Analys av drivkrafter bakom skogsnyttjandet i Polen, Litauen och Lettland

Policy drivers behind the forest utilisation in Poland, Lithuania and Latvia

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Santrauka

Šis magistrinis darbas yra tarptautinio tiriamojo projekto, atlikto Latvijoje, Lietuvoje ir Lenkijoje, dalis. Projekto tikslas - ištirti politikos varomąsias jėgas, lemiančias miško naudojimą išvardintose šalyse. Šio darbo tyrimų objektas - Lietuva, tačiau taip pat buvo atlikta palyginamoji analizė, dėl galimų miško naudojimo pokyčių per sekančius dešimt – dvidešimt metų, Latvijoje, Lietuvoje ir Lenkijoje.

Vertinant miško naudojimą lemiančius veiksnius, pirmiausia, būtina išanalizuoti ir socialinės sistemos, ir pačius socialinius pasikeitimus kurie daro didelę įtaką miškų sektoriui (Shanz 1999). Taip pat tiesiogiai nulemia miško naudojimo lygį šalyje, ypač kai visuomenė pereina nuo socialistinės prie kapitalistinės sistemos. Pasirinkta socialinė santvarka apibrėžia politikos tikslus, ir nustato veikimo ribas tiek patiems politikams tiek ir suinteresuotoms grupėms (Springate – Baginski and Soussan 2004). Toliau priimami politiniai sprendimai yra įtakojami įvairių suinteresuotų interesų grupių įvairiose politinių sprendimų priėmimo stadijose tiek kalbant apie bendrąją politiką, tiek ir politiką susijusią su miškų ūkiu. Būtina pabrėžti, kad vienas iš svarbiausių miškų ūkio politikos tikslų – miško naudojimo lygio nustatymas. Suinteresuotų grupių veikimo pagrindas yra vieni ar kiti interesai, kuriuos jos atstovauja, suformuoti ekonominių, ekologinių, ar socialinių veiksnių (Krott 2005). Minėti veiksniai galėtų būti apibūdinami vienu žodžiu – žinios, kurios nulemia suinteresuotų grupių interesus ir suteikia kryptį vieniems ar kitiems jų veiksmams (Krott 2005). Ar interesai bus pasiekti ir įgyvendinti politikoje, priklauso nuo suinteresuotų grupių politinės įtakos (Krott 2005). Iš to seka, kad norint suprasti politikos varomąsias jėgas, lemiančias miško naudojimą Lietuvoje, būtina išsiaiškinti suinteresuotų grupių interesus ir jų įtaką politikos formavimo procese.

Suformavus tikslus, buvo parinkti atitinkami metodai. Šiuo atveju geriausiai tinko literatūros ir inventorizacijos duomenų analizės bei ekspertinės apklausos metodų trianguliacija (Denscombe 1998). Naudojant literatūros analizę, buvo įvertinti ekologiniai, ekonominiai ir socialiniai veiksniai, kurie formuoja interesus, o naudojant ekspertinę apklausą, išsiaiškinti suinteresuotų grupių interesai ir įtaka politinėje arenoje. Ekspertinė apklausa buvo atlikta remiantis kokybinės apklausos principais. Iš viso 35 vadovai iš skirtingų interesų grupių organizacijų, po penkis iš kiekvienos interesų grupės, buvo apklausti. Pats klausimynas suformuluotas iš kokybinių vadinamų atvirųjų, ir kiekybinių klausimų.

Iš ekologinių veiksnių grupės išanalizuoti tik miško augimą apibūdinantys veiksniai ir jų kaita 1988 – 2005 metais. Svarbiausi iš jų: bendras metinis medienos prieaugis, bendras medienos tūris, medynų plotų pasiskirstymas pagal vyraujančias medžių rūšis ir amžiaus klases, brandžių medynų plotas ir tūris. Nustatyta, kad minėto periodo pabaigoje išvardinti veiksniai buvo palankesni intensyvesniam miškų naudojimui negu periodo pradžioje. Kaip bebūtų, medynų rūšių struktūra žymiai nepasikeitė, netgi truputį pablogėjo. Pušynų plotai sumažėjo dviem procentais, o baltalksnynų padidėjo vienu procentu. Nagrinėjant miškų nuosavybės pasikeitimus nustatyta, kad miškų, paliktų nuosavybės teisių atkūrimui

nenaudojimas, smarkiai sumažino miško kirtimų apimtis Lietuvoje. Miškų ligos, vabzdžių atakos, sausros 1992 – 1996 metais laikinai padidino miško naudojimą. Literatūros analizė ir respondentų apklausa išryškino didėjančią medienos paklausą rinkoje, tačiau taip pat patvirtino, kad visuomenės nuomonė ir miškų tvarkymo tradicijos yra palankesnės neintensyviam miškų naudojimui.

Interesų grupių įtakos analizė parodė, kad, anot respondentų, įtakingiausios organizacijos sprendžiant miško naudojimo klausimus yra Aplinkos ministerija, Miškų departamentas ir miškų inventorizacijos organizacijos. Respondentai manė, kad po dešimt metų minėtų organizacijų įtaka sumažės, o įtaka medienos pramonės ir nevyriausybinių organizacijų (toliau NVO) padidės. Tai rodo kad netolimoje ateityje kirtimų normos patvirtinimo procesas bus daugiau demokratinis. Respondentai norėtų, kad ateityje kirtimų ir prieaugio santykis padidėtų nuo 41- 80% iki 61 – 100%.

Pagrindinis palyginamosios analizės tikslas - palyginti miško naudojimo tendencijas po 10 – 20 metų Latvijoje, Lietuvoje ir Lenkijoje. Siekiant šio tikslo buvo atsakyta į sekančius klausimus: 1. Kurie ekologiniai, ekonominiai ir socialiniai veiksniai įtakos miškų naudojimą netolimoje ateityje, 2. Koks bus norimas įvairių interesų grupių naudojimo lygis netolimoje ateityje, 3. Kaip pasikeis įvairių interesų grupių įtaka, 4. Kokie yra santykiai tarp interesų grupių. Atliekant palyginamąją analizę, buvo naudojami tie patys metodai kai ir ankstesnėje dalyje. Rezultatai, gauti Latvijoje ir Lenkijoje buvo paimti iš projekto kolegų, kurie atliko tyrimus savose šalyse.

Respondentų nuomonės tyrimai parodė, kad po dešimt metų, Aplinkos ministerijos įtaka Lenkijoje ir Lietuvoje, atitinkamai Žemės ūkio ministerijos įtaka Latvijoje, taip pat ir inventorizacijos organizacijų įtaka sumažės. Tuo tarpu medienos pramonės įtaka visose šalyse padidės. Pasak respondentų, NVO įtaka visose šalyse taip pat padidės, tačiau neatsvers medienos pramonės įtakos. Respondentai norėtų matyti padidėjusį miškų kirtimo ir prieaugio santykį nuo 41 - 80% iki 61 – 100% visose šalyse.

Galiausiai, sekančios išvados buvo padarytos. Visose šalyse miško naudojimo intensyvumas didės, tačiau, siekiant apibrėžti konkrečius skaičius, papildomi tyrimai yra būtini. Miškų naudojimo intensyvumas priklausys nuo ekologinių, ekonominių ir socialinių veiksnių. Respondentų nuomone, sekantys veiksniai bus svarbiausi: didėjanti medienos pramonės svarba nacionalinėse ekonomikose, medienos pramonės lobizmas, privačių miškų sektoriaus vystymasis, didėjanti atsinaujinančių energijos išteklių paklausa (medienos kuras vienas iš jų), mažėjančios galimybės importuoti medieną, didėjantys medienos ruošos savikainos kaštai bei didėjanti nemedieninių miško funkcijų svarba visuomenėje. Valstybinių miškų naudojimas didės dėl to, kad būtų padengtos didėjančios valdymo išlaidos. Ekologiniai reikalavimai turėtų tapti švelnesni ir racionalesni, taip pat turėtų sumažėti reguliuojančių teisės aktų skaičius. Tarp ekologinių veiksnių, kurie leis padidinti miško naudojimą, buvo paminėti didėjantis bendrasis medienos tūris ir gerėjanti medynų amžiaus struktūra.

Apibendrinant, tikimasi, kad medienos pramonė ir NVO bus daug įtakingesnės, tačiau respondentai mano, kad NVO neatsvers medienos pramonės įtakos ir miškų naudojimo intensyvumas didės.

Raktiniai žodžiai: politikos varomosios jėgos, ekologiniai veiksniai, ekonominiai veiksniai, socialiniai veiksniai, suinteresuotų interesų grupių interesai, miškų naudojimo tendencijos, kokybinio tyrimo metodai, palyginamoji analizė.

Abstract

This work is a part of international research that was carried out in Latvia, Lithuania and Poland, in order to investigate policy drivers behind the harvesting level in these countries. This thesis was focused on Lithuania. However, a comparative analysis of future tendencies for possible harvesting levels in Latvia, Lithuania and Poland was done as well. First of all, it is necessary to point out the importance of a social system and social changes that are of great importance to forestry (Shanz 1999) and have a decisive impact on a harvesting level, especially when a society moves from socialist planning system to market economy. Further, the harvesting level is influenced by interests of stakeholders and their games of power in the decision making process. The interests of stakeholders are formed by ecological, economic and social factors (Krott 2005). These factors form the basis of stakeholders' knowledge that gives directions for further actions (Krott 2005).

The understanding of policy drivers for the harvesting level in Lithuania is not possible without the understanding of Lithuanian stakeholders' interests and their power in the national decision-making process. For defining policy drivers in Lithuania, methodological triangulation (Denscombe 1998), combining literature and inventory data analysis with questionnaire and expert interview methods, was used. The questionnaire and expert interview methods were based on a qualitative research approach and in total thirty-five top administrators of different stakeholders, five from each stakeholder group, were interviewed. However, the questionnaire was made of qualitative, open-ended questions as well as quantitative questions.

The analysis of ecological factors, such as gross annual increment, the total volume, the volume and area of mature woods, total forest area, distribution in the age classes showed, that at the end of the period 1988 – 2006, the harvesting level was higher as compared with the beginning of the same period. However, species composition did not become better, a fact, that can be illustrated by the loss of pine by 2% and increase of grey alder by 1%. Additionally, analysing forest ownership was found that forests, left for restitution, without a proper supervision, significantly decreased the harvesting level. Forest diseases, drought and beetle outbreak increased the harvesting level in 1992 – 1996, but it was done at the expense of losses in the future harvesting.

Literature analysis and the opinion of interviewed experts revealed, that market demand for wood is increasing. However, as the survey and literature analysis showed, the society and forest management traditions were more favourable to a lower harvesting level. According to the respondents, the Ministry of Environment and its Department of Forests, as well as Inventory bodies are the most powerful stakeholders today. Yet, the opinion of the respondents, concerning the power of the stakeholders after 10 years, was that the power of the Ministry of Environment and its Department of Forests as well as inventory bodies will decrease, while the power of wood industry and Non-Governmental

Organizations (further NGOs) will increase. This shows that in the future the process of the approval of a harvesting level will be more corporative. In addition, the dominant part of the most important stakeholders in Lithuanian forestry would like the harvesting/increment ratio to increase from 41- 80% to 61 – 100%.

The main goal of the comparative part was to compare the possible future harvesting tendencies in Latvia, Lithuania and Poland. In order to achieve this goal, it was necessary to address the following issues: 1. Ecological, social and economic factors, that create the interests of various groups of stakeholders, 2. Expected harvesting level in the future, 3. The changes of different groups of stakeholders' power in the future, 4. Relations between stakeholders. When completing the second part of the study, the same methodology as in the previous part was used. The results for Latvia and Poland were taken from the theses, written in those countries, and prepared by the colleagues of the work team. After carrying out the research, the following results were obtained.

According to the respondents from different countries, after 10 years power of the Ministry of Environment in Poland and Lithuania, and the Ministry of Agriculture in Latvia, as well as power of inventory bodies in all the three countries will decrease. However, power of wood industry will increase significantly in Latvia, Lithuania and Poland. In addition, according to the respondents, NGOs will become more powerful as well. The analysis of the opinions on the future harvesting /increment ratio showed that the groups of stakeholders would like the harvesting level in all countries to increase from 41 - 80% to 61 – 100%. According to the respondents, economic factors, such as the need for bio fuel as a resource of renewable energy and raw material for wood industry, as well as the importance of wood industries to national economies, will contribute to the increase of the harvesting level. Yet, ecological and social factors, according to the opinion of the respondents, will have a contrary effect.

Referring to the results, presented above, the following conclusion can be made. In all countries, the harvesting level has a tendency to increase; however, in order to make more reliable predictions on the exact level of increase, some additional research is necessary. It is obvious, that the harvesting level will depend on the future development of ecological, economic and social factors as well as on power of different stakeholders.

According to the respondents, the most important future factors will be: the increase of the role of wood industry, mostly by lobbing through politicians, changes in private sector, development of usage of renewable resources, possibility to import wood, labour costs and larger range of non-productive forest functions will continuously generate higher expenditures of state forests. Keeping to the rule of self-sufficiency (in Lithuania and Poland) will require more harvesting in order to cover increasing costs. Ecological requirements should become softer and more rational, and decrease in number. Among the main biological factors, that determine a future harvesting level, the enlargement of total growing stock and distribution in age classes are listed.

To summarize, it is expected, that power of wood industry as well as power of protective organizations will increase in all countries in the future. However, according to the respondents, wood industry will be more powerful than NGOs.

Key words: policy drivers, ecological factors, economic factors, social factors, interests of stakeholders, power of stakeholders, tendencies of future harvesting, qualitative research methods, comparative analysis.

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List of Shortenings

CVE - Cutting Volume Estimation

FMP - Forestry Management Plan

FMS - Forest Management Scheme

GDP - Gross Domestic Product

GDSF - General Directorate of State Forests

HLFDM - Highest Level Forestry Decision-Makers

JSC "LVM" - Directorate of State Forests in Latvia "Latvijas valsts meži

LTSFS - State Forest Service in Lithuania

LVSFS - State Forest Service in Latvia

NFI – National Forest Inventory

NGO - Non Governmental Organizatios

PLFDs - Forest Districts in Poland

PLSFS - State Forest Service in Poland

PLTEC - The Technical Economical Commission in Poland

PLRDSF - Regional Directorate of State Forests in Poland

REPD - Regional Environmental Protection Departments in Lithuania

SEID - State Environmental Inspection Directorate

SFNFH - Forests National Forest Holding in Poland

 SWI – Stand-Wise Inventory

I.   NATIONAL ANALYSIS FOR LITHUANIA

1. INTRODUCTION

1.1. THE PROJECT BACKGROUND

The intensity of forest utilisation for timber differs widely within the Baltic Sea region. The ratio between timber harvest and increment ranges from 30-40 percent in Germany to 80-90 percent in Sweden. Obviously, the extent of forest utilisation is not simply bound to demand-supply relationships, but rather is a result of a number of factors, including historical facts, prevailing forest management paradigms, policy tools, ownership structure, conservation strategies, etc.

Latvia and Lithuania, to some extent Poland as well, were the countries directly involved in the whirlwind of socialism. After the collapse of the USSR, when moving from one system to another, these countries experienced great changes. Of course, some changes occurred in the forest sector as well. Harvesting level, being quite low in each country at the beginning of the transition period, at present is significantly different. Therefore, it is very interesting and valuable to make a comparative analysis of changes in the harvesting level and the effect that different policy drivers have on it. Yet, any meaningful predictions for future timber outputs are not possible without the understanding of the major policy drivers behind the forest utilisation.

The final project will consist of three quite similar analyses, made in Lithuania, Latvia and Poland. This thesis will analyse in detail the hypotheses, raised for Lithuania and then figures, that indicates future forest usage, from the three countries will be compared.

1.2. THE HISTORICAL BACKGROUND

In the previous century, the history of Lithuania as well as of some other European countries was very dynamic, merciless and in some periods even tragic. With this respect, three most important historical dates, which changed the lives of Lithuanian people and divided the century into three historical parts, could be mentioned. The first of them is 16 February 1918, when the members of the Lithuanian Council signed the Act of Independence of Lithuania. This act declared that Lithuania, with its capital Vilnius, is rebuilt on the democratic basis, at the same time claiming the independence from other countries (Lietuvos Taryba 1918). The second date is 23 August 1939, which marks the signing of the Ribbentrop – Molotov pact. According to this pact, the nonaggression agreement between Germany and the USSR was signed. Together with this, some secret protocols, by which middle Europe was divided between two aggressors, were signed as well (Vilkpedija 2007). Finally, 11 March 1990 is known as the date, when the act of reestablishment of the independence of Lithuania was signed (LRAT 1990). Without going very deep into details, those three periods could be characterised by several words. The first period marks the

emergence of democracy and economical relations in Lithuania (Vitkus 2004), as well as its trade with other countries. The second period could be defined as the occupation of Lithuania and introduction of socialism (Butulis and Galinis *et al.* 2002). The third period could be characterized by the following words: the reestablishment of independence, the rise of democracy and the emergence of market economy (Kaupa 2004).

In fact, a single word changes could define those three periods. Describing the word changes, Shanz (1999) refers to Sztompka (1994) and outlines three different ideas the word involves: differences, different temporal moments, changes in the state of the same part of reality. At this point, the question why do social changes play an important role in forestry arises. There are three general concepts, which define the relationship between forestry and society, and explain why social changes are of great importance to forestry: 1. Forestry as a part of society. Based on a system approach, forestry could be interpreted as a component of a social system (forests, foresters, forest interest groups and forest policies), 2. Foresters as social beings (actions). In this sense, forestry means the totality of all people, who make decisions on particular actions, concerning forest land, 3. Processes, since forestry may be considered as a social field, the processual characteristics of society are stressed above all (Shanz 1999).

When analysing the influence, which societal changes have on forestry, it is good to distinguish between two groups of factors that have specific effects on forestry's institutions and performances: 1. Factors that depend on the nature of social changes (realm, scope and speed), 2. Factors that depend on the characteristics of societal subsystem (perception channels, institutional/organizational inertia and ideological, and expertise filters) (Shanz 1999).

Looking at the historical situation of Lithuania and changes that occurred as its consequence, it is worth to focus on the factors of the second group. Perception channels are characterized by the market signals, which manifest themselves in supply and demand, as an expression of a free will of many individuals and by a political system that at the same time projects the social changes into forestry (Shanz 1999). The author also stresses the importance of institutional and organizational inertia, but only the fluctuations that are stable in time are recognized as changes (Shanz1999). Characterizing the ideological filters, Shanz (1999) refers to Hellstrom and Reunala (1995: 46) and defines it as the failure of foresters to recognize the underlying changes in society. Expertise filters' nature in their physical existence greatly restricts our actions (Shanz 1999).

Further, it is necessary to analyze the influence of history on the forest sector. In the first period 1918 - 1939, according to Algirdas Brukas, a specialist in forest management, forest sector was of great significance to the country looking from the economical point of view (Brukas and Kairiukstis 2003a). About 51 – 72% of produced wood was used to satisfy the needs for energy and fuel, whereas 16 – 25% of wood was used for industry. The author also stresses the high efficiency of the forest sector in that period and quite low expenses for the forest sector, and points out the importance of it to the re-

established economy of the country. Before World War I, about 40% of forests in Lithuania were state owned forests. In 1937, in Lithuania, excluding Vilnius region, there were 84% state owned forests, while the rest were private forests (Brukas 2003). Because of nationalization, the fund of state forests increased from 353000 hectares in 1919 to 878400 hectares in 1939 (Brukas and Kairiukstis 2003a). Further, the period of occupation and socialism in the forest sector could be characterized as follows (Verbyla 2003):

1. Centralized planning.
2. Very low regulated wood prices.
3. Low efficiency, since people were not eager to work more and harder.
4. Regeneration of forest resources.
5. High investments in forest roads, melioration and fire protection system.
6. The development of forest science.
7. The introduction of new technologies to forest management.
8. No private ownership.

Finally, in summary, the period after the reestablishment of independence in 1990 could be characterized in the following manner (Brukas and Kairiukstis 2003b):

1. The emergence of democracy, together with market economy and market relations (it is worth to point out that wood prices were regulated until 15 October 1992).
2. The establishment of the forest fund in 1991, which meant that cleaning, care and protection of forests were funded.
3. The new Forest act (LRS 1994) by which all activities of the state forest enterprises started to be funded by the forest fund. The fund was formed from the revenues of the state enterprises, excluding revenue received from wood processing.
4. Forest privatization that started in 1991.
5. The establishment of the private Forest Owners Association in 1992.
6. In 1997 almost 47% of wood was cut by private companies.
7. 75% of state enterprises' revenue came from soled wood.

The main changes in forest administration included the following:

1. In 1996 the Ministry of Agriculture and Forest Management was established.
2. In 1996 the General Directorate of State Forests (further GDSF) emerged.
3. In 1998 the forest management sector was joined to the Ministry of Environment.

This work will focus on the period, covering last twenty years, further, the present day situation will be analyzed and finally, future harvesting possibilities will be looked at. It should be noted that the period between the wars and early years within the USSR will not be analyzed.

1.2.1. LITHUANIAN FOREST POLICY AND STRATEGIC OBJECTIVES FROM 2002

Lithuanian forest policy is formed and implemented according to four principle directions: general, economical, ecological and social (LRAM 2002a).

 The general directions:

1. Preservation and increase of forest resources.
2. Insurance of forest ownership variety.
3. Participation of the society in the solution of the main problems.
4. Making the information on forest condition and management accessible for the society.
5. Development of forest research and education.
6. Development of international relations.

The economical directions:

1. Rational and even usage of forest resources.
2. Improvement of the economical efficiency of forestry.

The ecological directions:

1. Ensuring the sustainability of forest ecosystems.
2. Preservation of biodiversity and improvement of forest health.

The social directions:

1. Satisfaction of the general forest - related needs of the society.
2. Development of state and private forestry in the context of general rural development.

1.2.2. THE POLITICAL SYSTEM

Since 1990, the structure of the forest administration system has been changed three or four times. Figure 1 below will present its final version (Kupstaitis 2005).
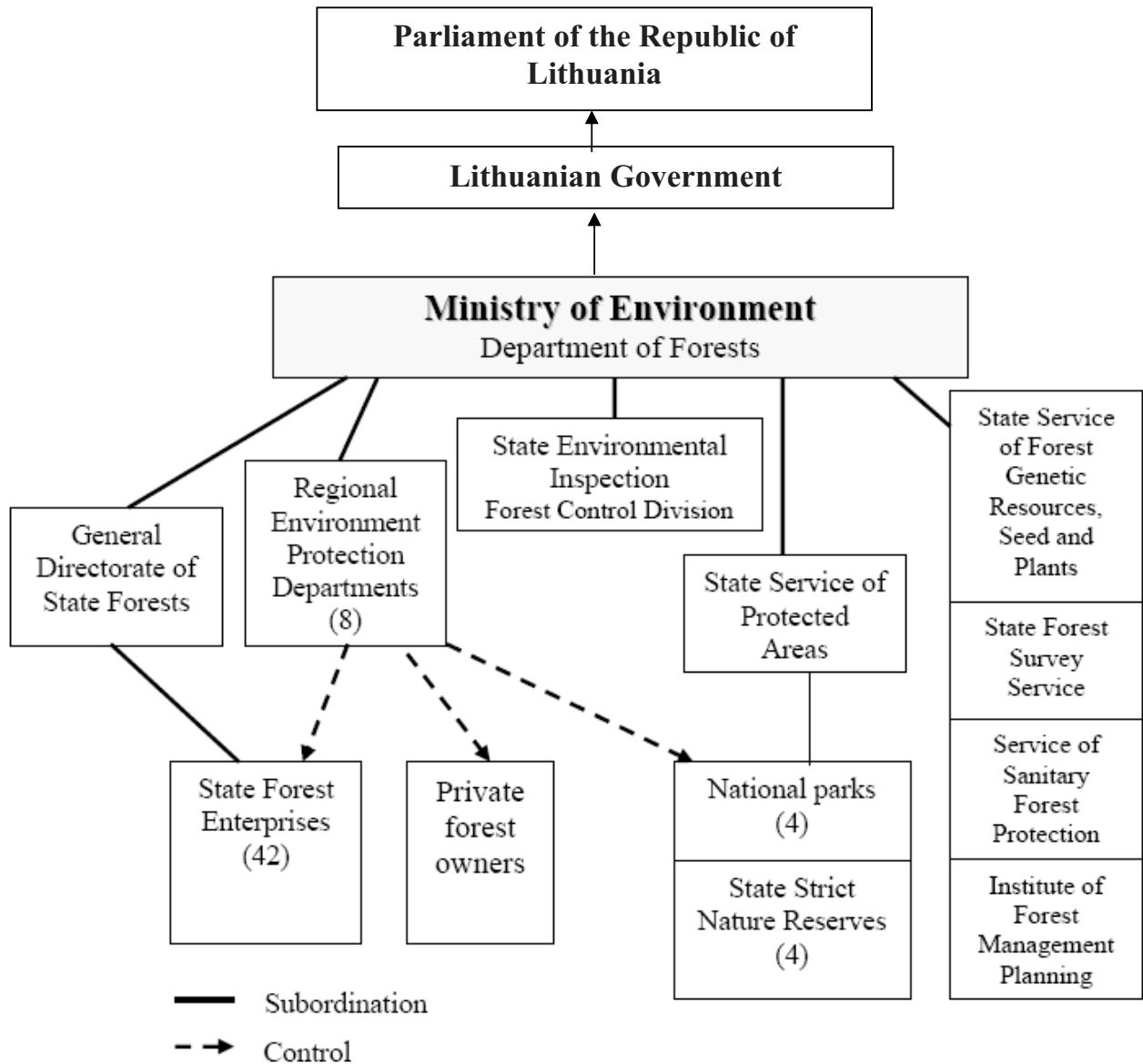
Figure 1. *The structure of the forest administration system in Lithuania. (Source:* Kupstaitis 2005).

The highest level in the system belongs to the Lithuanian Parliament, which is followed by the Lithuanian Government and then by the Ministry of Environment and its Department of Forests. GDSF, Regional Environment Protection Departments, the State Environmental Inspection, the State Service of Protected Areas as well as other institutions such as the Genetic Resources or Inventory bodies, including the State Forest Survey Service or the Institute of Forest Management Planning make the next level. The

lowest level is formed by the state forest enterprises, private owners and national parks. The bold and dotted lines in the Figure 1 show the relations between the different institutions. Looking at the structure, several functions of the main institutions in Lithuania can be mentioned. The Parliament is responsible for legislation and the Government controls the execution of legislative acts.

The main functions of the Ministry of Environment, concerning the forest sector (LRV 1998), include: 1. According to the legislative acts, the Ministry of Environment performs the functions of national governance, related to the protection of nature, biodiversity and usage of natural, and recreational resources, etc., 2. Forms policies for the protection of nature, biodiversity and landscape as well as the rational usage of nature and recreational resources, etc.

The Ministry of Environment has the following functions, related to forest management: 1. Carries out the national administration of the forest sector, 2. Forms the system of protected areas and controls activities in these areas, defines criteria for the establishment of protected areas, 3. Prepares and confirms the regulations on forest growth, management, forest inventory, main and intermediate cuttings, forest regeneration, sanitary forest protection, as well as other legislative acts, concerning different issues of forest management. 4. Organizes the enlargement of the forest area in Lithuania, administers the protection of forest gene fund, landscape and biodiversity, 5. Coordinates the inventory of all Lithuanian forests, prepares the projects for forest management, performs forest monitoring and is responsible for the cadastre of Lithuanian forests, 6. Prepares the rules for round wood trade.

The responsibilities of the Department of Forests include the following (LRAM 1999a): 1. To formulate the policy and strategy of the Lithuanian forests and to coordinate their implementation, 2. To develop sustainable forestry practices in Lithuanian forests, 3. To strive for a rational usage of Lithuanian forests and to protect forest ecosystems, and biodiversity, 4. To increase forest area in Lithuania. Looking closer to the functions of the Department of Forests, only those that are related to forest usage are worth to be mentioned here: 1. Increases forest productivity and its economical efficiency; makes preconditions to satisfy the needs of Lithuanian economy and its people, without violating the limits of a calculated cutting norm, 2. Schedules and coordinates forest inventory work, 3. Organizes deliberation of forest inventory projects, 4. Approves forest inventory projects, 5. Prepares projects on a yearly cutting norm in Lithuanian state forests, 6. Approves cutting limits of the main and intermediate cuttings for the state forest enterprises, 7. Prepares regulations on forest division into management groups, sets management groups to the forests, 8. Prepares main and intermediate cutting regularities and rules, approves methodology for the calculation of a cutting norm, suggests forest cutting ages, prepares forest inventory, forest regeneration, and other acts related to the issues of forest management that are further provided to the Minister of Environment for approval, 9. Provides methodical consultation to private forest owners, keeps contact with the Private Forest Owners Association.

GDSF coordinates the work of state forest enterprises. The below presented functions of the GDSF were considered as most important: 1. Organizes and coordinates forest regeneration and management as well as protection, and use of forest resources in state forest enterprises, according to the principles of sustainable forestry, 2. Seeks efficient and profitable work of state forest enterprises, 3. Establishes state forest enterprises, 4. Sets obligatory amounts of work for state forest enterprises in the fields of forest regeneration and protection, 5. Offers advice to the Ministry of Environment on the issues related to forest management (LRAM 2001a).

At this point, it is worth to look at the units of environmental protection and control. The State Environmental Inspection performs the following functions in relation to Lithuanian forests: 1. Implementation of legislative acts of the Republic of Lithuania connected with environmental protection and control as well as usage of natural resources, 2. Coordination of the activities of regional Department of Forests, 3. Control the usage of natural resources, 4. Prepare projects of legislative acts that regulate state control of environmental protection and define the order of their implementation, 5. Accomplishes the function of control of state and private forests.

The main function of regional environment protection departments is to organize and implement protection of national environment, and to control the usage of natural resources at the regional level (LRAM 2003a).

The main functions of the State Service of Protected Areas are: 1. To implement the strategy and policy of protected areas, 2. To organize the management of protected areas in the national level, 3. To participate in policy making process connected with the formation of protected areas, 4. To organize and coordinate activities of the national reserves, national parks and other objects of the natural heritage (LRAM 2002b).

Summing up the major functions of Lithuanian forest sector, it is possible to claim that at the highest level the functions are divided between the GDSF and the Department of Forests (this is not the case in Poland). However, the division is not very clear, which causes hostility between the institutions. Yet, at the lower level, the structure is integrated. State forest enterprises practically carry out both management and policy implementation functions (this is not the case in Latvia) (Larsen and Brukas 2000).

1.3.   THE OBJECTIVES OF THE WORK

When comparing the harvesting level in 1987 that was 3 million m^3 with the harvesting level in 1987 that was 6.4 million m^3, sharp differences can be noticed see Figure 2. The main objective of this study is to define and analyse the main policy drivers, making impact on the harvesting level.
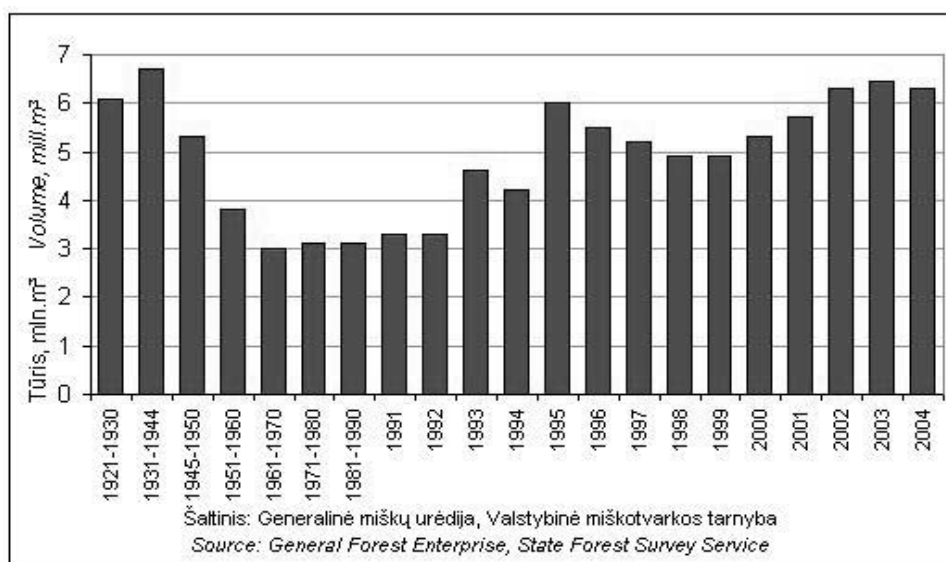
 Figure 2. *Harvesting levels in the period 1921 – 2004. (Source: VMT 2005).*

To reach the objective, the following aims were set:

1. To examine the statistical forest figures of the country during the period 1987 - 2005 and to define the possible maximal yield cuttings.
2. To analyse the importance of ecological, economic and social factors to the harvesting level.
3. To identify the political groups that have a major impact on setting a harvesting level, to define their interests and power.
4. Referring to the discussion of political and technical factors, and the opinion of interviewed experts, to show tendencies for the future harvesting level.

2. THE HYPOTHESES

For reaching the aims, which were set in the introductory part, it is necessary to raise a hypothesis that could be confirmed or rejected by the results. After literature analysis, when some expectations rose up, several hypotheses were formed:

1. During the period 1988 – 2006 the change in forest yield (ownership categories, gross annual increment, total area of forests, total volume, volume and area of mature woods, species composition and forest area distribution in age classes) and management parameters (forest management groups, cutting ages) indicated a higher harvesting level at the end of the period, to compare with the beginning of the period.

2. In the period 1988 – 2006, political factors played a greater role in setting the harvesting level than technical and biological ones.

3. The increased market demand, forest management traditions and orientation to economical profit as well as the decreased environmental concern at the end of the period 1988 – 2006, created favourable conditions for the increase of the harvesting level.

4. Wood industry, in general, was the main driving force for the increase of the harvesting level during the period 1986 – 2006.

5. The dominant part of the most important stakeholders in Lithuanian forestry would like a harvesting level to increase in the future.

Some issues that are relevant for the topic and the hypotheses raised were formed as related questions:

1. How did the harvesting level change during the period 1988 – 2006?

2. How did forest growth and management parameters change?

3. What were the predictions on the harvesting at the beginning of the period and at the end of the period?

4. What are the maximal yield cuttings in the future?

5. What are the political groups that define the increase of a harvesting level?

6. What is the power of political groups?

7. What political/technical factors could increase the harvesting level in the future, according to the respondents?

3. THE THEORETICAL BACKGROUND

3.1. THE ASPECTS OF POLICY DEVELOPMENT STAGE

The following Figure 3 presents the policy making process. The process could be divided into three phases. Policy development is the first phase in the process, then the second phase is policy adaptation by the government, whereas policy implementation by the implementing agencies is the third phase of the process (Springate – Baginski and Soussan 2004).
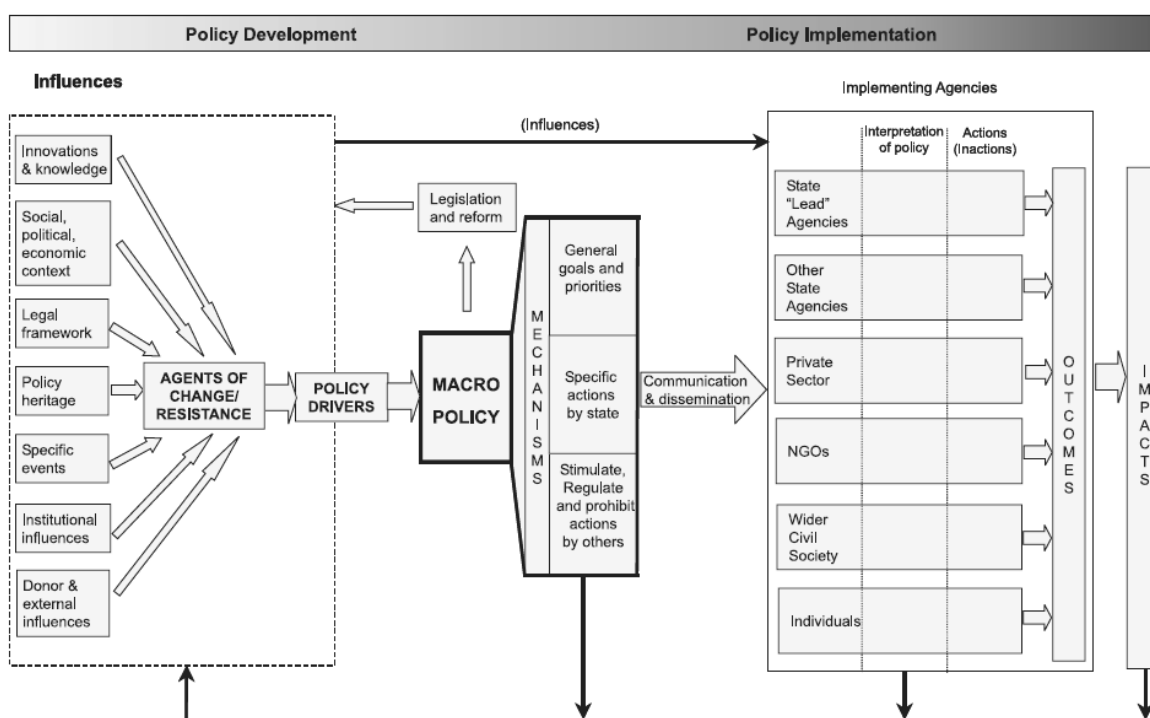
Figure 3. *The model of policy making process. (Sourse: Springate – Baginski and Soussan 2004).*

This study will focus on the first part, or, in other words, on policy development phase and especially on policy drivers. In the process of policy development, Springate – Baginski and Soussan (2004) distinguish between three parts: influences, agents of change or resistance and policy drivers.

- *Influences.* "Along aspects of the key policy milestones, policy heritage, legal framework and specific events, are contextual aspects, such as social, political and economical context, institutional influences, donor and external influences, innovations and knowledge" (Springate – Baginski and Soussan 2004: 7).

- *Agents of change or resistance.* "Influences act on strategically placed individuals and institutions that become the agents of change or resistance" (Springate – Baginski and Soussan 2004: 7).

- *Policy drivers.* "The diverse influences and agents come together, under heightened pressure from

particularly key policy issues, to become policy drivers, pushing policy in certain directions at certain times" (Springate – Baginski and Soussan 2004: 7).

Firstly, it is good to define the term Stakeholder. "Stakeholders – several individuals or groups that are interested in influencing the decision, even though they are not decision makers them selves" (Accorsi and Apostolakis 1999: 11). Further, interests, based on action orientation, play a major role in determining the measures, taken by politicians (Krott 2005). Krott (2005: 8) refers to Gluck (1996) and points out that "interests, which can be economic, ecological or social, are the beginning of all actions". Which type of interests, economic, ecological or social, will be most important, is determined by values (Krott 2005). Each stakeholder has his/her own set of objectives that he/she wishes to achieve (Accorsi and Apostolakis 1999).

Since forestry involves a lot of mutually exclusive interests, such as economical profit and protection of nature, conflicts are inevitable (Krott 2005). Organizations are created to focus attention and direct action towards identified purposes (Shannon and Schmidt 2002). Writing about the influence of stakeholders, Krott (2005: 13) refers to Krott (1990(1)) and claims that "Despite the endless means of political intervention in forest related conflicts of interest, their impact is based upon only two different elements of social bargaining, namely *information and power*". By using information, a stakeholder can form his/her interests, but their implementation may create conflicts with other stakeholders (Krott 2005). Additionally, "An actor uses information in order to convince actors in other sectors of the necessity of cooperation or building an intersectional coalition" (Krott and Hasanagas 2006: 557).

The nature and the levels of participation in a policy or a development process are often measured in terms of power and roles that different stakeholders have in the decision – making process (Buchy and Hoverman 2000). Power doesn't care about trough anyhow (Haas 2004). Describing power, Krott (2005: 14) refers to Weber (1972: 28) "Power is described as probability that a person can assert his own will in a social relationship, despite resistance". Five power types could be distinguished: 1. The lawful type, 2. The trustworthy type, 3.The little brother type, 4. The omniscient type, 5. The redistributors type (Hasanagas 2004). Power could be defined in two dimensions. Firstly, as legally anchored (Direct) power in national law and secondly, as hidden (Indirect) power of those, who profit from forestry and authorities, which make regulations (Krott 2005). The nature and the levels of participation in a policy or a development process are often measured in terms of power and roles that different stakeholders have in the decision making process (Buchy and Hoverman 2000). Furthermore, according to Hasanagas (2004), indirect power could be operationalized as trust and the direct power as incetive and irreplaceability. Trust, incetive and irreplacebility explain the power status with different weights: trust 82%, incetive 8% and irreplacebilituy 10 % (Hasanagas 2004). Finally, power may take two forms - financial incetives and pressure (Krott and Hasanagas 2006). Governments can seize power over established institutions, such as policy communities and networks (Richardson 2000).

