volumes than those finally planned by RMK for 2010.

Figure 7. Possible area of spruce stands in dry boreal, fresh boreal and nemoral state owned commercial forests of older age classes in the course of the next 50 years if clear cuttings are constantly performed in the volume planned for 2010



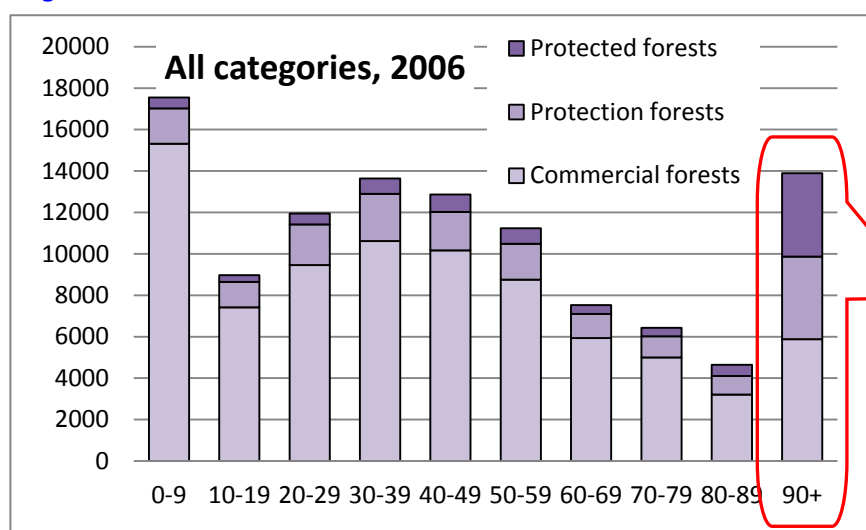
Stands for clear cutting could be selected in 2029 from among these spruce stands with the total area of 6501 ha (79% of the area in 2009).

Apart from the fact that the choice of cutting areas would be less by one-fifth in 2029 than in 2009, the damage caused to forest ecosystems by that time would be considerable as there would be no more 90-year-old and older dry boreal, fresh boreal and nemoral spruce stands in the commercial forests of RMK.

The ecological condition of old fertile spruce stands is deteriorating

30. By 2009 the area of old fertile spruce stands in state forests was already less than it had been in 2006 (Annexes C, D, E and F). If clear cutting in the spruce stands of commercial and protection forests is continued in the volume planned by RMK for 2010, the area of 90-year-old and older dry boreal, fresh boreal and nemoral spruce stands in both managed, i.e. commercial and protection state forests, and unmanaged, i.e. protected state forests would be 77% of their area in 2006 in 10 years from now and 68% of their area in 2006 in 20 years from now (see Figure 8 and 9; Annex C, D, E and F). This means that there will not be enough protected forests to balance the clear cuttings performed in managed forests to prevent the decrease in the total area of old fertile spruce stands. As there would be no more old spruce stands in fertile sites located outside protected areas if the current management practices are continued, the cohesion of protected areas and their functioning as an ecological network would considerably suffer.

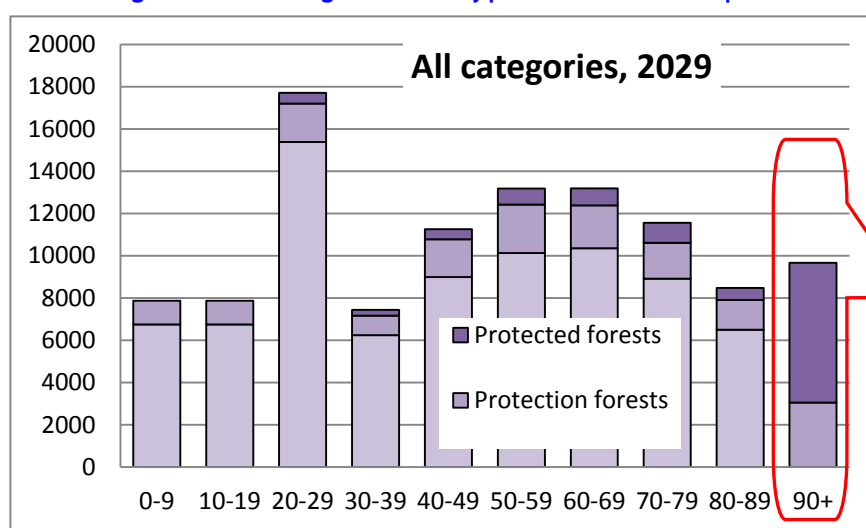
Figure 8. Total area of spruce stands in dry boreal, fresh boreal and nemoral state forests by age classes in all forest categories as of 2006 (ha)



Source: RMK

According to the statistics of the Forest Register the total area of spruce stands at the age of 90–200 years in dry boreal, fresh boreal and nemoral state forests in managed and unmanaged areas, i.e. in commercial, protection and protected forests as of 2006 was 13 893 ha.

Figure 9. Possible total area of spruce stands in dry boreal, fresh boreal and nemoral state forests in 2029 by age classes in all forest categories if clear cuttings are constantly performed in the volume planned for 2010 (ha)



Source: National Audit Office

If clear cuttings are consistently continued in the same volume as planned by RMK for 2010, the total area of both managed and unmanaged spruce stands in dry boreal, fresh boreal and nemoral 90-year-old and older state forests in 2029 would be 9398 ha, i.e. only 2/3 of the area in 2006.

As there would be no old spruce stands in commercial forests any more, the cohesion of protected areas would suffer.

31. During the second half of the last century (in 1950–1990) considerably more spruce stands were planted in state forests than in the earlier or subsequent decades. Therefore the current area of 20–59-year-old spruce stands is relatively large (see Figure 8). This means that in a few decades relatively many spruce stands will reach maturity. As these stands are often plantations which are poor in species, they do not play a particular role in ecosystems as natural habitats. It is very important for the preservation of ecological stability to avoid cutting old spruce stands rich in life in fertile site types within a few decades proceeding from the argument that relatively many middle-aged spruce stands are reaching maturity.

32. According to the evaluation of the National Audit Office, considering the age structure of spruce stands and for the alleviation of excessive cuttings of earlier years in spruce stands of dry boreal, fresh boreal and nemoral forests it would be necessary to reduce the area of

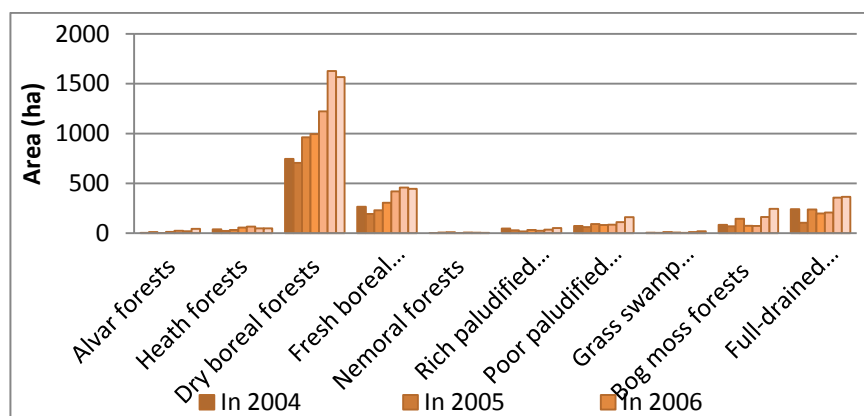
clear cuttings by approximately 40–50% in comparison with the plans for 2010. The cutting volume in better spruce stands (spruce stands on more fertile soils) will have to be less than now for 10 years as a minimum, after which it can be increased again when the current middle-aged spruce stands have become premature or mature and if spatial planning of forest landscapes and forest use is applied for the functioning of the network of conservation areas. In such a case it will be possible to make the age distribution of fertile spruce stands more uniform and progress towards stable forest use. Besides, it can ensure that the ecological status of fertile spruce stands will not deteriorate and maintain the possibility of functioning of protected areas as a coherent network.

Excessive clear cutting was started in superior pine stands in 2008.

Pine stands

33. At the same time when RMK reduced the areas of annual clear cuttings in better spruce stands (spruce stands on more fertile soils) (see Figure 5), the area of clear cuttings in pine stands of better type groups was considerably increased (see Figure 10). According to the explanations of RMK both the decrease in the cutting volume of spruce stands and the increase in the area of dry boreal and fresh boreal pine stands proceeded from economic considerations, which covered the stand ages allowed for cutting according to legislation, the influence of the weather on the performance of cutting, forest infrastructure, timber market and also several other factors. According to the evaluation of the National Audit Office, the explanation by RMK is misleading as there cannot be weather conditions or circumstances arising from infrastructure which would at the same time lead to a decrease in the cutting volume of spruce stands and an increase in the cutting volume of pine stands.

Figure 10. Area of clear cuttings performed in state forests with pine-dominated stands in the period audited, and the clear cutting area planned for 2010



Source: RMK

Stable use yield – total area of all stands divided by the average allowed age for cutting, to which 5 years have been added, i.e. stable annual area of clear cutting during the whole growth cycle of forests.

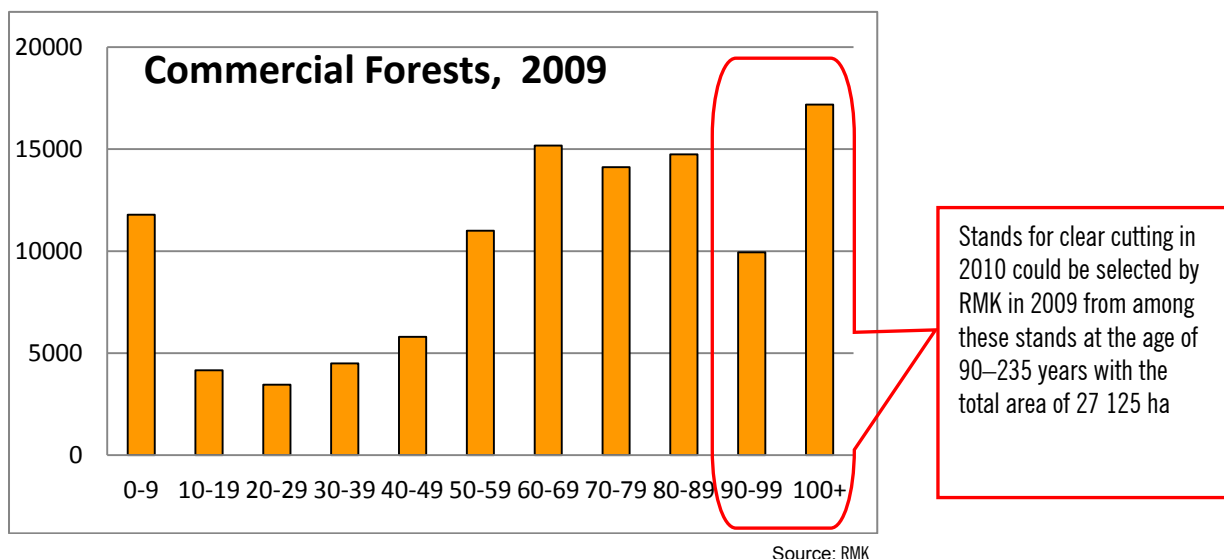
34. An additional opportunity for increasing the area of clear cutting in pine-dominated stands was created with the Minister of the Environment Regulation established at the end of 2006²¹, which reduced the age allowed for clear cutting of pine stands from the beginning of 2007 by 10–20 years in different quality classes (Table 1; Annex G). Such a reduction of cutting ages made mature a large number of pine stands which had been premature or middle-aged according to earlier criteria. As

²¹ Rules of Forest Management. Regulation No. 88 of the Minister of the Environment of 27.12.2006.

a result of this the estimated mature yield of pine stands was double the [stable use yield](#).

35. According to the analysis of the National Audit Office²², clear cuttings were performed in dry boreal and fresh boreal pine stands of state forests²³ from 2008 in the volume which cannot be permanently maintained. If, for instance, clear cuttings were consistently performed in the volume planned by RMK for commercial forests for 2010, the area of 90-year-old and older dry boreal and fresh boreal pine stands would be 11 % less after 10 years from now than in 2009. Mature dry boreal and fresh boreal pine stands would run out in commercial forests before 50 years from now as there will not be enough aging middle-aged forests to replace cutting of old forests (see Figure 11 and 12; Annex C). In reality the problems would appear within a much shorter term as the choice of cutting areas would also be limited by access to the forests to be cut and requirements to joining the areas.

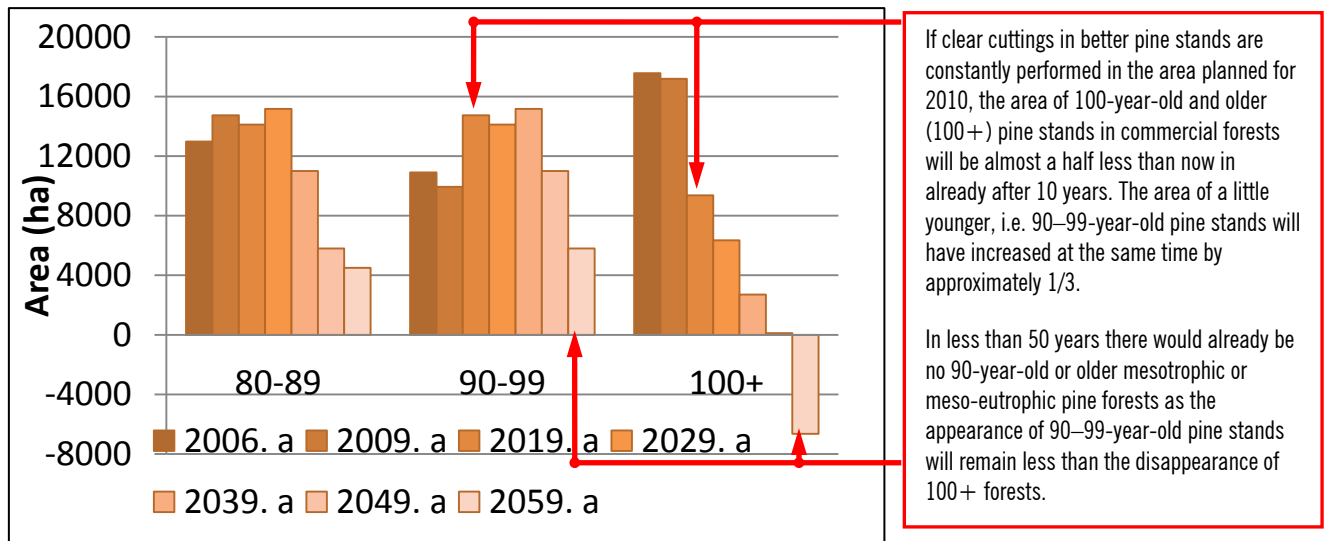
Figure 11. Area of dry boreal and fresh boreal pine stands in state commercial forests by age classes in 2009 (ha)



²² Methodology of simulation has been described in the audit characterisation (p. 40) and more specific results of simulation have been presented in the annexes to the report.

²³ As there are very few nemoral pine stands (according to the statistics of 2009 – 432.1 ha in the commercial state forests), they do not have a significant weight in the general management of state forests.

Figure 12. Possible area of dry boreal and fresh boreal pine stands in state commercial forests of older age classes in the next 50 years if clear cuttings are constantly performed in the volume planned for 2010 (ha)



Source: National Audit Office

36. As there are relatively many protected dry boreal pine stands in state forests (see Annex D and E), the clear cuttings of dry boreal pine stands in managed forests will probably not cause major ecological problems but the cohesion of protected areas and their functioning as an ecological network may suffer anyway.

The ecological condition of fresh boreal pine forests would gradually deteriorate

37. The situation of fresh boreal forests is much worse as they have been protected much less and the area of old fresh boreal pine stands would keep decreasing if the clear cutting were continued in the current volume (see Annex C, D, E and F). While, for instance, in 2009 the total area of 100-year-old and older fresh boreal pine stands in all forest categories was approximately 6800 ha, the continuation of clear cuttings in the volume planned for 2010 would reduce their area to approximately 5100 ha (75%) in 20 years and to just approximately 3000 ha (44%) in 40 years.

38. The age structure of dry boreal and fresh boreal forests shows (see Figure 11) that the areas of age classes of pine stands younger than 50 years are considerably smaller than the areas of older age classes. This means that fewer new pine stands have been planted since 1960 than in earlier decades because planting of spruces has been preferred (see Figure 6). On the other hand, there are relatively many pine stands planted or naturally grown in 1920–1950 (age classes 60–89). In interaction with the reduction of cutting ages such a situation leaves the impression that the area of mature stands and stands which are a few decades younger is substantial and not decreasing. In the short term there is a risk to plan clear cuttings in larger volumes than it would be sustainable even without violating legal provisions.

Rotation – time from clear cutting until the next clear cutting in the same area.

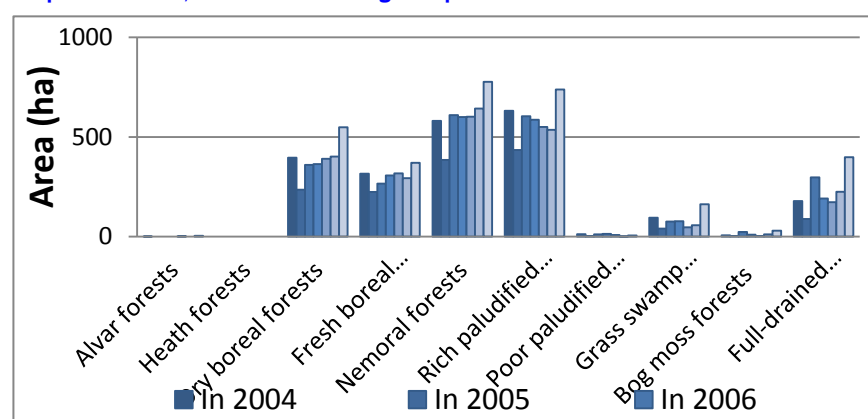
39. According to the evaluation of the National Audit Office, cuttings should be planned in the long term, i.e. to the extent of the full **rotation**. The planning should take into account the need to have mature stands also by the time when the pine stands with a relatively small total area which started to grow during the second half of the last century have reached the maturity. Considering the age structure of dry boreal and

fresh boreal pine stands, a sustainable annual clear cutting area would be at least 30% less than planned for 2010, i.e. not more than was planned for 2007.

Birch stands

40. Unlike in spruce stands or pine stands, the annual clear cutting areas in birch stands have been relatively stable (see Figure 13). The year 2005 was an exception when many salvage cuttings were made due to storm damage and when less clear cuttings were performed than usual in birch stands. However, it is evident that in the couple of last years the annual clear cut areas have somewhat increased in dry boreal and nemoral birch stands at the same time when the clear cutting areas in birch stands of rich paludified forests and in grass swamp forests (i.e. birch stands with periodical or permanent excessive moisture) have decreased.

Figure 13. Area of clear cuttings performed in state forests with birch-dominated stands in the period audited, and the clear cutting area planned for 2010



Source: RMK

In better types of birch stands, clear cutting has been excessive during the entire period under review (2004–2009)

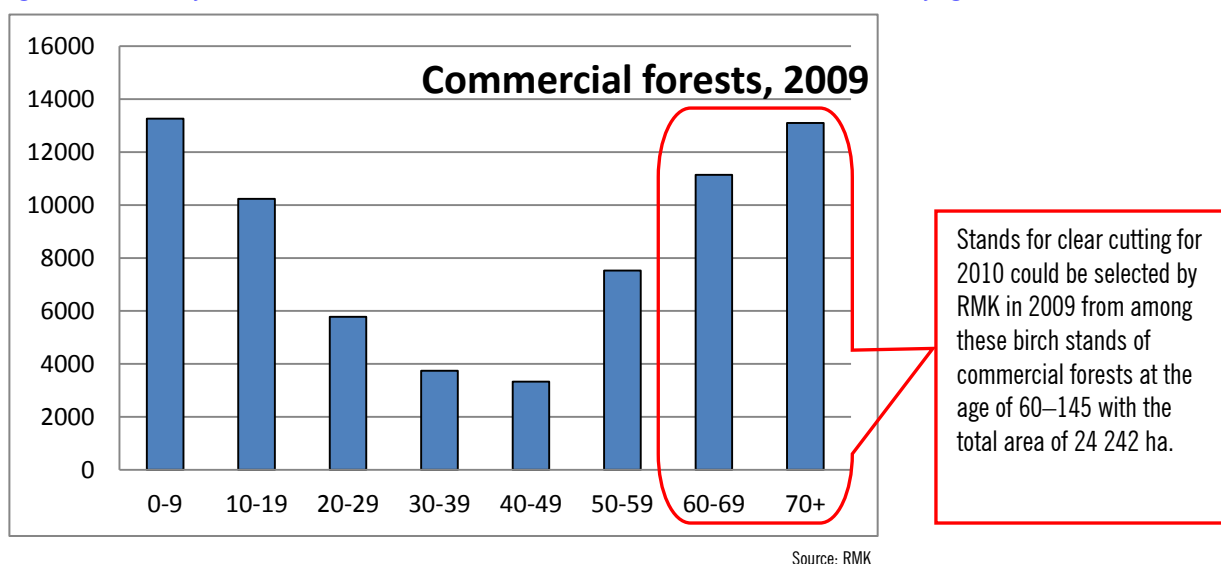
41. Also in birch stands the maturity ages were lowered with the Regulation of 2006 and therefore additional opportunities for clear cutting were created. Although the maturity age was lowered in only two quality classes by 10 years (see Table 1), the area of mature birch stands increased by 45% as a consequence. As a result, the estimated maturity yield of birch stands almost doubled from the level of the stable use yield.

42. Just like in the description of changes that have taken place in the cutting volumes of spruce stands and pine stands, RMK gave only general explanations about the circumstances related to the increase in the area of clear cuttings in dry boreal and nemoral forests and the decrease in the cutting volumes of rich paludified forests and grass swamp forests. According to the explanations of RMK, the reason lies in business considerations which take into account the allowed cutting ages of stands according to the legislation, the weather which allows to perform cuttings, forest infrastructure, timber market and also several other factors.

In less than 30 years all birch stands of fertile site types of RMK commercial forests would be younger than 50 years old

43. Through simulation of the continuation of current cutting practices²⁴ the National Audit Office reached the conclusion that clear cutting practices were sustainable only in birch stands of rich paludified forests and in 2005 in dry boreal and nemoral birch stands as it is not possible to maintain the clear cutting volumes performed in other forest types and in other years. For instance, if clear cuttings were constantly made in the volume planned for commercial forests for 2010, such management in the course of 10 years would lead to a decrease in the area of 60-year-old and older dry boreal, fresh boreal and nemoral birch stands in commercial forests to only 2/3 of their area in 2009, and there would already be no more 50-year-old and older birch stands in such type groups before 2039 (see Figure 14 and 15; Annex C). Although the lowest allowed age for clear cutting in birch stands is 60 years, the legislative acts allow performance of clear cutting also in younger stands if they have reached the maturity diameter²⁵.