However, national forest laws impose certain limitations on games of power and interests that are defined by the established principles - policy milestones (Springate – Baginski and Soussan 2004). Further Schmithusen (2004: 87) argues that "Sustainable development, balancing economic, social and environmental goals, concerning renewable natural resources, is today the overarching principal of forestry".

3.2. INTERESTS OF VARIOUS GROUPS OF STAKEHOLDERS

Krott and Hasanagas (2006) indentifies 14 sectors of possible stakeholders: nature conservation, forestry, general agriculture, industry, consulting, small scale enterprises, water management, tourism, hunting, science, energy, education, employment and rural development. The whole totality of forest users could be divided into three big groups: owners, forestry workers and the general population (Krott 2005). The interests of forest owners are to maintain their authority over their property and to get various forms of profit from forest utilization (Krott 2005). Indeed, the general population makes use of forests and nature during their leisure time (Krott 2005). Firms or companies that use wood as raw material make another important group of stakeholders. Thus, for wood processing companies, resource availability is a vital factor for their survival (Pfeffer and Salancik 1978). Resource scarcity is an omnipresent feature in their existence. It can arise in three ways: trough the drop in the supply of the key resource, trough an increase in demand and trough a change in the relative access of different groups to the resource (Homer – Dixon 1999).

The interests of NGOs include protection of nature and comprehensive environmental protection (Krott 2005). The architecture and structure of the European Union opens new and more effective forms of political influence for NGOs (Weber and Cristophersen 2002).

Scientists' interests in forests depend on their traditions and values that are formed over time. These interests can be related to economical, environmental or social issues. Yet, science remains influential, if its expertise and claims are developed behind a politically insulated wall (Haas 2004). Further, Haas (2004) argues, that science is politically tainted and suspect, and has become extremely politicized.

3.3. ASSOCIATIONS AND THEIR GAMES OF POWER

Public participation creates more qualified operative decisions, provide a more solid base for the final agreement (Appelstrand 2002). "Associations are organizations, which articulate the interests of the groups they represent, and attempt to implement them by lobbying politicians" (Krott 2005: 69). Trough the associations, different groups of stakeholders can seek their interests and aid in policy making (Krott 2005). Furthermore, "Interest groups have to develop cross national links with a diverse range of actors

from different cultures and traditions, if they are to be well informed and influence European public policy" (Richardson 2000: 1014).

To quote Krott (2005: 81), "Political lobbying begins with the Parliament, Government and administration, other associations, international institutions and the general public. The best opportunity for associations to do the lobbying is in the pre-parliamentary stage, where bills of legislation are drafted". Yet, Economic interest groups are unable to act in utility – maximizing way in content of political uncertainty (Grossman 2004). The influences of associations may be divided into two groups – formal influence potential and informal influence potential (Krott 2005). Political equilibrium depends on the efficiency of each group in producing pressure, the effect of additional pressure of their influence, the number of persons in different groups and the deadweight cost of taxes and subsidies (Becker 1983).

Krott (2005) argues that formal influence potential is defined by the national law and the informal influence of associations is practised in following ways: 1. Expertise, practical solutions and experts, 2. Practical and ideological orientation towards common welfare, 3. Members of a decision making potential, 4. Financial resources, 5. Political alliances. Krott (2005), defining the relations between associations and the state, refers to Heinze (1981) and claims that they can be either pluralistic, or corporative.

4. MATERIALS AND METHODS

To summarize, in this part, the methods used in the work will be presented. Section 4.1 describes overall structure of all the work and the used methods. Section 4.2 presents literature as well as inventory data used. Section 4.3 explains the set-up of the expert interview survey.

4.1. GENERAL DESCRIPTION OF THE METHODS

Figure 4 presents the process of the approval of a harvesting level and adopted methods for the research. It can be noticed that the policy development process is rather similar to the one, provided in the theoretical part. Knowledge, which is built by ecological, social or economic factors, is used by various stakeholders when forming their interests (Krott 2005). On the basis of stakeholders' power, their interests are put into practice (Krott 2005). On the whole, the whole process is in the frame of forestry policy principles or milestones (Springate – Baginski and Soussan 2004).
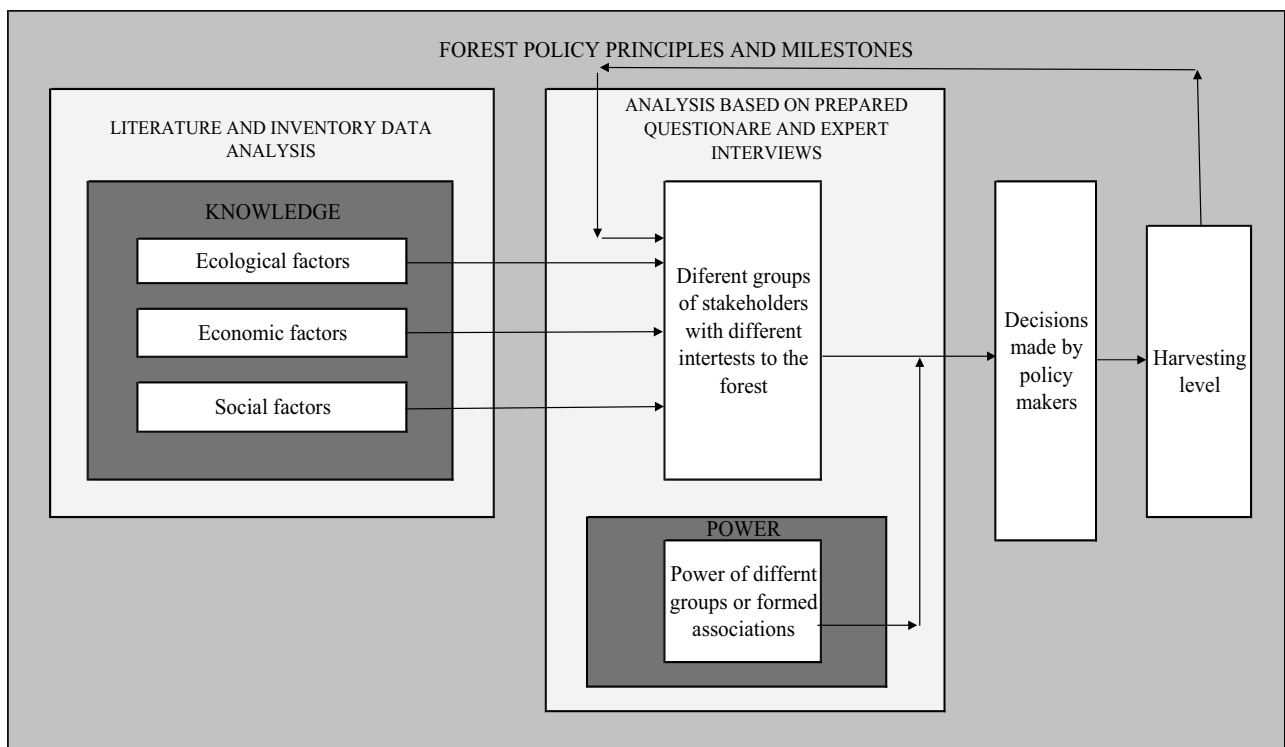
Figure 4. *The model of a decision making process in the approval of harvesting level, and methods adopted for the analysis.*

As the scheme shows, in the first place, in order to analyse policy drivers for harvesting level, it is important to analyse ecological, economic and social factors, which form the knowledge. In the second place, the analysis of the interests of various stakeholder groups and their power is necessary as well.

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The presented goals define the strategy that should be involved when completing this work. On the whole, two types of methods were used. First of all, for the part that reviews ecological, economic and social factors literature and inventory data analysis was carried out. Secondly, to analyse stakeholders' interests and power, a questionnaire was prepared for interviewing experts. In the questionnaire some questions on economic, ecological and social factors were introduced as well. Thus, it could be said that methodological triangulation for the "knowledge" part was used, see the scheme above. As Denscombe (1998: 85) puts it, "Triangulation involves locating a true position by referring to two or more coordinates". In this case, literature analysis was one coordinate, while expert interviews were other coordinates. The author goes on claiming that, on the one hand, the use of several methods is likely to improve the research by getting different data on the same topic. Yet, on the other hand, "there is a cost for this, because the researcher will almost certainly need to sacrifice some areas of the investigation, which would have been included using one method, in order to free up the resources to use a multi method approach" (Denscombe 1998: 84). The first hypothesis will be tested by using literature analysis and the other ones will be tested by using expert interviews.

4.2. ANALYSIS OF LITERATURE AND INVENTORY DATA

When doing literature analysis and reviewing economic, ecological and social factors, time period from 1986 to 2006 was especially important. The attempt to point out the most important factors that had an impact on the harvesting level in this period was made. Further, the inventory data reflects the way of management quality and potential of the Lithuanian forests.

For literature and inventory data analysis, various statistical books as well as reports from the Institute of Forest Management Planning were used. It should be noted that all statistical figures, presented in these sources, were obtained by using Stand-Wise Inventory method. The books, chosen for the analysis, were taken from different time periods, because those books could better reflect the situation of the period in question. With respect to this, some books are worth to be mentioned here. The first of them was written by Brukas and Kenstavicius (1992). The book provides statistical figures of forest inventory, compiled in 1987. Moreover, it gives prognoses for future management up to year 2010. A second book, written by Verbyla (1992), reflects the general situation of Lithuanian forests and also provides useful statistical figures, describing the end of the occupation period. To go further, LVMI (1993) gives first figures of independent Lithuania. Another interesting book that should be mentioned here was written by Kuliesis and Petrauskas (2000). This book appeared and forest usage prognoses were made in a totally different context and different political situation.

The calculation of maximal yield cuttings was done in the following way. Firstly, an average volume of mature woods per hectare was taken and, secondly, then it was multiplied by the area of forests in each age class. It is important to note that each age class covers the period of 10 years. The calculation

was done for a period of 100 years by manipulating with each age class (Antanaitis and Deltuvas 1987). The only limiting factor in the calculation was the cutting age that is used in the IV forest management group.

Economic factors were also analyzed by using literature from different periods. The average prices of wood were taken from following sources MUM (1994 – 1995), ZMUM (1996 – 1998), MSTD (200), LRAM (2001c), GMU (2002 – 2005). The data about Lithuanian forest recourses in the period 1998 – 2005 as well as statistics, concerning exports, imports and investments to wood industry, during the period 1994 –2005, were taken from VMT (2001 – 2006). The data on social factors and expectations was taken from the study, done in 2003 by the company "Baltic Investigations", (Baltic investigations 2004), when the analysis of the society's opinion on forest values was carried out. In total 1010 respondents were interviewed from 100 different places of Lithuania. Age of respondents varied between 15 and 74 years. In this research also participated and 223 private forest owners.

4.3. QUESTIONNAIRE AND EXPERT INTERVIEWS

4.3.1. A GENERAL DESCRIPTION OF QUALITATIVE METHODS

In order to find out the interests of different groups and define their power, and to understand the general situation in Lithuania, a questionnaire was prepared and an expert interview was conducted. As a basis for this analysis, qualitative research methods were used. In quantitative research, "The basic concept most often is probability sampling, directed at representativeness. Measurements of variables are taken from the sample, which is chosen to be representative of some larger population" (Punch 1999: 193). A quantitative research tends to make generalizations about all population from the samples (Kardelis 2002).

In this study, the opinion of all population would not aid in testing the raised hypotheses, because the topic and answers require some expert knowledge in the selected area. Therefore, this research focussed not on finding out and reflecting the expectations and opinion of all population, but rather on trying to understand the reasons behind fluctuations of harvesting level and finding out the impact that different factors have on it. Concerning the purpose of the survey and sampling strategy, qualitative research methods were employed. However, the survey includes both quantitative and qualitative questions.

The strengths of qualitative research include the richer definition of the topic and explanations of causal processes (Carvalho 1997). Further, accuracy and depth of information are also considered the advantages of this approach, because "in many instances, especially when an interpretive understanding of a phenomenon or process is required, qualitative methods are more successful in obtaining relevant data, ideas or recommendations" (Carvalho 1997: 14). However, this method has some weaknesses. For

example, one of them is the absence of possibility to make generalizations beyond the research area, which is because of only a small part of population covered, the use of non-probability sampling and open-ended nature of responses (Carvalho 1997). Other weaknesses are related to difficulties of verifying the information, since the process of collecting and analysing the data involves subjectivity (Carvalho 1997). In fact, "Subjectivity arises from the nature of the information sought, non-structured interview formats and flexible response recording, and response analysing methods" (Carvalho 1997: 14).

In qualitative research, credibility of the research depends on three elements: "firstly, rigorous techniques and methods for gathering high quality data that is carefully analysed, secondly, credibility of a researcher, which is dependent on his/her training and experience and finally, philosophical belief in the phenomenological paradigm that is a fundamental appreciation of naturalistic inquiry, qualitative methods, inductive analysis, and holistic thinking" (Patton 1990: 461).

4.3.2. DESCRIPTION OF THE QUESTIONNAIRE

The complete questionnaire may be found at the end of the thesis in the Appendix B. However, it is necessary to list its main parts and to discuss the issues, involved in the questionnaire. The first part of the questionnaire is named "Personal data and information about represented organization". The aim of this part is to get some basic information about the representatives and also to highlight the interests of organizations, concerning forest usage. The second part "The expected goals of forestry" is intended to find out the desired direction of forestry in the future. The third part "The assessment of forest resources" tends to highlight the opinion of representatives on the evaluation system that is used in the country, the accuracy of measurement, as well as the data presented by inventory bodies. The fourth part "Driving forces behind utilization" and the questions formed aim to reflect the opinion of the representatives about the importance of different economic, ecological, social factors to the forest usage. The first section in this part covers the period 1986 – 2006 and the second focuses on the present days. The fifth part "The stakeholders" aims to point out the power of different associations in policy making process. This part also analyses the relations between different groups of stakeholders. The sixth part "The optimal level of forest utilization" highlights the expectations, concerning forest usage at present as well forest usage after 10 and 20 years. In addition to this, the representatives' very important opinion on the ecological, economic and political factors that could have impact in the future is also provided in this part.

4.3.3. SAMPLING OF REPRESENTATIVES

When selecting the representatives, a purposeful sampling was used. "Purposeful sampling is used as a strategy when one wants to learn something and come to understand something about certain select cases without needing to generalize to all such cases" (Patton 1980: 100). In addition, as Punch (1999: 193) states "Purposive sampling - it means sampling in deliberate way with some purpose or focus in mind". A

qualitative approach involves using key informants' interviews "with persons, selected on the basis of their special knowledge and experience in area of interest. Number of informants usually varies from 10 to 25" (Carvalho 1997: 7).

In this research, 35 representatives filled in the questionnaires and were interviewed. It is believed that selected number of respondents is enough, because of nature of research and applied qualitative approach, furthermore, for answering raised hypotheses.

First, seven groups of different stakeholders that were considered to have the greatest influence on the harvesting level were chosen: **scientists, inventory bodies, NGOs, highest level forestry decision-makers (further HLFDM), wood industry, private forest owners and managers of state forest.** Those groups represent a variety of interests that a society may have. From each group of stakeholders, five representatives were interviewed. The selection within groups was based on two criteria - knowledge of the topic and predicted power to influence decisions. It is clear that the most powerful players act at national level. Firstly, in each group the most active and powerful associations were found and the representatives, who occupy the highest positions in those organizations were interviewed. As some selected people refused to participate in the research, the attempt to find people, who occupy as high positions as possible, was made. At this point, the selected participants in each group will be described. Although, the exact names of people will not be revealed, the names of associations or companies will be mentioned. Yet, in order to ensure the confidentiality of the respondents, no direct connection to any opinion will be made.

In the *group of scientists,* the representatives, connected with the topic, but representing different fields, were interviewed. Thus, the specialists in forest inventory, economics, forest productivity and silviculture were taken. The respondents represented the following institutions: Lithuanian Forest Research Institute, Lithuanian University of Agriculture, the Faculty of Forestry and Kaunas College of Forestry and Environmental Engineering**.**

The group of inventory bodies. In Lithuania, there are two institutions that make forest inventory at national level: the Institute of Forest Management Planning that works with Stand-Wise Inventory (further SWI) and State Forest Survey Service manages National Forest Inventory (further NFI). Two representatives were taken from those organizations and three other well-known experts in forest inventory were interviewed as well.

The NGOs group. In this group, the following organizations were selected: Baltic forum, the Fund of Nature, the Green Movement, Lithuanian Ornithologists Association and the Union of Foresters, which is also an environmental organization.

The group of HLFDM. In this group, the respondents were mainly chosen from the Department of Forests at the Ministry of Environment. According to its regulations, the Department of Forests deals directly with the evaluation of a harvesting level.

The group of wood industry. In brief, the focuses of attention were the companies that directly buy and process wood in highest amounts and operate at national level. The interviews were taken from the representatives of the following companies: StoraEnso Timber, Klaipėdos Mediena, Girių Bizonas, Latvijas Finieris and Libros Grupė.

The group of private forest owners. In Lithuania, there are two associations of private forest owners - the Private Forest Owners Association of Lithuania and the Association of Private Forests of Lithuania. One representative from each of these associations took part in this study. In addition to this, three senior managers of three private forest owners' cooperatives were interviewed.

The group of managers of state forests. In Lithuania, there are 42 state forest enterprises and the GDSF. When carrying out the research, one representative from the GDSF was interviewed. The GDSF has a consultative board that provides advice. This board, which also works as a supervising unit in the regions, involves 9 state forest enterprises. From those 9, 4 state forest enterprises, located in different regions of Lithuania (namely, in the south, west, centre and east), were selected: the enterprise of Kretinga, the enterprise of Trakai, the enterprise of Alytus, and the enterprise of Dubrava.

Further, some details of expert interviews will be explained. Firstly, interviews with respondents were completed during October and November in year 2006. Secondly, interviews continued from 30 minutes to 2 hours. The longest conversation took 4 hours and the shortest 30 minutes. After getting agreement of respondents, interviews were recorded for further analysis. Experts were asked to fulfil the questionnaire and give comments for selections. Finally, oral discussions with experts were carried out on connected issues.

5. THE RESULTS

5.1. THE RESULTS FROM LITERATURE ANALYSIS

Generally, this part presents some facts and knowledge about Lithuanian forest sector and is very important for proving or denying comments of experts, presented in Section 5.2.

5.1.1. THE ECOLOGICAL FACTORS

In this chapter only one ecological factor - changes of forest yield will be analysed. Forest yield could be characterized by following parameters: forest area, forest ownership, species composition, volume and area of mature woods, forest productivity and forest age class structure. Further, mentioned parameters together with forest management regulations like forest management regimes and forest cutting ages are the main factors that define harvesting level at present and in the near future in Lithuania (Kuliesis 2006).

Yet, first of all, it is good to focus on forest inventory systems used in Lithuania, then to take a look to forest usage in the period 1988 – 2005, after that analyse forest yield parameters, then take a look to the forest management regulations, eventually focus on prognoses of harvesting level, made in different periods, and finally, define the maximal yield cuttings for next hundred years in Lithuania. The exact figures with the graphs will be presented in the Appendix A, tables 1 – 21.

5.1.1.1. The process of calculating the harvesting level

In the countries of the Baltic Sea Region, the process of calculation of harvesting level or cutting norms slightly differs. Firstly, for gathering data, some countries use only SWI, and some countries use both SWI as well as NFI. Additionally, much more differences could be found in processes then forest cutting norm is approved. This chapter presents forest inventory systems, used in Lithuania, as well as institutional set up for an approval of a harvesting level.

5.1.1.1.1. The institutional set up for an approval of a harvesting level

Figure 5 presents the process of the approval of a cutting norm for Lithuanian forests. It is set by the order of the Minister of Environment (LRAM 2005b). The calculations are done for a period of 10 years.
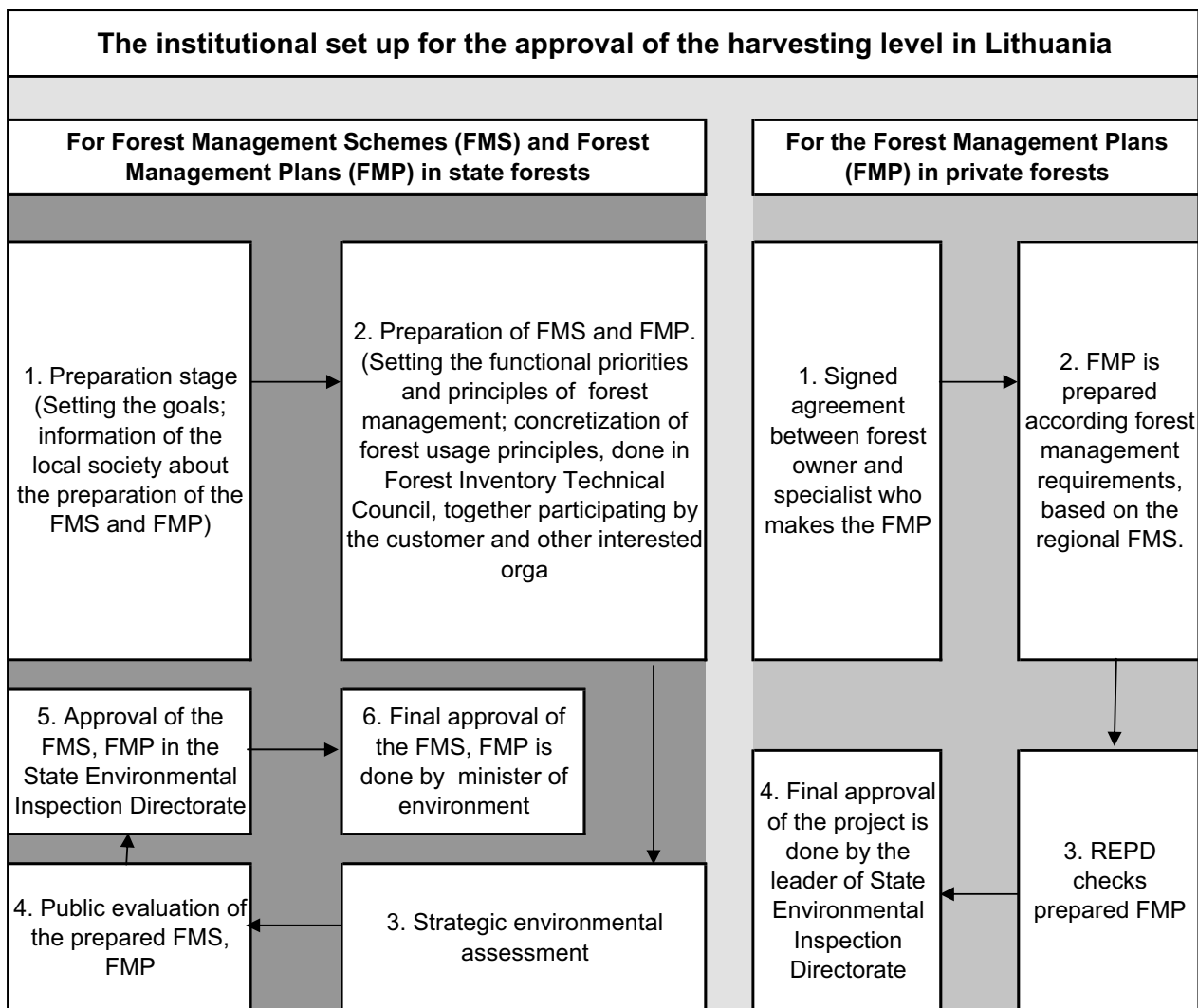
Figure 5. *The institutional set up for the approval of the harvesting level in Lithuania. (Source:* LRAM 2005b).

Firstly the meaning of Forest Management Scheme (further FMS) and Forest Management Plan (further FMP) should be explained. In brief, FMS is strategic planning document in the regional level. Basically, it sets political principles of forest management. Further, this document evaluates enlargement of forest area in the region, then distribution of forest area into forest management groups, after that assesses the quality of forest recourses, even more, settles the principles of forest inventory and forest management. FMP is tactical planning document, which is usually prepared for ten years, for each private or state estate. In this document, issues like forest inventory and preparation of direct forest management activities, such as regeneration, final or intermediate cuttings, protection from fire and etcetera in the selected area are analyzed. It is very important that principles, settled in the FMS, should be implemented in FMP.

Further, the presented scheme in the Figure 5 will be analyzed. In brief, two different processes for approval of FMS and FMP in State forests and other approval of FMP in private forests are distinguished. Firstly, the basic requirement that before preparation of FMP forest inventory has to be

done not taking into account is it private or state forests, has to be fulfilled. For the approval of FMS and FMP in state forests, six levels approach is used. First is preparation stage. In this stage the goals for FMS or FMP are set and then should be official announcement to the public that preparation of FMS or FMP is started. In this stage selection of the assessor for the strategic environmental assessment is done. Second stage is preparation of FMS or FMP. In other words, evaluation of documents, collected data and evaluation of appeared problems should be done. In addition, forest management priorities and principles are set. The decisions, concerning the forest utilization, are done in Forest Inventory Technical Council. Interested organizations or sides are able to participate in this meeting. Then FMS or FMP is prepared, strategic environmental assessment is done. The principles of this process are set by Lithuanian government (LRV 2004a). Additionally, prepared FMS or FMP is given for public evaluation. The principles of public evaluation are set by Lithuanian government (LRV 2004b). Next, State Environmental Inspection Directorate (further SEID) assesses FMS or SFM conformability with the national legislation. The final approval of FMS or FMP is done by minister of environment.

The process of preparation of FMP for private forest owners is simpler, because neither strategic environmental assessment nor public participation is needed. Basically only four levels of preparation could be distinguished. Firstly, a signed agreement between forest owner and experts, who prepares FMP is necessary. Secondly, experts have to inform the private forest owner about the data of previous forest inventory, additionally, experts have to present the requirements of regional FMS, which should be fulfilled. Further, the requirements of private forest owner have to be taken into account. Regional Environmental Protection Departments (further REPD) are encouraged to provide forest planning requirements, settled in the FMS, for the preparation of FMP. Then FMP is finished, REPD examines, if requirements of FMS are fulfilled in FMP. The final approval of the FMP is done by the leader of SEID. Above all, it is very important to point out that the organizer of the processes, showed in Figure 5, for FMS is Ministry of Environment and for FMP are responsible state forest managers or private forest owners.

5.1.1.1.2. The forest inventory system in Lithuania

Forest inventory in Lithuania is done in two ways: 1. By inventorying all forest estates - SWI, 2. By using selective methods - NFI (LRAM 2001b). The figures, obtained by SWI are the basis for management of each forest stand. In other words, SWI helps to set up appropriate forest management systems. Yet, this method has certain shortcomings. For example, the precision of figures is not known and subjectivity of the collected data is not eliminated. In addition, the method is used without demarcating the area of plots within forests (Kuliesis 2004). Still, this method is very cheap and presents the data on all forests of a country. The investigations in the field of NFI in Lithuania started in 1976 (Kuliesis 1996). Yet, the real NFI started in 1995. NFI is done by setting and measuring the net of temporary and permanent plots

(Kuliesis and Kasperavicius 2000). The main objectives for NFI are "Firstly, to measure forest resources, structure and dynamics with required accuracy, secondly, to control other inventory methods, finally, to control forest management efficiency at national level as well as the usage of forest recourses" (Kuliesis and Kasperavicius 2000: 10). The method is also used as a tool for strategic forest planning (Kuliesis and Kasperavicius 2000). However, this type of inventory has limited possibilities to work efficiently in regional level and present objective information about a separate forest stand (Kuliesis 2004).

It is worth to take a look at the main forest inventory figures that were obtained by both types of inventories. Some results from the first circle of NFI were analysed by Kuliesis (2003). A more detailed comparison was made by the same author in 2004 (Kuliesis 2004). Table 1 and Table 2 below present the results on the calculation of forest volume and increment.

Table 1. *A comparison of SWI and NFI on an average volume of all woods and mature woods per hectare. (Source: Kuliesis 2004).*

Index	SWI 2002	NFI 1998 - 2002	Difference (SWI - NFI)
Average volume per ha	195	228	-33
Average volume of mature woods per ha	251	304	-53

Rather significant differences can be seen here. The figures, presented by NFI, are greater than those, indicated by SWI. Thus, an average volume differs by 33 m^3/ha, while the difference in average volume of mature woods makes 53 m^3/ha. The differences arise because of these reasons. Firstly, NFI calculates the biological volume of all trees, whereas SWI calculates only the volume of economically valuable trees. Secondly, not always the same normative is used, after that are time discrepancies and finally, systemic SWI mistakes. Additionally, inadequate reaction of foresters, if forest volumes were a little too high, made forest inventory specialists to admit lower wood volumes (Kuliesis 2004).

Table 2. *A comparison of SWI and NFI. (Source: Kuliesis 2004).*

Index	State forests		Private and other forests		All forests		Differences between Stand-Wise and National inventories		
	SWI	NFI	SWI	NVI	SWI	NFI	Forests of state importance	Private and other	All forests
Volume increment m^3/ha	5.8	7.4	6.5	8.7	6.1	8	-1.6	- 2.2	-1.9
Volume increment%	2.9	3.2	3.4	3.9	3.1	3.5	-0.3	-0.5	-0.4
Age of stands	56	55	50	47	53	51	1	3	2
Site productivity indexes	25	27	25.6	26.5	25.3	26.8	-2	-0.9	-1.5

Rather high volume increments could be explained by the unequal forest area distribution in age classes. The differences between SWI and NFI occur because of discrepancies between increment calculation schemes (Kuliesis 2004). According to Kuliesis (2004), gross annual increment in Lithuania for year 2002, respectively to above mentioned inventory systems NFI and SWI, were 16 and 11.8 million m^3.

5.1.1.2. Forest usage in Lithuania

5.1.1.2.1. Forest ownership

Over time, forest ownership, see Figure 6, has changed. In 1938, there were 84.1% of state forests in Lithuania. In 1988, 100% of forests were state forests, although, they were administered by different managers. To be more precise, 66.9% of forests were of state importance and 29.2% of forests were managed by agricultural enterprises.
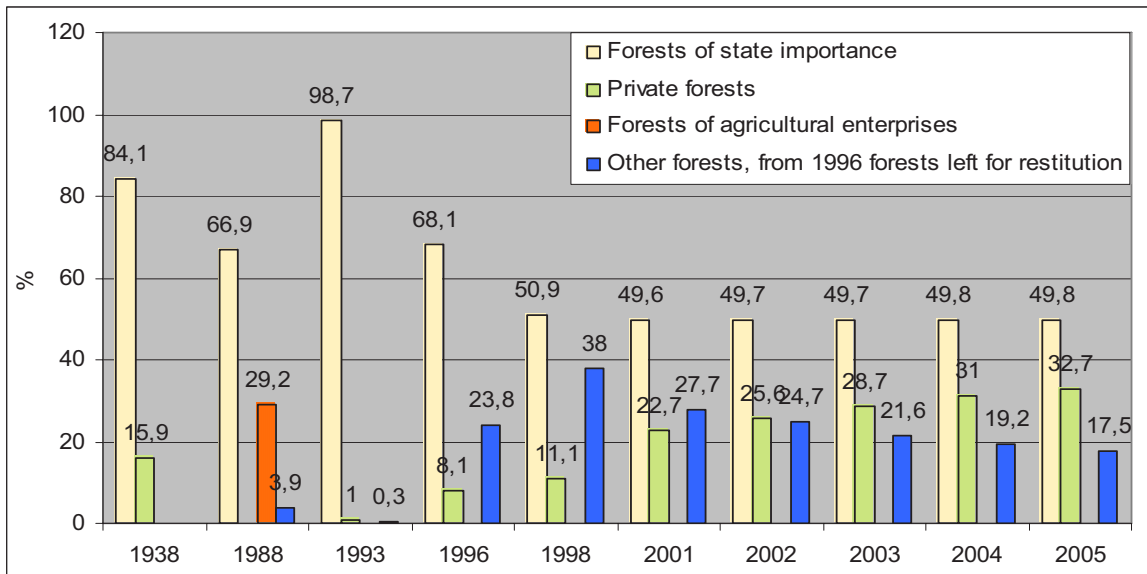
Figure 6. *Forest ownership in 1938 – 2005. (Source: Mizaras 1997; VMT 2005).*

In 1993, there were 98.7% of state forests and 1% of private forests. In 1998, there were 50.9% of forests of state importance, 11.1% of private forests and 38% of forests, left for restitution. The year 2004 saw a significant increase in the area of private forests up to 31%, while the area of forests, left for restitution, decreased to 19.2% and the number of forests of state importance remained more or less stable, and made 49.8%. In 2005, slight changes could be seen. Forests of state importance amounted for 49.8%, private forests made 32.7% and forest area left for restitution made 17.5%.

5.1.1.2.2. The changes in harvesting level in 1986 – 2005

Figure 7 presents harvesting levels in the country during the period 1986 – 2005. As it can be seen, from 1986 to 2005, the harvesting level increased from 2.6 million m^3 to 6.1 million m^3. The graph also shows the emergence of private forests in 1993, which became rather significant in 2005 with their cuttings of 2.5 million m^3. According to the graph, the first peak was observed in 1993, when cuttings reached 4.5 million m^3. In 1995 the cuttings rose to their second peak of 6 million m^3. Afterwards, the cuttings were decreasing until 1998, when they made 4.9 million m^3.
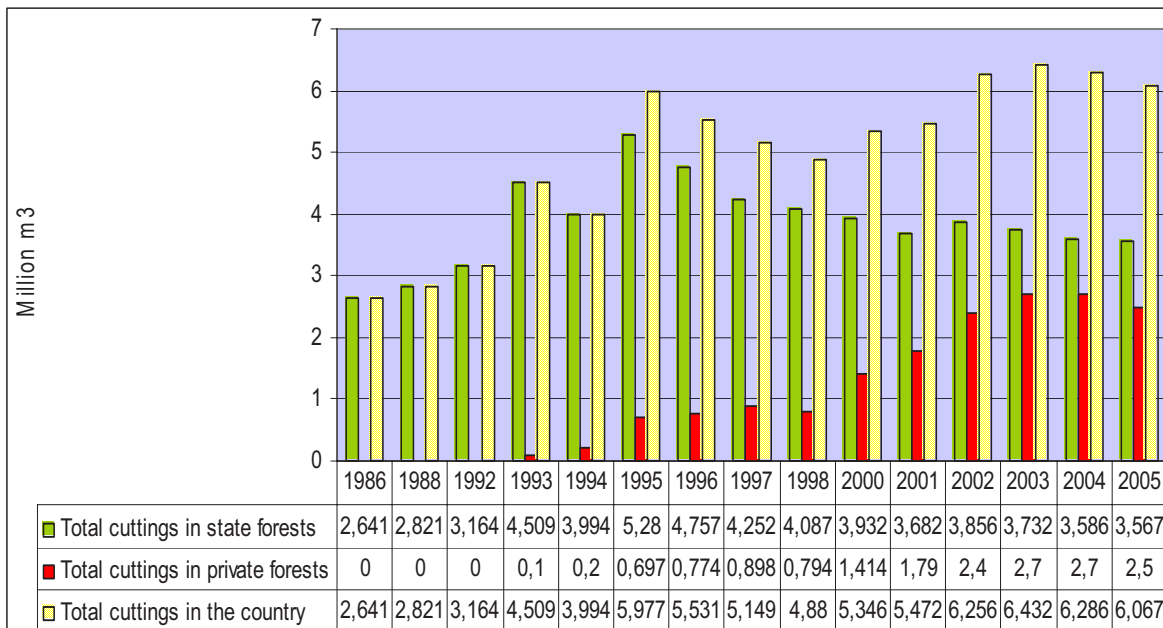
Figure 7. *The total cuttings in Lithuania in 1986 - 2006. (Source: Verbyla 1992; MUM 1993 – 1996; ZMUM 1996 – 1998; MSTD 2000; LRAM 2002d; GMU 2003 – 2006; LRAM 2005a).*

In 2003 the cuttings were at their peak again and made 6.4 million m^3, whereas afterwards they were slightly decreasing. By looking at the bars, which show the cuttings in state forests, the two above mentioned peaks in cuttings can be seen: in 1993, when the cuttings were 4.5 million m^3 and in 1995, when the cuttings made 5.3 million m^3. After that, the cuttings were steadily decreasing and in 2005 they reached 3.6 million m^3. The cuttings in private forests were steadily increasing until 2003, from 0.1 million m^3 in 1993 to 2.7 million m^3 in 2003. In 2005 they decreased to 2.5 million m^3.

5.1.1.2.3. Harvesting – increment ratio in 1988 - 2005

The harvesting level in the analysed period increased almost three times. At this point, it is interesting to look at the changes in the harvesting/increment ratio during this period. The graph below, Figure 8, depicts harvesting /increment ratio.

The harvesting /increment ratio was calculated in following manner, since the official sources do not present these figures. Firstly, gross annual wood increment of certain years was taken and multiplied by 0.87 for getting gross annual increment of merchantable wood. Then, consumed amount of wood in certain years was divided from gross annual increment of merchantable wood and multiplied by 100.
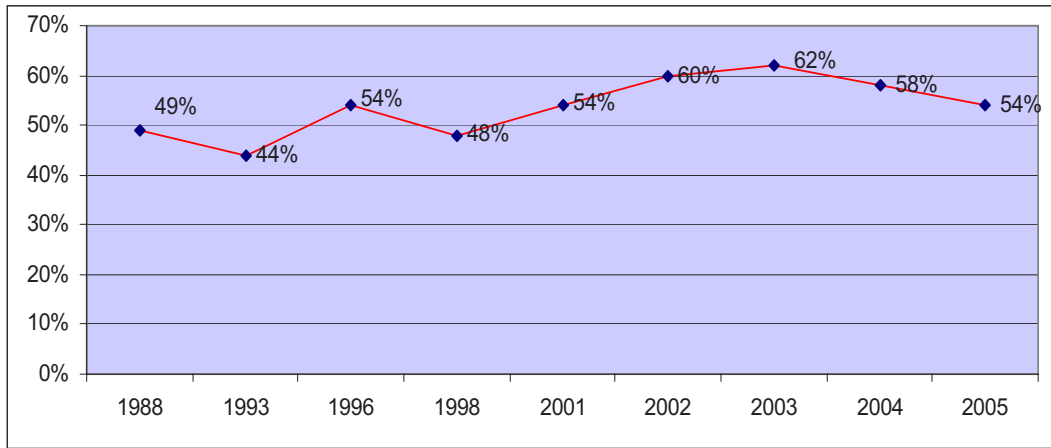
Figure 8. *Harvesting – increment ratio in Lithuania in 1986 – 2005.*

The Harvesting – increment ratio changed from 49% in 1988 to 54% in 2005. Looking to the graph above, the fluctuations of usage intensity could be seen. The lowest ratio was in 1993. It was 44%, yet, should be kept in mind that for year 1988 annual increment was taken 6.59 million m^3 as it was official figure, presented in official book of those days. Some authors like Brukas (2003) claims, that the current increment per hectare for this year was not 3.8 but 6.8 m^3/ha. Because of this, usage/growth ratio for 1988 would be much lower. The highest usage ratio was in 2003 and then 62% of the annual current increment was used. In short, all figures, presented in this chapter, were collected by using SWI methods.

Additionally, forest usage intensity in state and private forests should be defined, see Table 2. These figures were calculated in following way. Firstly, forest area figures for certain years were found, and then forest usage level, separately in the sate and private forests, was taken. Forests, left for restitution, were not involved in this calculation. Finally, Usage level for each year was divided by specified forest area. In conclusion, following results were got. Forest usage from one hectare in state and private forests did not differed significantly. In 1998, forest usage in state forests was higher than in private forests, respectively 3.9 and 3.6m^3/ha. However, in the following years, forest usage in private forests was higher than in state. As an example, in 2003 forest usage in private forests was 4.6 m^3/ha and in state 3.9 m^3/ha. In 2005 usage in both sectors decreased and in private forests was 3.7 m^3/ha, and in state 3.4 m^3/ha.