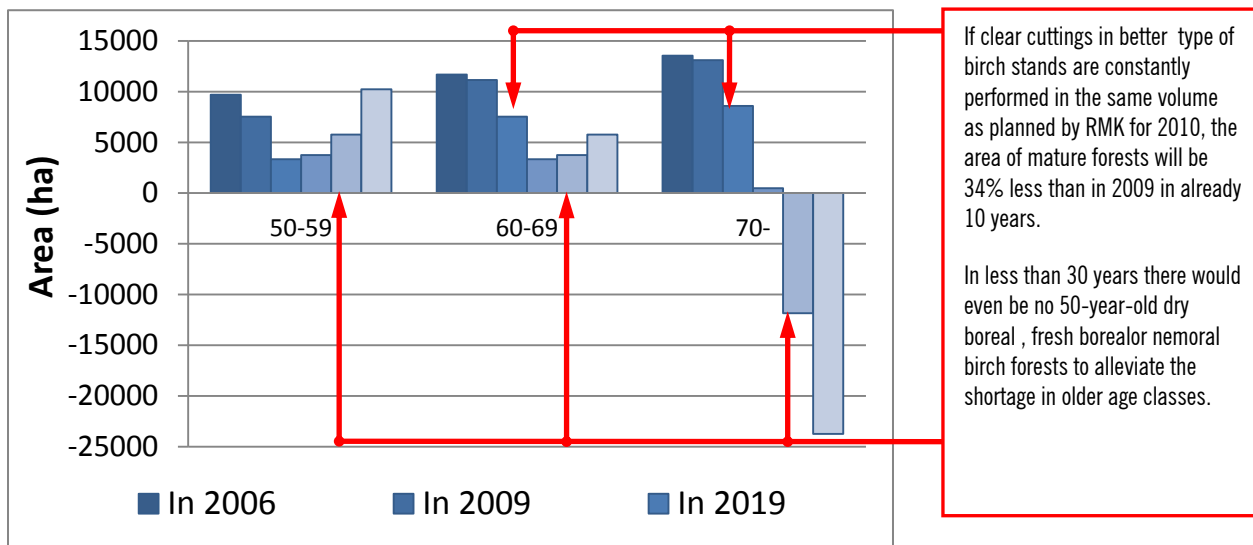
Figure 14. Area of dry boreal, fresh boreal and nemoral birch stands in state commercial forests by age classes in 2009 (ha)



²⁴ The simulation methodology has been described in the audit characterisation (p. 40) and the more detailed results of simulation have been presented in annexes to the report.

²⁵ Rules of Forest Management. Regulation No. 88 of the Minister of the Environment of 27.12.2006.

Figure 15. Possible area of birch stands in dry boreal, fresh boreal and nemoral forest types state commercial forests within the next 40 years in older age classes if clear cuttings are constantly performed in the volume planned for 2010 (ha)

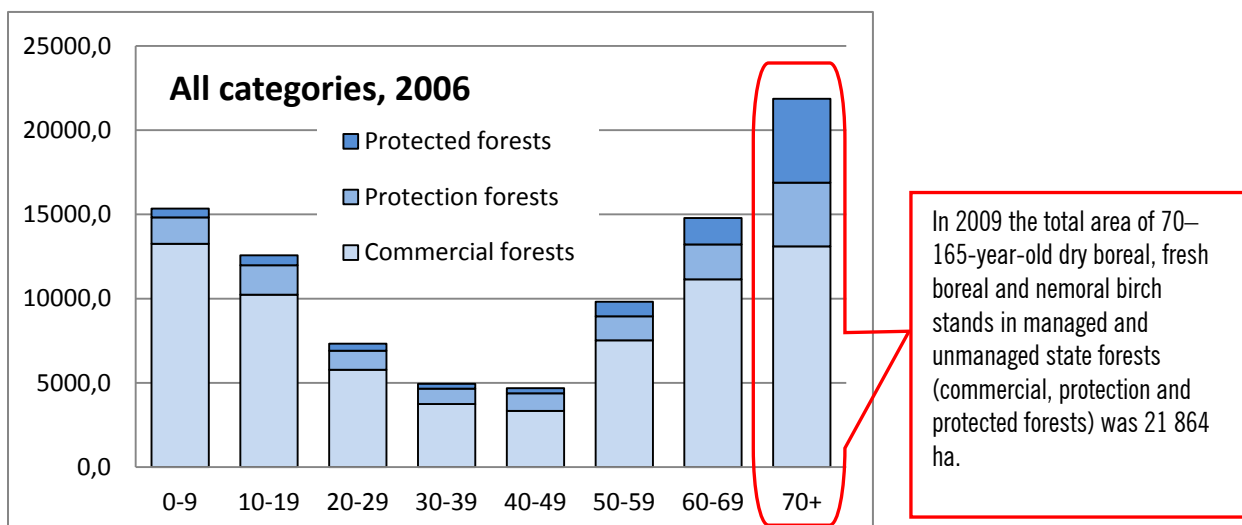


44. If to analyse the RMK information without taking into account forest types, the decrease in cutting possibilities in better birch stands is not so evident as the area of mature birch stands in rich paludified forests would constantly increase (see Figure 26 and 27; Annex C). But in birch stands in rich paludified forests the wet soil makes cutting difficult and the timber quantity and revenues from cutting are lower due to the lower quality class than in fertile site types.

Ecological stability of fertile birch stands is not maintained

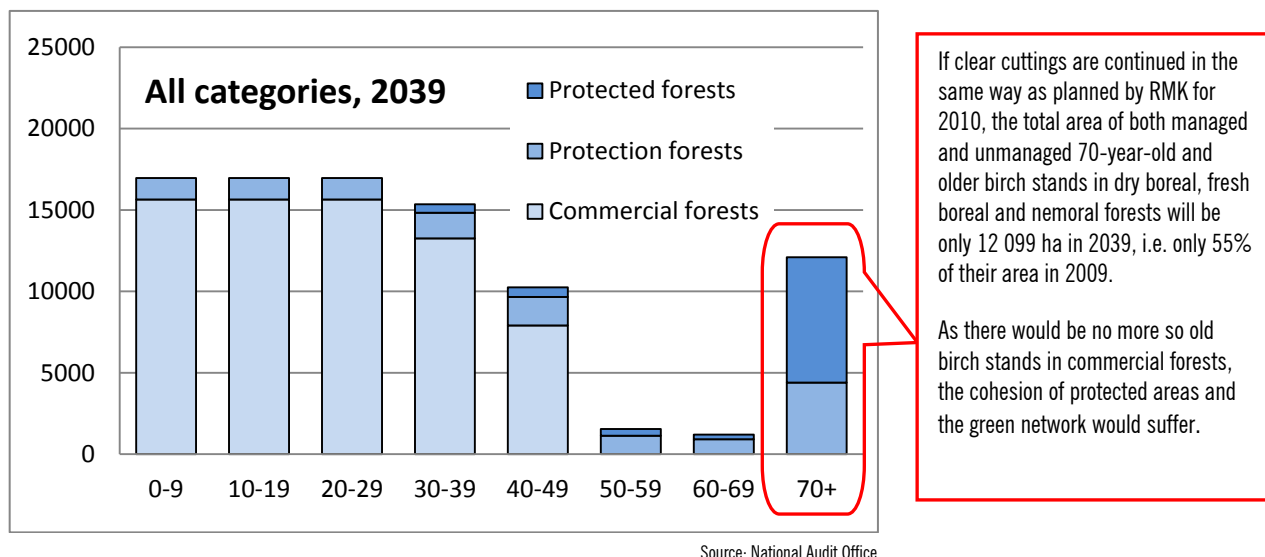
45. Cutting of better birch stands to such an extent would lead to considerable changes in forest ecosystems as the protected birch stands and their aging cannot compensate clear cutting. If clear cutting is continued in the same volume as was planned by RMK for 2010, the total area of both commercial and protected 70-year-old and older birch stands in dry boreal, fresh boreal and nemoral state forests in 10 years from now would be 90% of their area in 2009 and in 30 years from now 55% of their area in 2009 (see Figure 16 and 17; Annex C, D, E and F).

Figure 16. Area of dry boreal, fresh boreal and nemoral birch stands in state forests of all forest categories by age classes in 2009



Source: RMK

Figure 17. Possible total area of birch stands in dry boreal, fresh boreal and nemoral state forests in 2039 by age classes in all forest categories if clear cuttings are constantly performed in the volume planned for 2010.



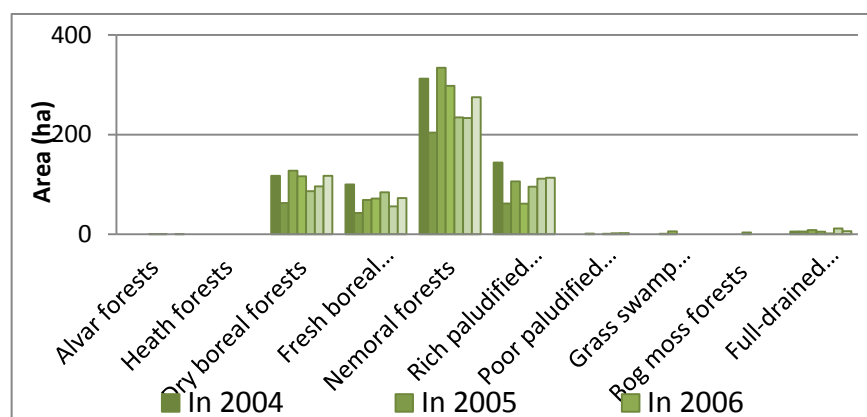
46. According to the evaluation of the National Audit Office, for the achievement of stable use considering the age distribution of birch stands and the need to alleviate the excessive cuttings performed in earlier years, it would now be necessary to reduce the area of clear cuttings in dry boreal, fresh boreal and nemoral birch stands by approximately 50% in comparison with the volumes planned for 2010, and in 10 years the clear cuttings should be reduced even more. At the same time it will be possible to perform clear cuttings in birch stands of rich paludified forests on an area which is 1/3 larger than the area cut in 2009 without reducing the area of old birch stands of rich paludified forests as a consequence of management.

Aspen stands

In aspen stands, clear cutting has been excessive during the entire period under review (2004–2009)

47. According to cuttings statistics presented by RMK (see Figure 18), clear cutting areas in dry boreal and nemoral aspen stands in the last couple of years and in fresh boreal aspen stands in 2009 have been smaller than they were in 2006–2007. Similar to the processes going on in birch stands, also cutting statistics on aspen stands demonstrate that in 2005, RMK worked on elimination of substantial storm damage and therefore the clear cutting areas in aspen stands were reduced. The new maturity ages which became effective since the beginning of 2007 and allowed clear cutting in aspen stands, were 10–20 years lower than the maturity ages which had been effective until the end of 2006 (see Table 1). So the performance of clear cuttings started in younger aspen stands but the cutting area decreased. At the same time the area of clear cuttings has been increased in aspen stands in rich paludified forests, i.e. in forests with periodic excessive moisture.

Figure 18. Area of clear cuttings performed in state forests with aspen-dominated stands in the period audited, and the clear cutting area planned for 2010



Source: RMK

48. Explanations of RMK are general also with respect to aspen stands: the increase in the area of dry boreal and fresh boreal aspen stands proceeded from economic considerations, which covered the stand ages allowed for cutting according to legislation, the influence of the weather on the performance of cutting, forest infrastructure, timber market and also several other factors.

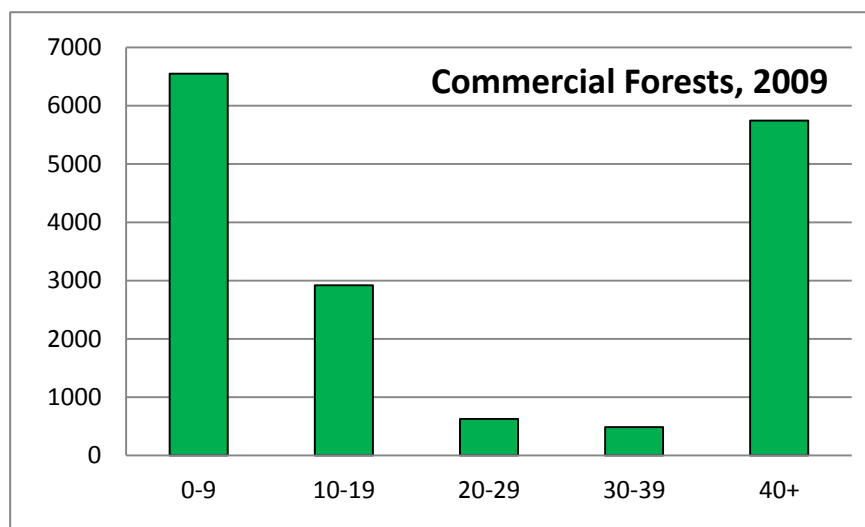
In more fertile aspen stands the cutting possibilities have decreased and will decrease even more with the continuation of similar management practices

49. The analysis of the National Audit Office²⁶ shows that clear cuttings performed in aspen stands were excessive in all type groups and that it will not be possible to permanently continue cuttings in such a volume. For instance, if clear cuttings are constantly performed in the volume planned by RMK for commercial forests for 2010, 10 years from now the area of 30-year-old and older aspen stands would only account for 41% of their area in 2009. While in 2009 the RMK commercial forests included in total 5746 ha of dry boreal, fresh boreal and nemoral aspen stands at the age of 40–140 years²⁷, there would be no more 40-year-old or older aspen stands in less than 20 years (see Figure 19 and 20, Annex C).

²⁶ The methodology of simulation has been described in more detail in the audit characterisation (p. 40), and the more exact results of simulation have been presented in annexes to the report.

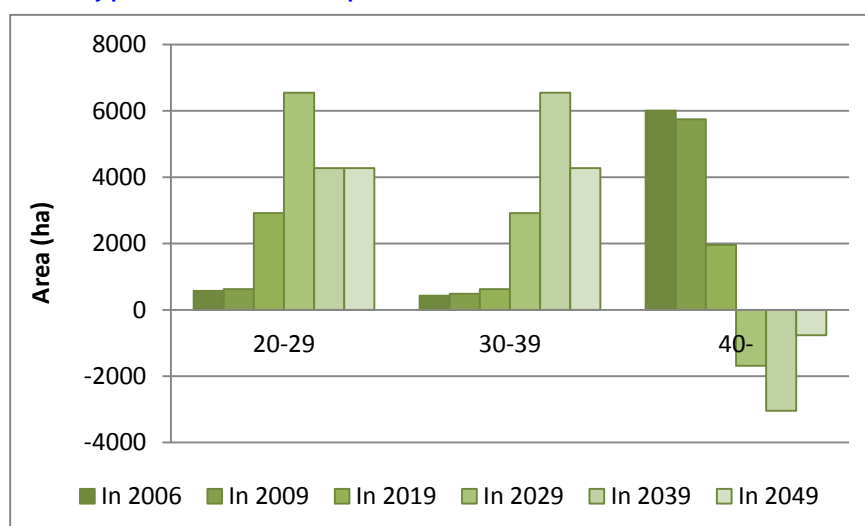
²⁷ Although the allowed age for clear cutting for Ia quality class is 30 years, there were in total only 18 ha of aspen stands with Ia quality class at the age of 30–39 years in the state commercial forests according to the RMK information of 2009.

Figure 19. Area of dry boreal, fresh boreal and nemoral aspen stands in state commercial forests by age classes in 2009 (ha)



Source: RMK

Figure 20. Possible area of aspen stands in dry boreal, fresh boreal and nemoral state commercial forests within the next 40 years in older age classes if clear cuttings are constantly performed in the volume planned for 2010 (ha)



Source: National Audit Office

50. While in 2009 the total area of 40–145-year-old dry boreal, fresh boreal and nemoral forests in all forest categories (incl. protected and protection forests) was 8560 ha, the constant continuation of clear cuttings in the volume planned for 2010 would reduce already in 10 years the area of 40-year-old and older aspen stands of the same type groups to 4507 ha, i.e. to only 53% of their area in 2009 (Annexes C, D, E and F). Similar to other forest types, the cutting of aspen stands in such a high volume will lead to changes in forest ecosystems as protected forests are not sufficient to balance the impact of clear cuttings performed in commercial forests.

51. According to the evaluation of the National Audit Office, considering the age structure of aspen stands and for the alleviation of excessive cuttings of earlier years in aspen stands, it would be necessary

to reduce the area of clear cuttings by approximately 70% in comparison with the plans for 2010.

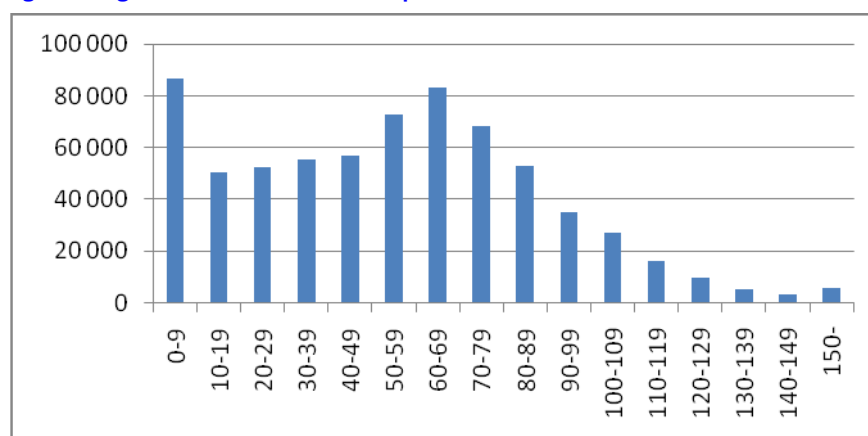
Clear cut areas

The proportion of clear cut areas and stands younger than 10 years is very high in state forests

52. Sustainable forest management should eventually lead to such age distribution of forests in which areas of all age classes are more or less equal. With skilful planning of cuttings it may be possible to achieve a uniform age distribution of forests.

53. It is evident when looking at the age distribution of state forests that the area of the youngest age class of 0–9 years, i.e. a clear cut areas and forests younger than 10 years, is very large compared to the area of the next age class (stands at the age of 10–19 years) (see Figures 4, 8, 11, 14 and 19). According to the information of RMK on 2009, clear cut areas and thickets younger than 10 years constitute 12% of the area of commercial and protection forests (see Figure 21). In commercial forests it is 14%, and in better forest types (dry boreal, fresh boreal and nemoral forests) even more, i.e. 17%. According to the explanation of RMK, the area of the age class of 0–9 years in the managed parts of state forests, i.e. in commercial and protection forests (clear cut areas and stands younger than 10 years) has appeared as a result of clear cuttings and subsequent reforestation of clear cut areas.

Figure 21. Age distribution of state owned protection forests and commercial forests (ha)



Source: RMK

54. This problem is more evident from the cutting statistics of RMK (see Table 2) which show that by the period audited (2004–2009) the areas of clear cutting performed in state forests have considerably decreased. This shows that in the initial years of RMK the clear cut areas were more than a quarter larger than now. Probably the volume of clear cutting in state forests was too high to maintain it permanently. Here we have to take into account the fact that clear cuttings have been performed both in commercial and protection forests, that the area of commercial forests has decreased and that cutting statistics do not take into account forest types.

Table 2. Area of clear cutting performed in state forests from 1999 to the summer of 2009

Year	Clear cut areas in state forests (ha)
1999	7363
2000	7529
2001	7414
2002	7871
2003	6737
2004	6176
2005	5091
2006	6318
2007	5757
2008	5870
2009 (I half-year)*	2412
total	68 538

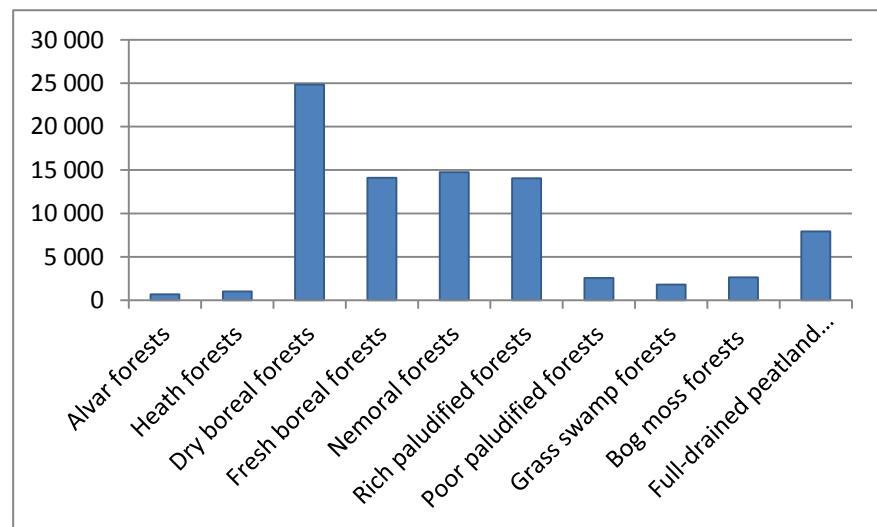
Source: Statistical Office; *RMK

Cuttings by RMK have changed the species and age structure of state forests

55. According to the information of the Statistical Office²⁸ and the cutting lists presented by RMK, the total area of clear cutting performed in state forests from 1999 to the summer of 2009 was 68 538 ha. According to the information of RMK, the total clear cut area and area of stands with age of up to 9 years in commercial and protection forests in the summer of 2009 (except young forests on old quarries) was 84 332 ha (see Figure 22), i.e. 23% more than the clear cut area in the last 10 years. In addition, the total clear cut area and area of stands with age of up to 9 years in protected forests, 4720 ha, where clear cuttings could be performed before placing these areas under strict protection. According to the evaluation of the National Audit Office, such a difference between the total clear cut area and area of stands with age of up to 9 years on the one hand and the clear cutting statistics published by the Statistical Office shows that either the actual clear cutting area was larger than the statistics presented on clear cuttings or that RMK had failed to reforestate a considerable part of areas clear cut before 1999.

²⁸ The Statistical Office obtained information on clear cuttings in state forests from the Centre of Forest Protection and Silviculture which got the information in its turn from RMK.

Figure 22. Total clear cut area and area of stands with age of up to 9 years in the state protection forests and commercial forests by type groups (ha)



Source: RMK

There are now less old forests in better forest types than in the initial years of RMK, and continuation of similar management practices will lead to further decreases

Closing of clear cut areas – no new clear cutting can be performed next to a clear cut area before a sufficient number of young trees have started to grow on the earlier clear cut area and the minimal closing time stipulated in the Forest Act has passed. Requirements for the closing of clear cut areas arise from the need to reduce paludification of clear cut areas and the risk of wind damage in forests adjoining the clear cut areas.

Minimal closing time in the case of regeneration with pine, spruce or hardwood (oak, ash, elm, white elm, maple) is 4 years and in other cases 2 years without including the cutting year in the closing period.

56. RMK essentially did not reply to the question about the reasons for the difference between the total clear cut area and area of stands with age of less than 10 years and the clear cutting area of the past 10 years as published by the Statistical Office, noting only that comparison of incomparable things makes no sense.

57. In conclusion we can state that the cuttings performed by RMK so far have altered the age structure of state forests which will be felt even in decades from now (see, for instance, Figures 9 and 20). Continuation of similar management practices would reduce the area of old stands in better forest types even more, reducing dramatically the timber quantities obtained from cutting in the next decades.

58. It should be taken into account that not all mature stands are equally accessible as they are at different distances from roads with a high load capacity, and some stands may be quite inaccessible with unfrozen ground. With the decreasing cutting opportunities, also requirements for **closing clear cut areas** are increasingly becoming an obstacle for performing clear cutting. Thus the decreasing choice of cutting sites leads to a decrease in revenues and increase in costs. Therefore it is necessary to take into account the fact that with the continuation of current state forest management practices the economic problems will appear sooner than within the terms presented in this audit.