Table 3. *Forest usage intensity in the state and private forests.*

	State forests			Private forests		
	Forest area 1000 ha	Cuttings	Usage m^3/ha	Forest area 1000 ha	Cuttings	Usage m^3/ha
1998	1055000	4.087	**3.9**	219000	0.794	**3.6**
2001	1002000	3.682	**3.7**	458000	1.79	**3.9**
2002	1011000	3.856	**3.8**	521000	2.4	**4.6**
2003	954400	3.732	**3.9**	586000	2.7	**4.6**
2004	1029900	3.586	**3.5**	641900	2.7	**4.2**
2005	1041800	3.567	**3.4**	684451	2.5	**3.7**

5.1.1.2.4. The intermediate cuttings in 1986 - 2005

In the period 1986 – 2005, the intermediate cuttings were fluctuating as well. Firstly, the intermediate cuttings in state forests will be analyzed. As following Figure 9 shows, in the period 1993 – 1998, a great boom in the intermediate cuttings could be observed. This was a consequence of sanitary cuttings, which rose almost three times. Yet, the primary reason for it was drought in 1992, which was followed by wind throws and beetle *Ips Typographus* attack (Karazija 1996). The amount of cleanings as well as of first and second commercial thinning in state forests was fluctuating during the period and reached its peak in 1998 and 2001. However, it did not amount for more than 500 thousand m³.
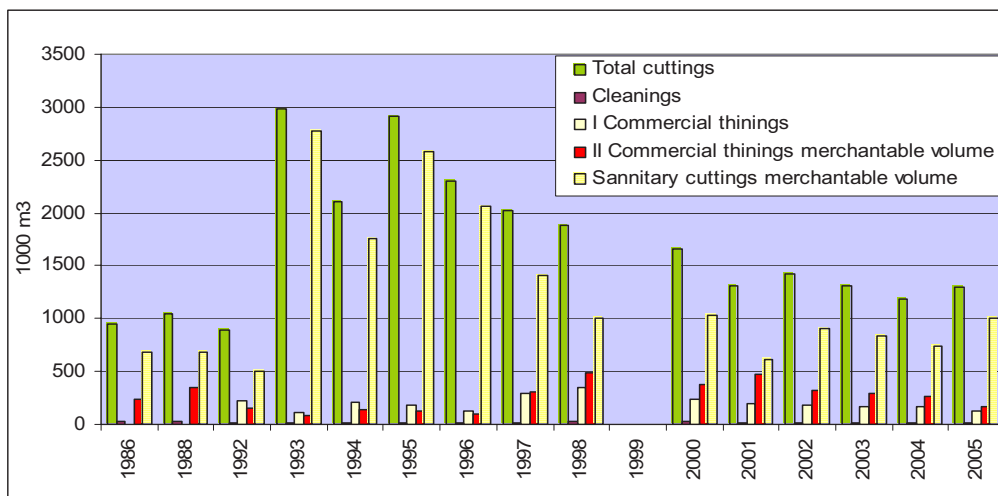
Figure 9. *Intermediate harvesting in state forests in 1986 – 2005. (Source: Verbyla 1992; MUM 1993 – 1996; ZMUM 1996 – 1998; MSTD 2000; LRAM 2002d; GMU 2003 – 2006).*

In 1995, the intermediate cuttings in private forest sector, see Figure 10, were 0.632 million m³, whereas in 1998 they decreased and were 0.363 million m³. However, in 2004 they rose again up to 0.531 million m³.
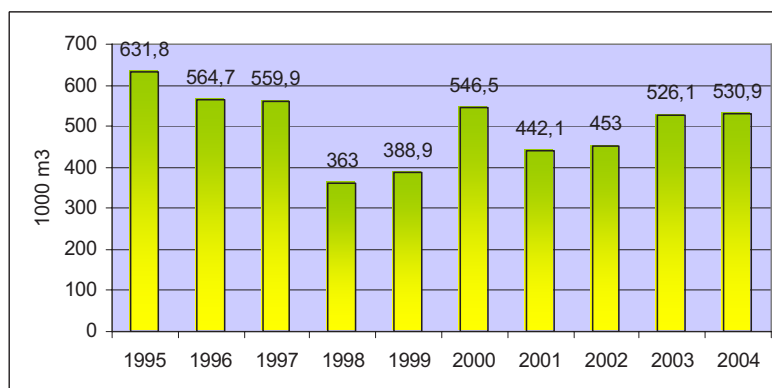
Figure 10. *Intermediate harvesting in private forests in 1995 – 2005. (Source: LRAM 2005a).*

5.1.1.3. The Forest yield in the period 1988 - 2005

5.1.1.3.1. The Forest coverage

According to the Figure 11, forest land area increased from 1.8776 million ha in 1988 to 2.091 million ha in 2005. Forest area, covered by stands, increased from 1.772 in 1988 to 1.988 million m^3 in 2005. These differences appeared because of changes in the methods, which were used for gathering data, as well as natural regeneration of forests in former agricultural abandoned lands.

	1988	1993	1996	1998	2004	2005
■ Forest land area according to Forest assessment, 1000 ha	1877,6	1920	1938	1978	2069	2091
□ Productive forest area 1000 ha	1776,2	1860	1871	1888	1968	1988
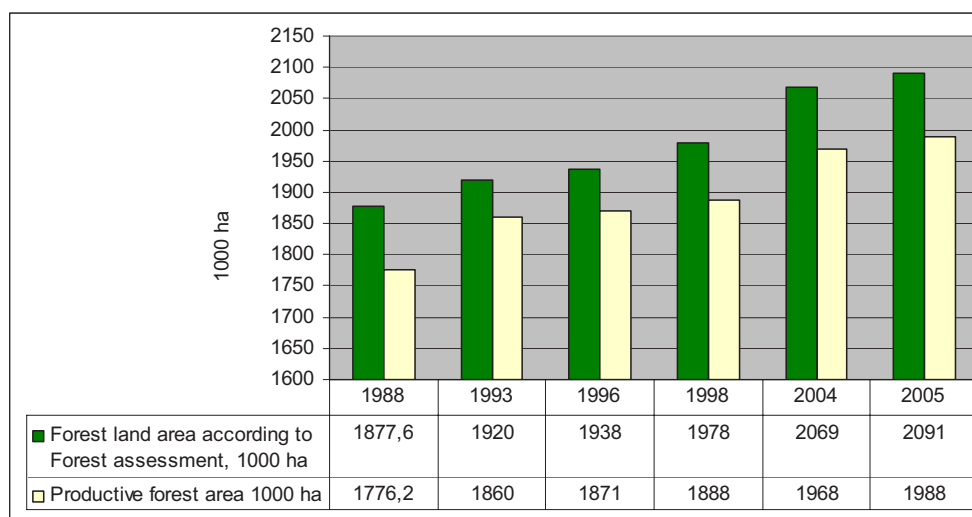
Figure 11. *The changes of forest area in 1988 – 2005. (Source: Brukas and Kenstavicius 1992; LVMI 1994; Rutkauskas 1997; VMT 2005).*

As Figure 12 shows, there were differences in forest coverage in the analyzed period. In 1988 it was 29% and in 1995 already was more than 30%. Further, more rapid increase occurred after year 2000. Then forest coverage was increasing fast and in 2005 it was already 32%.
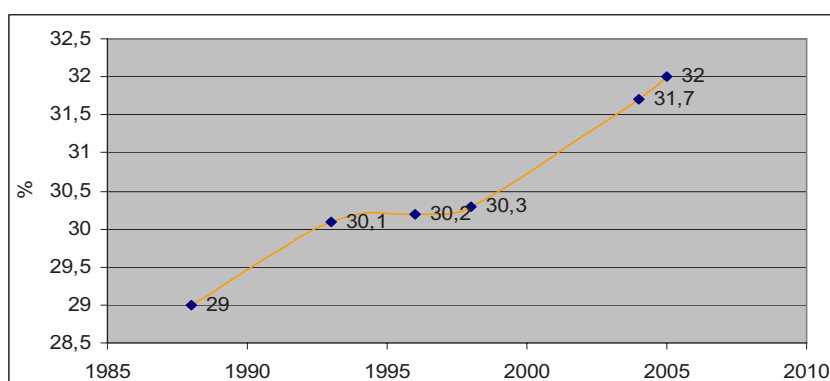
Figure 12. *The changes in forest area in 1988 – 2005 (%). (Source: Brukas and Kenstavicius 1992; LVMI 1994; Rutkauskas 1997; VMT 2005).*

5.1.1.3.2. The total growing volume

As Figure 13 shows, the volume of woods was steadily increasing over the time. In 1988 it was 309.16 million m^3, in 1993 it grew up to 334 million m^3, and in 2005 it was 393 million m^3.
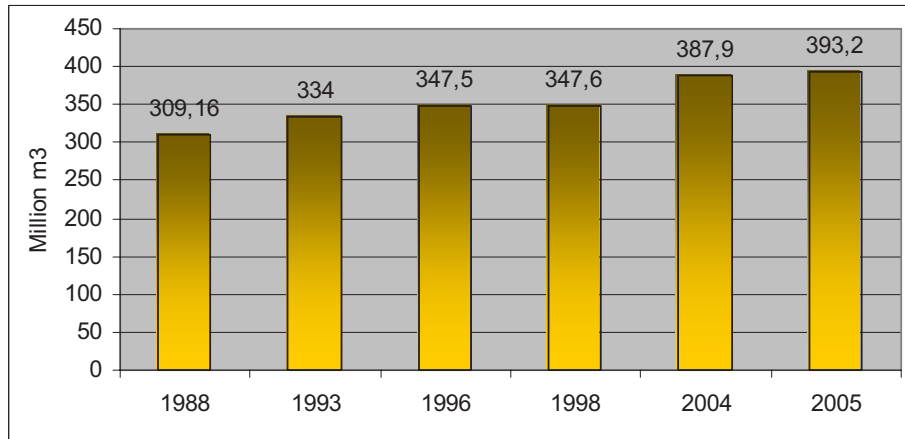
Figure 13. *Total growing stock volume 1998 – 2005. (Source: Brukas and Kenstavicius 1992; LVMI 1994; Rutkauskas 1997; VMT 2005).*

5.1.1.3.3. The average growing stock per hectare

According to Figure 14, average growing stock per hectare increased from 174 m^3/ha in 1988 to 198 m^3/ha in 2005. In other words, it increased by 12%. However, in 1996 and then in 2004 and 2005 the growing stock volume was at its peak. In 1998 the average volume per hectare decreased to 184 m^3/ha. Then it started rapidly increasing and in 2004 already was 197 m^3/ha.
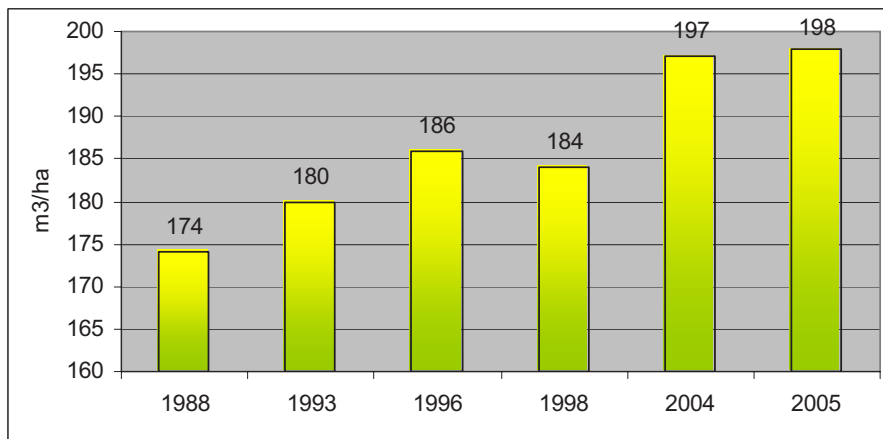
Figure 14. *Growing stock volume per hectare 1998 – 2005. (Source: Brukas and Kenstavicius 1992; LVMI 1994; Rutkauskas 1997; VMT 2005).*

5.1.1.3.4. The forest area distribution according to tree species

There were no considerable changes of forest area distribution in composition of tree species, see Figure 15 below. Yet, the area of pine forests decreased. In 1988 it was 37.5%, in 1993 it was 37.4% and in 2005 it made 36.2%.

	Pine	Spruce	Birch	Aspen	Black alder	Grey alder	Oak	Ash
■ 1988	37,5	20,8	22	3,5	5,5	6,1	1,7	2,3
□ 1993	37,4	24,2	19,5	2,7	5,6	5,6	1,7	2,7
■ 2005	36,2	21,8	20,6	3,2	6,6	6,3	1,9	2,5
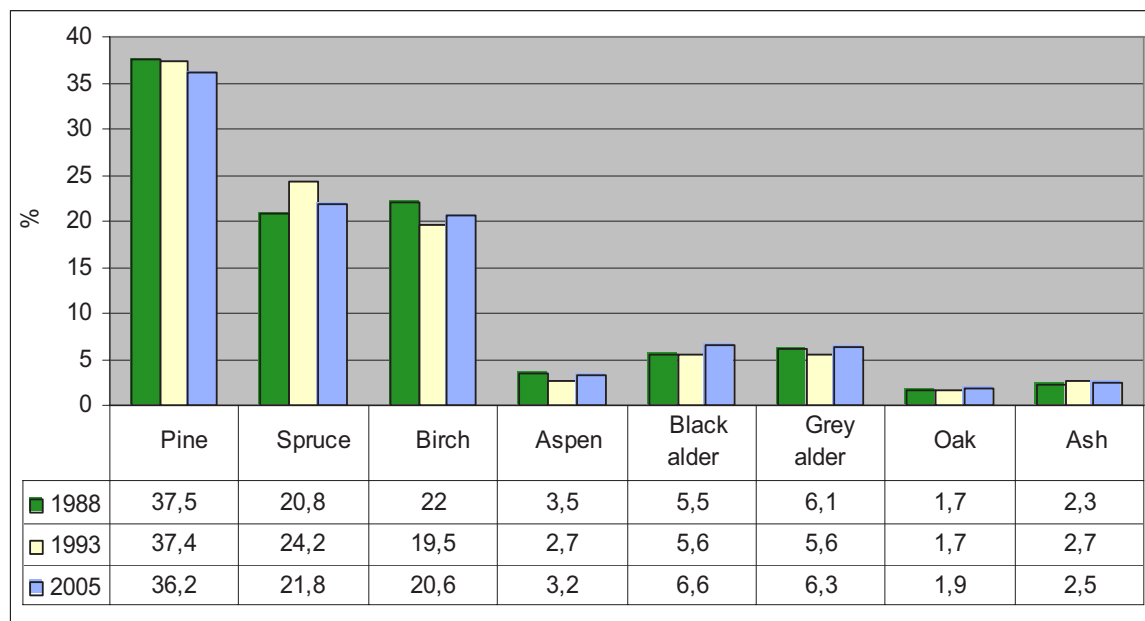
Figure 15. *Species distribution in percents. (Source: Brukas and Kenstavicius 1992; LVMI 1994; VMT 2005).*

The main decrease in the amount of pine in Lithuanian forests occurred in the period 1993 – 2005, when it decreased by 1.2%. Yet, the proportion of spruce forests area increased. In 1988 it made 20.8% of all trees, in 1993 it made 24.2% and in 2005 its share decreased to 21.8%. The proportion of birch forests area decreased. In 1988 it made 22%, in 1993 it made 19.5% of all trees and in 2005 its share increased again to 20.6%. The proportion of aspen forests area remained rather stable. It was 3.5% in 1988, 2.7% in 1993 and then slightly increased to 3.2%. The amount of black alder forests area kept quite stable as well. In 1988 it was 5.5%, in 1993 it was 5.6% and in 2005 it increased to 6.6%. Similar observations about the proportion of grey alder forests can be made. In 1988 forest area of grey alder was 6.1%. Then it decreased a little to 5.6% in 1993 and, afterwards, increased to 6.3% in 2005. The proportion of oak forests area in 1988 and 1993 was 1.7% and then in 2005 it slightly increased to 1.9%. The proportion of ash forests area also remained very stable. In 1988 it was 2.3%, in 1993 it was 2.7% and in 2005 it slightly decreased to 2.5%.

5.1.1.3.5. The volume distribution by tree species

Figure 16 below, shows the volume distribution by tree species in period 1988 – 2005. The volume of pine forests increased from 122 million m^3 to 170 million m^3, but volume of spruce forests increased very slightly from 80 to 81 million m^3. Volume of the oak, the ash and the aspen forests increased as well, but changes were slight. The oak forests volume increased from 5 to 8 million m^3, the ash from 5 to 8 million m^3 and the aspen from 12 to 13 million m^3.
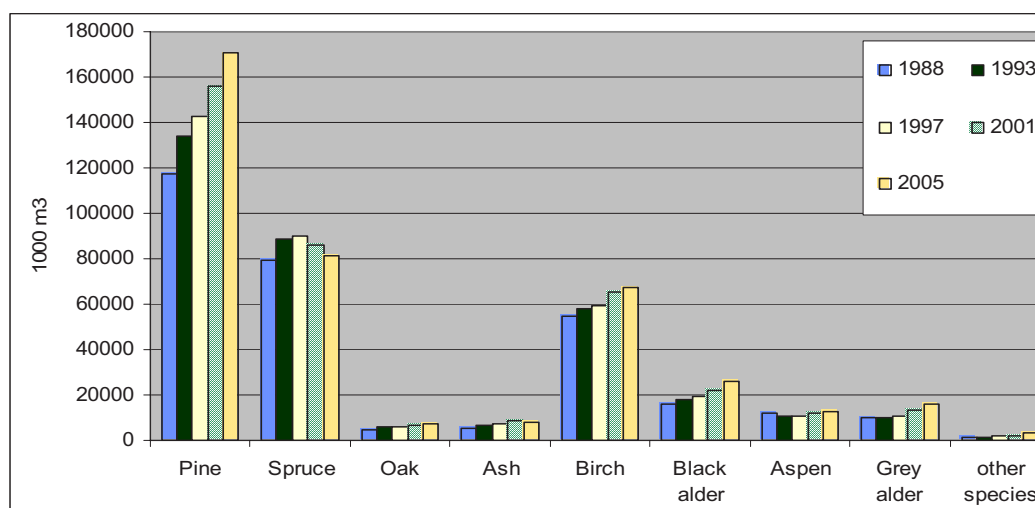
Figure 16. *Volume distribution by tree species 1988 - 2005. (Source: Brukas and Kenstavicius 1992; LVMI 1994; VMT 2001; VMT 2005).*

More remarkable changes could be seen for the birch, the black alder and the grey alder forests volumes. Volume of the birch forests increased from 55.5 to 67 million m^3, the black alder from 16.5 to 25.9million m^3 and the grey alder from 10 to 16 million m^3. Exact figures are presented in Appendix A, Table 8.

5.1.1.3.6. Volume and area of mature woods

Indeed, it is necessary to point out, that area and volume of mature woods in year 2005 are presented only for III and IV forest management groups. The reason for this is that forest inventory bodies in their annual publications have not presented figures of the mature woods for all Lithuanian forests since 2001. It makes difficulties to compare the data. Nevertheless, taking mentioned fact into account, still changes in total area and volume of mature woods in period 1988 – 2005 are remarkable. The area of mature woods, see Figure 17, increased from 158 thousand ha in 1987 to 326.2 thousand ha in 2005. The volume of mature woods also increased significantly, see Figure 18, from 32.32 million m^3 in 1988 to 81.52 million m^3 in 2005. In other words, the volume of mature woods increased more than three times. The volume of mature woods is very important for the calculation of forest usage. The increased amount of mature woods can directly lead to the increase in harvesting level.
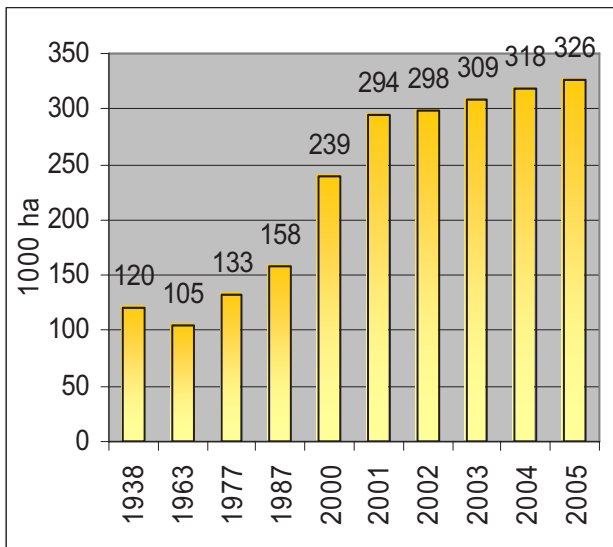
Figure 17. *The total area of mature woods in 1938 – 2005. (Source: VMT 2005).*
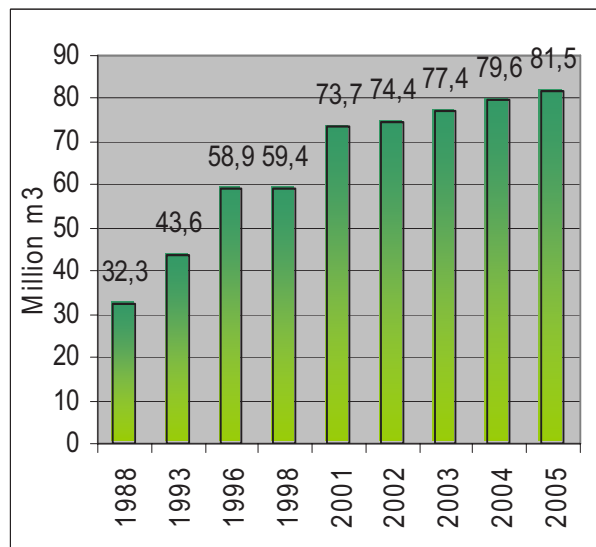
Figure 18. The t*otal volume of mature woods in 1987 – 2005. (Source: Brukas and Kenstavicius 1992; LVMI 1994; Rutkauskas 1997; VMT 2001; VMT 2002; VMT 2003; VMT 2004; VMT 2005).*

The volume of mature woods per hectare, see Figure 19, also changed. The volume of mature pine forests increased from 271 m^3/ha in 1988 to 300 m ^{3}/ha in 2005. During the same period, the volume of mature spruce forests increased from 264 m^3/ha to 304 m^3/ha. The volume of mature birch remained stable and was about 230 m^3/ha.

	Pine	Spruce	Birch	Aspen	Black alder	Grey alder	Oak	Ash	Total
1988	271	264	229	256	258	155	241	250	242
1993	278	285	235	261	270	167	246	244	244
2005	300	304	230	271	289	148	245	230	250
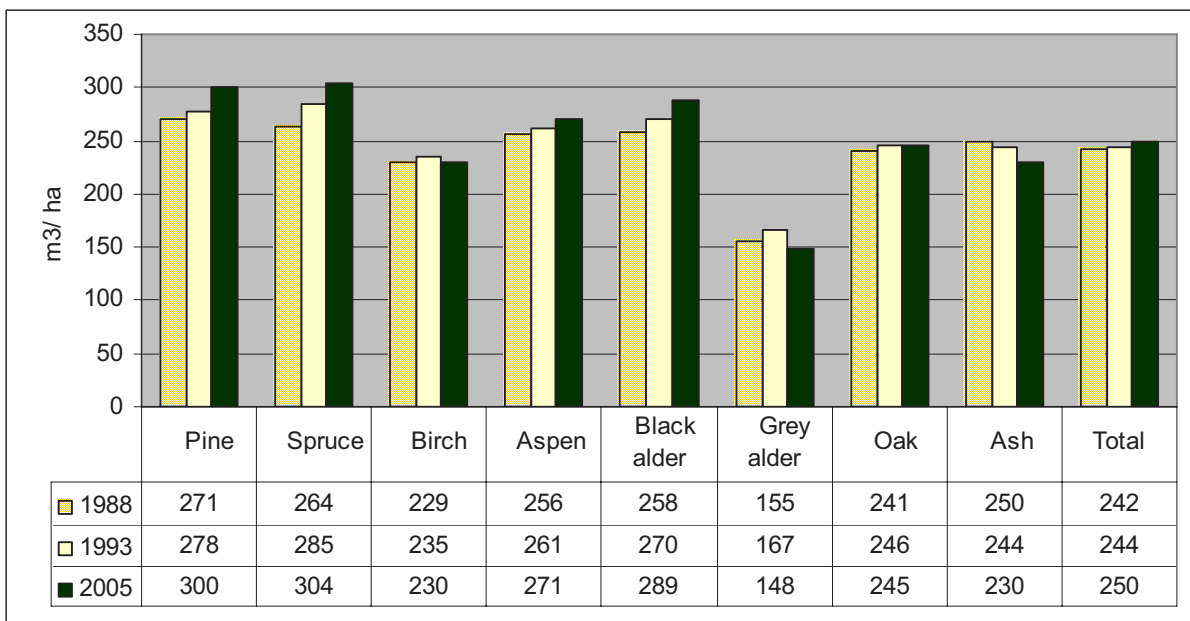
Figure 19. *The volume of mature woods by tree species per hectare in 1988 – 2005. (Source: Brukas and Kenstavicius 1992; LVMI1993; VMT 2005).*

The volume of mature aspen increased from 256 m^3/ha in 1988 to 271 m^3/ha in 2005. The volume of mature black alder increased from 258 m^3/ha in 1988 to 289 m^3/ha in 2005. However, in 2005 the volume of grey alder decreased from 155 m^3/ha to 148 m^3/ha. The average volume of mature oak kept stable and made about 240 m^3/ha. The volume of mature ash decreased from 250 m^3/ha in 1988 to 230 m^3/ha in 2005.

In the next Figure 20, the distribution of volume according to tree species and changes during the period 1988 – 2006 can be seen. Data for year 2005 is presented only for III and IV forest management groups. It can be noticed that the mature volume increased for all tree species. The amount of mature pine increased almost three times from 6.06 million m^3 in 1988 to 9.3 million m^3 in 2005. The amount of mature spruce volume increased from 6.4 million m^3 to 24.4 million m^3, which is almost four times.

	Pine	Spruce	Birch	Aspen	Black alder	Grey alder	Oak	Ash
1988	6062	6420,9	6374,5	6408,2	2428,4	2123,6	1107,3	150,1
1993	7040	10913	9715	7289	3759	3169	1281	224
2005 II IV forest groups	9364	24408	19206	10015	8012	8607	1129	193
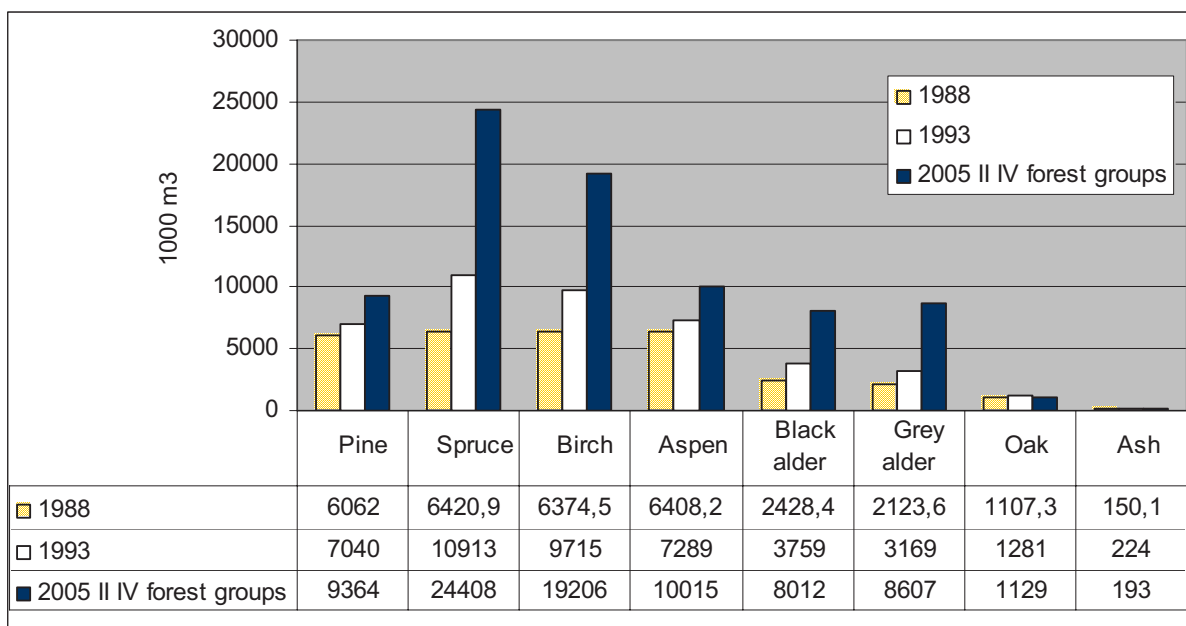
Figure 20. *The total volume of mature woods by tree species in 1988 – 2005. (Source: Brukas and Kenstavicius 1992; LVMI 1994; VMT 2005).*

The amount of mature birch forests increased from 6.3 million m^3 to 19.2 million m^3, which is more than three times. The volume of mature aspen woods increased from 6.4 million m^3 to 10 million m^3 or, in other words, almost two times. The amount of mature black and grey alder separately increased from 2 million m^3 to 8 million m^3, which is almost five times. The volume of mature oak forests did not change much and stayed around 1.1 million m^3. The volume of mature ash forests was very low during the period. However, it increased twice from 0.15 million m^3 to 0.193 million m^3.

5.1.1.3.7. Forest productivity

Forest productivity can be defined by the total gross annual increment. Figure 21 shows that the total gross annual increment, during the period 1988 -2005, increased two times from 6.59 million m^3 in 1988 to 12.8 million m^3 in 2005.
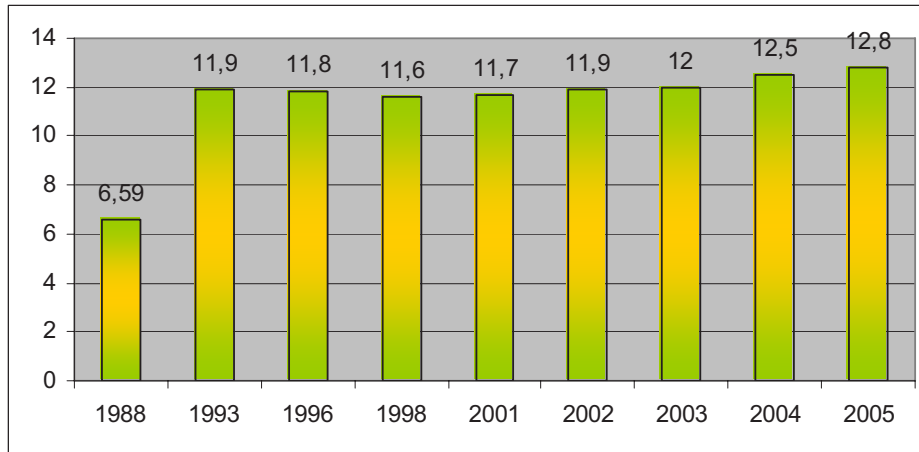
Figure 21. *Gross annual increment in 1988 – 2005. (Source: Brukas and Kenstavicius 1992; LVMI 1994; Rutkauskas 1997; VMT 2001; VMT 2002; VMT 2003; VMT 2004; VMT 2005).*

The biggest increase occurred in 1993. The difference between the years 1993 and 1988 is 5.31 million m^3. In later years, only a slight increase can be seen and the difference between the years 1993 and 2005 makes only 0.9 million m^3.

The mean current annual increment of different tree species**,** see Figure 22**,** also increased. Looking at the graph, it can be seen, that the total mean current annual increment in the period 1988 - 2005 increased from 3.8 to 6.4 m^3/ha. These differences appeared because in soviet times, forest inventory experts used to hide real forest inventory figures. Looking at different tree species, it can be noticed that mean current annual increment of pine increased from 3.6 m^3/ha to 6.2 m^3/ha. For spruce, the tendencies were different. Starting with 3.8 in 1988, it increased to 7.7 m^3/ha and then decreased to 6.2 m^3/ha. During the analysed period, the mean current annual increment of birch increased from 3.6 to 6.2 m^3/ha. Aspen had the same tendencies as spruce, since at first it increased from 5 m^3/ha in 1988 to 7.8 m^3/ha in 1993 and then decreased to 7 m^3/ha in 2005. For black alder, it increased as well from 4.1 m^3/ha in 1988 to 7 m^3/ha in 1993. Then it decreased to 6.5 m^3/ha in 2005. The mean current annual increment for grey alder increased from 4.2 m^3/ha in 1988 to 6.7m^3/ha in 2005. For oak and ash, it increased from 2.3 and 3 m^3/ha in 1988 to 4.9 and 5.7 m^3/ha in 2005.
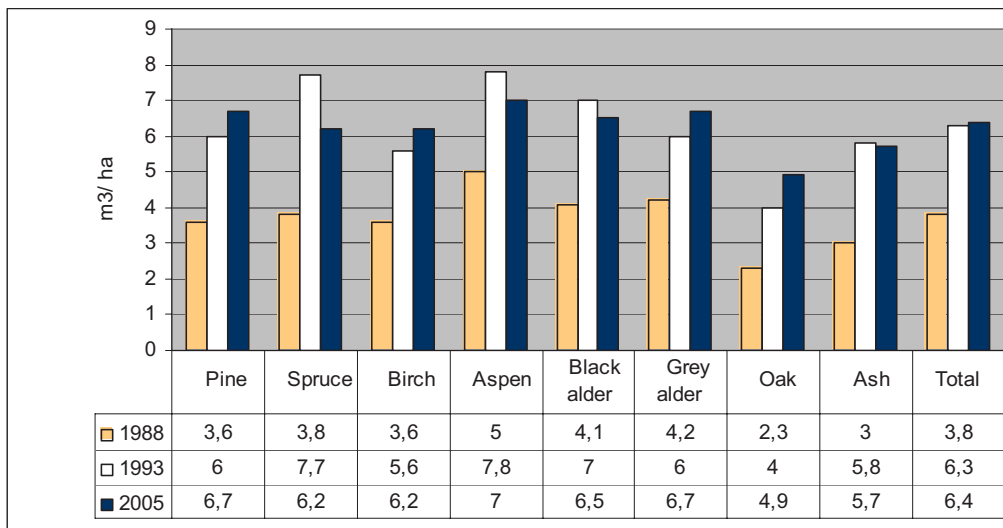
Figure 22. *Mean current annual increment in the period 1988 – 2005 according tree species. (Source: Brukas and Kenstavicius 1992; LVMI 1994; VMT 2005).*

Soil productivity index, presented in Figure 23 bellow, tells about the productivity of soil and possible forest growth potential. This is an important factor that defines forest productivity. The graph below presents soil productivity index of the present days. The average soil productivity index for all Lithuania forests is 27 metres in 100 years and for mature woods it is 24 metres. Spruce and ash forests have the highest soil productivity index, which is 30 metres, whereas grey alder and black alder have the lowest soil productivity indexes, which respectively are 17 and 24 metres. Pine, birch, aspen and oak have an average soil productivity index for all forests, which is about 28 metres. As it can be seen, mature woods have significantly lower soil productivity indexes: pine – 24 metres, spruce - 26, aspen - 28, black alder – 22, grey alder – 17, oak – 24 and ash – 24 metres.
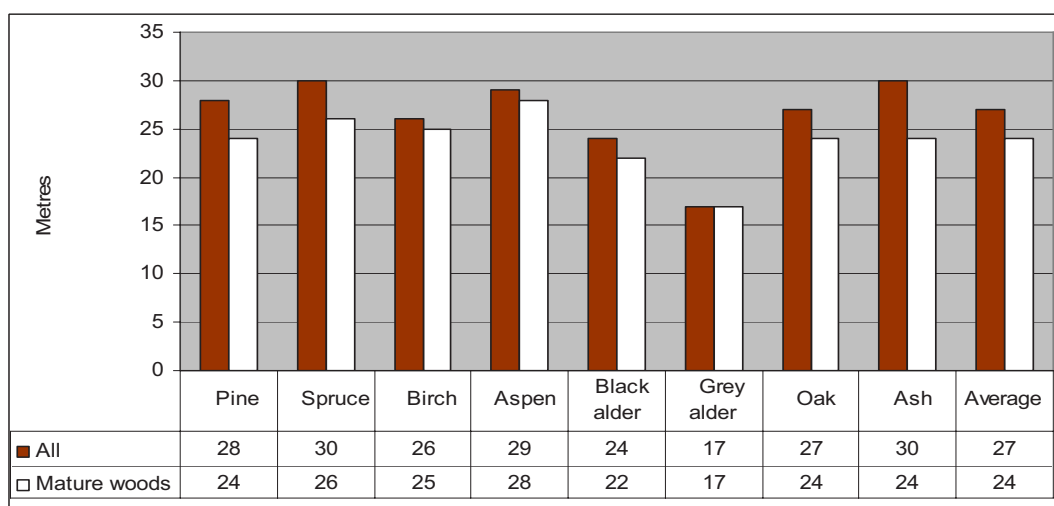
Figure 23. *Soil productivity index in 2005. (Source: VMT 2005).*

5.1.1.3.8. The Forest area distribution according to the age classes 1988 - 2005

Figure 24 describes forest area distribution according to the age classes in period 1988 – 2005. To summarize, this graph below, shows unequal distribution of the forests in age classes. Exact figures are presented in Appendix A, Table 9. Thus, in this graph could be seen too little proportions of young and mature stands and too high proportions of middle age and premature stands.
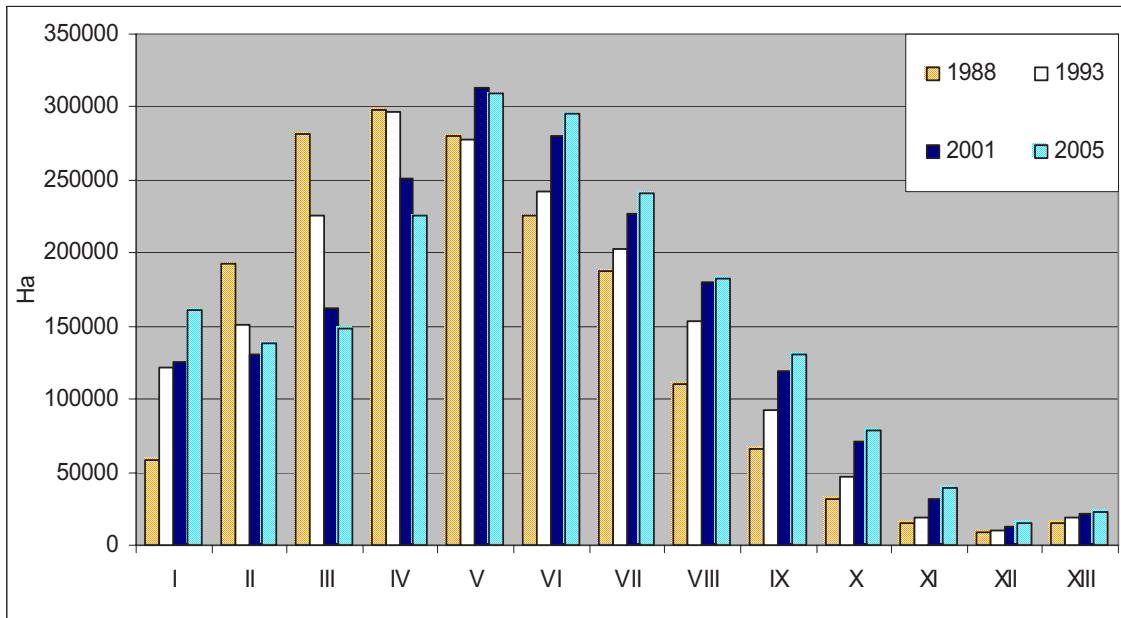
Figure 24. *Forest area distribution according to age classes 1988 – 2005. (Source: Brukas and Kenstavicius 1992; LVMI 1994; VMT 2001; VMT 2005).*

In conclusion, during this period, the highest proportion of forest area was in IV, V and VI age classes. In particular for each mentioned age class were about 300,000 hectares. Moreover, could be seen the shift of forest area to the right in the age classes, proving that Lithuanian forests became older. In brief, could be seen increased amount of I age class forest area and significantly decreased amount of II, III and IV age class forest area, making age class distribution more unequal in year 2005.

5.1.1.4. Forest management regulations

In this chapter, forest management regulations are presented. In short, perhaps the most important forest management factors are forest management regime and applied forest cutting ages in the country. Certainly, forest management regime sets certain rules for the forest management in particular forest areas. Further as, cutting ages define forest management rotations, which in particular are very important to generated incomes from the forests, moreover, to the net present value of the forests.

5.1.1.4.1. Forest management regime

According to the Forest Act (LRS 1994), all forests of Lithuania are divided into four forest management groups:

1. Group I – strict nature reserves. The management aims to leave these forests for natural growth process. Any type of cutting is forbidden.
2. Group II (a) – ecosystem protection forests.
3. Group II (b) – recreational forests. For group II, the main aim of management is preservation of forest ecosystems and forest usage for recreational purposes. The wood that achieved natural maturity or was damaged by natural disasters is allowed to be cut by main regenerative cuttings. Yet, the priority is given not to the final cuttings. The final cuttings could be used only, if intermediate cuttings have not achieved the required composition of species. The cutting area for the group II (a) cannot be bigger than 2 ha, while for the group II (b) it cannot cover more than 3 ha.
4. Group III– protective forests. The main aim here is protection of soil, water and environment. The final cuttings as well as intermediate and sanitary cuttings are allowed.
5. Group IV – commercial forests in which all types of cuttings are allowed. Yet, for group III the final cutting area cannot be bigger than 5 ha and for group IV it cannot cover more than 8 ha.

In Lithuania, forest usage mainly lies on the III and IV forest management groups that make 86.6% of the total forest area. Thus, Lithuania has almost 14% of protected forests, 1.2% of which are reserves.

In brief, it could be said that in 1988, see Figure 25, group I involved protected forests and group II involved commercial forests. In the next Figure 26, which shows the distribution of forest area into management groups from 1993, groups I, II and III represent protected forests in different level and group IV contains commercial forests.
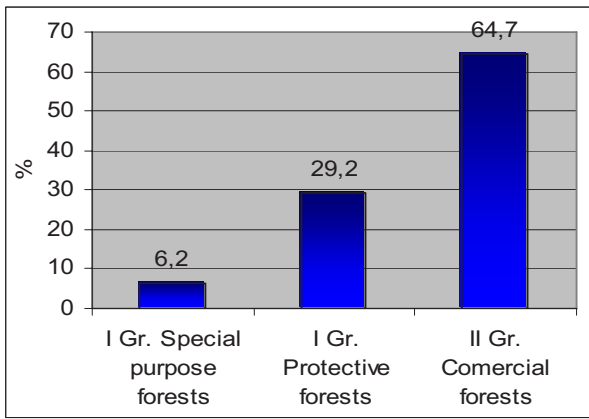
Figure 25. *Forest management groups in 1988. (Source: Brukas and Kenstavicius 1992).*
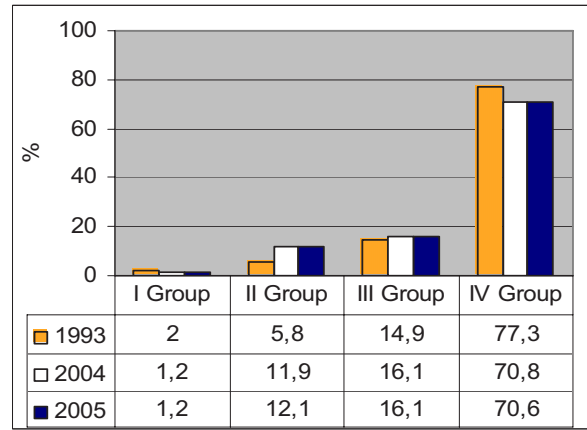
Figure 26. *Forest management groups in 1993 – 2005. (Source: LVMI 1994; VMT 2004; VMT 2005).*

Looking at Figure 25 and Figure 26, it can be seen that the proportion of protected area in the period 1988 – 2005 decreased from 35.34% to 29.4% in 2005. At the same time, the area of commercial forests increased from 64.66 to 70.6%. In 1993 it reached even 77.3%.

In addition, forest area of commercial forests, see Figure 27, increased from 1.357 million ha in 1988 to 1.476 million ha in 2005.
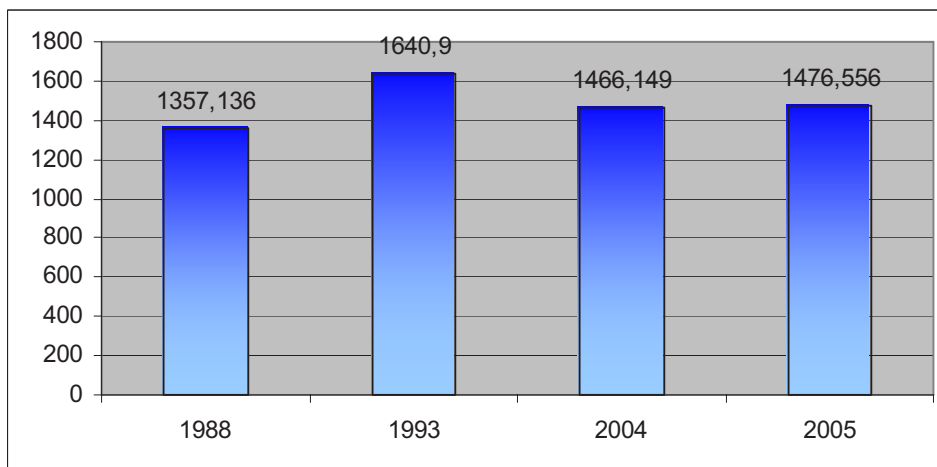
Figure 27. *The area of commercial forests in 1988-2005. (Source: Brukas and Kenstavicius 1992; LVMI 1994; VMT 2004; VMT 2005).*

5.1.1.4.2. Forest cutting ages

In this part, the changes of cutting ages in commercial forests will be analysed. The changes of cutting ages in other management groups can be seen in the Table 11 that is provided in the Appendix A. The Figure 28 shows some changes in the cutting ages of IV forest management group.
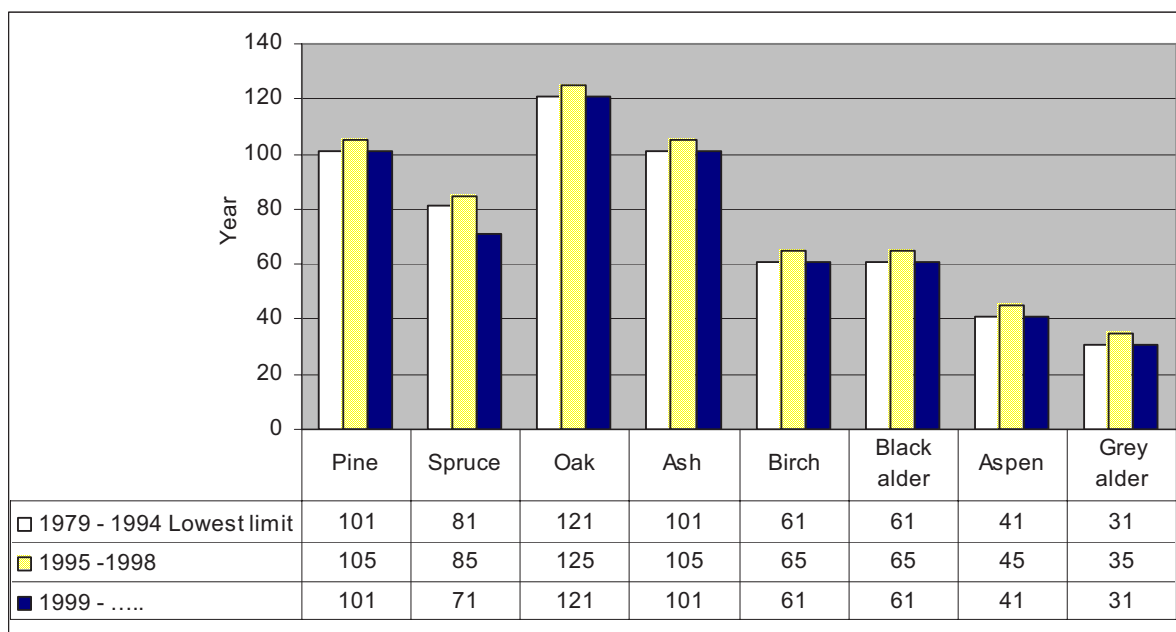
Figure 28. *The cutting ages used for commercial forests in 1979 – 2005. (Source: Brukas and Kenstavicius 1992; Kenstavicius 2000; VMT 2005).*

Firstly, cutting ages, used in the period 1979 – 1994, are presented in the figure. In this period, the lowest cutting limit for pine was 101 years, spruce – 81, oak – 121, ash – 101, birch – 61, black alder – 61, aspen – 41 and grey alder 31 years. Further, after year 1995, cutting ages were little bit increased: for pine to 105 years, for spruce – 85, for oak – 125, ash – 105, birch – 65, black alder – 65, aspen – 45 and finally, grey alder 35 years. In 1999, the cutting age for pine was reduced from 105 to 101 years, for spruce from 85 to 71 years, for oak from 125 to 121 years, for ash from 105 to 101 years, for birch from 65 to 61years, for black alder from 65 to 61 years, for aspen from 45 to 41 years and for grey alder from 35 to 31 years. Thus, the most serious reduction in a cutting age was made for spruce, since it was reduced by 15 years.

5.1.1.5. The forest usage prognoses made in different periods

In short, during the period 1988 - 2005, three different prognoses for possible forest usage in year 1992, next, in year 1997 and finally, in year 2000 were made. Those prognoses were supposed to be reliable, because predictions were done by inventory experts, who were responsible for calculation of annual forest usage cutting norm, but nevertheless, they were significantly different. Together with the prognoses, the experts additionally provided their comments on the predicted figures. Further, in the following chapters, prognoses, done by different authors in different times, are analysed. In brief, then comparing different prognoses, basis for analysis is selected following factors: total cuttings in the country, total cuttings from one hectare and finally, usage/growth ratio of different prognoses.

5.1.1.5.1. Prognoses made in 1992

The first prognosis, done by Brukas and Kenstavicius (1992), see Table 4, which predicted the lowest harvesting level for the analysed period and in the future, was made in 1992. According to it, the harvesting level in 1995 should have been 4.2 million m^3, in 2005, it should have made 4.9 million m^3, and in 2010 – 5.2 million m^3.

Table 4. *The real cutting norm, set in certain years, and the future prognosis made in 1992. Volume in million m3. (Source: Brukas and Kenstavicius 1992).*

Type of cuttings	Harvested volume		Cutting prognoses					
			Normal			Maximal		
	1965	1990	1995	2005	2010	1995	2005	2010
Main cuttings	1.229	1.766	2.193	2.698	2.999	2.398	3.052	3.364
Thinnings	1.237	1.263	1.315	1.378	1.412	1.866	1.87	1.87
Other cuttings	0.12	0.043	0.056	0.056	0.056	-	-	-
Total cuttings	2.586	3.072	3.564	4.132	4.467	**4.264**	**4.922**	**5.234**
Cuttings from 1 ha m^3	1.4	1.7	2	2.3	2.5	**2.3**	**2.7**	**2.9**

These prognoses were made by using forest inventory data from the year 1987. Brukas and Kenstavicius (1992: 523) give the following reasons for the increase of the harvesting level "After reestablishment of independence of Lithuania in 1990, Russia almost stopped exports of wood to our republic. As a consequence, deficit for wood emerged and by the order of the Ministry of Forestry, a new optimally maximal cutting norm was established and approbated for state forests for the period 1991 - 1995. The Ministry of Forestry also allowed the level of thinning to increase to optimally maximal level."

5.1.1.5.2. The prognoses made in 1997

The prognoses, made in 1997, by forest management specialist Rutkauskas (1997), see Table 5, predicted higher forest usage level than previous ones. The following table shows that in the period 1994 – 2003 5.05 million m^3 harvesting level was predicted. For the period 2004 – 2013, it was predicted to make 5.52 million m^3 and in the period 2014 – 2013, it was expected to be 5.86 million m^3.

Table 5. *The cutting prognoses in Lithuania, made in 1997. Volume in million m^3. (Source: Rutkauskas 1997).*

Type of cuttings	Cutting prognoses		
	1994 – 2003	2004 – 2013	2014 – 2023
Main cuttings	3.22	3.96	4.46
Thinnings	1.83	1.56	1.4
Total cuttings	**5.05**	**5.52**	**5.86**
Cuttings from 1 ha m^3	2.72	2.97	3.15

In his article, Rutkauskas (1997) gives the following explanations for the predicted harvesting level:

1. Because of the forest reform, forests left for restitution (500 thousand ha), large number and area of protected areas (360 thousand ha) and because private forest owners are not willing to cut, practicable forest usage until 2000 can make 4.2 – 4.4 million m^3.

2. After the forest privatisation reform, when private forest sector functions normally, forest usage will increase and until year 2005, it can reach 5 million m^3.

3. In 2015, because of improved stand age structure and increased share of mature stands, forest usage may reach 5.5 – 6 million m^3.

Firstly, Rutkauskas (1997) suggests decreasing the amount of dying wood to 0.8 – 1 m^3. Secondly, he recommends increasing forest management intensity. Thirdly, he suggests shortening growing rotations. In this case, forest usage could be 6 - 7 million m^3.

5.1.1.5.3. Prognoses made in 2000

The highest forest usage prognoses were made in year 2000, by Kuliesis and Petrauskas (2000), see Table 6. For the period 2001 – 2010, the harvesting level of 6.83 million m^3 was predicted, for the period 2011 – 2020, it was predicted to make 7.96 million m^3 and for the period 2021 – 2030, the harvesting level of 8.94 million m^3 was anticipated.

Table 6. *The prognoses for removable merchantable wood in 2000. Volume in million m^3. (Source: Kuliesis and Petrauskas 2000).*

Cuttings	Forests								
	State importance			Private and other			Total		
	2001 – 2010	2011 – 2020	2021 – 2030	2001 – 2010	2011 – 2020	2021 – 2030	2001 – 2010	2011 – 2020	2021 – 2030
III and IV Forest management groups									
Final cuttings	2.57	2.57	2.66	1.39	2.15	2.61	3.96	4.72	5.27
Cleaning	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2
Thinnings	0.9	1.02	1.18	0.91	1.04	1.17	1.81	2.06	2.35
Salvage	0.25	0.24	0.25	0.31	0.29	0.27	0.56	0.53	0.52
II Forest management group									
All cuttings	0.2	0.3	0.4	0.1	0.15	0.2	0.3	0.45	0.6
Total cuttings	4.02	4.23	4.59	2.81	3.73	4.35	**6.83**	**7.96**	**8.94**
Growing stock use intensity in Lithuanian III – IV group forests									
Merchantable wood m^3/ha	4.83	4.97	5.28	3.09	4.11	4.71	**3.91**	**4.51**	**4.98**
Increment consumption %	90	94	90	57	78	95	**72**	**86**	**93**

Kuliesis and Petrauskas (2000) points out the following:

1. After 20 - 30 years, the area of mature forests in the forest management group II will increase and forest usage will increase to 0.5 - 0.6 m^3 annually.

2. Over the period of 30 years, it is expected to increase the forest area by 360 thousand ha or by 18% of the present total forest area with minimal investments.

3. The area of mature forests and cutting ages are of great importance. Having the cutting age for spruce in commercial forests reduced to 71 years, the area of mature stands would increase.

4. In the period 2001 – 2100, the increase of forest productivity in state forests will fluctuate from 4.6 to 7.1 m^3/ha and in private forests from 4.4 to 7.0 m^3/ha. The increase of forest productivity in state forests will be the most important factor that will determine the increase of mean annual volume.

5. The prognoses show that in 100 years' time in private forest sector, the mean forest volume per ha will increase by 68 and in state forest sector by 36 m^3/ha.

6. The volume of mature woods in state forests will increase by 83 m^3/ha and in private – by 139 m^3/ha.

7. Those results will be reached under certain conditions. First, only, if intensive forest management technologies are used. Second, if forest regeneration is improved. Third, by more intensive tending of young stands. Finally, if stand formation from fast growing, viable tree species is ensured.

5.1.1.5.4.   A comparison of the prognoses

When comparing harvesting level, predicted of different prognoses, see Figure 29**.** It can be noticed that the lowest harvesting level was predicted in 1992, whereas the highest harvesting level was predicted in 2000. Comparing the prognoses, made in 1992 and 1997, highest differences, even by 0.79 million m^3, were to be found for years 1995 – 2000, but starting with the year 2005, differences decreased to 0.598 million m^3. Finally, the prognoses for the year 2010 differ only by 0.286 million m^3. Some significant differences can be found when comparing prognoses of the year 2000 with prognoses, made in 1992 and 1997 years.

	1995-2000	2001	2005	2010	2011-2021	>2021
■ Max. year 1992	4.264	4.264	4.922	5.234		
■ Year 1997	5.05	5.05	5.52	5.52	5.86	5.86
■ Year 2000		6.83	6.83	6.83	7.96	8.94
■ Harvested volume	5.2	5.5	6.1			
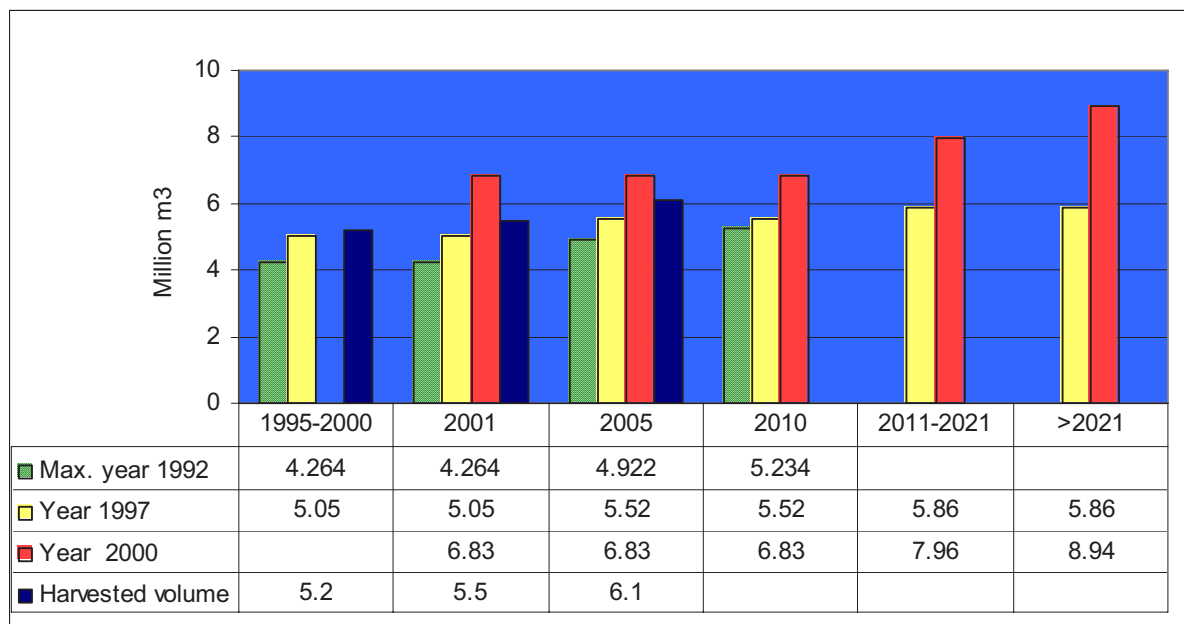
Figure 29. *A comparison of the prognoses, made in different years.*

The prognoses for year 2001, made in 1992 and 1997, are almost 2.566 million m^3 and 1.78 million m^3 lower than those, made in 2000. The prognoses, made in 1992 and 1997, comparing with prognoses, made in 2000, for the year 2010 differ a little less - by 1.596 million m^3 and 1.31 million m^3. Further, prognoses, done in 2000, since 2011, increased predicted harvesting level, while predictions of 1997 stayed in the same level. Hence, the difference between the prognoses, made in 1997 and 2000, increase till 2.1 million m^3. The last predictions of the prognoses, made in 1997 and 2000, since the year 2021, differ even more, by 3.08 million m^3.

When comparing the prognoses, it is worth look at and compare the cutting volume per hectare, see Figure 30, and the volume usage/growth ratio, see Figure 31. First, the cuttings per hectare will be looked at. The prognosis, made in 1992, gives the lowest rates, whereas the prognosis, made in 2000, predicts the highest cutting volume per hectare. The first prognoses for the years 2001, 2005 and 2010, predicted 2.3 m^3/ha, 2.7 m^3/ha and 2.9 m^3/ha cutting volume. The prognoses of 1997 predicted 2.72 m^3/ha, 2.91 m^3/ha, and 3.15 m^3/ha, whereas the prognoses, made in 2000, predicted the following figures: 3.91 m^3/ha, 4.51 m^3/ha and 4.98 m^3/ha.

	1995-2000	2001	2005	2010	2011-2021	>2021
▢ 1992	2.3	2.3	2.7	2.9		
▢ 1997	2.72	2.72	2.97	2.97	3.15	3.15
▢ 2000		3.62	3.62	3.62	4.22	4.74
▢ 2000 II IV forest management groups		3.91	3.91	3.91	4.51	4.98
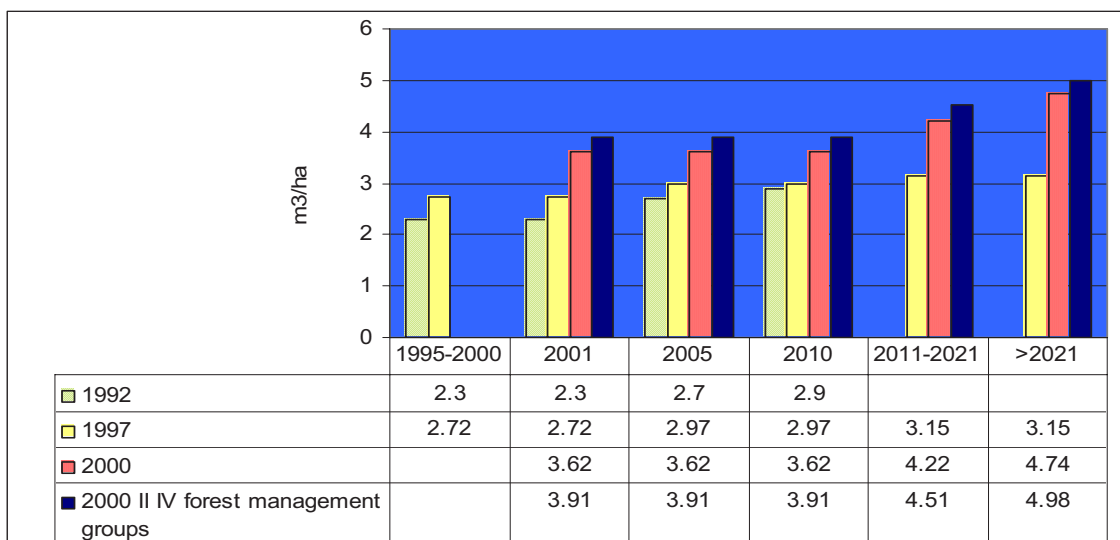
Figure 30. *The cuttings from one hectare, according to different prognoses.*

The last column in the graph shows the harvesting level for groups III – IV. The predictions of year 2000 on usage per 1 ha for the period 2001 – 2010 were 3.91 m^3/ha, for the period 2011 – 2021 they indicated usage of 4.51 m^3/ha and the prognoses for the period from 2021 amounted to 4.98 m^3/ha.

The following Figure 31 shows the predicted forest usage/growth ratio. It can be seen that the prognosis, made in 1992, does not expect the total usage/growth ratio be more than 36% till year 2005 and not more than 44% till year 2010. The prognoses of 1997 are slightly more optimistic, since they predict that in different periods usage/growth ratio will increase from 43% in 1997 to 50% after year 2022.

	1995-2000	2001	2005	2010	2011-2022	>2022
▣ Max. year 1992	36%	36%	41%	44%		
▣ Year 1997	43%	43%	47%	47%	50%	50%
▣ Year 2000		59%	59%	59%	69%	77%
▣ Year 2000 III IV forest groups		72%	72%	72%	86%	93%
▣ Real usage - growth ratio		54%	54%			
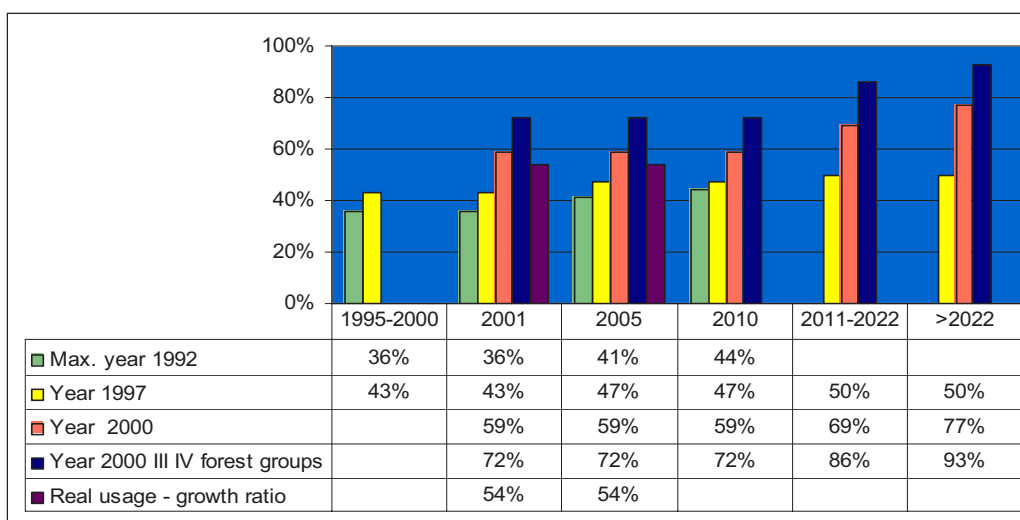
Figure 31. *The usage/growth ratio according to different prognoses.*

However, 2000 year prognoses were much more optimistic for more intensive forest usage and for the period 2001 – 2010 predicted forest usage/growth ratio to be 59%, while for further periods it was claimed to rise from 59% to 77%. According to the predictions, made in 2000, for forest management groups III and IV, usage/growth ratio will change from 72% to 93%. In brief, actual forest usage/increment ratio in Lithuania, in the period 2001 - 2005 was around 54%.

The volume of forests that was harvested up to the year 2000 was much higher than it was predicted in 1992, see Table 7**.** There was an opinion that until the year 2000, a little more than 4 million m^3 would be harvested. Yet, actually a little more than 5 million m^3 was harvested, taking into account natural disasters, which happened in the years 1992 and 1995. It was also believed that in 2005 harvesting level would make almost 5 million m^3, but in reality, a little more than 6 million m^3 was cut. Other predictions, made in year 1997, proved perfectly correct for the period 1995 – 2000, since the anticipated harvesting made 5.05 million m^3. Yet, the predicted harvesting level for the year 2005 was too low to compare with how much wood was cut in reality. To be more precise, the predicted harvesting level indicated 5.52 million m^3, while more than 6 million m^3 were cut in 2005.

Table 7. *A comparison of the prognoses for cutting volume, made in different years.*

Prognoses made in different years	Years					
	1995-2000	2001	2005	2010	2011-2021	>2021
Max. year 1992	4.264	4.264	4.922	5.234		
Year 1997	5.05	5.05	5.52	5.52	5.86	5.86
Year 2000		6.83	6.83	6.83	7.96	8.94
Harvested volume	5.2	5.8	6.6			

The predictions, made in 2000, were too optimistic for the year 2001, giving 6.83 million m^3, while a little more than 5.5 million m^3 of wood was harvested. Yet, for the year 2005, the prognoses were more correct, anticipating 6.83 million m^3 when in reality 6.6 million m^3 was harvested.

5.1.1.6. The possibilities for future harvesting based on the maximal yield cuttings

We claim that harvesting volume in any country usually depends on political and biological factors. First, the distribution of forests into management groups, ways to calculate the cutting norm and cutting age limits are determined by the decision-making bodies at the national level, subject to political will. Second, the intensity of forest growth and yield is a biological factor that has a great impact on a harvesting level. In this chapter, the possible maximal yield cuttings will be analysed. In our understanding, maximal harvesting means that everything, what grows in the forests, is harvested by applying the rules from forest management group IV to all Lithuanian forests, without considering the issues of forest protection or uneven forest area distribution by age classes. However, cutting ages, see Figure 28, applied in the IV forest management group, will be used then calculating possible cutting norm. Obviously, defining future the maximal yield cuttings, it is necessary to take a look to the distribution of volume according age classes, then applying above mentioned conditions of forest management regime and cutting ages, calculate total possible harvesting level, called the maximal yield cuttings, and finally, to clarify the maximal yield cuttings according tree species.

5.1.1.6.1. The distribution of volume according to age classes

The possible harvesting level will be analyzed according to different tree species. Figure 32 presents the distribution of volume into age classes in year 2005.
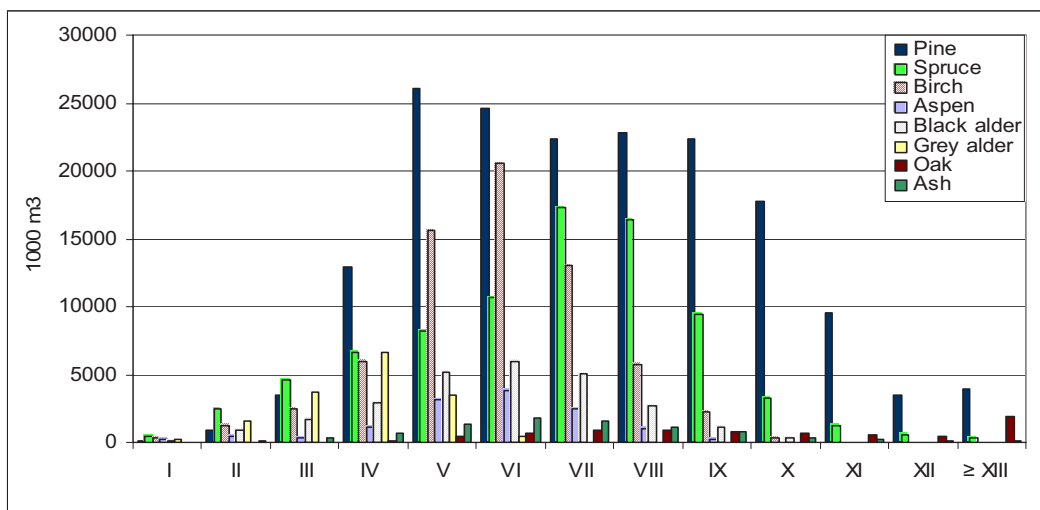
Figure 32. *Volume distribution according to tree species and age classes in 2005. (Source: VMT 2005).*

The exact figures of the distribution into age classes are presented in the Appendix A, Table 12. In general, it can be seen that the classes between 5 and 9 make the biggest amount of volume. The minimal cutting age for pine now is 101 years. The distribution of spruce into age classes shows that today the volume of mature spruce has already reached the maximum and will be decreasing in the future. Its

cutting age is 71 years. The amount of birch will also decrease, because the volume of mature birch forests have also reached maximum. The cutting age for birch is 61 years. The graph also shows many over mature aspen stands. The minimal cutting age for aspen is 41 years. But, as it can be seen, the highest proportion of aspen is distributed over age classes 5, 6, and 7. In addition to what has been said before, the graph also shows the highest proportions of over mature grey alder stands, while black alder also has lot of mature stands. The minimal cutting age for black alder is 61 years. However, oak and ash stands have a very little proportion of mature stands and their cutting ages are 121 and 101 years respectively.

5.1.1.6.2. The calculations of the maximal yield cuttings

The possible cutting volumes were calculated taking the area of a certain age class and multiplying it by the present volume of mature stands. The condition that all mature forests will be cut in the selected 10 years period was taken into account and the regulations of protected areas were not involved. The calculations were made only for the main cuttings. The maximal total harvesting level for next 100 years is presented in the Figure 33. It can be seen that possible harvesting in next 10 years could be 10.2 million m^3. However, already in the following 10 years period, harvesting would decrease to 7.2 million m^3 and after 30 - 40 years, harvesting could make only 5.3 million m^3 yearly. After 80 – 90 years, harvesting level would increase again even to 8.2 million m^3. However, after 90 years, it would decrease to 5.6 million m^3.
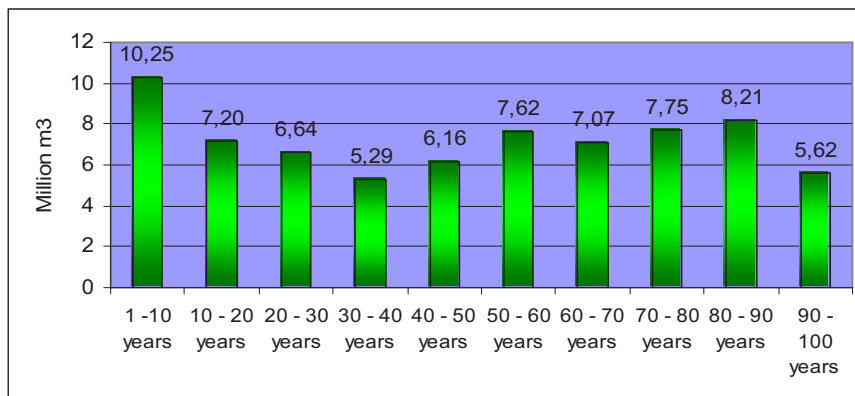
Figure 33. *The possible maximal cuttings for 100 years.*

5.1.1.6.3. The maximal yield cuttings according to tree species

The following Figure 34 shows the distribution of harvesting volume according to tree species. It indicates the reduction in the volume of harvested spruce, birch and aspen from 3.12 million m^3, 2.14 million m^3 and 1.09 million m^3 in the period 1 – 10 years to 1.03 million m^3, 0.63 million m^3 and 0.24 million m^3 in the period of 40 - 50 years. However, in the same periods, the harvested volume of pine

would increase from 1.69 million m³ to 2.54 million m³. In the next 50 years, the tendencies will change to the contrary. The harvested volume of spruce would increase from 1.03 million m³ in the period 40 – 50 years to 1.73 million m³ in the period 90 - 100 years. The harvested volume of birch for the next 50 years would increase from 0.63 million m³ to 2.04 million m³.
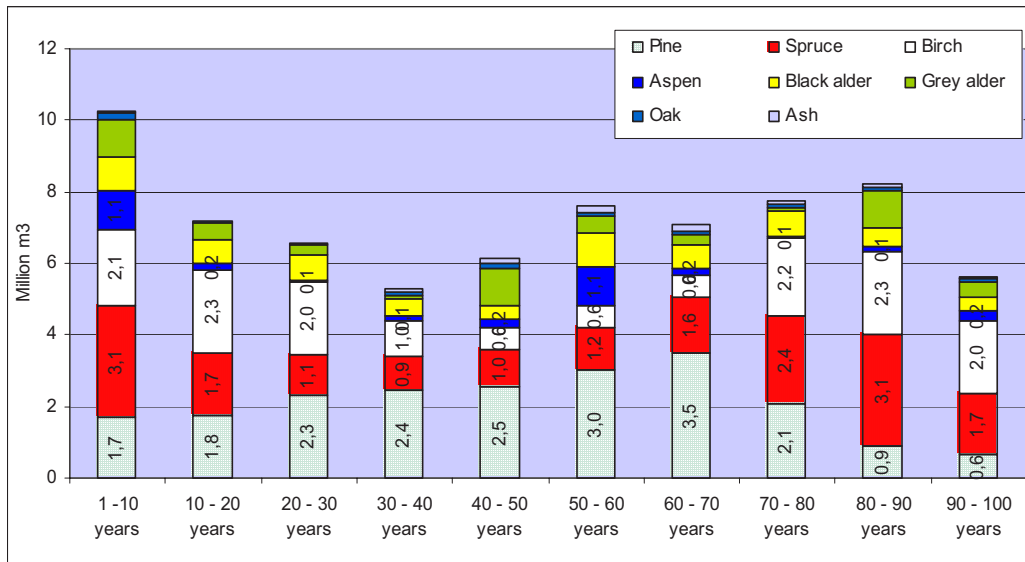
Figure 34. *The possible maximal cuttings according to different tree species.*

The harvested volume of pine in the next 50 years would decrease from 2.54 million m³ to 0.65 million m³. This could be a result of changes of valuable pine stands to spruce forests in the present days (Kuliesis 2006).

5.1.1.6.4. Conclusions on the maximal yield cuttings

According to this calculation, in 100 years, 718 million m³ could be harvested by main cuttings. It means that it could be harvested 7.18 million m³ per year in 100 years period. If to assume that the intermediate harvesting, according to Kuliesis and Petrauskas (2000), could be around 2 million m³, then yearly the maximal yield cuttings could be 9.18 million m³. Yet, if we take into account protected areas and leave as not used 15% of volume that is located there, then in 100 years period by the main cuttings could be harvested 610 million m³ or 6.1 million m³ per year. Additionally, adding volume, harvested by intermediate cuttings, then maximal harvesting level in Lithuania could be 8.1 million m³ per year. It is important to say that this figure is true only, if forest productivity, species composition, the average volume of mature woods, the area of strictly protected areas, forest cutting ages and other influencing parameters will remain the same.

5.1.2. THE ECONOMIC FACTORS

5.1.2.1. The importance of the forest sector to the country

The importance of the forest sector could be explained by looking at how much the sector amounts in the Gross Domestic Product (further GDP) of the country, see Figure 35. In 1995, the GDP of Lithuania was 25.56 billion LTL, in 2000 it was 45.848 billion LTL and in 2005 it was 71.084 billion LTL. The forest sector in the state GDP amounted from 3.2% in 1995 to 4.08% in 2005. As it can be seen in figure below, wood processing industry was the leading branch of the forest sector and its share in the period 1995 - 2005 increased from 0.9% to 1.8%.
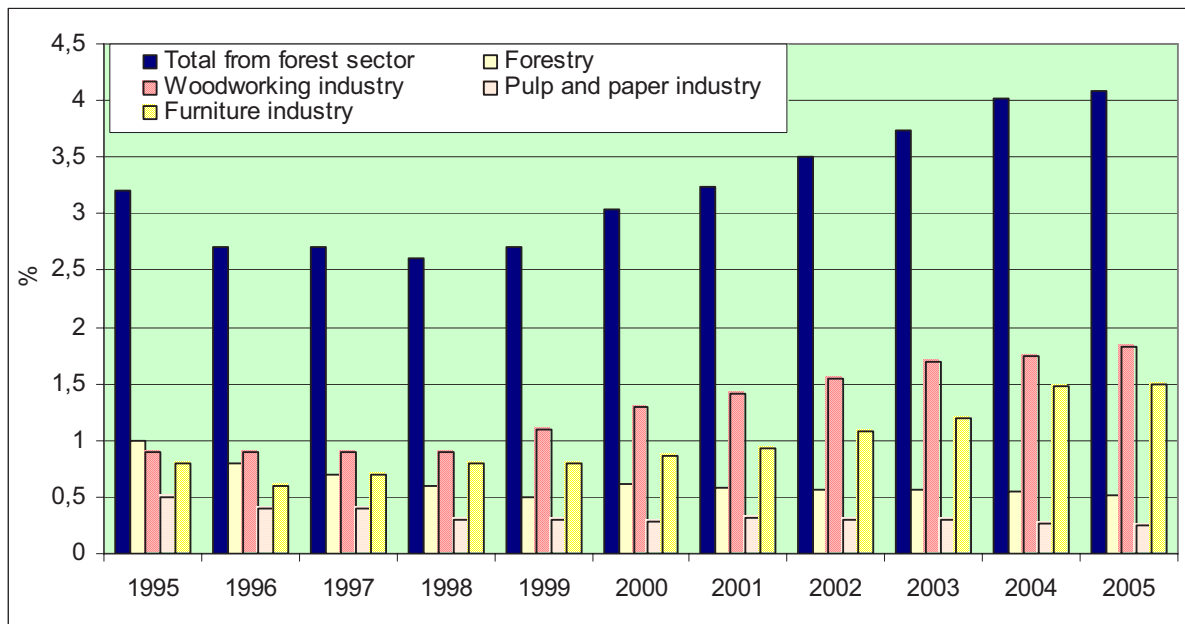
Figure 35. *The share of forest sector in GDP in1995 – 2005. (Source: VMT 2005; VMT 2006).*

The increased importance of furniture industry should be noted as well. During the same period, the share of furniture industry in GDP changed from 0.8% in 1995 to 1.5% in 2005. Yet, the share of the forest sector decreased. In 1995 it was 1% and in 2005 it was only 0.51%. Pulp and paper industry was of least importance, since from 1995 to 2000 it decreased significantly. At the beginning of this period, it was 0.5% and at the end it made 0.25%. Summing up the results, it can be seen that up to present, forest sector has been of a medium importance in the country's economy.

5.1.2.2. Changes of wood prices in Lithuania

Firstly, for getting real picture of changing in wood prices, it is necessary to define inflation in the period 1990 – 2006 in the Lithuania, see Table 8 below. Hyperinflation in Lithuania was during years 1991 to 1995. In this period inflation in the year 1992 reached 1163%. Since 1995 till 2003 inflation had decreasing patterns from 35.7% to -1.3%. Since 2004 to 2006 inflation increased from -1.3 to 4.5%.