59. Stability of the forest ecosystem cannot be ensured with current management practices as although the strictly protected forest land area was considerably increased at the turn of the century and during the first half of this decade, the aging of protected forests cannot alleviate the reduction of the area of old forests in managed forests. Also as a result of auditing the setting up of the Natura 2000 network in Estonia, the National Audit Office had reached the conclusion that the activities of the Ministry of the Environment will not ensure the preservation of the

favourable status of key forest habitats²⁹. With the continuation of current management practices the habitats and sites of protected species, which are located outside protected areas, would disappear from state forests as they depend on old stands of fertile site types and that would make these species much more endangered than now. In addition, the role of protected areas in the ecosystem will decrease as disappearance of old commercial forests or decrease in their area between protected areas will reduce the cohesion of protected areas (see also Annex B).

60. Recommendations of the National Audit Office to the Minister of the Environment:

- As the approver of annual optimal cutting volumes, the Minister should ensure sustainable management of state forests and preservation of their ecological balance. Therefore such annual cutting volumes in different forest types should be found which would not reduce every year the area of old stands as a consequence of cutting (the clear cut area would not exceed the area of increase in old stands due to aging of middle-aged stands). Considering the age distribution and species distribution of state forests and for the alleviation of excessive cuttings of earlier years, the annual area of clear cuttings in dry boreal, fresh boreal and nemoral forests should be considerably reduced: in spruce-dominated forests approximately 40–50%, in pine-dominated forests by approximately 30%, in birch-dominated forests approximately 50% and in aspen-dominated forests approximately 70% of the area planned for 2010.
- In the preparation of the National Forestry Development Plan an analysis should be made or ordered and the appropriate deadline should be set, considering the age distribution of state forests by forest types, by which time the clear cut area in state forests has to conform to the stable use yield. The National Forestry Development Plan should also describe the deadlines and the respective intermediate stages for essential indicators to be able to monitor the achievement of stable use in the management of state forests.

Reply of the Minister of the Environment: Implementation of the recommendations of the National Audit Office would assume changing of long-term development orientations approved by the Parliament, and therefore the Ministry of the Environment does not regard it possible to implement them.

²⁹ Protection of key forest habitats in the Natura 2000 network areas. Report of the National Audit Office to Riigikogu, 28.05.2008

Unsustainable management of state forest has been caused by the inadequate work of the Ministry of the Environment and the nature of RMK.

Duties of the Ministry of the Environment

61. One of the fields of activities of the Ministry of the Environment is the fulfilment of the duties related to the use of natural resources and the preparation of the related strategic documents and draft legislation³⁰.

62. The main duty of the Forest Department of the Ministry of the Environment is to organise the development and implementation of forestry policy, apply the principles of sustainable and efficient management of forests and to organise the application of principles of preservation of biodiversity in the protection of forests³¹. For that purpose the Forestry Department has to:

- organise the preparation and amendment of legislation and strategic documents;
- present proposals to the top level of the Ministry for the development and implementation of policies and to analyse the effectiveness of the results;
- monitor the fulfilment of the obligations of the manager of state forests arising from the Forest Act.

63. Also the Nature Conservation Department has to participate in the development and implementation of the national forest policy. In addition, the Nature Conservation Department has to:

- organise the fulfilment of obligations arising from conventions and international treaties and to coordinate the activities required for the implementation of the pan-European network of conservation areas (Natura 2000) in Estonia;
- coordinate the management of natural objects placed under state protection, also the management of protected species growing or living outside protected areas.

Neither the Ministry of the Environment or any of its subunits have analysed the sustainability of the management of state forests

Analysis of the management of state forests

64. RMK, Forest Department and Legal Department of the Ministry of the Environment and the Centre of Forest Protection and Silviculture (the current Environmental Information Centre) participate in the planning of cutting volumes of state forests and analyse the conformity of the proposal on cutting volumes with effective legislation and with the Forestry Development Plan.

³⁰ Statutes of the Ministry of the Environment. Regulation No. 437 of the Government of the Republic of 30.12.1999.

³¹ Status of the Forest Department. Annex 9 to Directive No. 1419 of 28.12.2006 of the Ministry of the Environment.

65. The problem is that the Forest Department of the Ministry of the Environment has not sufficiently analysed the activities of RMK in the management of state forests and has not evaluated the long-term impact of such management. The Forest Department of the Ministry has briefly evaluated the daily management activities of RMK. For instance, in the last overview of monitoring the activities of RMK, presented to the Minister of the Environment by the Forest Department in May 2009, a positive development pointed out was the fact that unlike in 2007, RMK had followed for all tree species the maximum clear cut areas allowed for 2008 with an order of the Government of the Republic and that in 2007 the maximum allowed clear cut areas were exceeded, for instance, in spruce stands by 11%. The Forest Department has not, however, analysed cuttings by better (forests on more fertile soil) and worse (forests on less fertile soil) type groups or the possibilities for maintaining cutting volumes on the same level. The Forest Department has noted the forest regeneration volume, which was the highest in 2008 after many years, as a positive achievement concerning reforestation of clear cut areas. It had, however, ignored the fact that RMK had planted trees, sowed tree seeds and contributed to natural regeneration on a smaller area than was the clear cut area. The Ministry has set up a system for checking the conformity of the planned cutting with the requirements of legislation which regulates cuttings but has not fulfilled its duty to check the fulfilment of the obligations of the state forest manager, arising from the Forest Act – that the management of state forests should not set ecosystems at risk and should conform to principles of the sustainable use of forests. The Nature Conservation Department of the Ministry of the Environment has not performed such an analysis either.

Annual Allowable Cut – annual area of regeneration cuttings determined with calculations based on the age structure and status of a forest.

66. The Ministry of the Environment explains in its replies to the National Audit Office that according to the Forestry Development Plan it is the duty of the Supervisory Board of RMK to determine the scope of economic activities of RMK, set annual measurable objectives and organise the monitoring of their fulfilment. The National Audit Office hereby points out that development of forest policy and approval of optimal cutting volumes of state forests are duties of the Minister of the Environment which cannot be fulfilled without analysing the management. In addition, the Ministry of the Environment notes that since 2008 the Centre of Forest Protection and Silviculture (the current Environmental Information Centre) also verifies the conformity of the Annual Allowable Cut calculated by RMK to the requirements of the legislation. The Ministry also refers to the overview prepared by the Forest Department concerning monitoring the activities of RMK as described in the section above. According to the evaluation of the National Audit Office this is not sufficient to ensure sustainable management as it does not bring out aspects which would require the amendment of legislation. For instance, the problem that as the effective legislation does not require taking into account different forest types, there is a risk of excessive cutting in better forest types, has not been identified yet.

Since 2004, RMK has prepared regular development plans only for four years

67. The Ministry of the Environment has also not sufficiently analysed the preparation of development plans by RMK and their frequent changes. Since 2004, RMK has prepared regular development plans for four years but has changed the development plans every two years, every time by increasing the optimal allowed clear cut areas (see Table 3).

While in the development plan for 2007–2010 one reason for increasing cutting volumes was lowering the ages allowed for clear cutting and the resulting increase in the area of mature forests, there have been no subsequent changes in criteria for allowed cutting. The National Audit Office is not aware of any objective reasons for the need to increase optimal areas for regeneration cutting in the development plan prepared for 2009–2012.

68. RMK in essence did not reply to the question of the National Audit Office about the reasons for increasing optimal areas for regeneration cutting in the development plan prepared for 2009–2012. RMK gave just a general reply that three main factors have the most important effect on the calculation of the Annual Allowable Cut: cutting age, maturing of stands and uncut Annual Allowable Cuts of earlier years.

Table 3. Optimal annual areas of Annual Allowable Cut (ha) indicated in the RMK development plans by stands of main tree species and forest categories

Main tree species	Development plan for 2005–2008 ³²			Development plan for 2007–2010 ³³			Development plan for 2009–2012 ³⁴		
	Commercial, i.e. managed forests	Protection forests, i.e. with managem. restrictions	total	Commercial, i.e. managed forests	Protection forests, i.e. with managem. restrictions	total	Commercial, i.e. managed forests	Protection forests, i.e. with managem. restrictions	total
Pine	1850	280	2130	2600	450	3050	2650	450	3100
Spruce	1000	120	1120	900	150	1050	950	200	1150
Birch	2600	190	2790	2700	250	2950	2850	290	3140
Aspen	650	40	690	500	50	550	550	60	610
Other	300	25	325	300	50	350	340	60	400
Total	6400	655	7055	7000	950	7950	7340	1060	8400

Source: RMK

69. The Ministry of the Environment does not explain in its reply to the National Audit Office in what manner and whether at all the Ministry pays any attention to changing the development plans by RMK and increasing the annual areas of regeneration cuttings in them. The Ministry just notes in general that the content of the RMK development plans is analysed by representatives of the Ministry in the Supervisory Board of RMK.

70. According to the evaluation of the National Audit Office, lack of analysis and frequent changes in the development plans refer to the lack of a clear long-term vision of the management of state forests and proceeding from just short-term considerations in the management. This is confirmed by the explanation of the Chairman of the Supervisory Board of RMK to the approval of the supplementary budget of 2010 that RMK had to increase cutting volumes due to the activation of the timber market³⁵.

Effective legislation does not exclude the management of forests at the expense of the future

Effect of legislation on forest management

71. The current legislation regulating forest management does not require taking into account forest types in the planning of regeneration cuttings. Also the national forestry statistics and the calculations made for forestry development plans concerning actual or possible cutting volumes are presented either as aggregates for all forests or only by stands of main forest species. For instance, the Ministry of the Environment has declared to the general public on several occasions in the recent years that the increment of forests exceeds cutting volumes and that there is no reason

³² RMK Development Plan for 2005–2008. http://www.rmke.ee/files/arengukava_2005-2008.pdf

³³ RMK Development Plan for 2007–2010. http://www.rmke.ee/files/RMK_arengukava_2007-2010.pdf

³⁴ RMK Development Plan for 2009–2012. <http://www.rmke.ee/files/RMK%20arengukava%202009-2012.pdf>

³⁵ RMK press release: RMK adopted the supplementary budget for 2010, 13.04.2010. <http://www.rmke.ee>

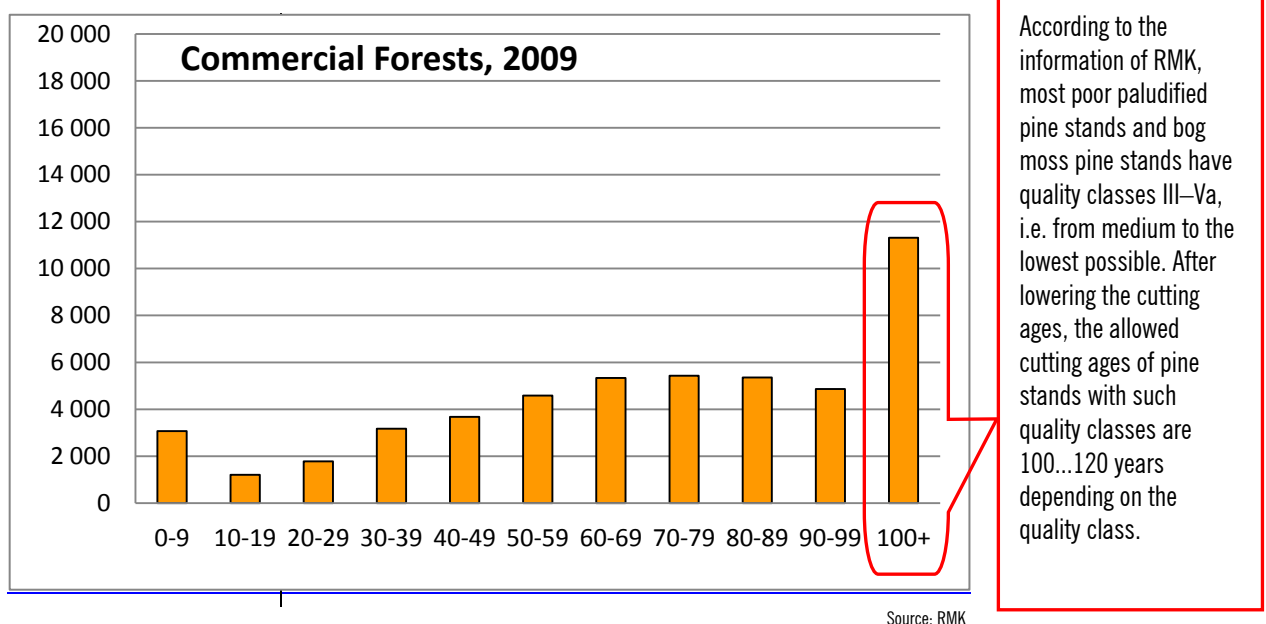
to be worried³⁶ and that the cutting volumes of the recent years have been less than optimal³⁷. Presentation of such aggregate statistics does not take into account the huge differences between forests both from economic and ecological aspects.