Table 8. *Inflation in Lithuania in the period 1990 – 2006. (Source: LSD 1993; SD1996; SD2000; SD 2007).*

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Inflation %,	9	383	1163	189	78	35.7	13.1	8.4	2.4	0.3	1.4	2	-1	-1.3	2.9	3	4.5

Market demand for wood in the country in the period 1994 – 2005 can be defined by looking at the prices of wood in that period, see Figure 36. The exact prices of roundwood and pulpwood are presented in the Appendix A, Table 16 and Table 17. The graphs below show nominal prices in the mentioned period. The average prices for commercial wood in this period increased from 84 LTL/m^3 to 114 LTL/m^3. The average price for roundwood increased from 86 LTL/m^3 to 153 LTL/m^3.
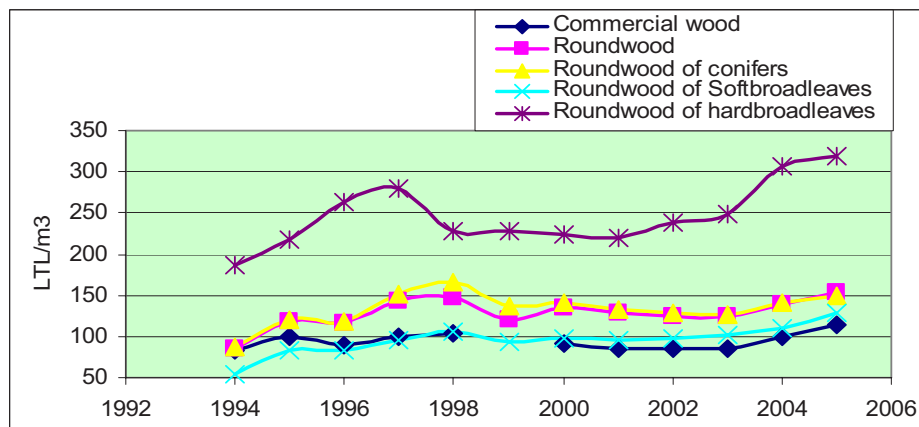
Figure 36. *The average price for roundwood logs in Lithuania in 1994 – 2005. (Source: MUM 1994 – 1995; ZMUM 1996 – 1998; MSTD 2000; LRAM 2002d; GMU 2003 – 2006).*

Roundwood of hard broadleaves had the highest price in this period and it increased from 186 LTL/m^3 to 319 LTL/m^3. The average prices for roundwood of conifers increased from 88 LTL/m^3 to 150 LTL/m^3. The average prices for roundwood of soft broadleaves increased from 54 LTL/m^3 to 129 LTL/m^3.

The average prices for pulpwood in period 1994 - 2005, see Figure 37, increased from 73 to 75 LTL/m^3. However, the average price for spruce pulpwood decreased from 72 to 67 LTL/m^3 and the average price for pine pulpwood decreased from 79 to 71 LTL/m^3. The average prices for birch pulpwood increased from 81 to 90 LTL/m^3.
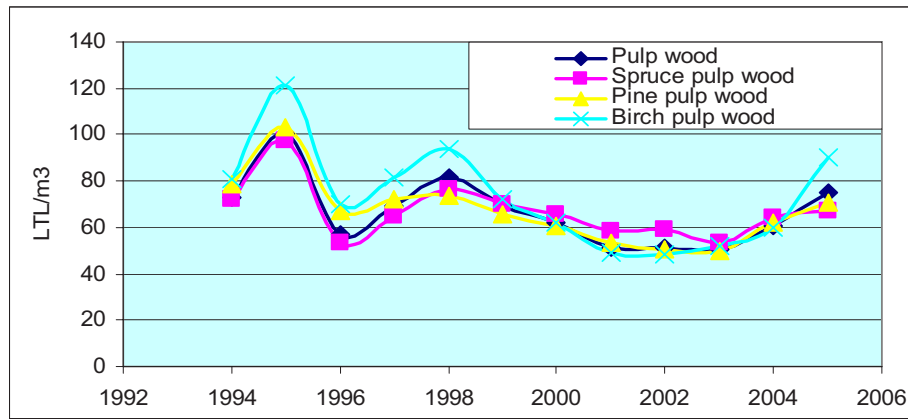
Figure 37. *The average prices for pulpwood in 1994 – 2005. (Source: MUM 1994 – 1995; ZMUM 1996 – 1998; MSTD 2000; LRAM 2002d; GMU 2003 – 2006).*

The average prices for roundwood and pulpwood had the same tendencies. From 1995 to 1996, a drop in prices can be observed. Then, until 2004, they fluctuated at quite the same level and afterwards, from 2004, they reached almost the same level as in 1995.

5.1.2.3. Wood imports and exports

From 1996 to 2005, imports of wood in Lithuania increased from 19000 m^3 to 258000 m^3, see Figure 38. Imports from different countries changed during this period. However, it appears that in the last years, the imports from Belarus were the most important. In 2005, from the total amount of imported wood, which was 258000 m^3, 143000 m^3 were imported from Belarus. This graph does not reflect the amount of imports before the independence in Lithuania. Before the independence was restored, 1 – 2 million m^3 of wood were imported from Russia annually (Mizaras 2000).
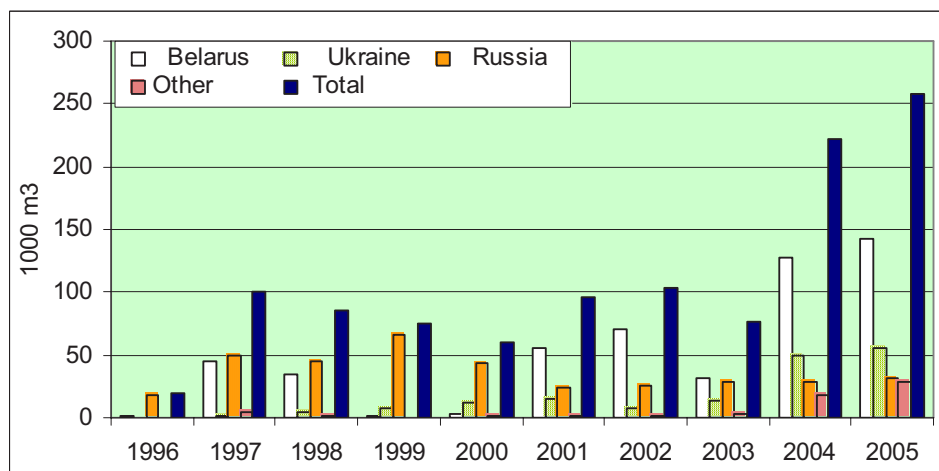
Figure 38. *Imports in Lithuania in 1994 – 2005. (Source: VMT 2005; VMT 2006).*

The exports of wood in Lithuania, during the period 1994 – 2005, see Figure 39, show that, after 1994, exports drastically increased from 0.887 million m³ to 1.131 million m³. During this time, Sweden was the major importer of Lithuanian wood, annually importing around 0.6 million m³. Yet, in the last year, Poland overtook Sweden, since 0.416 million m³ of wood was exported to Poland and 0.336 million m³ of wood was exported to Sweden.
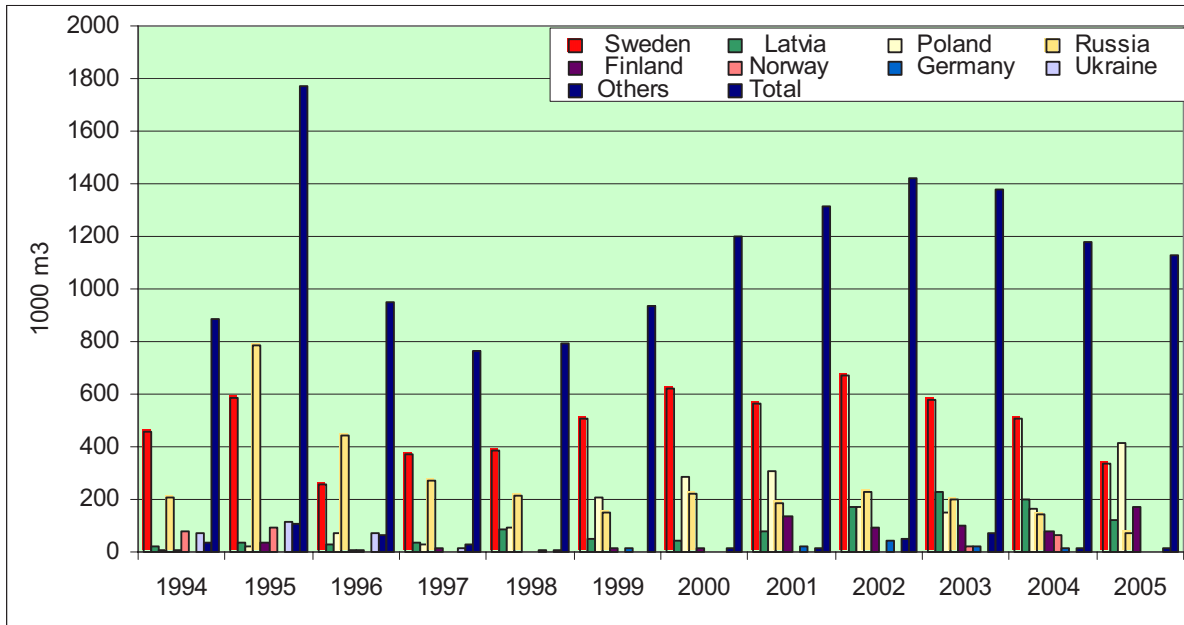
Figure 39. *Exports in Lithuania in 1994 – 2005. (Source: VMT 2005; VMT 2006).*

"After independence was restored, the balance between imports and exports in Lithuania totally changed. Before, Lithuania used to import 1 – 2 million m³ of wood from Russia. Whereas now, 72.9% of wood and its products are exported" (Mizaras 2000: 53).

5.1.2.4. The investment in Lithuanian wood industry

The following Figure 40 shows tangible fixed investment in wood industry in 1995 – 2005. This type of investment grew from 60.1 million LTL in 1995 to 301.1 million LTL in 2005. As it can be seen, the major investment was made to the manufacture of wood and wood products. During the analysed period, the investments increased from 43.8 million LTL to 160.4 million LTL. Manufacture of furniture was the second most important sector. Investment in this sector increased from 9.3 million LTL to 115 million LTL. However, insufficient investment in pulp and paper production can be seen. Investment in this sector increased only from 7 million LTL to 25.5 million LTL.
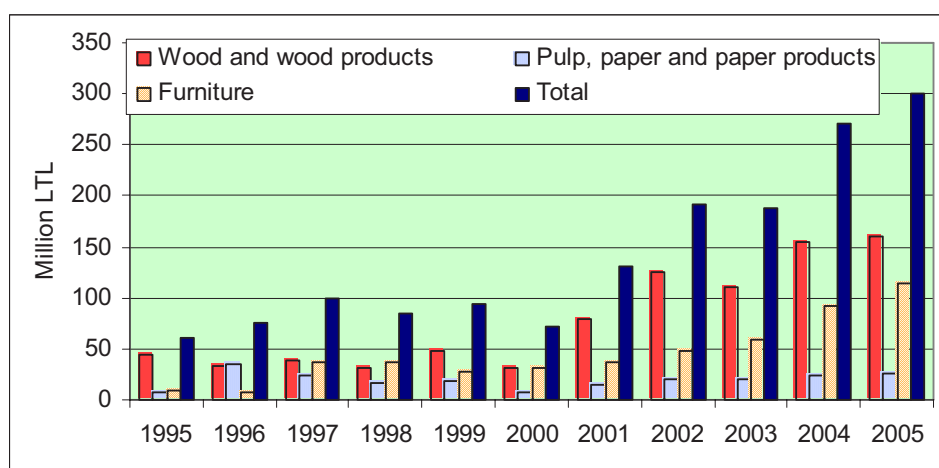
Figure 40. *Tangible fixed investment in wood industry. Million LTL in 1995 – 2005. (Source: VMT 2005; VMT 2006).*

The total foreign direct investment in Lithuanian wood industry, see Figure 41, increased from 145 million LTL in 1997 to 503.7 million LTL in 2006.
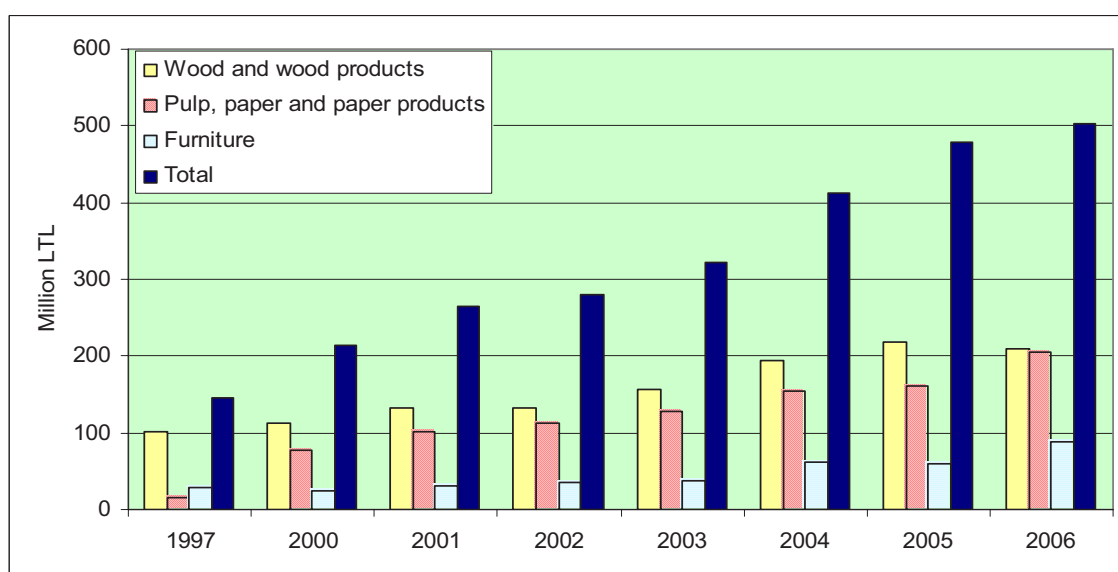
Figure 41. *Total foreign investment in 1997 – 2005. (Source: VMT 2005; VMT 2006).*

As the Figure 40 and Figure 41 above show, in the period 1995 - 2005, tangible investment in Lithuanian wood industry increased almost five times and direct foreign investment in Lithuanian wood industry increased more than three times.

Figure 42 below shows that sales of industrial production increased from 14648 million LTL to 3999.2 million LTL. Sales of furniture production increased from 491.5 million LTL to 1597.6 million LTL. Sales of pulp and paper production kept quite stable, since it increased from 265.2 million LTL to 352.7 million LTL.
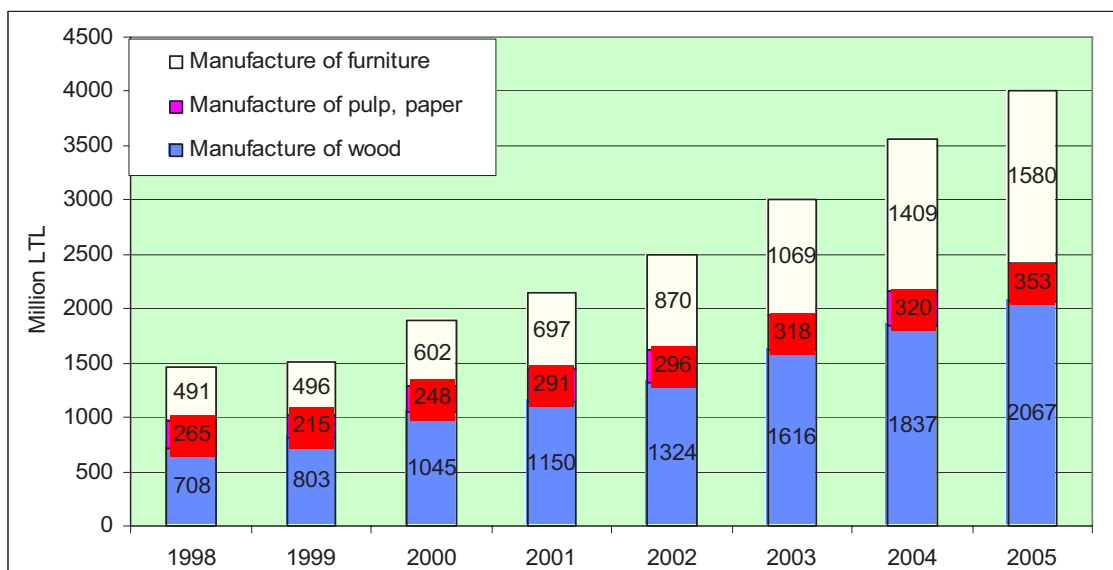
Figure 42. *Sales of industrial production in 1998 – 2005 million LTL. (Source: VMT 2005; VMT 2006).*

From 1998 to 2005, sales of wood production increased almost three times from 708.2 million LTL to 2066.9 million LTL.

5.1.2.5. The balance of wood consumption

The balance of wood consumption can be made by summing up exported wood, wood consumed by wood industry and wood, used as firewood. The consumption of industrial roundwood is presented in the following Figure 43. The graph shows that the consumption of industrial wood in the period 1989 – 2005 was fluctuating by about 3 million m^3. In 1989 3.1 million m^3 of wood was consumed. Afterwards, in 1997 the consumption of wood increased to 3.5 million m^3, in 1999 it decreased to 2.9 million m^3 and in 2005 it increased to 3.6 million m^3.
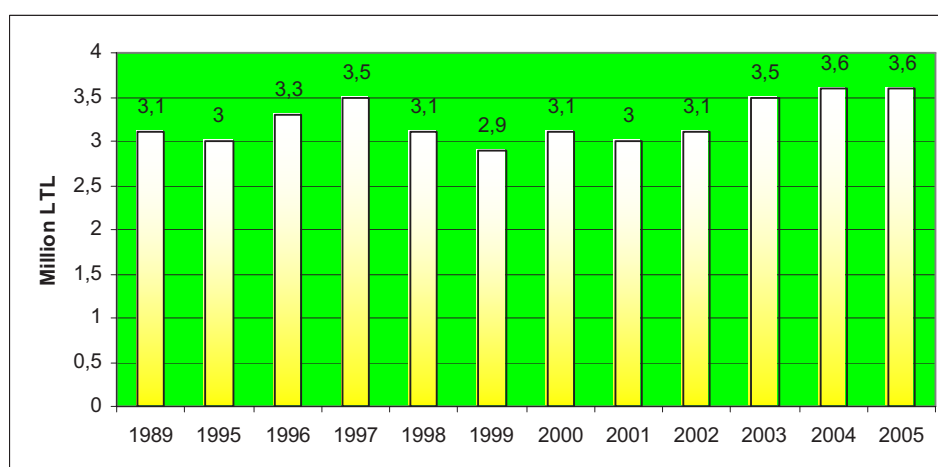
Figure 43. *The consumption of industrial roundwood in 1989 – 2005. (Source: VMT 2005; VMT 2006).*

The production of firewood, as Figure 44 shows, slightly changed in the period 1992 – 2005. In 1994 it increased to 1.74 million m^3. Yet, in 1995 it decreased to 1.09 million m^3, then in 2000 it reached 1.51 million m^3 and in 2005 it increased again to 1.85 million m^3.
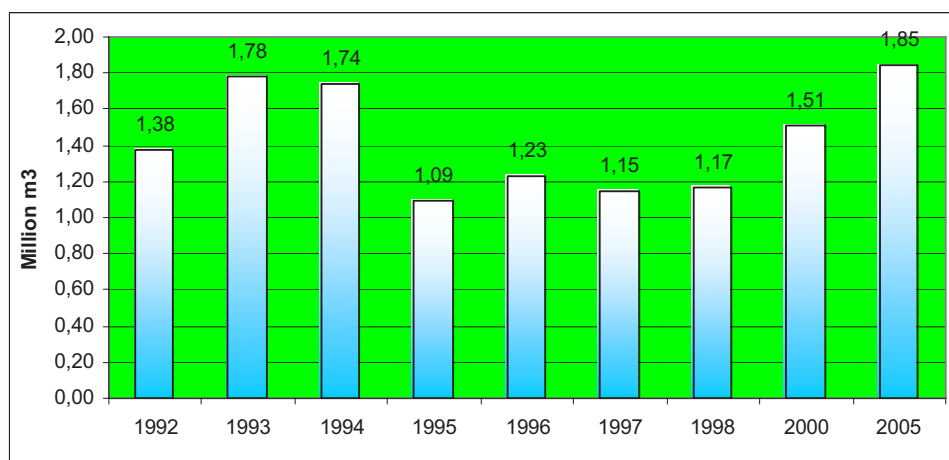
Figure 44. *The production of firewood in 1992 – 2005. (Source: FAO 2007).*

Further, FAO (2007) presents that in Lithuania wood consumption balance was as follows, 5.881 million m^3 of industrial roundwood and 1.846 million m^3 of wood fuel were consumed. In total it was 7.727 million m^3.

5.1.3. THE SOCIAL FACTORS

Opinion of society about forest values usually plays important role in policy making process. Because of it, some political decisions are made and some never reaches day light. In 2003 company "Baltic investigations" carried out research and analysis on the opinion of society about forest values. Since the data of research is important to this study, it will be presented and analysed in this section.

5.1.3.1. Purposes of visiting forests

The Figure 45 below shows that Lithuanian people like visiting forests. In 2003 81.7% of respondents visited forests and only 16.9 % did not. Although, 1.5% of respondents did not answer this question.
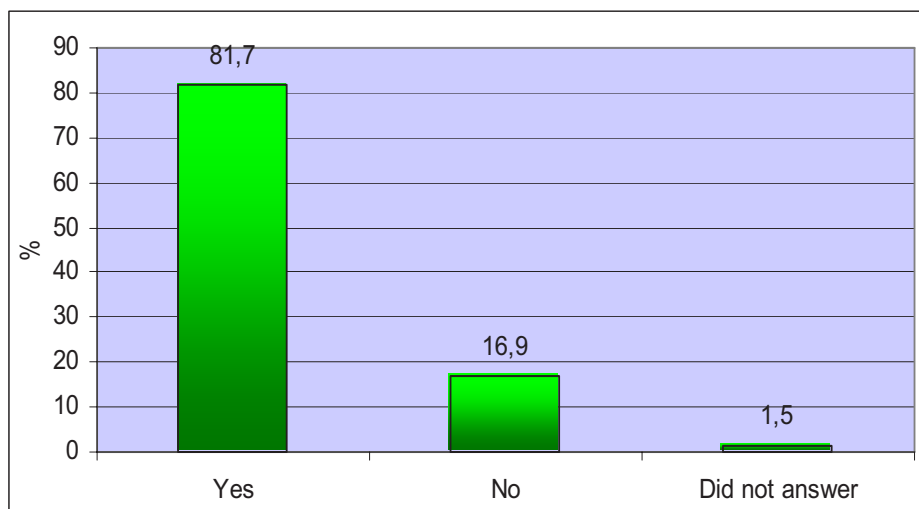
Figure 45. *Forest visitation during last 12 months (2003). (Source: Baltic investigations 2004).*

The main purpose for visiting forests, as the Figure 46 shows, was picking mushrooms (67.1%,), rest and recreation (50.8 %) picking berries (33.8%). 13.4% of the respondents visited forest in order to pick firewood, and only 1.9% went hunting.
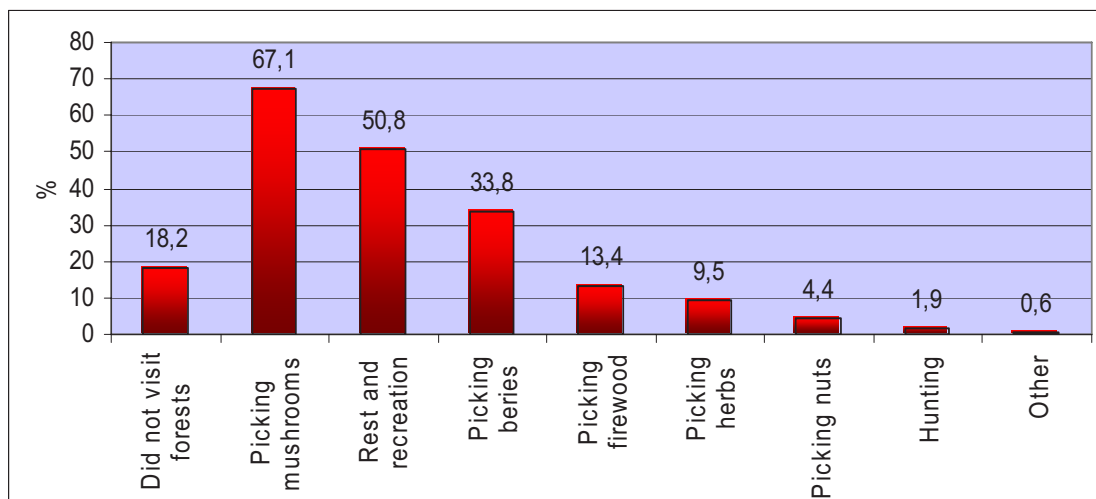
Figure 46. *The purpose of visiting forests (2003). (Source: Baltic investigations 2004).*

5.1.3.2. The most important forest values

The following Figure 47 presents the values of Lithuanian forests that are considered most important by Lithuanian people. The function of a forest as an ecological values, air cleaner and a living place for animals, was considered very important by 65.5% of people, 27.1% thought it was important and only 0.4 % of the respondents marked it as unimportant. The function of forests as providers of "mushrooms and berries'' was seen very important by 62% of the respondents, 33.7% indicated it as important, while this function was not important only for 0.3% of people.

	Ecological values	Mushrooms, beries	Place for recreation	Resource of biofuel	Constructional material	Aditional working places	Hunting
■ Very important	65,6	62	55,1	43,8	40	23,8	22,5
▨ Seems to be important	27,1	33,7	37,1	41,1	45,1	43,7	37,8
☐ Seems to be unimportant	1,9	1,7	4	7,9	8,1	13,6	17,5
☐ Not important	0,4	0,3	0,9	2,5	2,5	6,6	12,9
■ Did not know	5,1	2,3	3,1	4,7	4,3	12,4	9,3
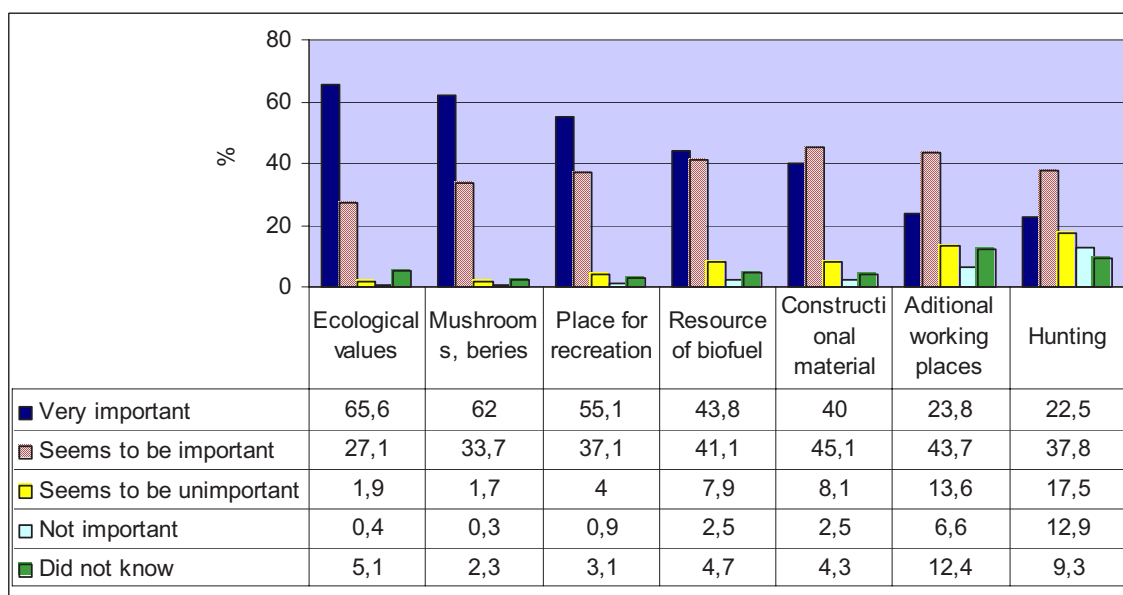
Figure 47. *The most important forest values according to Lithuanian people (2003). (Source: Baltic investigations 2004).*

The function of forests as a ''place for recreation'' seemed to be also important. 55.1% of the respondents mentioned it as very important, 37.1% marked it as important and only 0.9% considered it as unimportant. The function "to produce bio fuel" was evaluated worse than other functions, mentioned before. 43.8% indicated it as very important, for 41.1% of the respondents it seemed to be important and only 2.5% considered as not important. Other functions of forests, such as "the resource of constructional material", "additional working places" and "a place for hunting" got the lowest scores, see figure above.

5.1.3.3. The most important functions of forests in the future

The respondents were also asked, which forest functions should be developed in the future, see Figure 48. 63% of people would like to see ecological functions developed in the future and 19.3% recreational functions. 7.5% of people thought that forest should create more working places. The function of forests, a resource of incomes, seemed to be quite unimportant. Only 3.1% of the respondents saw this function as important.
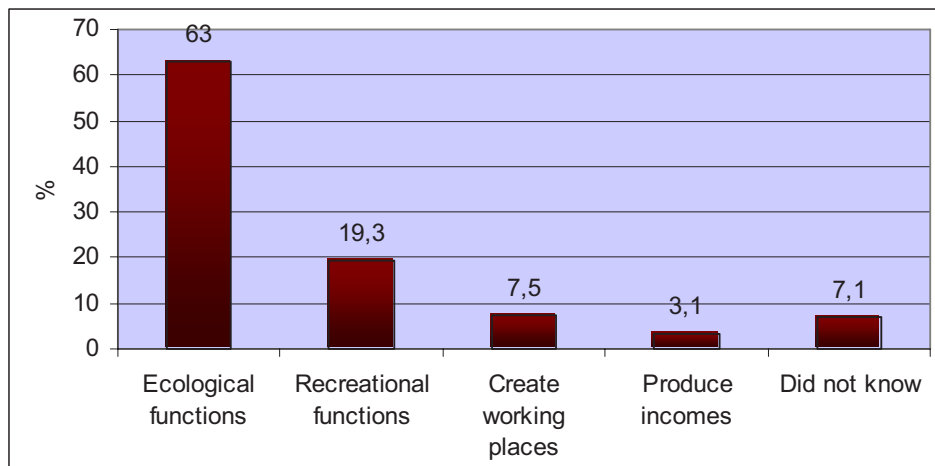
Figure 48. *Forest functions which should be developed in the future (2003). (Source: Baltic investigations 2004).*

5.1.3.4. The amount of protected areas

The opinion of respondents, see Figure 49, about the amount of protected areas was as follows: 26.7% of the respondents thought that the amount of protected areas was too small and only 2.7% thought that it was too big. The main opinion about protected areas was that there was sufficient amount of protected areas (49.7%).
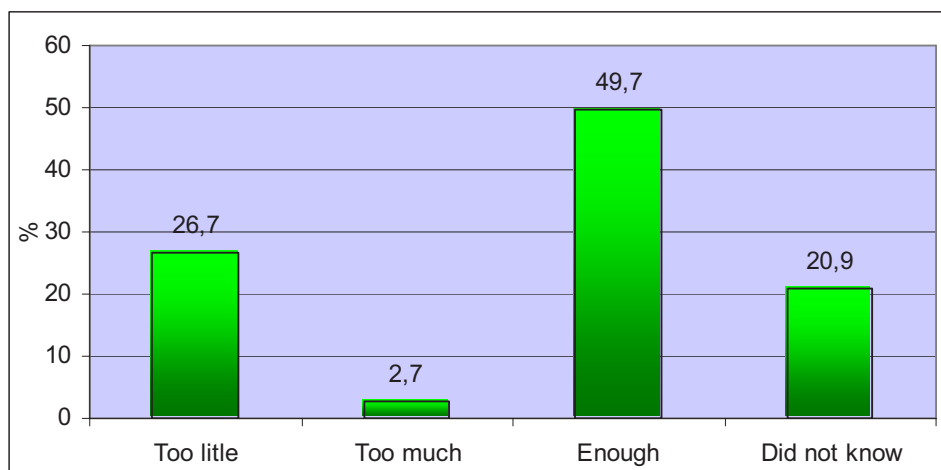
Figure 49. *The opinion on the amount of protected areas (2003). (Source: Baltic investigations 2004).*

5.1.3.5. Forest management

37.6% of the participants in the study thought that Lithuanian forests were better managed by state forest enterprises, see Figure 50, while 22.9% indicated that private forest owners could manage Lithuanian forests better. However, 40.4% of the respondents did not know the answer or did not have any opinion about this question.
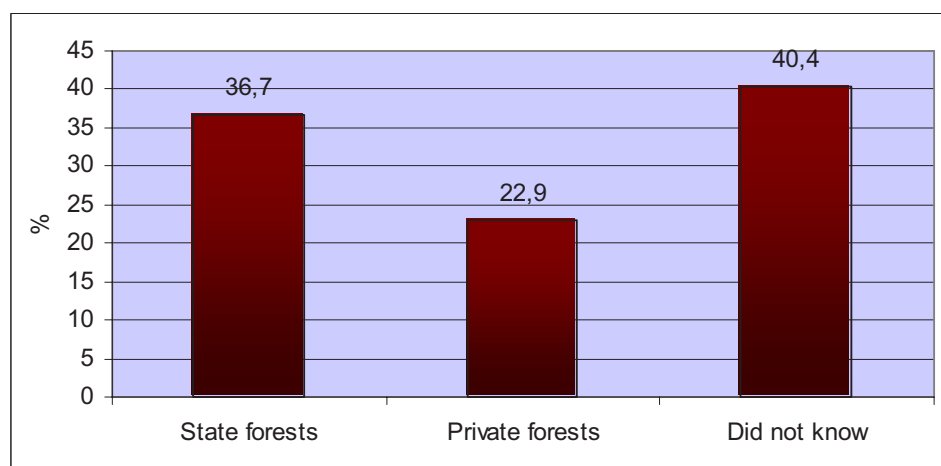
Figure 50. *The opinion on who better manages Lithuanian forests (2003). (Source: Baltic investigations 2004).*

5.2. THE RESULTS FROM EXPERT INTERVIEWS

5.2.1. DATA ABOUT THE RESPONDENTS

In total, 35 respondents were interviewed and filled in the questionnaires. An average age of the respondents was 47 years and all 35 respondents were men. The positions, the respondents occupy in their organization or company, was another important factor. Although, leaders of companies are usually considered to know the situation best, sometimes people, who occupy lower positions, can tell more, since leaders not always are willing to talk about certain issues.

The Figure 51 below shows the respondents' education. 26 respondents have a degree in forestry, 7 of them have a degree in other sciences, whereas 2 respondents did not answer to this question.
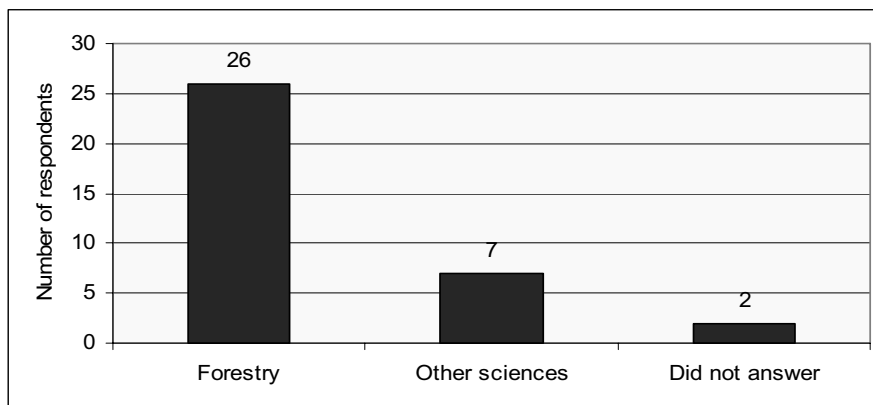
Figure 51. *The respondents' education.*

The following Figure 52 shows the positions of the respondents in their organization or company. 20 respondents had the highest positions in their companies, 3 occupied middle management positions, 8 were the heads of departments, 1 was an assistant and the rest 3 fell in other categories. This category is mainly represented by the scientists, who have their PhD in forestry.
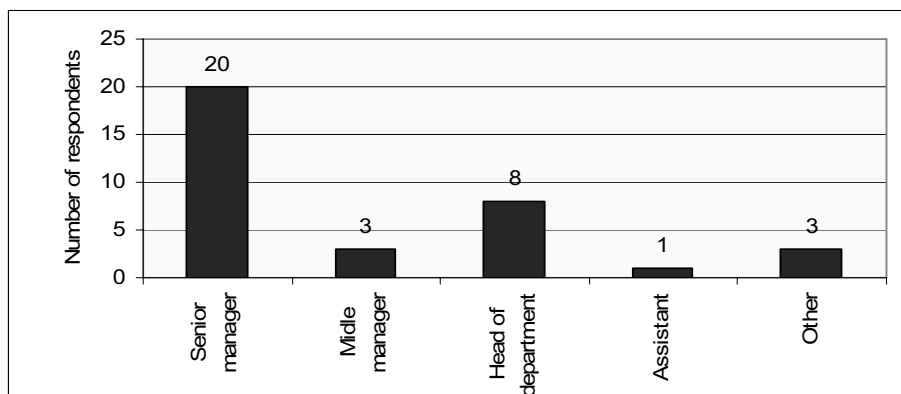
Figure 52. *The respondents' rank in the organizations they represent.*

5.2.2.   OPINIONS ON FACTORS THAT INFLUENCED FOREST USAGE IN 1990 – 2006

In this part, the respondents were asked about the social, ecological and economic factors that could have impact to the harvesting level. First of all, the respondents were asked to mark "yes" or "no" next to the factors, which were thought, could be important. The following Figure 53 shows how many respondents marked each factor positively. The most important factor appeared to be "forest privatization", since 32 respondents marked it as "yes". "Natural disasters" were in the second place with 29 positive responses. The third most important factor, with 27 points, was that of "improved taxation figures, got from forest inventory, and the increased amount of mature woods". Two other factors, those of "increased market demand" and the "emergence of market economy in the analyzed period", were of similar importance, because 25 respondents marked them as "yes". Other factors, such as "changes in forest management groups in 1994", "changes in the methodology for calculation of a cutting norm", "the lasting land reform" and "the increased quality of inventory" were not seen as important.
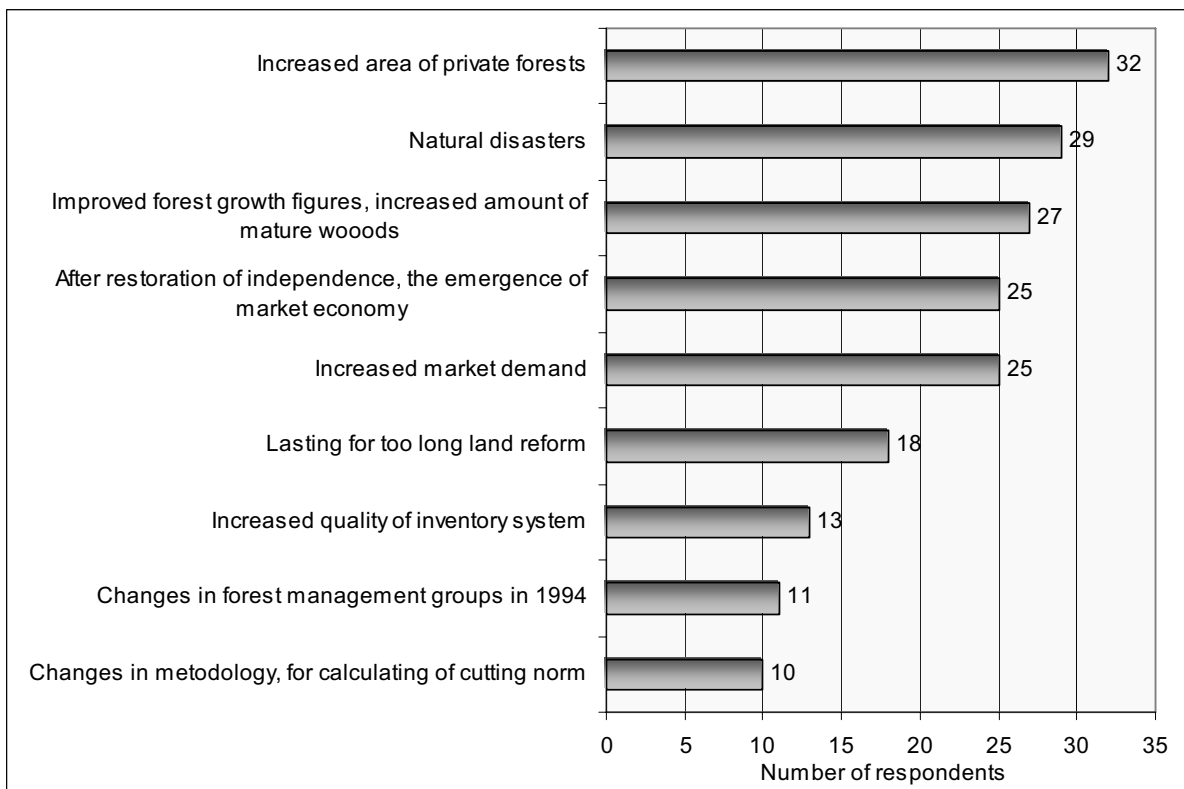
Figure 53. *The factors that influenced the harvesting level in 1991 - 2005 (yes/no marking).*

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In order to clarify, which factors were the most important, the respondents were asked to mark three most important factors in order of importance with numbers 1, 2, and 3. Those factors that were not marked got 4 points. Then the points were calculated and deducted from 140. The value that was obtained is shown in the Figure 54. 140 is a figure, which shows the maximum of points that one factor can have. Thus, by summing the points for each factor, the most important factor would get the smallest sum. However, when this sum is deducted from 140, the result changes to opposite and the most important factor gets the maximum points.

The factors of "the increased area of private forests" and "the increased taxation figures", together with "the increased amount of mature woods" got maximum points 41 and "the emergence of market economy in 1990" got 39 points. "The increased market demand" went to the fourth place with 32 points, whereas "natural disasters" with 29 points occupied the fifth place. Other factors got only a few points and were seen as unimportant.
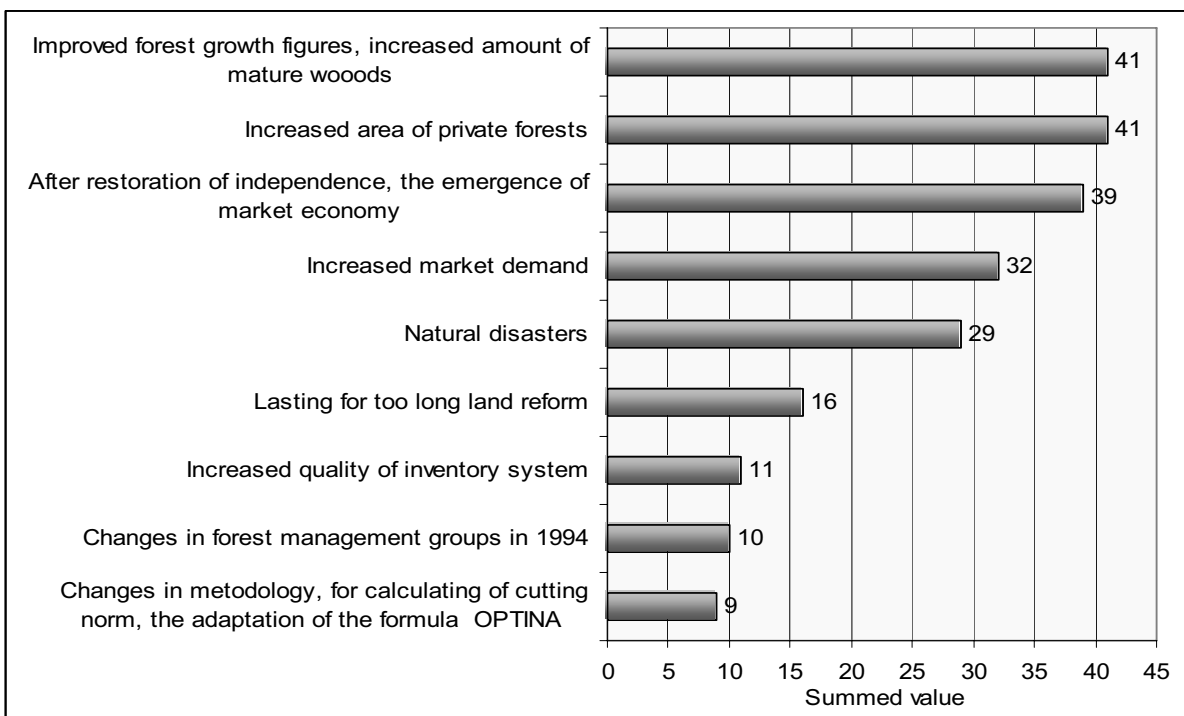
Figure 54. *The three most influential factors in 1991 – 2005 (selecting top three factors by each respondent).*

The Figure 55 below reflects the opinion about the factors that define the current harvesting level. The opinion on "not intensive forest usage" was supported by 28 respondents. The factors "very strict requirements for the protection of nature" and "slow land reform" got an equal number of 27 points. "Traditions to use forests by saving them" got 25 points, which is quite a high rate.

Comparing with the previous graph, the importance of appeared private ownership decreased by one position and factor "improved forest growth figures, increased amount of mature woods" was moved

to the first place. Factor –"appearance of market economy" moved by one place up as well.
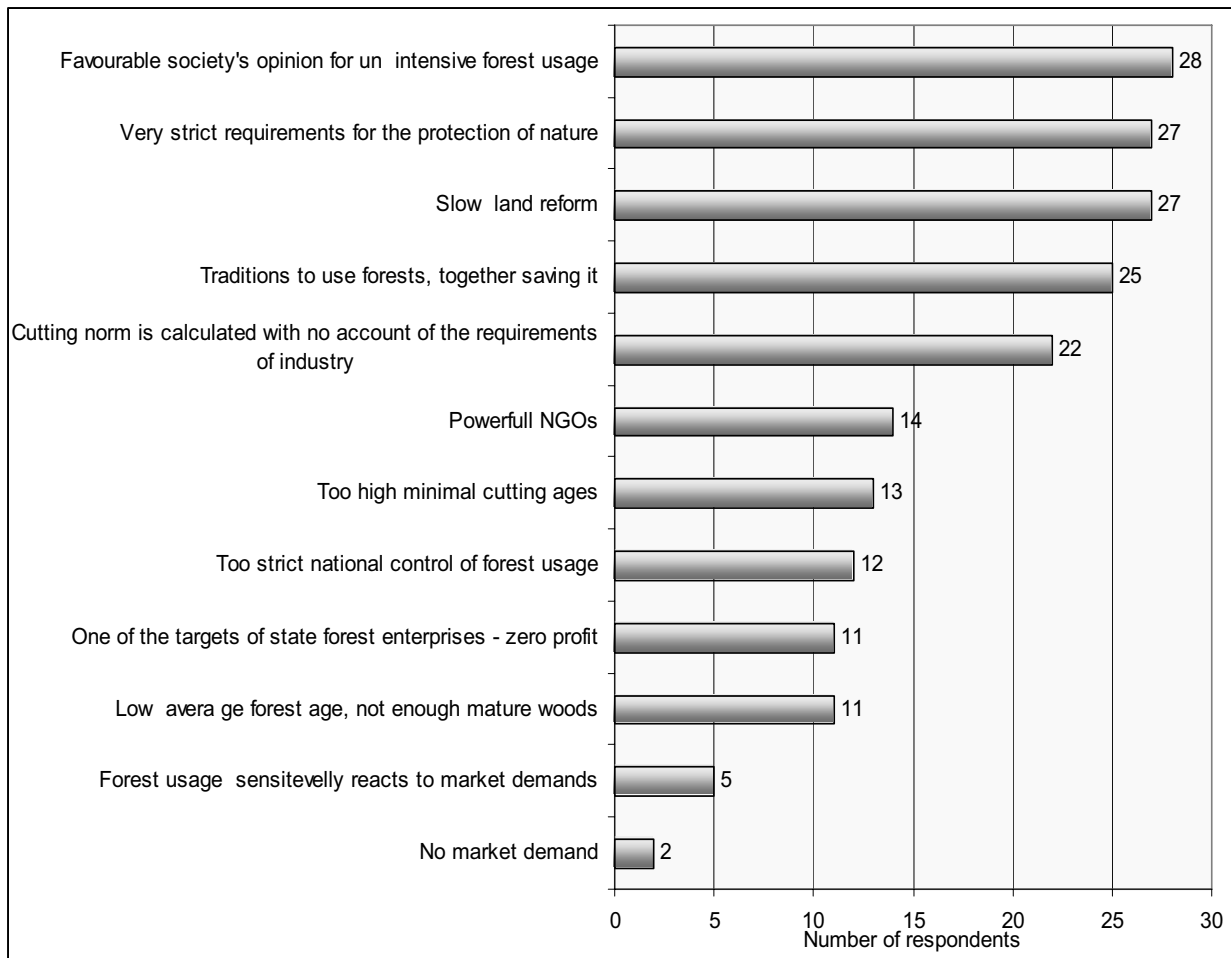
Figure 55. *The factors that define the current harvesting level (yes/no marking).*

In this case, "no market demand" got only 2 points, which is the smallest number. This shows that market demand for forests really exists, thus expert opinion conforms to observed the price development on the timber markets, see Figure 36. The factor that "the calculation of a cutting norm is done by paying no regard to industrial demands" got 22 points. Other factors, such as "too high cutting ages", "forest usage reacts sensitively to market demands", "too strict control of forest usage", "too low average forest age" got about 11 points and seem to be less important according to the experts.

The respondents were also asked to evaluate which 3 factors were most important, see Figure 56. Number "1" had to be given for a most important and "3" for a less important factor. For the analysis, the same principle of summing up the points as for the analysis of factors in 1990 – 2005 will be used.
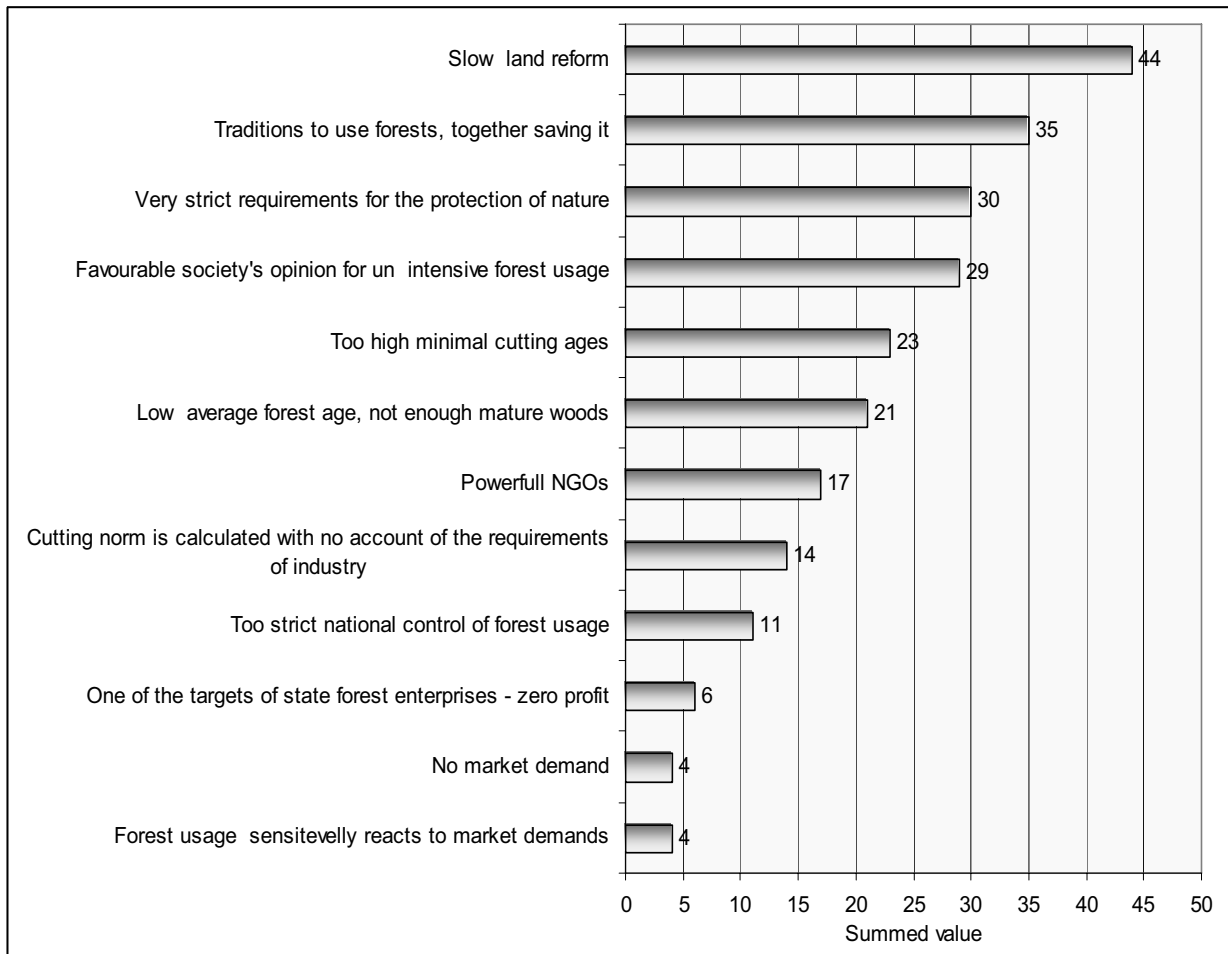
Figure 56. *Three most important factors that define the current harvesting level (selecting top three factors by each respondent).*

"The slow land reform" got 44 points and, therefore, seems to have the greatest impact. "Tradition to use forests by saving them at the same time" received 35 points and appeared in the second place. In the third place, with its 30 points, was the factor "very strict requirements for the protection of nature". The factor "favourable society's opinion on not intensive forest usage" received 29 points and went to the fourth place.

Comparing Figures 55 and 56 some more serious differences could not be found. Only importance of slowly going land reform was highlighted.

5.2.3. THE ACCURACY OF FOREST MEASUREMENT

Accuracy of figures is very important for forest management. Therefore, the opinion of the respondents on the accuracy in the measurement of forest volume and increment in Lithuanian private and state forests was considered very important. As it can be seen in the Figure 57, the evaluation of accuracy, when measuring volume and increment in state forests, and Figure 58, the evaluation of accuracy, when

measuring volume and increment in private forests, the opinion of the respondents is very positive. What concerns measurement in state forests, 28 respondents thought that the figures were reliable, while only 2 respondents indicated that the figures were not reliable, because they were much higher than the real ones. 6 respondents did not have an opinion. When considering measurement in private forests, 25 respondents indicated that the figures were reliable and 2 respondents thought that the figures were not reliable, since the real figures were much higher. For the rest 8 respondents it was difficult to say. Thus, a conclusion that inventory figures are rather reliable can be made.
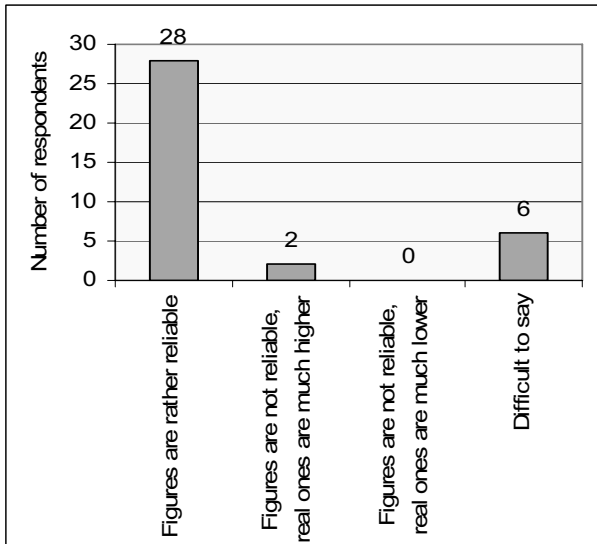
Figure 57. *The evaluation of accuracy when measuring volume and increment in state forests.*
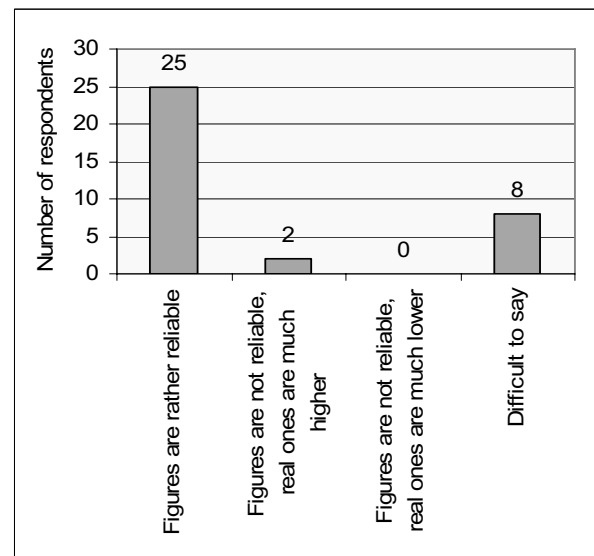
Figure 58. *The evaluation of accuracy when measuring volume and increment in private forests.*

Then comparing SWI and NFI, there was no clear opinion on which inventory system was better, see Figure 59. 10 respondents claimed that SWI was more reliable, 13 stated that NFI was more reliable, while 12 respondents did not express their opinion at all. A lot of respondents argued that it is not possible to compare the two methods, because they have totally different purposes. SWI is used for tactical forest management and NFI is used for strategic forest management. In short, it is necessary to remember that SWI and NFI use very different methods for the gathering information and only NFI method is statistically acceptable. Gross annual increment in Lithuania for year 2002, respectively to above mentioned inventory systems NFI and SWI, were 16 and 11.8 million m^3. Even respondents argued that figures are rather reliable, it is difficult to make conclusions, what is the most realistic gross annual increment in Lithuanian forests. Further, it raises questions, if present forest usage level is well reasoned. The comments on the comparison of the two inventory systems are summarized in Table 9.
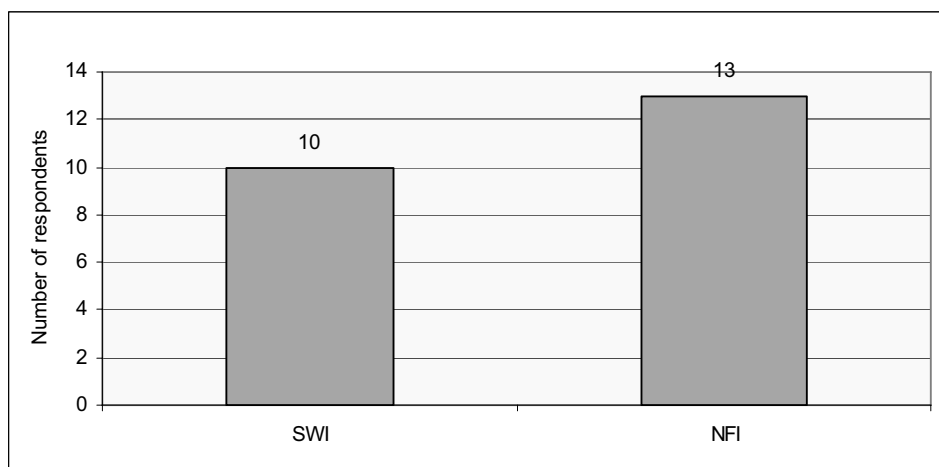
Figure 59. *A comparison of SWI and NFI systems.*

Table 9. *The respondents' comments on the used inventory systems.*

Group of stakeholders	Comments
Scientists	Today, no research has been done yet, therefore, it is difficult to say which of them is more reliable. Since each of them has certain advantages and disadvantages, there is no point in deciding which is more precise.
	Plot inventory is more reliable at estate level; management should be done according to it. National inventory figures are higher, because they include all the maximal yield cuttings, thus, it could be used at national level.
Inventory bodies	Those methods have different aims. To obtain exact and accurate figures on the volume, increment and area dynamics in all Lithuanian forests is possible ONLY with national inventory.
	Plot inventory used at estate level; while National inventory works better at national level (it does not give figures at estate level).
	Quite difficult to compare, because their purpose is different (different usage).
	National inventory figures are more reliable at national level, but they are not reliable at estate level.
NGOs	No comments or lack of competence to comment.
HLFDM	National inventory is based on selective principle; Plot area inventory is based on an administrative principle (more detailed).
Wood industry	National inventory is not used in practice.
Private forest owners	No comments.
Managers of state forests	National inventory deals with figures at national level.
	Figures of plot inventory are more reliable, because they are gathered from each forest site.
	The truth is somewhere in the middle: plot inventory includes human factor and mistakes, which are made as a consequence, whereas National inventory has problems with methodology.
	Figures are not comparable, because the parameters in different inventories are represented with different accuracy.

5.2.4.   THE INTERESTS OF DIFFERENT GROUPS OF STAKEHOLDERS

During the interview, different stakeholders' interests and problems, related to stakeholder groups, were found out. Some respondents, along with their interests, mentioned and some direct duties. Specially, it could be said about the scientists, Inventory bodies and HLFDM groups. The scientists' interests (probably more correct to say duties) were as follows: 1. Preparation of forestry specialists, 2. Applied investigations, scientific programs, 3. Investigations in forestry policy and economics, 4. Scientific research in forestry sector. This group does not have direct relations with forest usage and do not get profit from it.

The duties of the representatives of inventory bodies were as follows: 1. Calculations and providing of information on forest resources, calculations of the main forest usage, 2. Forest management according to soil types, 3. Distribution of main forest usage within the period of 10 years, projection of intermediate cuttings, 4. Calculation of the main possible forest usage. This group of stakeholders does not have a direct interest to the forest utilisation. However, since it calculates a possible amount of forest usage, it has a direct impact on forest usage. They are responsible for working according to the rules, set by forest policy makers.

The interests of the NGOs were as follows: 1. To ensure communication between forest users and forest protectors, 2. To ensure that forest usage takes into account environmental issues, 3. To influence forest usage in the way that attention be focused not only to harvesting issues, but also to forest protection and environmental issues, 4. To ensure harmony between people and nature, since forest is nature within nature, 5. Forest protection is the mission of our organizations, 6. To make work in forestry better and more effective. As it can be seen, the interests of NGOs are mainly related to the protection of forests.

The HLFDM' interests were as follows: 1. Forest regeneration is the main interest of our organization, 2. Forest management projects have the main influence on forest usage, 3. Prepares and coordinates the strategy and policy of forestry sector, at the same time influencing forest usage, 4. The main goal of the Department of Forests is sustainable development of state and private forests, 5. Wood industry and private owners have their own interests. To control the situation and ensure that forest usage is not too high are the main interests of policy making representatives. This stakeholder group creates the policy of forestry and ensures sustainable development of forests.

The interests of the representatives of wood industry were as follows: 1. We are one of the biggest wood purchasers, we use almost all types of wood, 2. The usage of low quality wood. Since large amounts of wood are used, it is important to increase forest usage, specially the usage of low quality wood, 3. Increased forest usage, not enough of wood in the market, 4. Supply of birch wood to companies, 5. The largest users of oak, birch and spruce wood. Wood industry has direct interests to forest usage. The amount of harvested wood and its availability in the market influences wood prices that further have a direct impact on companies of wood   industry.

The private forest owners' interests can be defined as follows: 1. To take care of the management of private forests, 2. To provide information, concerning the matters of private forests, 3. The wish of private forest owners to cut more, 4. Cutting and selling of wood, 5. To earn money from forest cuttings. This group of stakeholders directly owns, harvests and makes for their living from the forests. Thus, forest cutting and earnings is probably one of the most important interests of this group with regards to forest utilisation.

The interests of managers of state forests were as follows: 1. The state forest enterprises obey the rules and use the state forests, i.e. does cuttings and other complexional activities there, 2. Forestry, forest usage, hunting, 3. Cuttings are the main source of revenue of these organizations, 4. The distribution of forest cuttings between state companies, preparation of projects and corrections if needed. Forest usage for this group is also very important, because their revenue comes directly from cuttings and other activities. In addition, this group performs other functions related to forest management.

5.2.5. THE PROBLEMS RELATED TO THE DIFFERENT INTERESTS OF STAKEHOLDERS

The scientists' group pointed out several problems, which in the first place, concerned insufficient sponsorship of the science, low salaries and difficulties in attracting prudent people to forestry sector. Problems, directly related to forest usage, were as follows: forest usage in prospect and accumulation, and decay of wood recourses. In other words, the main concern is how to balance forest usage.

The inventory representatives pointed out that unfinished land reform and changes in law were the main problems.

The representatives of NGOs indicated many more problems. First of all, they pointed out that environmental protection is a continuous process and targets cannot be reached immediately. Therefore, continuous conflicts between forest users and environmentalists will arise and, in those cases, it is very difficult to make compromises. Protection of environment and nature is also one of the national interests. NGOs go on explaining that meeting of the requirements of environmental protection would ensure satisfaction of needs for future generations. The representatives of NGOs point out that international agreements, which are superior to the national law, should not be forgotten. Those issues should be first resolved in state forests. Most of the heads of the districts of the National Forest Service think that state forest companies are similar to personal companies and they should represent not personal, but national interests what is not always the case. Various problems can be solved at ministerial level. The representatives pointed out that there all conditions to gather together and solve the problems, but yet, things do not move. Environmental problems are not solved within one system. Another problem that was mentioned concerned inability to acknowledge personal mistakes, having no goal to look for common interests. The group of foresters is a type of a structure that formed long time ago and has its traditions,

power and interests. By professional and active lobbying, they try to increase forest usage and to avoid people, who strive to protect forests. Usually, behind their backs other decisions, which are totally different from those that were agreed upon during the official meetings, are made, without making attempts to deal with different interests. Lack of dialogue, compromise and general understanding were mentioned as well. Both groups see each other as competitors and not as constructive partners. Common understanding that cooperation is necessary is needed. Yet, partnership means that high ambitions will have to be abandoned. "We are fighting for our acknowledgment. Policy making clerks still do not know what we want. " The weakness of state institutions in solving serious problems, such as illegal cuttings, illegal house constructions in protected areas, steadily increasing interests of business companies that have a wish to lay their hands on forests by privatizing them, were pointed also out.

HLFDM pointed out the following problems. First, external changes in the EU forest policy, next, lack of responsibility from forest managers for regenerating forest stands, then, sometimes too tendentious, fixed and implemented opinion of the society. Further, because of the increased market demand and development of wood industry as well as the increased demand for bio fuel, there will be not enough of local material. Thus, there will be pressure from wood industry to increase forest usage. Finally, there is a lack of cooperation between the Parliament and the Government of Lithuania.

The representatives of wood industry pointed out to the following problems: 1. Lack of wood in the market, cutting rates should be higher, 2. Increased competition in wood buying auctions, 3. Decisions are made by HLFDM. Wood industries have very small influence in a decision making process, 4. Lack of market relations, especially in the state forests, when not only the price offered determines whether you can buy wood or not. Imperfect wood trade rules in the state forests that create possibilities for different manipulations, political and personal attitudes, 5. Lack of market relations in state forests, lack of transparency. Forest sector is very defragmented. When you try to communicate, foresters and heads of regional state forest companies feel like small kings, 6. Market economy is not finally implemented yet. A lot of wood still decays in the forests. The State Forest Service (Further LTSFS) waits until prices rise to the reasonable level, but because of this wood will decay. It is said that industry will destroy forest sector, like agricultural sector was destroyed after the restoration of independence in Lithuania. This opinion is very common in Lithuanian society. Yet, it is subjective.

The problems of private forests sectors include: 1. Unfinished land restitution reform, which after the restoration of independence, already lasts for the second decade, 2. Organizational and financial problems, 3. Fragmented activities in private forest owners training, 4. Unfavourable environment for the development of private forest sector, every movement is regulated by law, excessive bureaucracy, 5. Laws only forbid and not motivate private owners to do or not to do some activities, 6. Disproportionably high number of controlling organizations and their officers. 7. Too strict state policy, going into details and making big problems out of small ones. Forest policy is too strict, which is not needed.

Problems, which were pointed out by the state forest enterprises and their representatives were as follows: 1. Too strict Forestry Law, defining forest usage. "We have to keep to exact harvesting amounts of timber that are defined by representatives of inventory bodies and HLFDM." 2. Political problems, 3. Forest usage could be higher, 4. Lithuanian Government approved the cutting amount for the years 2004 – 2008, which makes is 2.4 million m^3, but in the projects, made by inventory units, it is less by 280 thousand m^3 and is close to 2.2 million m^3.

5.2.6. THE GOALS OF FORESTRY

Different groups of stakeholders were also asked about the desired goals of forestry. The questions included the following issues: protection requirements, proportion of private and state forests, different forest owners' freedom in decision making process and income from forest sector. The respondents were also asked to think about how society's opinion about forest values changed, which forest management school they would prefer and why.

The main opinion about the requirements for the protection of nature was that the requirements should be softer, see Figure 60. This opinion was expressed by 19 respondents. 3 respondents thought that they should be much softer. However, 8 respondents thought that they should remain the same and 5 were in favour of stricter requirements. This opinion was mainly supported by the representatives of science and NGOs groups. The main comments for this question were as follows, see Table 10.
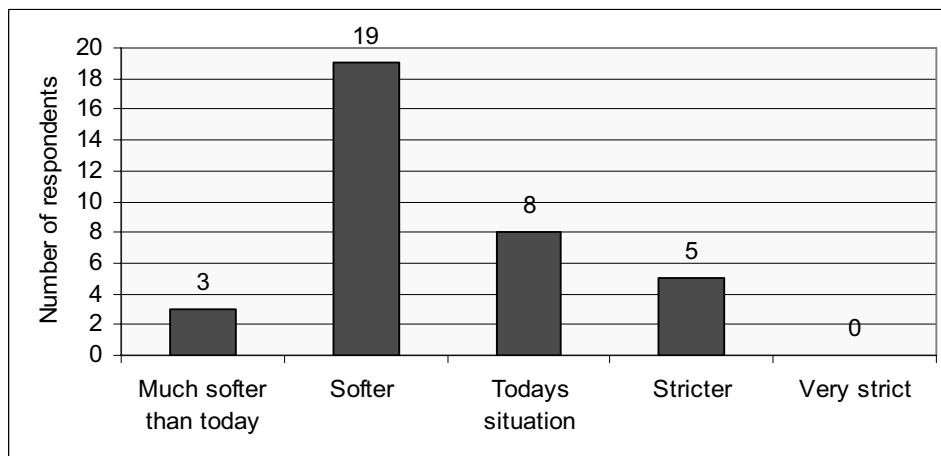
Figure 60. *The requirements for forest protection.*

Table 10. *The comments of the respondents on the requirements for forest protection.*

Group of stakeholders	Interests
Scientists	The requirements for protection of nature have no scientific basis.
	Commercial activities are restricted in a logical way.
	They could be stricter but more logical, because now you may be fined if your harvester moved a half metre from the strip roads.
	Good forestry itself is the best environmental protection and restrictions matter only to an illiterate society. Key habitats are children's game.
Inventory bodies	Forest certification will make environmental requirements stricter.
	Some restrictions are set without scientific background.
	The goals of environmental protection could be reached without forbidding forest usage. Yet, the requirements of protection could be softer. It is not good to forbid without any reason.
NGOs	More goal orientated and more clear requirements are needed. In order to be accepted and realized in the reality, it should be clear what is protected and in what areas.
	The stronger the requirements, the worse the quality of Lithuanian forests. Although Natura 2000 was set, in Lithuania forest protection is still only on paper. There are no legislative acts and no additional requirements to regulate the cuttings in national parks, like for clear cuttings.
HLFDM	When forest cuttings are done according to the requirements of the protection of nature, not only clear cuts which better suit for protected areas, but also other types of cuttings could be allowed.
	Protection of nature is now at a very high level and this is why now we have it as it is. Maybe in some places requirements could be even stricter.
Wood industry	Rules cannot be stricter, because they already are, but are they logical?
	Looking to the size of protected areas, Lithuania has already become one of the leaders. There is no point to destroy the wood that has value in the market.
	Protection of nature should not have reserve status. We should weed and harvest crops in time.
Private forest owners	Lithuania has imposed very many or too many international restrictions on forests, such as NATURA 2000.
	In Lithuania protection is done by forbidding everything and after some time it turns against us.
	Our freely taken optional requirements for the protection of nature in Lithuania are twice as strict as the Swedish ones. If the country is very rich, this is probably good. But wood industry is very important for economy.
	According to today's requirements of nature protection, if there is some object of interest for them, everything around is forbidden. Russian way of protecting forests and nature is not flexible, but very categorical. First, we need to know what to protect and why.
	My personal opinion is that forest sector now fulfils the requirements of sustainable forestry theoretically and practically. From the three parts, economic, social and ecological, from economical perspectives only forest management could be much better, especially in state forests. On the whole, economic and social sides lack attention.
Managers of state forests	We have too many restrictions, which are unmotivated, for example, key habitats. Without them, even 33% of all forests are protected.

Figure 61 below, presents the opinion of the respondents on the forest ownership. The biggest part of the representatives, or 17, gave equal support to state and private forests. 11 respondents thought that it would be better if 75% of forests were state forests, whereas 7 respondents thought that 75% of private forests would be better.
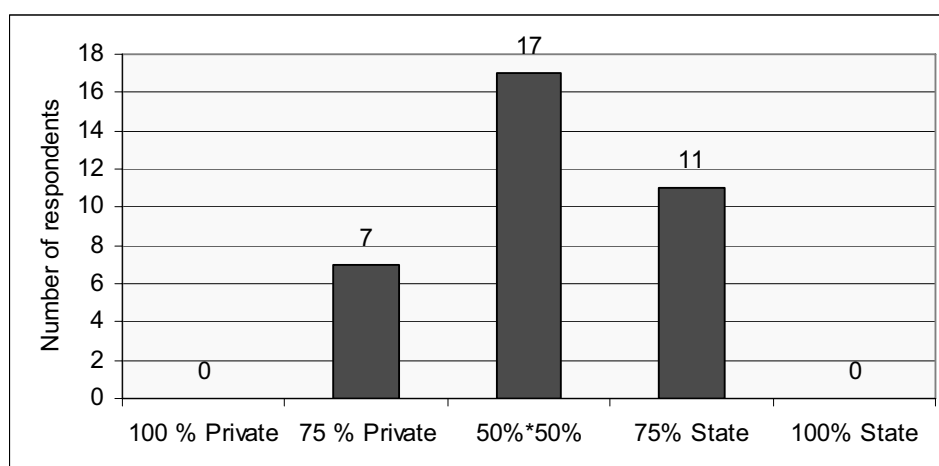
Figure 61. *The forest ownership.*

The representatives from the state forest enterprises and NGOs supported idea that 75% of forests should belong to the state. However, the representatives of wood industry and private forest owners supported the opposite idea, namely, that 75% of forests should be private forests. Further, the comments of the respondents are presented in the Table 11 below.

Table 11. *The comments of the respondents on forest ownership.*

Group of stakeholders	Comments
Scientists	State forests are managed better than private forests. Private owners see forests only as a source of income and, therefore, want to cut wood.
	This selection 50% and 50%, would be until private forest owners manage their forest like they are doing it now. Now private forestry is less effective than state.
	The state should not seek profit from forestry and allow forest privatization. The state should manage only protective forests.
	We can have impact on and control state forests, since we have 85 year-old traditions in the state sector.
Inventory bodies	Everything should be brought in order at first, since now we almost have a chaos in private forests. The average area of private forest holdings is quite small, they should become larger.
	The management in the private sector is worse than in the state sector. Only when traditions in the private sector are formed, the bigger private share will be possible.
	A perfect solution, offering possibilities for competition. State forests could perform more social functions.
NGOs	For the protection of nature, the best solution is 100% of state forests.
	From the environmental point of view, they are in favour for state forests, because the state first cares about the protection of nature.
Wood industry	Stability with wood purchasing contracts. When you work with state forest enterprises, they sign and carry out contracts, at least for one year. Private owners work without any contracts, they have more flexible prices. Thus, it would be very good to achieve a balance between them. Private owners can sell their wood to those, who offered a better price, even after the agreement is made.

	Private ownership always gives better economic efficiency, talking at least about commercial forests.
	Private sector has always been more efficient.
	Private forests would be more effective, wee need to teach them how to manage forests. It would be good to establish forest cooperatives.
	The state should manage protective forests and perform the function of forest control. State forests should not do commerce with forests, because their present commerce is only illusion. No transparency.
Private forest owners	The ownership of forests could be taken over by the state, but forest usage and cuttings should be privatized.
	Private forest owners will be more efficient in forest usage, but not now.
	There should be some state forests, such as reserves or other strictly protected areas, but commercial forests should be private.
	A decreased area of state forests will have social consequences for those people, who work in this sector.
Managers of state forests	State forests are managed better than private ones. In the future, state forests should be as they are in Europe.
	Now we have a terrible situation in private forests, especially when forests are cut but not regenerated.
	Now there is chaos with private forests in Lithuania. The restored forests are cut immediately. There are no forest management traditions. After 10 - 15 years forest privatization might be possible.

To sum it up, state forests appear to be managed and regenerated better, but from the economical and efficiency point of view, private forests are considered to be better. In addition, a lot of respondents mentioned that after 10 – 15 years, when the traditions of private forests are formed, the share of private ownership could increase.

The respondents were also asked about freedom to make decisions in forest management. Figure 62 presents the summarized opinions. The biggest part of the respondents or 17, answered that there should be more freedom in forest management and 13 respondents expressed the opinion that freedom should remain as it is now. The opinion was different among the representatives of different groups.
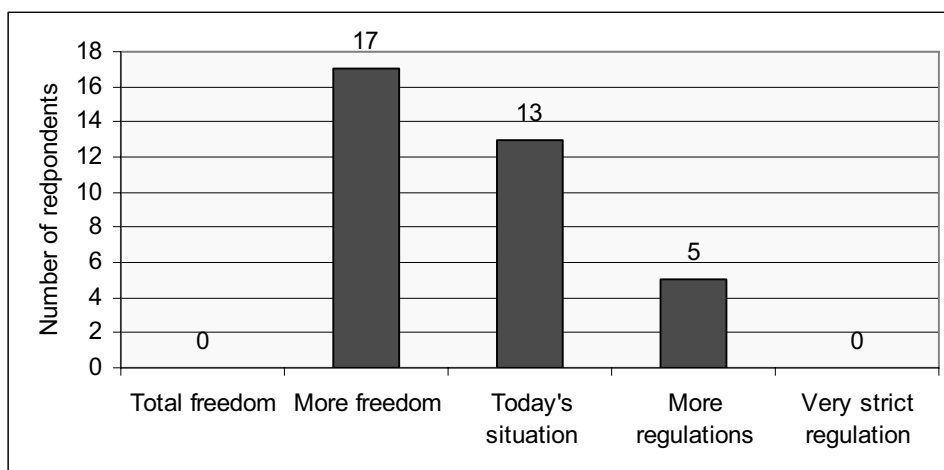
Figure 62. *Forest owners' control and freedom in making decisions.*

None of the groups supported one option. Yet, the final result was that there should be more freedom. None of the respondents selected either of two extremes - total freedom or very strict regulations. The following comments on that were given, see Table 12.

Table 12. The *comments of the respondents on forest owners' control and freedom in making decisions.*

Group of stakeholders	Comments
Scientists	Today, control cannot not be decreased, because private owners do not know how to manage the forests. The tendencies should be that control should decrease because of increased management skills of private owners and formed traditions of management in that sector.
	There should be more freedom, but to control, for example, cutting ages or regeneration is necessary.
	More rights and freedom for making decisions, but with strict key requirements, for example, that forests be regenerated.
Inventory bodies	We have strict regulations because of human mentality and economical situation.
	The most important thing is to avoid the situations, when forest are cut and forgotten.
	The right to use forests should be in the first place, but if you do cuttings in forests, you must reforest them and if you do not, the state should take the right of ownership away. There should be more freedom and at the same time more responsibility.
	The present day's situation is the balance between wishes of forest owners and the requirements of environmental protection.
	Maybe strict control was good at the beginning of forest privatization. We should start respecting private owners and let them to show initiative. Not control, but teaching is needed.
NGOs	We should not make the situation stricter, but rather work out prevention strategy.
	The rules should be goal-orientated.
	We need freedom and control, but not possibilities to do experiments. Control should be used to check whether a desired result was achieved, but not to control every single movement.
	In private and state forests we have lot of instances of insufficient and uneconomical forest management. We have objects that now are being threatened to extinction.
HLFDM	The situation that we have is already strict enough and it is not even possible to make it stricter; but on the other hand, forests are not only forest owners' property.
Wood industry	Releasing forest owners from a "chain" would not be good, because then we would have chaos.
	Forest owners are already cornered by today's legislative acts and dogmas that create problems and difficulties in forest management.
Private forest owners	Now we have too strict control. Since legislative acts contradict each other, they help inspectors to be involved in corruption.
	The rules are becoming softer now. Why do we need forest management projects? We do not need them at all.
	The level of consciousness has grown rapidly over the last 5 years. If earlier we had to force private owners to regenerate forests, now they are regenerated, but still we have a question about the quality of regeneration. Illegal cuttings have decreased. After consciousness increased, we should give more freedom for actions and creative activities. We should overview legislative acts to make forest management easier. From 1 of September 2006, the rules for forest management projects were changed.
Managers of state forests	Now there is chaos with private forests in Lithuania.
	Any restrictions to control create problems when managing a company. As a result, company's efficiency decreases. And yet, some control is necessary.
	If there is no need, there should not be any restrictions.
	Now there is chaos with private forests in Lithuania. They are cut immediately. There are no forest management traditions. Maybe, after some time people will buy forests and will think what to do or should they buy at all, how to manage, etc.

Summing up those comments, the following conclusions could be made. Regarding today's situation in private forest management, private forest owners should not be given more freedom that they have now. Yet, in the future private forest owners should have more freedom, whereas forest control should be focused only on certain issues, but not on controlling everything. On the whole, possibility to show initiative in forest management should be created.