72. As according to the methodology for the calculation of the Annual Allowable Cut, stipulated in Management Planning Guidelines, the annual area of regeneration cuttings has to be calculated only by stands of the main tree species without taking into account different forest types, RMK does not take into account different forest types in the planning of cuttings. However, such an approach gives a distorted picture of actual cutting possibilities as different forest types do not have equal weights in the management of forests.

The effective Forest Act favours the decrease in the area of old forests in superior forest types at the same time as the area of old forests increases in inferior forests

73. It was shown in Chapter I that by continuation of the current management practices of RMK, e.g. the mature dry boreal and fresh boreal pine stands would run out in less than 50 years (see Figure 11 and 12). According to the methodology stipulated in legislation, this problem is not evident in the calculation of the Annual Allowable Cut as the decrease in the area of old forests of fertile site types is alleviated by the increase in the area of old forests of dwarf-shrub-sphagnum paludified pine stands and bog moss pine stands of low quality (see Figure 23 and 24). This means that every year inferior forests will take up an increasingly larger area of mature pine stands.

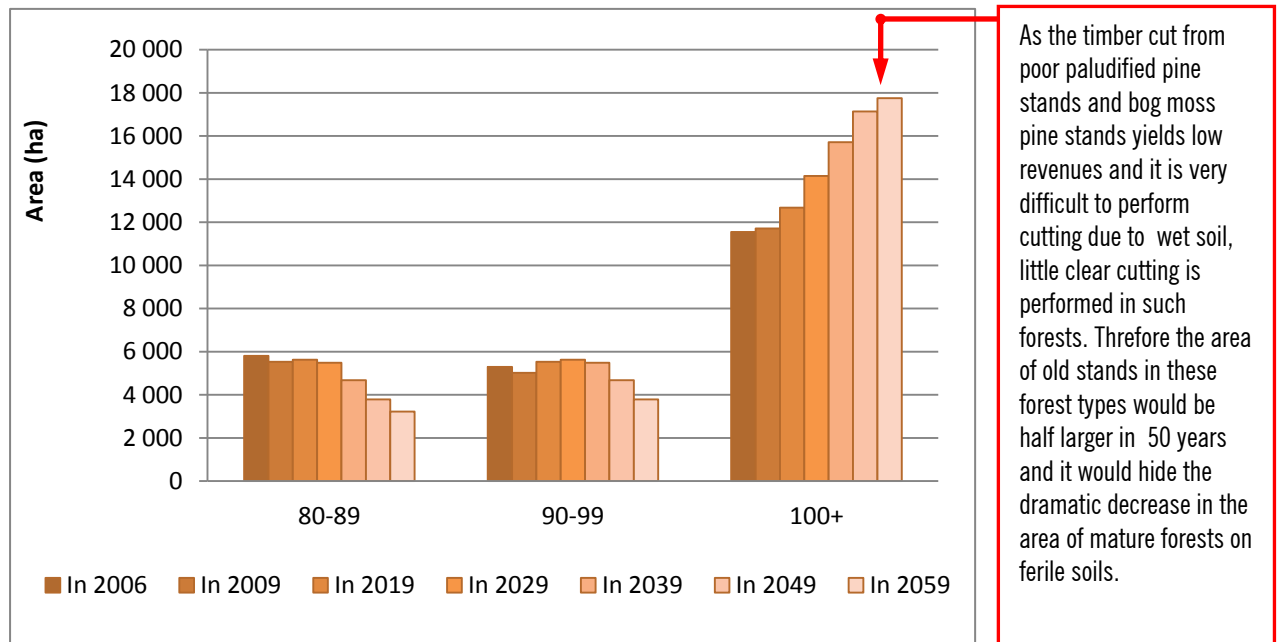
Figure 23. Area of poor paludified pine stands and bog moss pine stands in state commercial forests by age classes in 2009 (ha)



³⁶ Lamp, M. Kas Eesti metsade pärast peab tõepoolest murelik olema? Pärnu Postimees, 31.05.2008.

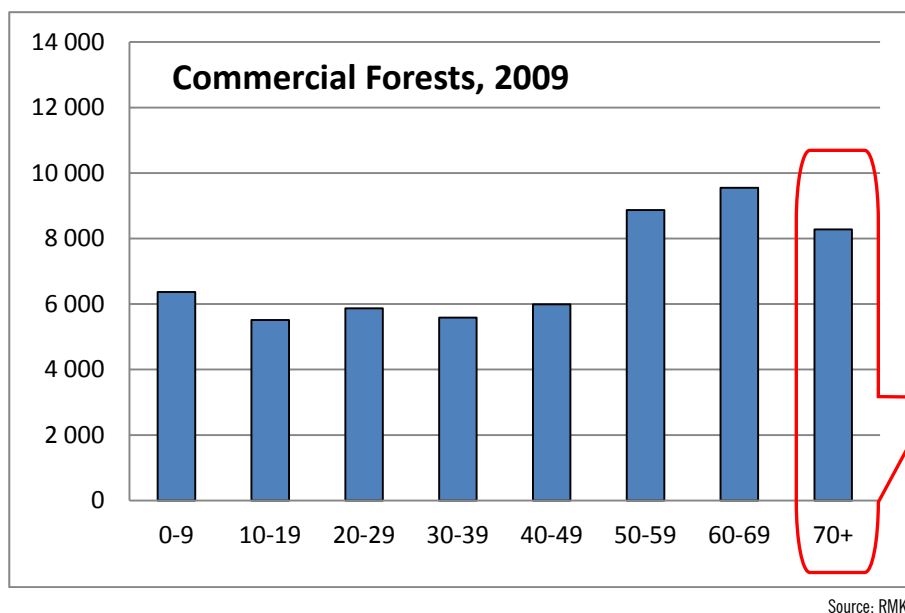
³⁷ „Metsaraie on jätkuvalt optimaalsest poole väiksem“. <http://www.maaleht.ee/news/mets/metsuudised/metsaraie-on-jatkuvalt-optimaalsest-poole-vaiksem.d?id=23970495>; „Eesti metsariik“ <http://www.envir.ee/375987>

Figure 24. Possible area of poor paludified pine stands and bog moss pine stands in state commercial forests within the next 50 years in older age classes if clear cuttings are constantly performed in the volume planned for 2010 (ha)

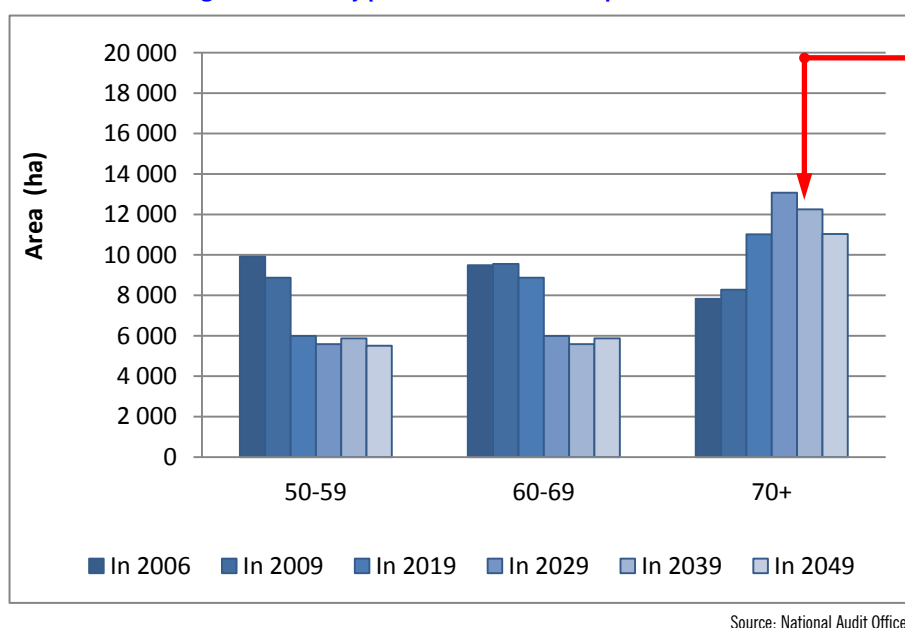


Source: National Audit Office

74. The situation with birch stands is similar. Although mature dry boreal, fresh boreal and nemoral forests would run out in RMK commercial forests in less than 30 years (see Figure 14 and 15), the application of the present methodology would alleviate the general impression as the area of old forests on less fertile soils – rich paludified forest – would increase (see Figure 25 and 26). As less birch stands of herb-rich mixed forests on wet gley soil would be cut compared to their aging and reaching maturity in commercial forests, and more birch stands of mesotrophic, meso-eutrophic and nemoral forests would be cut than such new forests can grow, with the continuation of the current management practices the forests growing on excessively moist soils would take up an increasing share of mature birch stands during the next decades. But clear cuttings in birch stands of herb-rich mixed forests on wet gley soil can only be performed in cold winters and they yield less timber than fertile birch stands.

Figure 25. Area of rich paludified birch stands in state commercial forests by age classes in 2009

According to the information of RMK, 87% of rich paludified birch stands belong to quality class II or lower where the minimum allowed age for clear cutting is 70 years. In 2009 the area of 70-year-old and older rich paludified birch stands was 8279 ha.

Figure 26. Possible area of rich paludified birch stands in state commercial forests within the next 40 years in older age classes if clear cuttings are constantly performed in the volume planned for 2010

As RMK is planning to cut relatively little of rich paludified birch stands which often grow on excessively wet soils, the area of old rich paludified birch stands would increase with the continuation of current management practices. As a result of management in the course of 30 years the area of 70-year-old and older rich paludified birch stands in commercial forests would be 12 254 ha, i.e. 48% more than in 2009. By that time the old birch stands in better forest types would have run out.

75. The Ministry of the Environment replied to the question of the National Audit Office about why legislation regulating forestry does not take into account different forest types that the Annual Allowable Cut methodology already ensures the sustainable use of forests. Since sustainability of the management of state forests has not been analysed, the Ministry had also no overview of the extent of the problem or the effect of legislation on the aggravation of the problem.

The area of mature forests was increased through lowering the maturity ages

76. Although National Forestry Policy describes that following the principle of stable use is ensured in state forests by the calculation of the Annual Allowable Cut, this is actually not the case. One of the results of lowering maturity ages is that a part of middle-aged and immature stands became mature overnight, which had a considerable effect on the results

of calculation of the Annual Allowable Cut and led further from following the principle of stable use (see also sections 27, 34, 41 and 47, also Annex G).

77. When lowering the maturity ages, the Ministry of the Environment failed to analyse its effect on the species structure and age structure of forests, on the cohesion of conservation areas and on the sites and habitats of species of protected categories II and III outside conservation areas.

78. Recommendations of the National Audit Office to the Minister of the Environment:

- To audit and analyse regularly the management of state forests every year before approval of cutting volumes for the next year, in order to ensure the fulfilment of the obligations of a forest owner, i.e. management without endangering the ecosystem and in accordance with the principles of the sustainable use of forests. To make public the results of the respective analyses.
- Legislation regulating forest management should be amended to require taking into account different forest types and the locations of the forests cut. The amended set of rules on forest management should ensure that the area of old forests of different forest types is not reduced and the cohesion of the network of protected areas is not damaged as a result of management.