The other question "state economical policy of private and state forests" gave following results, see Figure 63. The biggest part of the respondents (13) thought that today's situation is good. However, quite a great number (9) of the respondents thought that forests should bring more income to the state budget and 8 respondents thought that forests should be subsidized.
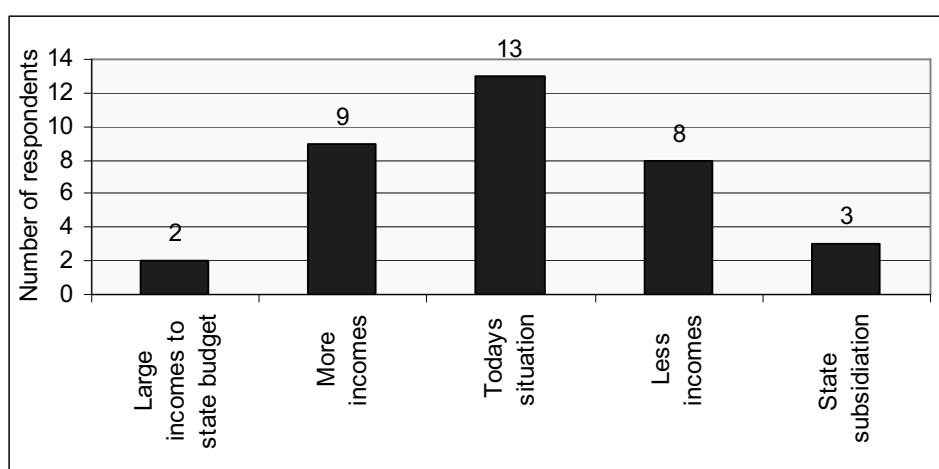
Figure 63. *State economical policy concerning private and state forests.*

The idea of subsidization was generally supported by the scientists, the representatives of NGOs and several state forest managers. The private owners, together with the representatives of wood industry and inventory bodies, approved the idea that forests should provide income to the state budget. Further, in the Table 13, some comments are presented.

Table 13. The c*omments of the respondents on state economical policy concerning private and state forests.*

Group of stakeholders	Comments
Scientists	At the moment subsidization is not needed, wood prices are at the EU level and salaries are five time smaller. By paying low salaries, state enterprises can survive. Yet, soon salaries will be increasing and state forests will experience losses.
	Partial subsidization, because of environmental requirements and limitations.
	The state should not seek profit from its forests. State forests perform some other functions, but profit is not the target. Profit is a target for private forests.

	If forest protective functions were commercialized, then there would be no need for subsidization. Wood costs grow faster than management expenses do.
	Subsidizations are needed when a good classical forestry is away and there is lack for good organizational structure.
Inventory bodies	In regions, where the quality of lands is worse, subsidization would be helpful, but generally it would not.
	Not related to wood forest functions will increase, whereas income from the wood will decrease.
	Forest management system is not good. Our forests could have a better economical value and perform more social or ecological functions.
NGOs	We should improve the structure of forest administration. By improving the structure and increasing environmental requirements, we would have the same results.
	Labour costs are rising and the prices for wood are stable, therefore, we should not think as agricultural sector does. In this case, the use of forests would not be so intensive. Now state enterprises need to cut more.
	We do not need subsidization because today's situation is good enough.
HLFDM	The state should subsidize state programs, related to the needs of society, such as tourism and recreation.
	There cannot be any talk about forest subsidization.
Wood industry	Giving subsidies is illogical, because forest sector can give big profit as well.
	Economy allows surviving for today.
	Like all other branches of economy, forests should give maximal profit, at the same time taking into account the ecological and social needs of society.
	To allow state forest enterprises rule forests according to the principle of self sufficiency and pay symbolic fees for the state is funny.
Private forest owners	Now incomes from forest management are too low, forest sector is in a bad situation, the system of administration is bad, and etc. Subsidization of forest sector would mean the bankruptcy of this sector.
Managers of state forests	Bigger incomes, because we have a potential, we need bring production of raw material in line with needs of wood industry.
	Private owners pay 15% income taxes. Private and state forest managers should have the same taxes. State sector should pay bigger taxes for the usage of state forests. Today state forests do not pay any taxes.
	Reforestation could be subsidized.
	If we take into account economical situation of our country, we will find that state has no possibilities to subsidize state forests.

Summing up the opinions, presented above, the following conclusions can be drawn. Some of the respondent groups would like to see subsidized ecological and social forest functions. State forest sector would like to get subsidies, since in the near future they will not be able to survive because of increased management costs.

The respondents were also asked about the changes in society's opinion about forest functions, see Figure 64. The main opinion was that ecological functions will become more important (14 respondents) or it will remain as it is now (15 respondents).
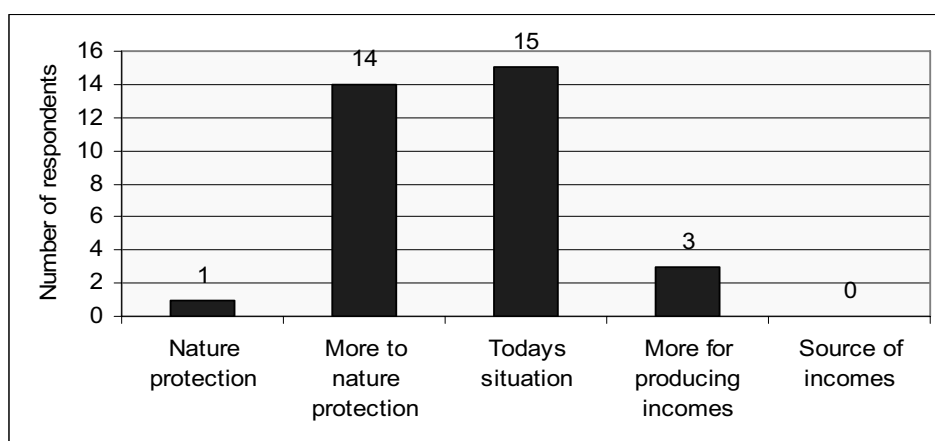
Figure 64. *Society's opinion on forest functions.*

In the near future, the society will probably prefer ecological forest functions to economical ones. The comments on this are as follows, see Table 14. For the society, ecological and recreational forest functions will remain most important.

Table 14. *The comments of the respondents on the society's forest values in the future.*

Groups of stakeholders	Comments
Scientists	More attention will be given to recreational and environmental forest functions.
	The society will need recreation and other forest functions. Multipurpose forestry.
	The same as all over the world.
	The society will strive for the protection of nature.
Inventory bodies	The opinion of the society takes into account only ecological and social functions of forests, without paying attention to the economical ones.
NGOs	Forests should serve the society. More forest recreational functions and more functions of environmental protection are needed.
	Today the situation is not good. Forests are converted to unnatural, human created ecosystems. After clear cuts forests are destroyed, and thus, we need to seek for continuous forest usage.
HLFDM	Forests in Lithuania should supply economical and ecological wealth, this is a part of national treasure that should be used and protected.
	The society moves towards the protection of nature.
	In all research into society's opinion, the society supports the ecological side of forests.
Wood industry	The society thinks that to cut trees is the criminal offence. The society lacks for information about it. The society should understand that cutting of trees is not so bad.
	The society will be willing to keep harmony in forests.
	Forests for forest users should be aesthetic and social functions fulfilling source of incomes.
Private forest owners	The need for recreation is increasing.
	The private owner is cheated with compensations. He/she seeks for economical profit from the forests.
	The greater part of the society has no connection with forest usage. Yet, the negative opinion exists, because some people form this opinion and there is no opposition to them.
	The society will pay more attention to social and economic functions of forest. This is proved by social investigations and research.
Managers of state forests	The society gives priority to the protection of nature.

Additionally, respondents were asked to share the opinion about German and Scandinavian forest management schools, then to explain which of them better suits to Lithuanian conditions, see Figure 65. As it can be seen, 12 respondents supported German school and 14 Scandinavian. German school was defined as more biologically-based and environmental. Yet, Scandinavian was described as oriented to profitable use.
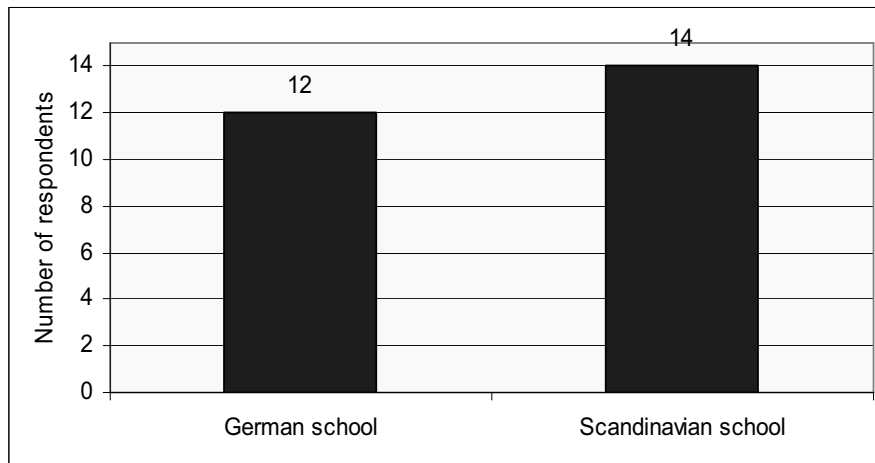
Figure 65. *Forest management schools.*

Quite significant number of respondents did not answer this question (9), arguing that they do not support neither German nor Scandinavian school. For them, the most acceptable was so called Lithuanian school, which has traditions of German, Scandinavian and Russian schools. The comments, concerning forest management schools, are presented below in Table 15.

Table 15. *The comments of the respondents about forest management schools.*

Group of stakeholders	Comments
Scientists	Forest sector is not so important for Lithuanian economy and probably will not be as it is in Scandinavian countries.
	I would choose a middle answer. Everything should be in balance.
	Economical benefit, forests can generate high income.
	None of them, we have our own school, which is a mixture of German and Russian schools, assuming a forest as a biological system. Scandinavian school does not have any sense. From the fragments you will not get a clear and complete picture.
Inventory bodies	We do not have such traditions and such state of environment as Scandinavia does. We need more forestry.
	In Lithuania social needs, such as recreation and environmental protection, are more important.
	Traditions are very important to each society, as well as to any branch of economic sector.
	I would prefer a combination of these two schools. This model is being implemented now in Lithuania, in I and II strict protective groups. In forests of groups III and IV, we do have forest management activities.

NGOs	Forest management machines from Scandinavia do not suit our conditions. Our climate is closer to German. We have soft soils and it is being destroyed by Scandinavian technique.
	There are certain Scandinavian examples that could be adopted in Lithuania. For example, the idea of key habitats was Scandinavian and then it was brought to the Baltic region. Still, German school arouses more positive feelings.
HLFDM	I would choose neither German nor Scandinavian school. I suggest the Lithuanian one, because it combines the elements of German, Scandinavian and Russian schools. From those two, mentioned before, German school is closer.
	Because of geographical and economical reasons, we need a balance between those two schools.
	The middle one. Both are extremes.
Wood industry	We should not copy Scandinavian school blindly. Lithuanian forestry already has its own traditions.
	The need for wood will increase and we still have a possibility to increase forest usage without damaging it. If the increment allows increasing forest usage, to use only 50% of increment is too little.
	Our country is not big and therefore, we should derive a possible economic benefit from the forest.
	The concern, we represent, needs huge amounts of wood. That is why we prefer the Scandinavian model.
	The Scandinavian model creates more working places.
Private forest owners	German school is based on subsidies. Scandinavian can finance its forest sector itself and pays taxes. Lithuania is not so rich to subsidize sectors, which themselves can be profitable.
	We have 50 year-old spruce with rotten roots which means that after 70 years, spruce forests will have totally decayed. Thus, we loose a lot of spruce forests and money as well.
	I think that forests should be managed according to local conditions, because both German and Scandinavian schools are the extremes, which were created by local countries in their economic, social, and economical environment by taking into account forest structure and the needs of industry, typical of these countries.
Managers of state forests	There should not be only Scandinavian or only German forest management model. We should get the highest possible wealth from the forest, taking into account environmental forest functions.
	The middle one, none of the extremes is good enough.

5.2.7. THE STAKEHOLDER ANALYSIS

In this part, the power of different stakeholders and the relations between different stakeholder groups are analysed. Different stakeholders can have influence on laws that can change the harvesting level in the country.

First of all, it is necessary to clarify whether different groups of stakeholders are interested in participating in political processes, see Figure 66, and secondly, whether they have participated in any political processes, see Figure 67, in which harvesting level was discussed. 16 respondents indicated that they were interested in participating in political processes, 17 told that they were interested in it very much and 2 respondents told that they had no interest in that. Those, who gave the answer "interested very much" were mainly the scientists, HLFDM, private forest owners and the representatives of NGOs.

To the question "Have you participated in earlier described political processes?" 18 respondents gave affirmative and 16 gave negative answers.
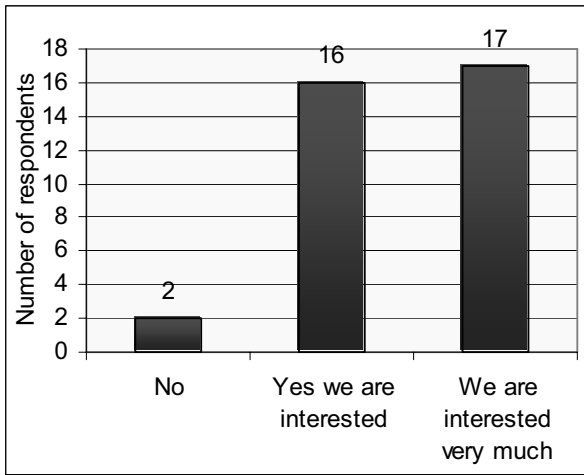
Figure 66. *The stakeholders' interest in participating in political process.*
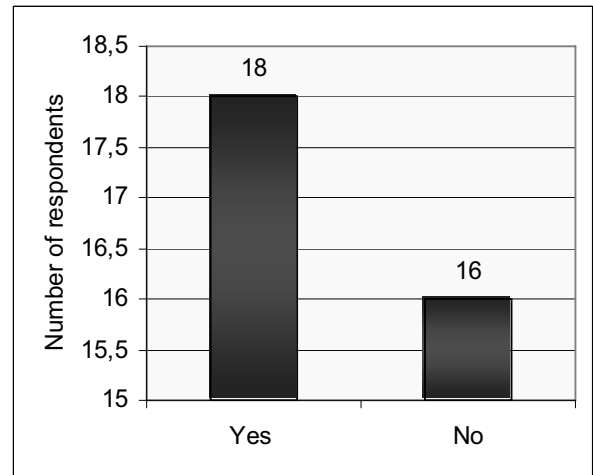
Figure 67. *The stakeholders' participation in political processes.*

The affirmative answer about the participation in these processes was given by the scientists, HLFDM, representatives of forest inventory bodies and one member of the State Forest Survey Service. Yet, none of the representatives of wood industry and private forest managers gave the affirmative answer.

As a next step, the respondents were asked to evaluate the power of different stakeholder groups when approving the harvesting level, see Figure 68. Each group of the respondents was asked to rank 5 groups of stakeholders according to their power. Thus, the most powerful group should have been given the first place, less powerful the second, etc. Afterwards scores were given for each group. For the group that was written in the first place 1 point was given and for the group that was written in the fifth place 5 points were given. Each unmentioned group was given 6 points. Then the points for each group were summed up. It is clear that the most powerful group, according to the calculation, got the smallest number of points. The group that was not mentioned by the respondents got 210 points. The summed value, described above, was subtracted from the maximum of 210 points and the figures that show the respondents' opinion on the power of different groups of stakeholders were obtained. The Department of Forests at the Ministry of Environment got the highest score (122 points). The second place was taken by the representatives of inventory bodies (113 points), while GDSF was in the third place (74 points). Scientists occupied the fourth place with their 51 points, whereas the representatives of wood industry got 35 points and were in the fifth place. Other groups of the stakeholders appeared in the following order. The representatives of state forest enterprises got 30 points, NGOs-24 points, private forest owners-13 points and the Lithuanian Foresters Union-9 points.
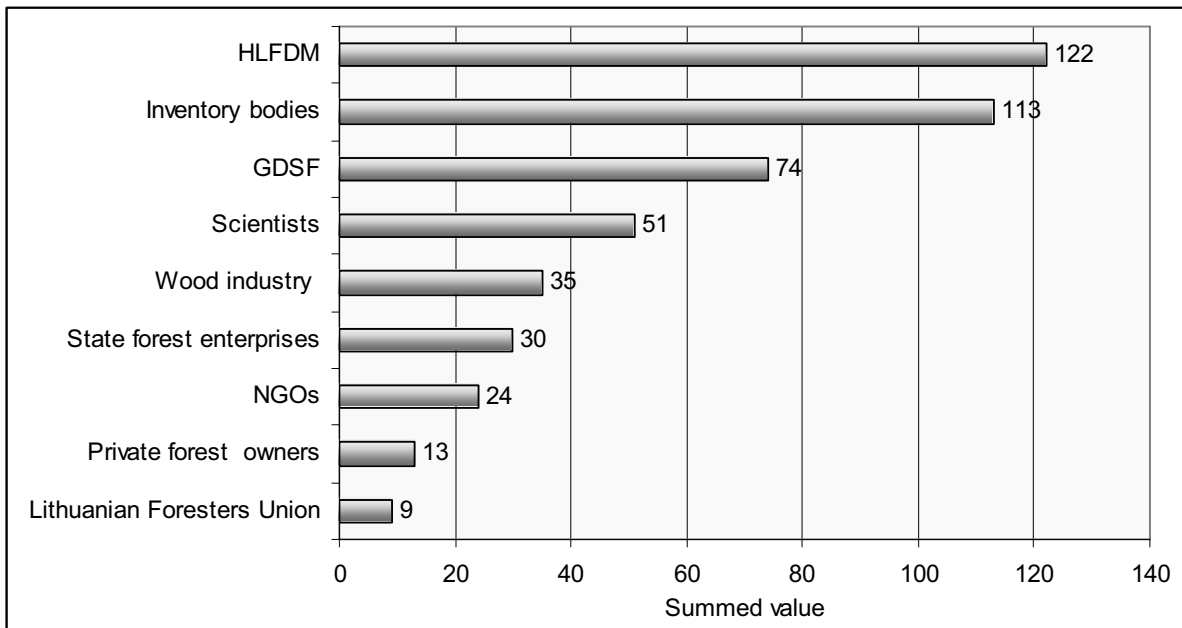
Figure 68. *The power of different stakeholder groups today.*

To the question ''how different stakeholders make the effect on a harvesting level'' for the comments see Table 16. The main answers were that National Forest Inventory calculates forest figures, GDSF, as well as the scientists, give comments on the proposed harvesting norm. The scientists also work with methodological issues and Department of Forests represents the Ministry of Environment.

Table 16. *Respondents comments stakeholders power in defining the level of forest utilisation.*

Group of stakeholders	How do they express their power
Scientists	Department of Forests, at the Ministry of Environment, suggests cutting standards to the Government. The Department of National Forest Inventory calculates the cutting standards. Department of Forests, at the Ministry of Environment, speaks for limiting the forest usage. The decisions in wood industry, government and NGOs depend on the structure of the board. GDSF wants the cutting norm to be calculated and be approved by the Department of National Forest Inventory. The influence of wood industry depends on personal connections between the members of government and wood industry workers.
	Their interest is to protect the government-funded state enterprises and their economical situation. This factor increases the cutting norm.
	Scientists, Department of Forests, at the Ministry of Environment, Department of National Forest Inventory evaluate current forest resources. GDSF represents the economical side of state enterprises. State enterprises lack for income.
Inventory bodies	Department of Forests, at the Ministry of Environment, the department of National Forest Inventory and scientists decide on forest usage amounts, according to the comments of wood industrialists and the GDSF.
	The Department of National Forest Inventory presents figures. Government-funded forest companies take care that income is not too high and not too low, the Department of Forests, at the Ministry of Environment supervises the usage of Lithuanian forests, tries to reduce the forest usage in private forests. Scientists prepare methodology that can change the level of usage. Wood industrialists defend their interests.
	Made decisions not always go together with the real forest state.
	The Department of National Forest Inventory has influence on gathering figures and applying calculation methods connected with the forest usage. The influence of the Department of National Forest Inventory manifests itself in an unofficial way, through projects, methodology and people. The impact of state enterprises self-actualizes in their lobbying through the society and spreading of populism.

NGOs	Politicians give directions to cut more trees because of financial interest, after this, scientists find a scientific background for these actions and the Department of National Forest Inventory calculates how much should be cut. Managers of state forests are happy. No one asks of Botanical Institute about forest usage.
	Wood industrialists analyse inventory figures and require increasing the forest usage. Lobbying flourishes. The Department of National Forest Inventory presents the figures, which are in favour of wood industry. NGOs decrease the impact of wood industrialists, but not at an adequate level. State enterprises do not want the usage to decrease.
	Through lobbying.
	The Department of National Forest Inventory prepares the projects on forest resources and the government makes decisions.
HLFDM	Directly by participation. The Department of National Forest Inventory, scientists, state enterprises, GDSF, Department of Forests at the Ministry of Environment and sometimes NGOs provide their suggestions.
	By scientific investigations, calculations, analysis and the requirements for the protection of nature.
	Their influence manifests itself in recommendations. NGOs have no impact.
	By making problems known and lobbying through politicians.
	The cutting norm is approved by the Government. State enterprises advocate the cutting norm. Wood industrialists communicate directly with the Ministry of Environment by proposing suggestions or by lobbying through the Parliament and politicians. Private owners also give suggestions to the Ministry of Environment.
	The Ministry of Environment tries to take notice of the subjective opinion of the society.
	The Department of National Forest Inventory presents figures to the Ministry of Environment. GDSF controls the implementation of the cutting norm.
	Continuous forest usage. The cutting funds in enterprises decreased and they want to cut more.
	Decisions are made according to the suggestions of private owners.
	The compromise between interests should be reached. Emotions and displeasure about everything what is happening around is the driving force of NGOs. They have no responsibility for their actions, even politicians are at risk. When they take a risk they can be treated as partners. Directors of state enterprises feel like small kings. Some forest functions could be subsidized.
Managers of state forests	By evaluating the state of forests, by giving the approval for the objective to provide wood and by favouring the protection of nature.
	Scientists prepare methodology, the Department of National Forest Inventory calculates the allowable cutting norm and Department of Forests represents the Ministry of Environment.
	Department of National Forest Inventory and scientists prepare projects on the possible and recommended cutting norms and wood industry offers cutting standards that national economy requires.

In the same way, like it was done in the previous section, the political power of different stakeholder groups after 10 years was calculated. Some respondents argued that the period of 10 years is too short for changes to occur. However, the Figure 69 below shows quite significant differences. According to the respondents, the Department of Forests, at the Ministry of Environment, still remains in the first place with 95 points and the representatives of forest inventory bodies take the second place. As it can be seen, wood industrialists with 61 points are the third and scientists with 50 points are the fourth. They are followed by GDSF with 44 points and NGOs with their 41 points are very close to it. Finally, state forest enterprises were given 28 and private forest owners scored 26 points.

When comparing the present-day situation with the situation after 10 years, the following changes can be observed. According to the respondents, the power of the Department of Forests, at the Ministry of Environment, will decrease by 27 points, whereas the power of inventory bodies will decrease by 35 points. Further, the power of GDSF will decrease by 30 points, but the power of state enterprises will decrease by only 2 points and the power of scientists will decrease by 1 point.
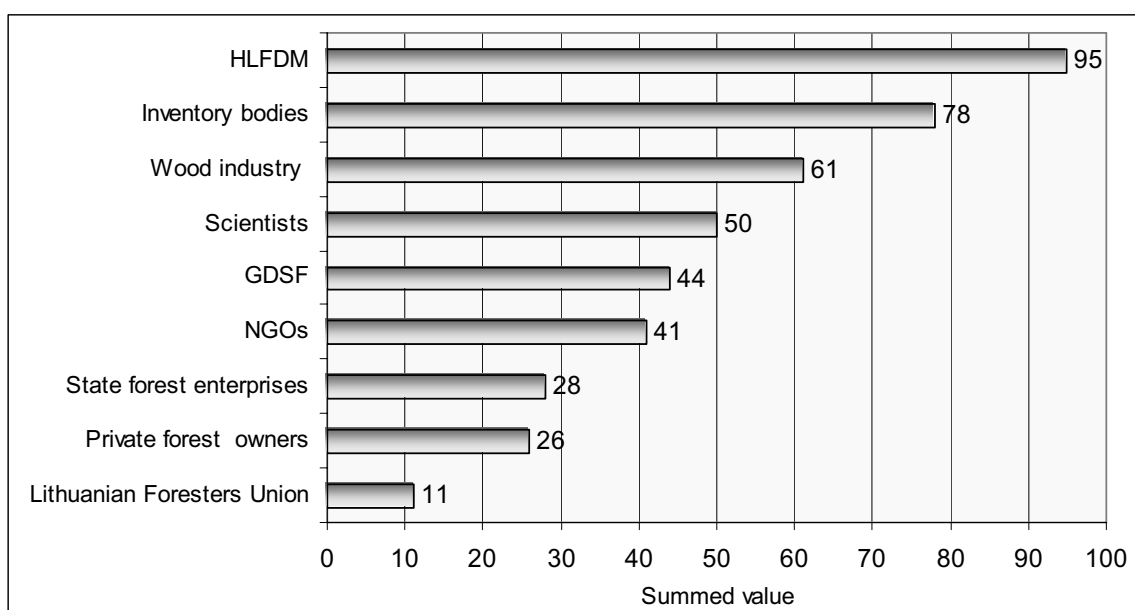
Figure 69. *The power of different stakeholder groups after 10 years.*

On the other hand, the power of wood industry would increase by 26 points, NGOs by 17 points and private forest owners by 13 points. The Lithuanian Union of Foresters will remain in the same place with 11 points and the power of this organization will increase by 2 points from 9 to 11. Further, some comments are presented in the Table 17.

Table 17. *The comments on the power of stakeholders after 10 years.*

Group of stakeholders	Comments
Scientists	The usage will increase, because of increasing building volume. If state forests are privatized, forest usage will double.
	Wood industry has high power in political arena. The impact of the Department of Forests, at the Ministry of Environment, is decreasing.
	Standing volume will increase, cutting systems will be formed.
Inventory bodies	The impact of private forest owners associations will increase, if they become stronger.
	Forest usage may increase, because wood industrialists will exert pressure that forest usage be calculated not at state enterprise level but for all Lithuania. Because of this, the requirements for the protection of nature may become more flexible. State enterprises are the strongest ones. As a consequence of this, forest usage will increase. NGOs will also be strong. Wood industrialists will do lobbying through one state enterprise.
	Too much freedom for NGOs, even if they are not able to solve issues of forest management.
	Taking into account the principles of sustainable forest management, it would be enough to set concepts.
NGOs	NGOs will take actions through the Department of Forests in the Ministry of Environment, by meetings and discussions. If NGOs are successful, the situation will change.
	The impact of private forests will increase. Wood industry will resettle in the East.
	Private associations have more resources than NGOs.
HLFDM	The impact of NGOs will increase.
	It is considered that situation will not change.
	Wood industry performs lobbying.
	The Government first looks at the opinion of the society and then at the needs of industry.
Wood industry	Wood industry and Lithuanian Green Movement should become stronger. Yet, the situation will probably not change.
	After 5 - 10 years the structure of state forests may be changed.

	The impact of wood industry will increase. NGOs power will depend on the present leaders. There is a lack for wood in the market.
	It is considered that the structure of state forests will change. If LTSFS is eager to get profit, state enterprises will become bigger. Because of this, there will be one big state forest enterprise.
	Maturity of the society. Less emotions and more wisdom. Today there is an opinion that harvested trees disappear. In some sense, forest management is similar to agriculture and you need to harvest wood. Forests are renewable resources, if they are managed well.
Private forest owners	No comments
Managers of state forests	The demand for wood in the market is increasing.
	Wood industry has an interest to get more wood. New factories are built without evaluating forest resources.
	Situation is changing very fast. Time flies very fast.
	The market demand for wood is noticeably increasing. However, organizations of the protection of nature are also becoming stronger and better organized.

When answering the question on which group of stakeholders the respondents would like to see more powerful, the following responses were given, see Figure 70. The way of evaluating the opinions was quite simple and similar to the one, used in the previous case. The main difference was that the respondents were asked to list 4 most influential groups of stakeholders and rank them in order of importance, where 1 point meant "most powerful" and 4 points meant "less powerful". For the first place 1 point was given and 4 points were given for the fourth place. The groups of stakeholders that were not mentioned by the respondents got 5 points.
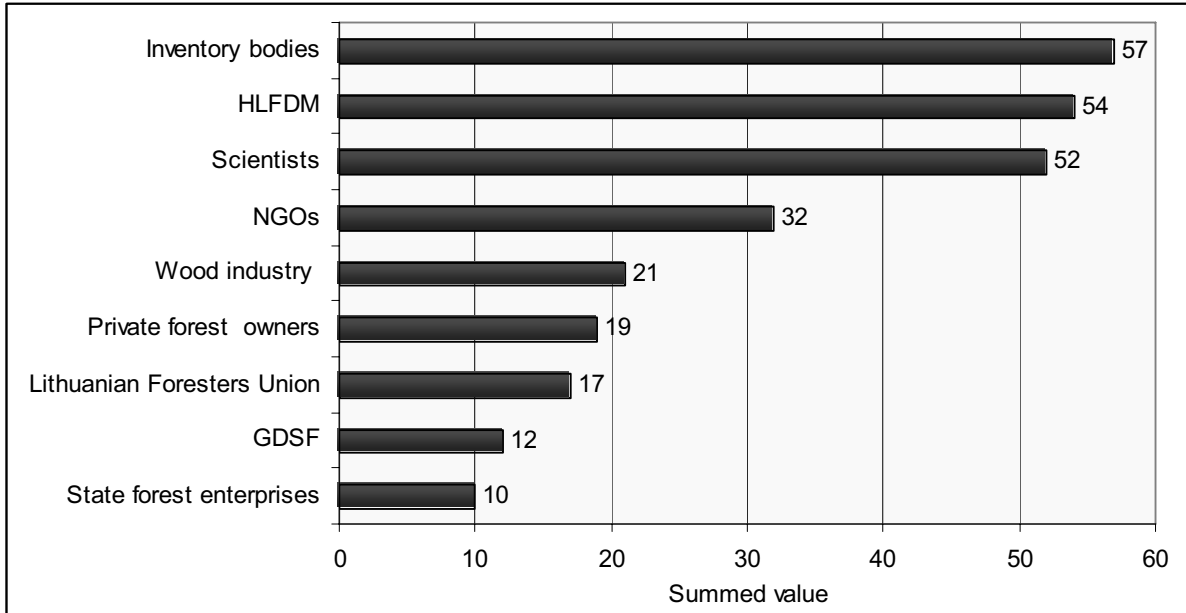
Figure 70. *Which groups of stakeholders, according to the respondents, should be more powerful?*

Then the points were summed up. In order that the first place can have the biggest number of points, from the maximum score of 175 points that a group could have got, if it had not been mentioned only once, the summed value was taken away and the following scores were got. Thus, the respondents would like

to see forest inventory bodies as the most powerful (57 points) and then Department of Forests, at the Ministry of Environment, with their 54 points, and scientists with 52 points follow. NGOs appear in the fourth place with the score of 32 points. Yet, the other groups did not get more than 21 points. Wood industry scored 21 points, private forest owners - 19, GDSF - 12 points, the Lithuanian Union of Foresters got 17 points and finally, Lithuanian state forest enterprises scored 10 points.

The results, obtained from the answers to the question on which group of stakeholders should be the least powerful, are represented in the following Figure 71. Wood industry was in the first place with its 47 points. The second place was taken by NGOs with 39 points, whereas GDSF got 36 points and appeared in the third place. Private forest owners scored 35 points and managers of state forests got 24 points. In the previous graph GDSF got only 12 points. It shows that this institution has power in defining the amounts of harvesting level.
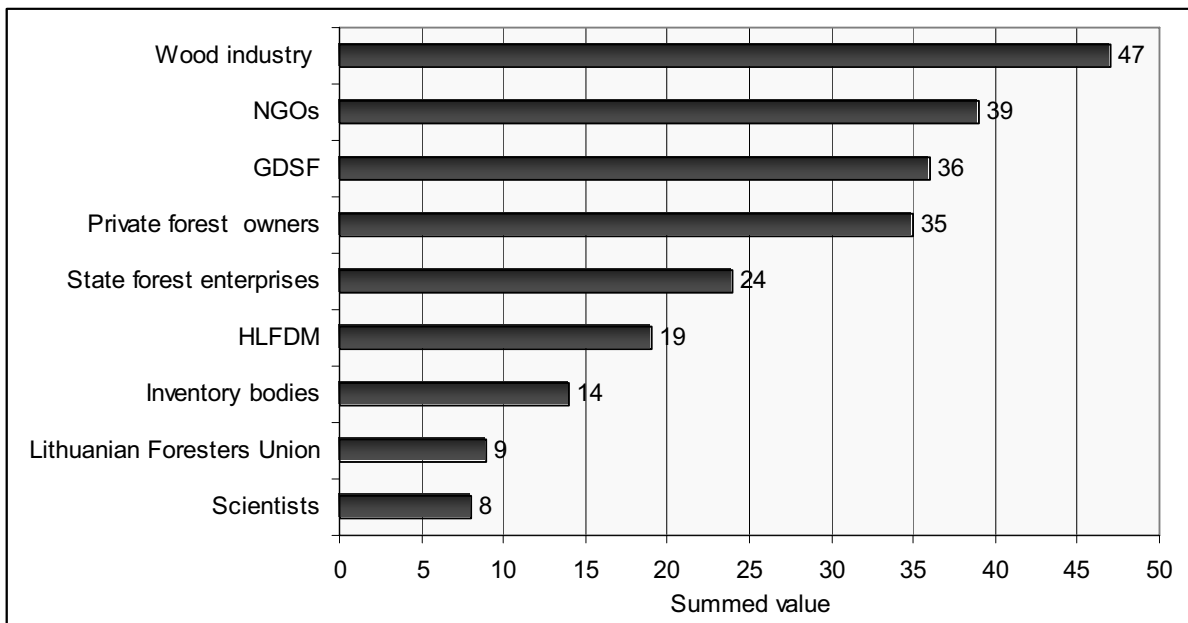
Figure 71. *Which group of stakeholders, according to the respondents, should be least powerful?*

Those groups that were previously mentioned as the most powerful got the smallest number of points. Thus, The Department of Forests, at the Ministry of Environment, got 19 points, whereas representatives of forest inventory bodies scored 14 points and scientists scored 8 points. The Lithuanian Union of Foresters appears to be not active in this process, since it got only 17 points as the most powerful and 9 points as the less powerful stakeholder.

5.2.8.   THE RELATIONS BETWEEN DIFFERENT STAKEHOLDERS

The relations between different groups of stakeholders can reflect possibilities for acting together by lobbying and seeking for personal interests. With respect to this, wood industrialists as forest users can cooperate with managers of state or owners of private forests, since all of them in one or another way depend on the harvested amount of wood.

Wood industrialists had better relations with private forest owners, see Figure 73, than with managers of state forests, see Figure 72. However, significant differences could not be found. 20 respondents told that the relations between wood industrialists and private forest owners were cooperative, whereas 15 respondents indicated that relations were neutral. The opinions about the relations between wood industrialists and managers of state foresters were as follows. 18 respondents told that they were cooperative, 14 marked them as neutral and 4 respondents indicated them as strained.
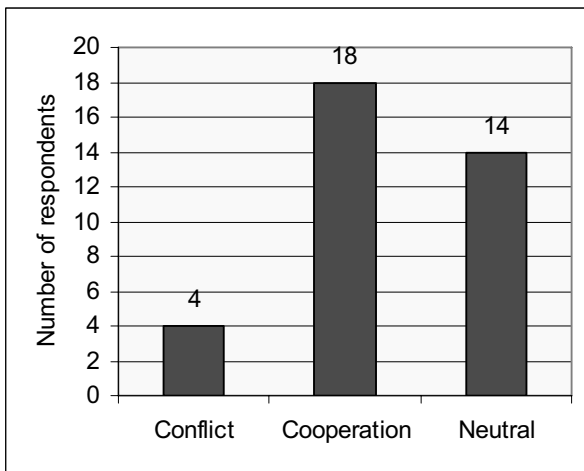
Figure 72. *The relations between wood industrialists and managers of state forests.*
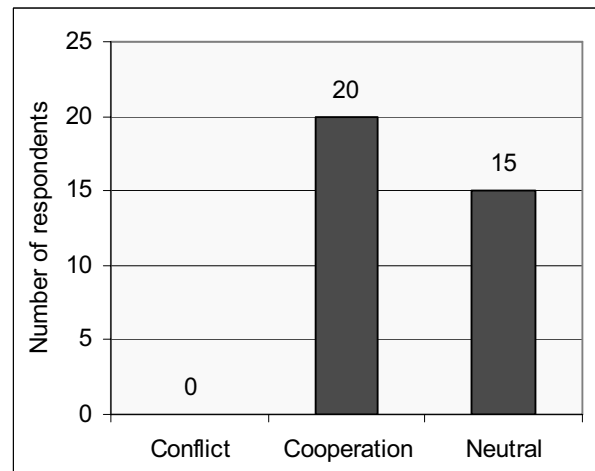
Figure 73. *The relations between industrialists and private forest owners.*

The comments on this situation concerned only purchase of wood from state or private forests. The problems, related to this, are as follows. Private forest owners, even after the agreement is made, can find another purchaser. Yet, the top administrators of state forest enterprises feel like kings in their companies and there are no real market relations. However, none of the respondents indicated that wood industrialists, private forest owners or managers of state forests cooperate for lobbying through politicians.

The relations between managers of state forests and private forest owners also do not seem to be very good, see Figure 74. 8 respondents mentioned that the relations between those two were tense, 13 indicated that cooperational and 9 respondents saw them as neutral. Some respondents marked several answers and therefore, the total number of answers was more than 35.
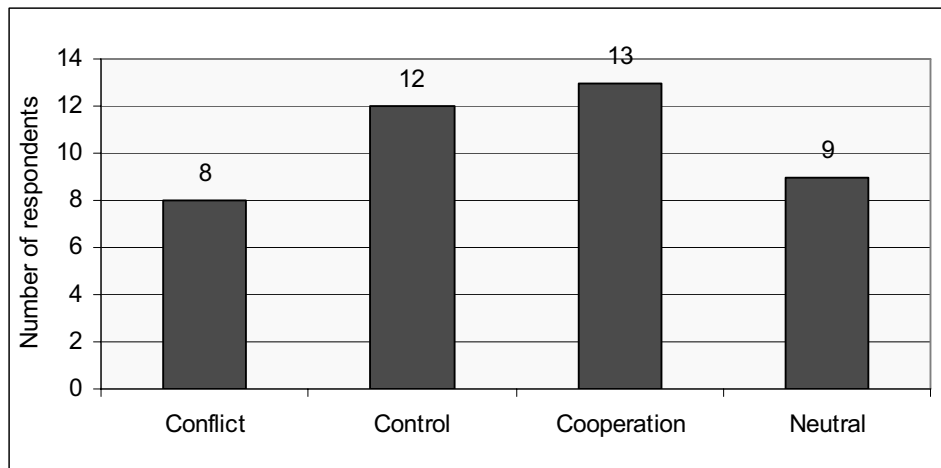
Figure 74. *The relations between managers of state forests and private forest owners.*

However, the survey shows, that state foresters and private forest owners do not act together and are not partners, even if they have the same interest, namely to get income from forests. This shows that state and private forest sectors compete with each rather than cooperate.

Figure 75 below present the relations between NGOs and state foresters and Figure 76 reflects the relations between NGOs and private forest owners. It seems that the relations between NGOs and state foresters are better, than those between NGOs and private forest owners. 19 respondents told that relations between NGOs and state foresters were cooperative, 9 indicated them as tense and 8 as neutral. 15 respondents told that relations between NGOs and private forest owners were tense, 5 as cooperative and 12 as neutral.
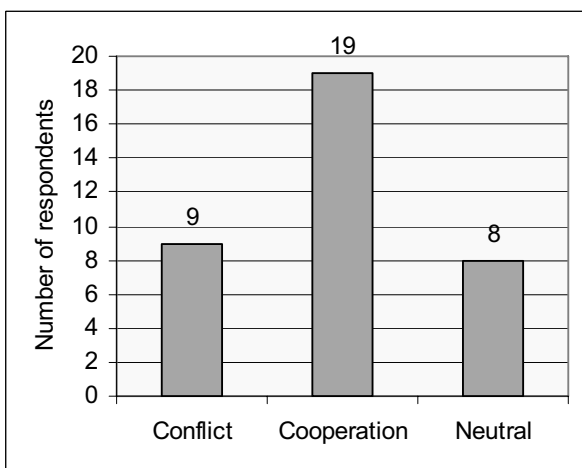
Figure 75. *The relations between NGOs and state foresters.*
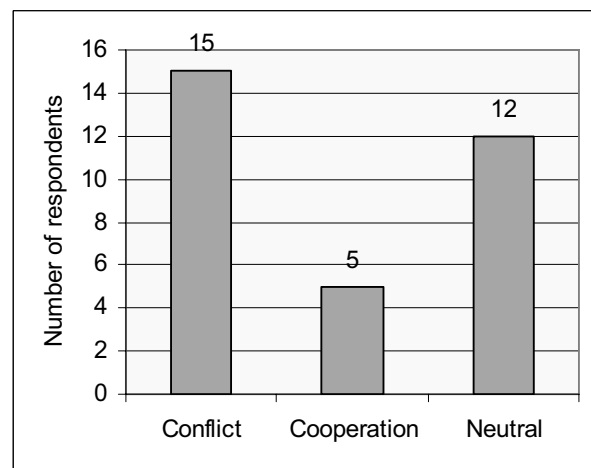
Figure 76. *The relations between NGOs and private forest owners.*

The comments show that the situation is like this, because the management of state forests is better, since this sector pays more attention to environmental and social issues. Private forest owners still have one interest – to cut as much as possible. Moreover, forests are not always regenerated. However, NGOs

opinion of state foresters is not favourable, since the latter are considered destroying key habitats.