Reply of the Minister of the Environment: Implementation of the recommendations of the National Audit Office would assume changing of long-term development orientations approved by the Parliament, and therefore the Ministry of the Environment does not regard it possible to implement them.

RMK as the manager of state forests

79. Until the end of last century the Ministry was in charge of and liable for the administration of state forests: before World War II the Ministry of Agriculture, during the years of occupation the Ministry of Forestry and Nature Conservation, and after regaining of independence the Ministry of the Environment. It was decided to make a change in principle with the Forest Policy approved in 1997: to set up an organisation for the management of state forests which would operate according to the rules of market economy and in the conditions of free competition.

80. With the Forest Act of 1998 the profit-making state agency State Forest Management Centre (RMK) was set up which started its activities on 1 January 1999. Setting up RMK caused serious disputes at that time. For instance, the Ministry of Justice did not agree to setting up a self-sufficient agency for the administration of state forests as according to both the Estonian Constitution and generally accepted principles in different countries all revenues and expenses of the state have to be

recorded in the state budget.³⁸ The Ministry of Justice approved the Draft Forest Act prepared in 1998 on the condition that the following comment is taken into account: "We certainly cannot agree to setting up a profit-making state agency as the monitoring and auditing functions of the state have to be kept separate from commercial activities. Management of state forests as a commercial activity has to be delegated to the private legal entity set up by the state but the forest itself surely cannot be delivered to such a legal entity"³⁹. The Ministry of the Environment and the Parliament did not take that into account – the Forest Act provided setting up a self-sufficient profit-making state agency with commercial activities to which rights of the owner of state forests included in the area of government of the Ministry of the Environment were transferred.

81. For the definition of RMK the concept of profit-making state agency was introduced which was an unprecedented term in the Estonian legal area, and RMK is the only legal entity of this type in Estonia, being more similar to a company. RMK has to earn income with its economic activities to cover forest management costs ensure the fulfilment of public functions imposed on state forests (see Table 4). While the budgets of other state agencies are prepared as a part of the state budget and the Parliament approves them annually with the State Budget Act, the expenses of RMK are covered from the budget prepared by the Management Board of RMK and approved by the Supervisory Board of RMK.

82. Although RMK operates in the area of government of the Ministry of the Environment, its highest management body is the Supervisory Board of RMK the membership of which is approved by the Government of the Republic. The Supervisory Board of RMK plans the activities of RMK, organises the management of RMK and supervises the activities of the Management Board. The Supervisory Board consists of 2 members nominated with a decision of the Parliament, 2 representatives of the Ministry of the Environment, 1 representative of the Ministry of Economic Affairs and Communications, 1 representative of the Ministry of Finance and 3 experts according to the proposal of the Minister of the Environment.

83. Although the sales of RMK have increased from year to year, the proportion of forest revenues paid to the state budget from the sales of RMK has decreased in the recent years (see Table 4). 2009 was an exceptional year when timber prices were considerably lower than earlier and when the state took out more of the accumulated profit of RMK than it would be permanently possible in the course of annual management of RMK in order to maintain the balance of the state budget.

³⁸ Etverk, I. Taasiseseisvunud Eesti metsapoliitika ja -seadusandluse kujunemine (aastani 2005). 2005.

³⁹ Letter of the Ministry of Justice of 10.06.1998 to the Ministry of the Environment, No. 3-2/809.

Table 4. Sales and profits of RMK and the forest revenue paid to the state budget (billion EEK)

	2002	2003	2004	2005	2006	2007	2008	2009
Income from sales of RMK	0.931	0.950	0.978	1.107	1.127	1.595	1.669	1.251
Profit of RMK	0.080	0.095	0.095	0.136	0.033	0.385	0.111	0.149
Forest revenue paid to the state budget and their proportion from the sales of RMK	0.172 (18.5%)	0.174 (18.3%)	0.179 (18.3%)	0.178 (16.1%)	0.199 (17.7%)	0.228 (14.3%)	0.216 (12.9%)	0.680 (54.3%)

Source: RMK

RMK is planning increasingly higher annual revenues and cutting volumes without consideration for stable use of forest products

84. Comparison of the development plans approved by the Supervisory Board of RMK (see Table 5) shows estimated increases in the sales and profits. Also the area of optimal cutting volumes has been increased in the next development plans (see Table 3). At the same time the forest revenues paid to the state budget have not increased in the same volume as the sales and profits forecast.

85. On 09.04.2010 the Supervisory Board of RMK approved its supplementary budget for 2010 with which it planned to increase the cutting and sales volume of state forests to 2.8 million cubic metres, earn 1.7 billion kroons of sales revenue and the profit of 0.21 billion kroons. According to the Chairman of the Supervisory Board of RMK, the need for the supplementary budget arose in connection with the activation of the timber market and the opportunity to take more timber into use⁴⁰.

Table 5. The estimated sales and profits of RMK and the forest revenue paid to the state budget according to the development plans prepared at different times (billion EEK)

Sales/ profits/ revenue to the state budget	2005	2006	2007	2008	2009	2010	2011	2012
Development plan prepared in 2004 for 2005–2008	1.059/ 0.086/ 0.194	1.087/ 0.045/ 0.195	1.145/ 0.035/ 0.201	1.245/ 0.040/ 0.204				
Development plan prepared in 2006 for 2007–2010			1.269/ 0.073/ 0.161	1.489/ 0.091/ 0.202	1.606/ 0.073/ 0.215	1.729/ 0.055/ 0.229		
Development plan prepared in 2008 for 2009–2012				1.800/ 0.202/ 0.275	2.000/ 0.243/ 0.275	2.050/ 0.221/ 0.275	2.150/ 0.246/ 0.275	2.250/ 0.265/ 0.275

Source: RMK

86. The reply of RMK to the question of the National Audit Office about why the Management Board of RMK had prepared and presented to the Supervisory Board of RMK for approval the development plans in which the estimated annual sales and profits increased both during the period of the development plan and when comparing different development plans, was that the sales increase above all when timber prices increase. If the latter increase faster than the prices of outsourced

⁴⁰ RMK press release: RMK adopted its supplementary budget for 2010, 13.04.2010. <http://www.rmke.ee>

services, the profits increase. In the recent years the profit also increased due to the more efficient work procedures of RMK.

There is a conflict of interests between the current functions of RMK

87. According to the evaluation of the National Audit Office, the explanation of RMK is misleading as RMK did not mention in its reply that in parallel with the increase in sales and profits it is also planned to increase cutting volumes in the development plans. The National Audit Office notes that there is no reason to assume a constant increase in timber prices. RMK replied to the question of the National Audit Office about how such an increase in sales and profits conforms to the observance of the principle of stable forest use that profits and sales are not related to stable use as they primarily depend on the prices of goods and services bought.

88. The National Audit Office sees a conflict of interests between the current functions of RMK as RMK prepares and approves its budget, performs physical inventories of state forests, plans cuttings, organises cuttings, keeps account of these and also sells timber for which the money is paid to the account of RMK. In other words – RMK plans and performs itself the cuttings which its revenues depend upon, therefore RMK is interested in the maximisation of cutting volumes. As RMK is financially dependent on revenues earned from the cutting and sale of timber, such a mixture of interests sets the sustainable management and ecological condition of state forests at risk.

89. The National Audit Office pointed out the conflict of interests already in the audit published in 2007⁴¹. Having now analysed the sustainability of the management practices of RMK, the National Audit Office has reached the conclusion that the risks referred to in last audit have become a reality and that the current management of state forests is not sustainable.

90. Although formally the management of state forests has been well considered and includes many auditing levels, it has actually not ensured the sustainability of management. Only conformity with the legislation is verified but this does not ensure the fulfilment of the objectives set in forest policy. Therefore the position of the National Audit Office is that in addition to specification of the legal framework also the conflict of interests should be removed from the management of state forests: the state assets should be preserved and revenues should be earned from the sale of these state assets.

91. If the cutting volumes for more fertile forest types (better forests) are reduced to sustainable levels, the sales of RMK will considerably decrease. However, leaving the cutting volumes on the current level would imply continuation of unsustainable management, which will bring about even more severe problems in the future than there are now. Therefore the state has to find an optimal solution for the management of state forests in the conditions of decreasing revenues, in order to ensure both the sustainable use of forests and provision of public services.

⁴¹ Planning of cuttings by the State Forest Management Centre. Audit Report No. OSIV-2-1.4/07/82-2 (21.09.2007).

92. The National Audit Office reached the conclusion in the audit that the management of state forests has been unsustainable as the Ministry of the Environment as the representative of the forest owner has not analysed the processes going on in forest economy proceeding from long-term goals of the use of state forests. There is no legal framework which would ensure the fulfilment of the objectives of stable forest use as formulated both in the Forest Policy and in the Forest Act. On the other hand, reasons for unsustainable forest management are also inherent in the nature of RMK which is a commercial agency interested in earning profits and in increasing the income earned. If the current legislation allows to earn income from forest management at the expense of the future and by damaging the ecosystem, it is also done.

93. Recommendations of the National Audit Office to the Minister of the Environment: To change the operation of the organisation in charge of management of state forests to prevent a conflict of interests between earning revenues and preservation of state assets, stable use of forest resources and ensuring ecological stability. To analyse and find more appropriate ways for the management of state forests in the conditions of decreasing revenues, considering both the economic and ecological aspects. The National Audit Office recommends for the solution of the conflict of interests:

- a) to organise the administration of state forests (taking physical forest inventories, planning the management, preparation and evaluation of sites for selling cutting rights for stands, monitoring of forestry operations, analysis of management, organisation of nature conservation works, etc.) through one or several state agencies, financing their costs from the state budget similar to other state agencies;
- b) to ensure the reception of the revenues from the sale of state forests to the state budget;
- c) to outsource the organisation and performance of cutting works and transportation of timber to the private sector.

Reply of the Minister of the Environment: Implementation of the recommendations of the National Audit Office would assume changing of long-term development orientations approved by the Parliament, and therefore the Ministry of the Environment does not regard it possible to implement them.

/Signed with digital signature/

Tarmo Olgo

Head of the Performance Audit Department

Recommendations of the National Audit Office and replies of the Minister of the Environment

The National Audit Office made several recommendations to the Ministry of the Environment on the basis of the audit. Minister Jaanus Tamkivi sent his reply to the recommendations of National Audit Office on 25 June 2010.

General comments on the Audit Report

The audit *Sustainability of State Forest Management* of the National Audit Office has been performed on a subject of national importance. The audit was an effort to evaluate the sustainability of state forests managed by the Ministry of the Environment, proceeding erroneously from the definition which serves as the basis for the sustainable management of the forests of the state as a whole but has been used by the National Audit Office in a much narrower meaning.

Bases for the management of state forests proceed from the Estonian Forest Policy approved by the Parliament with a decision of 11 June 1997, which was drawn up as a result of a public process and set among other things objectives also to the management of state forests. The objective of the National Forest Policy is to maintain the average cutting volume within the limits which would ensure observance of the principle of stable use in Estonian forests.

In order to ensure the common interpretation of the objectives of Forest Policy, the Forestry Development Plan until 2010 was prepared proceeding from the principles of participatory democracy, and approved by the Parliament with its decision of 13 November 2002. The development plan set the goal to ensure setting and pursuing objectives in the management of state forests which conform to the interests of the majority in the society in the management of state forests and achieving through that the implementation of principles of sustainable and efficient management in state forests, arising from the Forest Policy. Proceeding from these principles also the Forest Act has been drafted which the Parliament passed on 07.06.2006.

Management of forests in conformity with the Forest Act and other laws, consistent regeneration of forests, use of forest management plans aimed at long-term and sustainable use, and calculation of the Annual Allowable Cut, and existence of international FSC and PEFC (pending) certificates which prove sustainability of the management of forests provide additional assurance to the Ministry of the Environment concerning the sustainability of management of state forests.

The National Audit Office has focused in its analysis on only the so-called better forest types in commercial forests that are administered by the state and has transferred to them the whole ecological role of forests, ignoring the analysis of the rest of commercial forests and the strictly protected forests and forests with management restrictions. We find such an approach misleading as ecologically valuable areas are primarily located in protected forests. In commercial forests the value of forests from the aspects of timber production and timber quality is more important but this has not been covered by the audit. Neither has the analysis taken into account the social aspects of sustainability. According to the evaluation of forest researchers of the Estonian University of Life Sciences, stable use and classical normal forests are like the horizon towards which one strives but which is never reached.

The Ministry of the Environment finds that the management of state forests which are in its area of government is sustainable, proceeds from the Forest Policy approved by the Parliament and from the goals set in the Forestry Development Plan, follows the forest legislation, good practices of forest management and long traditions. Organisation of forest management in Estonia is in accordance with international agreements. The methodology applied by the National Audit Office for the evaluation of the sustainable management of state forests is not proportional and the evaluation made according to this methodology is misleading for the general public.

Recommendations of the National Audit Office	Replies of the Minister of the Environment
Sustainability of state forest management 60. Recommendations to the Minister of the Environment: ■ As the approver of annual optimal cutting volumes, the Minister should ensure sustainable management of state forests and preservation of their ecological balance. Therefore such annual cutting volumes in different forest types should be found which would not reduce every year the area of old stands as a consequence of cutting (the clear cut area would not exceed the area of increase in old stands due to aging of middle-aged stands). Considering the age distribution and species distribution of state forests and for the alleviation of excessive cuttings of earlier years, the annual area of clear cuttings in dry boreal, fresh boreal and nemoral forests should be considerably	Reply of the Minister of the Environment: Implementation of the recommendations of the National Audit Office would assume changing of long-term development orientations approved by the Parliament, and therefore the Ministry of the Environment does not regard it possible to implement them.

Recommendations of the National Audit Office	Replies of the Minister of the Environment
reduced: in spruce-dominated forests approximately 40–50%, in pine-dominated forests by approximately 30%, in birch-dominated forests approximately 50% and in aspen-dominated forests approximately 70% of the area planned for 2010. ■ In the preparation of the National Forestry Development Plan an analysis should be made or ordered and the appropriate deadline should be set, considering the age distribution of state forests by forest types, by which time the clear cut area in state forests has to conform to the stable use yield. The Forestry Development Plan should also describe the deadlines and the respective intermediate stages for essential indicators to be able to monitor the achievement of stable use in the management of state forests (sections 21–59).	
Activities of the Ministry of the Environment for ensuring the sustainability of forest management 78. Recommendations to the Minister of the Environment: ■ To audit and analyse regularly the management of state forests every year before approval of cutting volumes for the next year, in order to ensure the fulfilment of the obligations of a forest owner, i.e. management without endangering the ecosystem and in accordance with the principles of the sustainable use of forests. To make public the results of the respective analyses. ■ Legislation regulating forest management should be amended to require taking into account different forest types and the locations of the forests cut. The amended set of rules on forest management should ensure that the area of old forests of different forest types is not reduced and the cohesion of the network of protected areas is not damaged as a result of management (sections 61–77).	Reply of the Minister of the Environment: Implementation of the recommendations of the National Audit Office would assume changing of long-term development orientations approved by the Parliament, and therefore the Ministry of the Environment does not regard it possible to implement them.
Conflict of interests in RMK 93. Recommendations to the Minister of the Environment: To change the operation of the organisation in charge of management of state forests to prevent a conflict of interests between earning revenues and preservation of state assets, stable use of forests and ensuring ecological stability. To analyse and find more appropriate ways for the management of state forests in the conditions of decreasing revenues, considering both the economic and ecological aspects. The National Audit Office recommends for the solution of the conflict of interests: a) to organise the administration of state forests (taking physical forest inventories, planning the management, preparation and evaluation of sites for selling cutting rights for stands, monitoring of forestry operations,	Reply of the Minister of the Environment: Implementation of the recommendations of the National Audit Office would assume changing of long-term development orientations approved by the Parliament, and therefore the Ministry of the Environment does not regard it possible to implement them.

Recommendations of the National Audit Office	Replies of the Minister of the Environment
analysis of management, organisation of nature conservation works, etc.) through one or several state agencies, financing their costs from the state budget similar to other state agencies; b) to ensure the reception of the revenues from the sale of state forests to the state budget; c) to outsource the organisation and performance of cutting works and transportation of timber to the private sector (clauses 79–92).	

Characterisation of the audit

Objective of the audit

The objective of the audit was to evaluate whether management of state forests has been arranged in a sustainable manner, i.e. whether state forests are managed in such a manner that cutting opportunities will be similar in the future and the ecological status of forests will be stable.

Criteria for making the evaluation and the methodology for simulation

The evaluation has been made proceeding from the criteria that the clear cut area in state forests can be maintained permanently and that clear cuttings are planned and performed proportionally with the occurrence of different forest types (i.e. cuttings have not been concentrated to better forest types or forests on more fertile soils).

In order to make the evaluation, the changes in the species structure and age structure of state forests have been simulated with the assumption that the current management practices will be continued in the next decades. The simulation is based on areas of clear cutting in different years recorded in the lists presented by RMK on stands cut or planned for cutting, and the total areas have been grouped by main tree species and site type groups in different years:

- on the basis of the lists of cuttings performed in 2004;
- on the basis of the lists of cuttings performed in 2008;
- average annual clear cut areas on the basis of the lists of cuttings performed in 2004–2008;
- on the basis of the lists of cuttings performed in 2009;
- on the basis of the lists of cuttings planned for 2010.

On the basis of clear cutting areas of these five periods, changes in the age structure of stands have been simulated by forest types and forest categories on the following conditions:

- The total areas of forests in forest categories remain the same, i.e. no additional forests are placed under protection and no managed forests are added.
- The main tree species and site types of stands remain the same but the age of the main tree species increases by 10 years every 10 years.
- The statistics on state forests for 2006 according to the Forest Register and the statistics for 2009 presented by RMK have been grouped by forest types and forest categories, whereas the age distribution of stands has been grouped by 10-year age classes of the main tree species (clear cut areas belong to the 0–9 age class together with the stands with the age of up to 9 years according to the current main tree species of such areas presented in the statistics of RMK).
- The tenfold annual clear cut area (i.e. the theoretical result of 10 years of management) has been deducted from the area of stands which have reached the minimum allowed age for clear cutting. This means that for pine-dominated stands the tenfold annual clear cut area has been deducted from the area of 90-year-old and older forests, for spruce-dominated stands it has been deducted from the area of 80-year-old and older forests, for birch-dominated stands from the area of 60-year-old and older forests and for aspen-dominated stands from the area of 30-year-old and older forests. As the age which allows clear cutting depends on the quality class and is actually often higher than the lowest age described here which allows clear cutting, the model used shows the

area of mature stands somewhat larger than it actually is. Nevertheless, the ages used in the simulation are absolute ages and not maturity ages which depend on the quality class, as maturity ages would not make it possible to compare the age distribution of different forest types, maturity ages were different in 2006 than in 2009 and the role of forests as a part of the ecosystem (appearance and number of elements characteristic of natural forests) depends above all on age and not on the quality class or on the development class assigned on its basis.

- As a result of the simulated theoretical management, the area of stands which have reached the lowest allowable age for clear cutting and older stands will become in 10 years the area of stands which are 10 years older than the stands with the lowest allowable age for clear cutting. For instance, the area of 90-year-old and older pine stands would become as a result of 10 years of theoretical management the area of 100-year-old and older pine stands, from which the tenfold annual clear cut area has been deducted. Therefore the last age class used in the simulated age distribution presented are the stands that are 10 years older than the lowest age allowed for clear cutting, for instance, in the case of pines, stands of 100+, i.e. 100-year-old and older.
- In order to evaluate the possibility for maintaining the cutting volumes, the age distribution of pine- and spruce-dominated stands was simulated in the course of 50 years and for birch- and aspen-dominated stands in the course of 40 years.
- If the area of clear cut stands is lower than or equal to the area added by the aging of younger forests, the area of stands of the last age class used in the comparison will not decrease. In such a case the cutting volume is sustainable, i.e. the cutting volume can be permanently maintained and the area of old forests will not decrease. If the area of stands of the last age class used in the comparison decreases or becomes even negative, there are consequently less younger than mature forests, compared to the clear cut area. This means that with the increase in the age of middle-aged forests by 10 years there will not be so much older forests which would compensate for the clear cuttings. Thus, the decrease in the area of stands of the last age class shows that management is no longer sustainable as the clear cut area is too large to maintain it permanently.
- The simulation assumes that a clear cut area becomes regenerated or is regenerated as soon as possible and with the same main tree species that had been cut. For instance, the area of fresh boreal spruce stands with the age class of 0–9 will increase as a result of 10 years of management by the same area that was clear-cut in the same period in fresh boreal spruce stands. Although in reality the main tree species may change in the reforestation of clear cut areas, the audit team has no reliable or usable information about such changes. Evaluation of the sustainability of cutting volumes showed that the main tree species for reforestation is of no significant importance from the aspect of this main issue of the audit as problems will become evident sooner than the stands planted during this or the next decades for the regeneration of clear cut areas can reach maturity.

The National Audit Office requested expert assessments from the University of Tartu and from the Institute of Agricultural and Environmental Sciences of the Estonian University of Life Sciences concerning the methodology used and the results obtained, requesting, among other things, replies to the following questions:

- Is the methodology applied appropriate for such an analysis?
- Have the analyses been performed and the results obtained according to the methodology used and according to the statistics presented by RMK?
- What may be the effects of changes in the age distribution of state forests?

Experts of the universities were also asked to make suggestions in cooperation with the National Audit Office for changes in the current management practices of state forests in order to ensure the protection of the forest as the ecosystem and its sustainable management.

Scope and method of the audit

For the evaluation of the sustainability of the management of state forests, the information submitted in 2006 to the national register (Forest Register) concerning the forests managed by RMK was used, also information used by RMK as at 2009. In addition, information presented by RMK about cuttings performed in 2004–2009 and cuttings planned for 2009–2010 were used. Only clear cut areas were considered without analysing in this audit the timber quantities cut.

The age distributions of state forests, drawn up for the evaluation of the sustainability of cutting volumes, and clear cut areas by forest types were sent to RMK for review and verification on 22.12.2009 and 14.01.2010. The results of the analysis made by the National Audit Office concerning the simulated changes in age distribution with the continuation of current cutting volumes were sent to RMK for review, verification and comments on 29.01.2010. The same materials were sent to the Ministry of the Environment on 04.02.2010. For the discussion of the results and conclusions of the audit, meetings were organised with the representatives of RMK and the Ministry of the Environment on 10.02.2010 and 21.05.2010.

Time of conclusion of the audit

The auditing activities were started in June 2009 and completed in May 2010.

The audit team

The audit team consisted of the Audit Manager Tuuli Rasso, the Senior Auditor Rainer Kuuba and the Auditor Matis Mägi.

Contact information

Additional information on the audit is available from the Communication Service of the National Audit Office, tel +372 640 0704 or +372 640 0777, e-mail: riigikontroll@riigikontroll.ee

An electronic copy of the Audit Report (pdf) is available on the web site www.riigikontroll.ee.

A summary of the Audit Report is also available in English.

The Audit Report number in the file system of the National Audit Office is 2-1.7/10/70038/9.

Postal address of the National Audit Office is:

Narva mnt 11a
15013 Tallinn
Tel +372 640 0700
Fax +372 661 6012
riigikontroll@riigikontroll.ee

Earlier audits of the National Audit Office on the subject of management of state forests

21.09.2007 – **Planning of cuttings by the State Forest Management Centre**

28.05.2008 – **Protection of key forest habitats in the Natura 2000 network areas**

All reports are available on the web site of the National Audit Office: www.riigikontroll.ee