The next step in the study was to find out the respondents' opinion about state foresters' orientation to zero profit, see Figure 77. This means that only the amount of wood that is needed to defray the expenses for forest management should be cut in state forests. 15 respondents answered that state foresters are oriented to zero profit, whereas 16 respondents indicated the opposite.
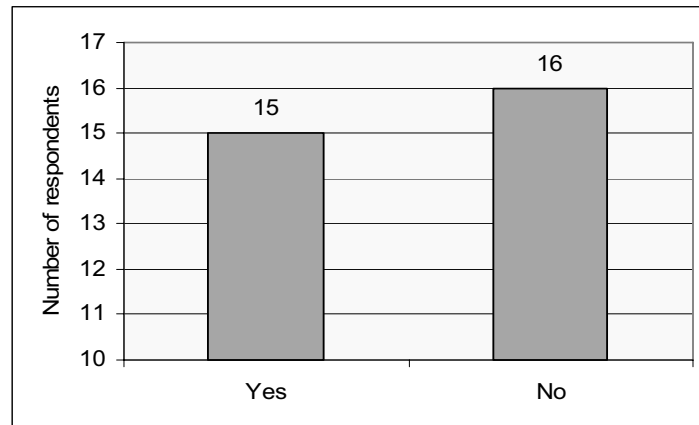
Figure 77. *The opinion about state foresters' orientation to zero profit.*

The economic set-up of State forestry removes motivation for profit-seeking. Further, the problems lie in the efficiency of LTSFS. Today, 36% of all expenses go for the personnel and other administrative staff (GMU 2005).

5.2.9. THE INTENSITY OF FOREST USAGE AND DEFINING FACTORS

First of all, the respondents' opinion about the intensity of forest usage in Lithuania was asked, see Figure 78. According to the respondents, today the intensity of forest usage in Lithuania seems to be too low (14 respondents) or optimal (15 respondents). The respondents from NGOs thought that forest usage in Lithuania was too high and respondents from wood industry, and private forests thought that it was too low. The opinion about the usage in state and private forests is that forest usage is more intensive in private forests. 13 respondents told that forest usage in state forests was too low, 19 that it was optimal and 5 that it was too high. 8 respondents, who were mainly from wood industry and private forests, told that forest usage in private forests was too low and 24 told that it was optimal. 12 respondents, who were all 5 representatives from NGOs, 3 representatives of state forests, 2 scientists and 2 from inventory bodies, indicated that forest usage was too high.
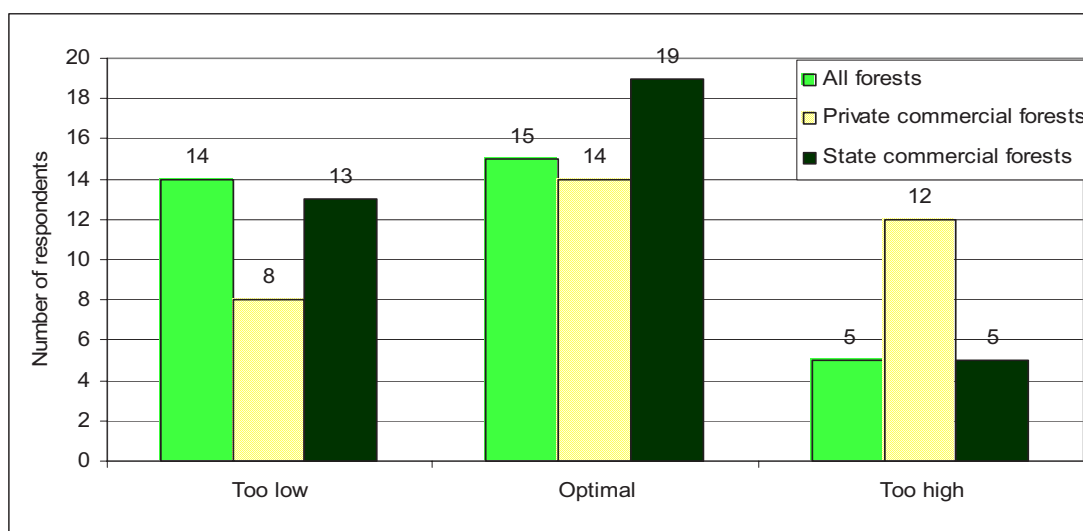
Figure 78. *The opinions about the intensity of present forest usage in Lithuania.*

The opinion about usage in state forests was as follows. 13 participants thought that it was too low, 19 respondents indicated that it was optimal and 5 that it was too high. The latter opinion was expressed by 4 respondents from NGOs and 1 from private forest owners. That it is too low, it was pointed out by the respondents from wood industry, private forest owners and representatives of state forests. Further, in Table 18 the comments are presented. Yet, Table 3 shows that forest usage per hectare in state and private forests differs only slightly. In 2005 in state forests was 3.4 and in private forests 3.7 m^3/ha. Discrepancies between opinion and real situation could be explained by the LTSFS public relations and declared orientation towards environmental values.

Table 18. *The comments on the intensity of forest usage in Lithuania.*

Group of stakeholders	Comments
Scientists	Forest usage in Lithuania was increasing at the expense of private forests, because today the main goal for private owners is profit. In state forests, cuttings are optimally calculated for 10 years. In private forests the intensity of usage is too high for present situation. It should be done according to the structure of age class.
	In commercial forests, forest usage could be higher, but because of requirements of the protection of nature, it is lower. In private forests it is also still not vulturous.
	The usage of pine forests should be higher. The usage of commercial forests is also controlled by Forestry Law.
	Hundreds of thousands hectares of forests are not used. There are also lot of material for bio fuel, which could be used. In all forests usage could be increased according to the same criteria.
Inventory bodies	There should be a balance between the market and the protection of nature. We could cut forests very fast, but how long it will take to regenerate them.
	Forest increment is at its maximum in young forests, but only mature woods are harvested, there is much less of increment and much bigger biodiversity.
	There are forests, reserved for restitution, which could increase forest usage.
	We cut only 85% of increment, sometimes even less.
	Because of forest reform and other reasons, some forests are not used in state forests. In some enterprises forest usage is too intensive and in some, forest usage is too low.
NGOs	Valuable forest key habitats are being cut, new valuable key habitats do not appear and the biodiversity of forests is decreasing.

	If we compare with the Soviet times, forest usage is 2 -3 times higher. Forest usage should not be higher that 3 -4 million m^3.	
	Forest usage is close to optimal, but not rationally organized. In calculations of a cutting norm, ecological factors should be limiting factors. Cuttings should be done to the extent that the decline of biodiversity would not appear.	
HLFDM	In broadleaves forests usage could be higher, because there wood starts decaying before it is cut, but there are also requirements of the protection of nature, which have equal importance. By increasing forest usage, other forest protection functions could decrease.	
	Everywhere is optimal.	
	We still have a reserve in not used forests.	
Wood industry	Forest usage in state and private forests is almost the same. If we allow more intensive forest usage in private forests, decline of forests will appear. Private owners do not take into account 10 years cutting norm.	
	Forest usage should catch forest increment.	
	Volume of wood in the forests is increasing.	
	As there is no reliable data about forest usage in private forests, it is calculated only according to permissions for cuttings. We should believe that forest usage there is optimal. We know forest usage in state forests quite well. I think that one third of increment is decaying.	
	Too strict forest protection requirements. Sometimes they even get status of reserves. There is an opinion that it would be good not to use forests.	
Private forest owners	Some forest enterprises work rationally and there forest usage could be increased, others do not want or cannot use forest resources rationally. In addition, areas of protected forests are too big, where now forest usage is decreased even though the requirements of forest protection allow doing it.	
	Forest area and increment is increasing. Forest volume is accumulated and then decays.	
	Private forest owners cut optimally, according to forest management projects.	
	Forest protective functions were given to state forests in order to get a balance between forest protection and usage.	
Managers of state forests	I think that forest usage in forest management group II is wantonly decreased.	
	Private forest owners cut mature woods very fast and this is not allowed in state forests.	
	Main cuttings in Lithuanian state forests do not seek cutting amounts, calculated by forest inventory. In private forests cuttings are done according to the forest management projects and requirements of the market.	

The general opinion about the cutting ages, see Figure 79, was as follows. That cutting ages were optimal, indicated 24 respondents, 12 respondents answered that they were too high and 2 respondents pointed out that they were too short. For 2 respondents from NGOs the cutting ages were too short, whereas the cutting ages were considered too high in particular by the representatives of wood industry and private forest owners.
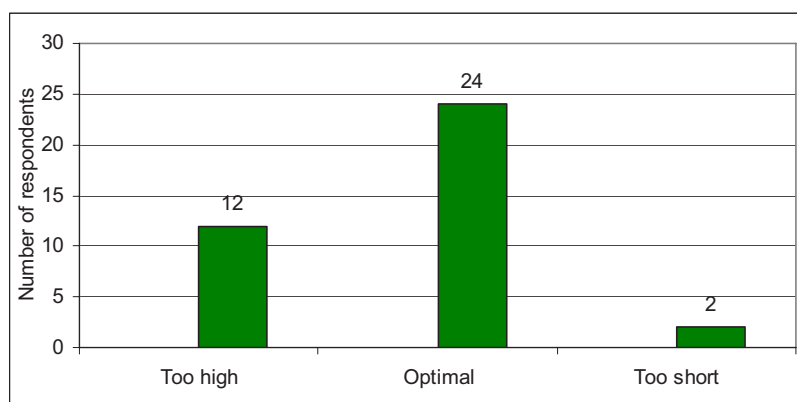
Figure 79. *The opinion about the present cutting ages.*

Another important question, concerned the desirable intensity, pointed out by different stakeholders, of forest usage in 2007, 2017 and 2027, see Figure 80. Present forest usage/growth ratio was around 60 %. According to the respondents, the desired harvesting level in 2007 would be 41 – 60% (10 respondents), 61 - 80% (17 respondents) and only 5 told that it should be 81 – 100%.
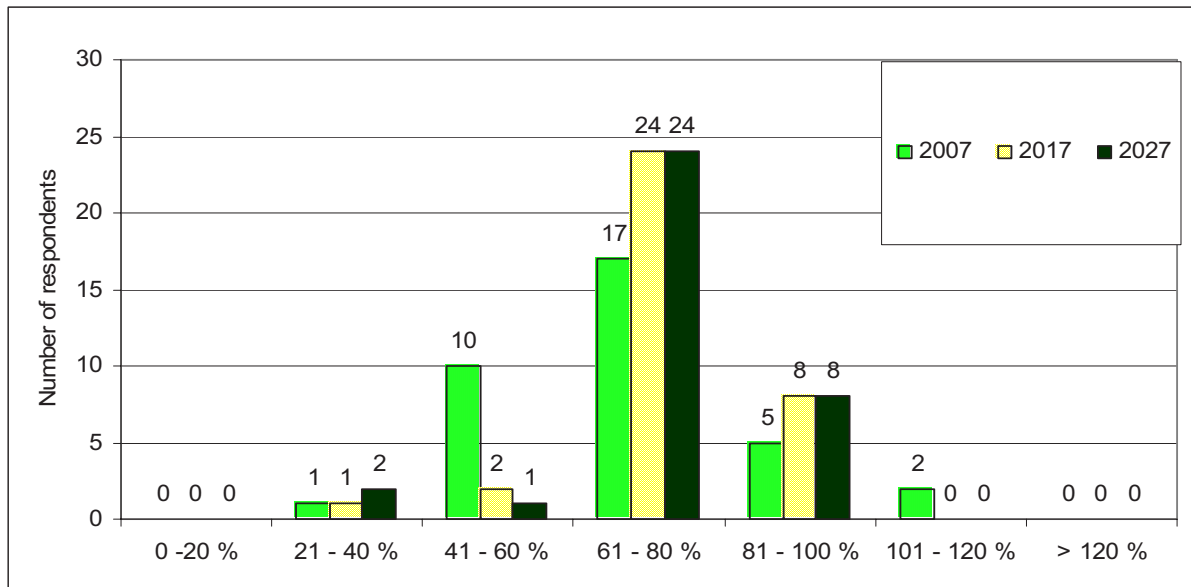
Figure 80. *The respondents' desirable intensity of forest usage in the future.*

That forest usage would be 81% - 100% indicated 2 respondents from wood industry, 1 scientist, 1 representative of inventory bodies and 1 of state forests. 2 respondents from private forest owners would like forest usage to be 101 – 120%. In this case, all mature woods should be cut in the next 10 years. After 10 years, the respondents expect the forest usage to increase. 24 of them told that in the future forest usage would be 61 – 80%, 8 pointed out that it would be 81 – 100% and only 2 said that it would be 41 – 60%. One representative from NGOs told that it would decrease and be no higher than 21 – 40%. 81 – 100% was mainly expected by the representatives of wood industry and private owners, 1 scientist, 1 representative of inventory bodies and 1 from state forests group. 24 respondents would like the harvesting level to be 61 – 80% and 8 respondents expect it 80 – 100% in 2027. Only 1 respondent expects the harvesting level to be 41 – 60% and 2 respondents from NGOs expect it to make 21 – 40%. The following comments, see Table 19, were obtained.

Table 19. *The comments on the intensity of forest usage in the future.*

Group of stakeholders	Comments
Scientists	Evaluation according to the structure of age class.
	Now forest usage should be higher, hen it should a little decrease. Age class structure and the coming pile of mature pine woods.
	Age class structure. A great amount of mature woods is coming. Increased usage of wood for bio fuel, more diverse forest wood usage.

	10% should be left for accumulation of wood in the forest and 10% for natural disasters.
Inventory bodies	It should be taken into account that forest usage is presented in negotiable figures and increment is presented together with bark. Some volume should be left for self-thinning. If we compare merchantable cuttings and increment, now forest usage is in the category 60 -80%.
	The amount of protected areas should be clearly declared. There is a possibility that some forests will be used more intensively and others will be used less. Natural disasters, climate changes should be taken into account. Until now the local needs of wood industry were satisfied. We should think how to use wood to get higher added value, for example by producing furniture.
	The selection is done according to the calculations, done in 2000.
	After finishing land reform and developing forest management in IV forest management group, 70% of increment could be used in the future.
NGOs	The cutting amounts should be at such level that the amount of forest key habitats would not decrease. Now forest usage is too intensive. Thus, the direction of forest management should be changed and the amount of key habitats should increase, not decrease.
	During the period 2007 – 2017, age class structure of trees will be very unfavourable because a lot of premature woods will become mature ones. If we do not cut, wood will rotten. However, looking at the future, forest usage ratio will not be higher than 30 -40%.
	I am against the methodology that was used. It is a bad way to calculate forest usage according to increment. In young forests, increment is much higher. There should be no less than 15% of mature woods from which 5% are taken off from forest usage. Then forest usage would be between 40 - 80%. Reserved forests from I group should not be included, when the cutting norm is calculated. First of all, the requirements of the protection of nature should be satisfied and from other forests 80 - 100% of increment could be used.
HLFDM	The increased forest usage is associated with finished land reform. We will probably not reach 7 million m^3 until 2007. However, until 2017 we will get it for sure. But still, 100% of increment will not probably be used.
	The offered forest usage is not dangerous for stability of ecosystems and partly satisfies the needs of society.
	Even now we do not know the usage of firewood.
	Some forests will be left for nature protection and commercial forests will be used 100%.
	Because of self-thinning, natural disasters, protected forests.
Wood industry	90% should be enough for satisfying the needs of wood industry. Until forest policy has the same impact as it does now, forest usage will not increase. Politicians will not put the rope on their neck. Forest management should be sustainable. More forests should be cut, but not over harvested. Variation of wood supply could be dangerous for wood industry. Local usage should be the priority. Wood deficit is a condition of free market. Deficit will happen because of firewood.
	Forest usage should catch forest increment and make about 7 - 8 million m^3.
	Forest usage should be 90%.
	Only 7 - 7.5 million m^3 are cut in Lithuania today, I would vote that forest usage should be 10 - 11 million m^3.
	Forest is a renewable resource of wood. Forest usage will be more intensive in the future. It is ecologically good to use forests more intensively, because forests are the renewable resource.
Private forest owners	According to the National Forest Inventory, forest increment is 16 million m^3 and 14 million m^3 in commercial forests. So let us leave 2 million m^3 for natural decay and 14 million m^3 could be used. Because of the land reform, 1 million m^3 is not harvested each year. Since we have a lot of over mature alder and aspen forests, forest usage could be increased without any damage.
	Forest increment is higher than the official one. Now we should cut all mature woods and then use forests rationally.
	It will depend on market demand and forest increment.
	It depends on forest age class structure. However there is impact of policy. EU support should be used properly.
	According to nowadays situation, forest usage is too high. It is not good, because wood prices are decreasing of too high supply according to supply and demand ratio. Until prices are higher in Latvia and Poland we are competitive.
Managers of state forests	Forest usage is increased and decreased according to the forest management groups. Forest usage should increase 7 - 8 million m^3 according to the state of Lithuanian forests.
	There is a possibility for slight increase.
	Forestry Law says that forest usage could not be higher than 85% of increment and this can not be questioned.

To the question whether forest usage in state forests should be increased, see Figure 81 below, 21 respondents told "yes" and 13 told "no". The affirmative answer was given by all scientists, 3 respondents from inventory bodies, all respondents from wood industry and 4 from managers of state forests.
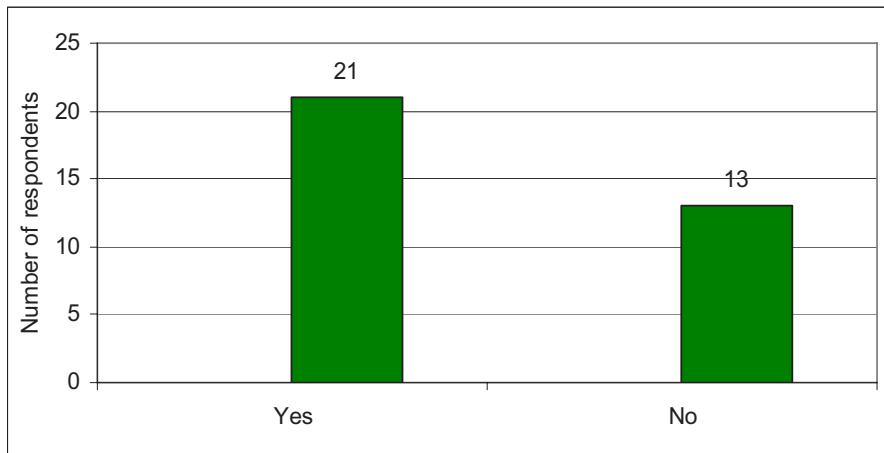
Figure 81. *Forest usage in state forests.*

The respondents were asked which factors could increase forest usage in state forests. The following Figure 82 presents the results. The main factor that could increase forest usage, according to the respondents, was forest productivity with 85 points. The second factor that was indicated by the respondents and scored 78 points was the change from zero profit to maximal possible profit. The third factor that could influence forest usage was the participation of wood industry in defining the harvesting level.
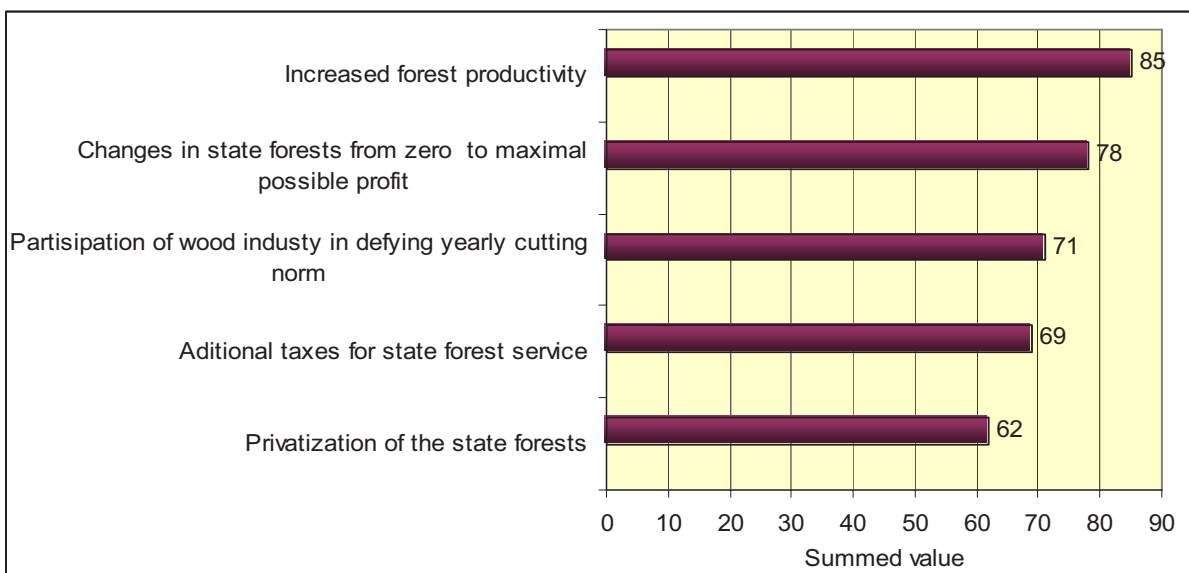
Figure 82. *Factors that can increase forest usage in state forests.*

For the intensity of forest usage in the future, possible future factors that can influence the harvesting level should be defined. The following Figure 83 presents the summed value that was obtained according to the same principle as in earlier figures. The respondents were asked to evaluate political, biological and economic factors and give scores from 1 (the most important) to 3 (less important). In order that the first place can have the highest number of points, from the maximum score of 105 points was taken away scores, given by respondents, and the following results were got.
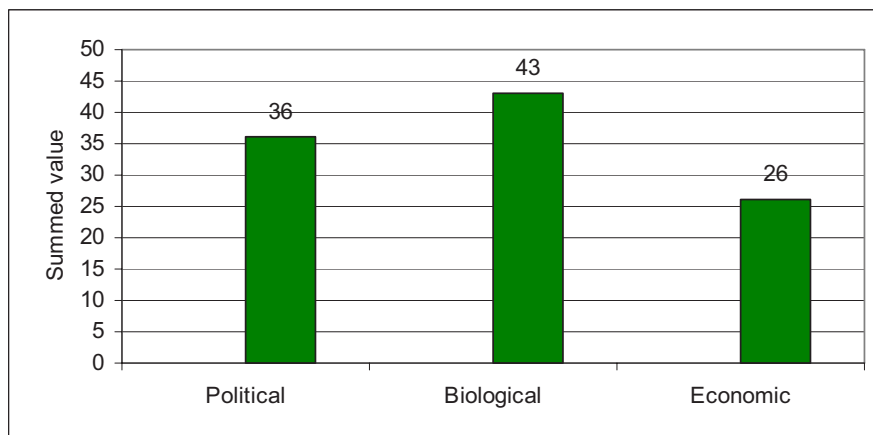
Figure 83. *The importance of the groups of factors.*

According to the respondents, biological factors will be the most important, political factors with 36 points are in the second place and economic factors with 26 points are in the third place. Further, it is presented, which political, biological and economic factors, according to the respondents, will have impact on the harvesting level, see Table 20.

Table 20. *Future political, economic and social factors.*

Groups of stakeholders	Political factors	Natural - biological factors	Economic factors
Scientists	Difficult to say.	Improved forest resources.	Markets for small dimension wood.
	Society's opinion.	Natural disasters.	Seeking for profit.
	If state forests become budget-financed companies, their usage will decrease.	Increased amount of mature woods.	If state forest enterprises become budget-financed companies, increased wood prices will have no effect on cutting amounts.
	Privatization of state forests.	If forest state is better.	Increased wood prices.
	Wood industry.	Increased forest area.	Biological factors define economic ones.
	State sector will be like a buffer to decrease increased cutting amounts in private sector. It means that, if forest usage in private forests increases, state sector will cut less.	According to prognoses, it should increase.	Increased market demand for wood.
	State forest privatization.		Increased demand for wood in the market.

			Economical model of state forest enterprise.
Inventory bodies	End of the land reform.	Dynamics of the forest increment.	Increased demand for wood in the market.
	Lithuania's relations with other countries, special cooperation.	Forest land area and productivity will increase.	Increased wood prices.
	Reorganization of state forest sector.	Natural disasters.	Increased demand for all kind of wood assortments in the market.
	Cutting ages.	Forest certification.	Increased wood prices.
	Social and environmental state policy.	Wood resources and their structure.	Development directions of wood industry.
	Private owners' cooperation.	Optimization of tree species and age class structure in the forests.	Decreased possibilities for imports of wood.
	Changes of private forest owners' rights to their property – forests.	Forest age class structure and changes inside it.	Development of wood industry.
	Lobbying of wood industry.	Appearance and development of plantation forestry and fast growing tree species.	Decreased or ceased possibilities for imports of wood from the East.
		Methodology for inventory and forest usage (cutting norm).	Intensity of forest management.
			Increased costs of labour.
NGOs	International (especially EU) requirements, connected with forest utilization.	The state of environmental habitats, key habitats.	Market demand.
	Power of different stakeholders, and their "friends" in the parliament.	Inducement of forest management.	Development of wood industry and state energy sector.
	Social, forest should accomplish not only cuttings but also other needs of the society.	NATURA 2000 and other protected areas.	Wood demand for wood processing industries.
	Lithuania aims to have easy income from forests.	Fulfilment of requirements for biological diversity.	Demand for wood in the market.
	Society's opinion.	Usage of commercial forests, favourable to ecological and biological issues.	Demand for certified wood.
	Responsible view of national institutions towards forest usage.	Forest usage with the maximum usage of biological and typical forest factors and regularities.	Demand for wood and its products in the market.
	Energetic resources, wood as a clean source of energy.	Decrease in clear cuts.	LTSFS can not be making less. It will need to have at least zero profit. Increased costs of forest management can lead to a higher harvesting level.
	Collection of the state budget.	General state of environment.	
	Transparency in decision making.	Participation of NGOs in decision making processes and gaining experience of scientific research.	
	Development of wood industry, appearance of pulp mills.	Forest certification.	
HLFDM	Lithuania's forest policy defines sustainable forest management and equal usage of forests.	Forest age structure.	Demand for wood in the market.

	All types of groups of stakeholders influence politicians.	Cutting amounts can not have any negative impact on the next forest generation and its ecological and biological functions. If they are broken, the whole ecosystem will be broken as well. Extinction of some species can damage soil of forests. Exotic tree species can disperse more and more. New forest generation should be as good as it is now and it depends on biological factors.	
	First of all, state forest policy will be affected by biological factors of forests.		
	Politicians make decisions on forest usage.	Stakeholders propagate ecological values of the forests.	
	Decreased cutting ages.	Wood volume and increment.	
	Government's decision about forest usage.		
	What we have, what we protect, what are economical needs.		
Wood industry	Wish of the politicians to please their electors.	Certification of private forests.	Demand for wood in the market.
	Emergence of the company "Lithuanian forests".	Increased forest productivity.	Additional taxes to state forests.
	Knowledge that intensive forest usage is not bad.	Forest diseases can make cut more.	Understanding that forest sector can create working places.
	Information about wood increment, cuttings and forest replanting.	Wind throws.	Development of wood industry.
Private forest owners	A balance between environmental protection and economical activities in forest sector.	The age of mature woods is constantly increasing.	The old fashioned view towards forests and forestry, that trees should be grown as much as possible until they become very big mature trees, is changing. Now industry does not need it.
	Society's opinion will change in the future (probably to more intensive forest usage).	Ecological requirements should become more flexible and more rational, and decrease in number.	State interest is to get maximal profit from its property.
	In the nearest future, privatization of commercial activities in LTSFS can be expected.	Forest diseases, root rot, bugs.	Increasing demand for wood in the market.
	Dynamics of political parties.	Cutting age.	Increasing wood prices.
	Changes in administrative structure in state forests.	Natural disasters and diseases, rotting and death of spruce, oak and ash.	Increased costs of forest management, lack of labour force.
	No market economy relations in forest sector.		Market economy in forest sector.
	Privatization of state forests.	Forest pests.	
	Quality and quantity of control institutions.	Forest age structure.	Changing of purpose of forest land to private house building and land type needed for it.

	EU directives and wishes, related to forestry and protection of nature.	Structure of forest tree species.	Possibility to buy and sell land. Availability of land market.
	I do not want any political factors to have influence on cutting levels, because of its instability. Forest sector in Lithuania needs stability.		Everything will be controlled by forest economics.
Managers of state forests	Subservience of political leaders to their electors. Usually this means that not the best possible solution is taken.	Increased forest productivity.	Increased multipurpose use of wood, fuel chips, usage of waste wood.
	Lithuanian government will prove cutting norms, which would be very close to those, calculated by inventory units. Now they are 15% less. In that case forest usage would increase, probably by those 15%.	Increased wood volume.	Wood users will try to increase forest usage, because of their egoistic purposes.
	Too high and not adequate attention to society. Unprofessional wishes of forest managers.	Natural disasters, biotic and antibiotic factors.	Increased demand for wood of wood industry.
		Multi type wood industry.	Increased wood prices, especially from private forests.
		Constantly increasing amount of mature woods.	

A lot of different factors were mentioned by the interviewees from the EU environmental policy to the state budget. Still, the most important ones were probably these: expressed sustainable management in Lithuanian forest policy, EU environmental policy , relations with other countries, possibility to import wood, finished forest restitution, lobbying of wood industry, development of usage of renewable resources, changes of private owners and their rights to their property and changes in state forest administration system. It is possible that the company "Lithuanian Forests" will be established, economical functions will be privatized or 25% of state forests will be privatized and private ownership will become the leading ownership form in Lithuania. Ecological requirements should also become flexible and more rational, and decrease in number. Forest protection policy, NATURA 2000, or forest certification as well as stakeholders, who propagate environmental values, will play an important role as well. The main biological factors will probably be these: increased forest productivity, better-balanced age class structure, amount of mature woods, forest area and volume as well as optimisation of tree species. Natural disasters will also play an important role. The main economic factors will include these: increased market demand for all types of wood, multipurpose use of wood, market for low dimension wood, a possibility that pulp mill will be built, development of wood industry, demand for fuel wood, decreased possibilities of wood imports and market economy in the forest sector.

5.3.   THE SUMMURY OF THE RESULTS. HIGHLIGHTING ANALYZED FACTORS AND POLICY DRIVERS

5.3.1.   FACTORS, THAT INFLUENCED HARVESTING LEVEL IN LITHUANIA 1988 - 2005

In this work, many factors trough the sections 5.1 and 5.2 were analyzed. Because of high amount of information it is necessary to point out the main factors as well as policy drivers, that important information would not be lost between the rows and presented for the reader. Firstly, factors will be presented:

Ecological factors (This heading includes forest management factors as well):

1. Natural disasters in 1993 – 1995 and later significantly increased amount of sanitary cuttings. Higher harvesting level during this period raised standards of state forest enterprises, formed higher needs for incomes, see Figure 9.

2. Increased forest inventory quality.

3. Forest inventory, after independence, started presenting much more favourable for more intensive forest usage data. For example gross annual increment increased in the period 1988 – 2005 from 6.59 to 12.8 million m^3, see Figure 21. Total grooving volume increased from 309.16 to 393.2 million m^3, see Figure 13, volume of mature woods increased from 32.3 to 81.5 million m^3, see Figure 18. The same time harvesting level increased from 2.641 to 6.067 million m^3, see Figure 7.

4. The structure of pine forests show that soon will be high amount of mature forests, which should be cut or will start decaying, see Figure 32.

5.   In 1994 new Forest legislation reorganized forest management groups, because of it, group of commercial forests increased from 64 to 71% in the period 1988 – 2005, see Figure 27.

6. In 1995 was adopted new principle of calculation of cutting norm, then all mature conifer and hard broadleaves wood should be cut not in 20 but 10 years, see Table 21 and Table 22.

7. In 1995 more serious works of NFI started, because of it, forest inventory started presenting more reliable data. Even today gross annual increment according to NFI and SWI differs by 4 million m^3 (Kuliesis 2004).

8. Possible maximal yield cuttings yearly 9.2 million m^3 in Lithuania, see Figure 34.

9. In 1999 substantially (15 years) decreased cutting ages for spruce, see Figure 28.

10. The EU principles of sustainable forest management, Natura 2000.

Economic factors

11. Reestablishment of Independence of Lithuania, because of it, wood import from the east was lost and local resources had to cover 2 million m^3 local needs (Mizaras 1997).

12. Local wood resources were a good available source for incomes, for the economically weakened country after the reestablishment of independence.

13. In 1992 appearance of private forestry, but because in the beginning only 5 ha per one owner was given back, small and defragmented forest sector was formed (Brukas 2003).

14. Appearance of exports to the west, especially Scandinavian markets, and reasonable prices for wood (Morkevicius and Zuraulis *et al.* 2003).

15. During Soviet times Lithuanian foresters managed to restore fully after Second World War over used Lithuanian forests (Brukas and Kairiukstis 2003a).

16. Hyperinflation till 1995, see Table 8.

17. For state forest enterprises in 1993 was set a model of complete self-sufficiency. It embodied two things. Firstly, incomes should cover expenses or state forest enterprise would be eliminated and managed forests would be joined to the stronger state forest enterprise. Secondly, lack for motivation of seeking maximal profits, which could not be used for local investments, even more, for the state forest enterprises, which got good profit, because of it, cutting fund could be decreased, creating uncertainty for future (Brukas and Kairiukstis 2003b).

18. The independence of local wood supply from the offered prices in the market, because possible wood supply of LTSFS is strictly fixed by inflexible methodology of calculation of cutting norm. Settled cutting norm should be cut till 1 m^3. Additionally, private forest sector is orientated to the present maximal forest usage, getting money from their properties now, not waiting then the prices will be better, See Table 11, Table 12 and Table 18.

19. Private forest owner's traditions of present maximal usage, see Table 11 and Table 12.

20. LTSFS orientation to producing zero profits, see Figure 77.

21. Absence of market economy in state forests. Private forest ownership is much more effective from economical point of view, see Table 11.

22. Further, wood prices in Lithuania are determined not only by local market, but also by changes in the Baltic Sea Region markets.

23. Local wood industry started restoring its capacity, lost after reestablishment of independence of Lithuania, only after 2000, see Figure 43.

24. Increased total investments in wood industry after 2000, see Figure 41.

25. Increased wood prices after 2004 are connected to the enlargement of the EU and, as consequence of it, appeared new markets and possibilities, see Figure 36 and Figure 37.

26. After the entrance of EU, appeared EU support and investments in wood industry.

27. EU support for private forest sector.

28. Forester's traditions, formed in soviet times to protect forests, create ideological filters for accepting challenges of market economy.

29. Significantly increasing labour costs. It has negative consequences, especially for LTSFS, see Table 13.

30. Certification, especially of state forests, not because of needs for certified wood, but because of public relations and image of Lithuania it the Baltic Sea region.

Social factors

31. Favourable society's opinion for not intensive forest usage, see Figure 47 and Figure 55.

31. Society's increasing needs for recreation, see Figure 47 and Figure 48.

31. LTSFS is a hostage of the situation. Forming good image in the society that LTSFS is firstly orientated to the saving forests, having good social relations, does not allow to increase harvesting level in state forests. Yet, forest usage from one hectare in state and private forests does not differ much, see table 3.

Further, the most important factors will be highlighted for state, private forest sectors as well as for wood industry.

State forest service: The most important factor for LTSFS was after independence introduced self sufficiency principle. It embodied two things. Firstly, incomes should cover expenses or state forest enterprise would be eliminated and managed forests would be joined to the stronger state forest enterprise. Secondly, lack for motivation of seeking maximal profits, which could not be used for local investments, even more, for the state forest enterprises, which got good profit, because of it, cutting fund could be decreased, creating uncertainty for future. Further, this principle showed that any other financial support could not be given to LTSFS. Increasing costs for the forest administration, insufficient from economical side management system, increasing labour costs, quite stable prices for wood and the same time decreasing proportion of state managed forests from 99% in 1993 till 51% in 1998 were the main driving factors in LTSFS. Additionally, should be kept in mind that incomes from harvested wood made 80 – 90% of total incomes in LTSFS. Other factors, like absence of market economy relations, public relations, had minor impact. The strict principles of calculating harvesting levels in state forests are set in the national law. Harvesting level for LTSFS could be changed only by changing following factors: forest distribution into management groups, cutting ages, formulas for calculating the cutting norm, area and volume of mature woods. In the period 1988 – 2005 proportion of commercial forests increased from 64 to 71%. In 1999 cutting ages were slightly reduced, more serious reduction happened for spruce 15 years less. Cutting norm formulas were changed in 1995 in the following manner. All conifers and hard broadleaves should be cut not in 20 but in 10 years, this change total harvesting level could increase by 20 to 30 percent (Kenstavicius 2004). Area of mature woods increased from 158 to 326 thousand ha.

Private forest sector. The main driving factor for private forest sector is orientation towards today's maximal profits not looking further in to the future, in other words, to cut as much as possible today, independently from wood prices. Next factor is absence of forest management traditions and third, the small size of holdings 4 ha takes any motivations for future forest management. FMP is the main document for the private forest management. Harvesting norms are calculated rather in the same way, like for state sector, at least for estates bigger than 150 ha. Additionally, should be pointed out very strict national control of private forest owners. Further, there is no freedom of decision making in forest management. As an example, obligatory forest cutting ages, obligatory FMP, strict requirements of nature protection. Yet, respondents expected that in near future more decision freedom would be given to private forest owners.

Wood industry. The main factors for wood industry are as follows. Local wood industry started restoring its capacity, lost after reestablishment of independence of Lithuania, only after year 2000. Total investments in wood industry started increasing more rapidly after 2000. Later on, then Lithuania joined EU in 2004, appeared EU support and investments in wood industry. Finally, wood prices in Lithuania are determined not only by local market, but also by changes in the Baltic Sea Region markets.

5.3.2. POWER ANALYSIS OF DIFFERENT STAKEHOLDERS

1. Representatives from HLFDM, forest inventory bodies, GDSF, science, are the most powerful stakeholders today, see Figure 68. With the old fashion traditions, supports LTSFS.
2. Forest inventory bodies are under direct subordination of HLFDM, see Figure 1. Because of this are politically influenced. Additionally, they are interested in higher forest usage, because of distribution of Lithuanian forests in age classes. Moreover, because of coming amount of mature woods and possible wood decay in the future.
3. Scientists lack financial support. Further, discussion with stakeholders highlighted theirs general opinion that science is very weak.
4. Private forest owners are weak as well. Firstly, because of very small average size of private holdings 4 ha. It takes away any motivation for more serious participation in policy decision making. Secondly, private owners are weakly organized, especially in the regional level, where existing so called cooperatives of private owners are rather private holdings of some people than real regional, organizational points.
5. During the interviews were clarified that NGOs lack financial resources, especially for implementing scientific research on hot environmental issues. Green movement, according to some respondents, is financially dependent from GDSF. Further, existing NGO organizations weakly coordinates actions between each other, hardly gets common opinion on environmental issues. However, they have high potential because of favourable society's opinion.

6. Wood industry, biggest companies are competitive enough to offer good prices and buy wood in big amounts, what is very important for LTSFS. Additionally, for ensuring availability of wood resources, personal relations with GDSF and corruption in different levels take place. Small wood industry companies are weakly organized uses tithes, which are left from big company's tables. Moreover, ensures required amounts of wood by buying illegally harvested timber. (Self impression after discussions).

7. Increased demand for wood fuel, annual use of wood 3 million m^3. Used bio fuel is not included in the calculations of annual forest usage level.

8. Wood industry, NGOs and private owners do not effectively utilise the potential lobbying in the highest policy levels. (Self impression after discussions).

9. Passivity of wood industry could be explained, that there are "promised" reserve of wood in the forests, left for restitution, which should be finish soon. 17 percent of now not used forests will be taken into account. It is clear that "promised" yearly amount o wood is more than 1 million m^3.

10. Weak crossectoral relations between wood industry and private owners, wood industry and state owners, between state and private owners weakens possibilities to do lobbying by all groups, see Figure 72, Figure 73, Figure 74, Figure 75 and Figure 76.

11. Lithuanian government set the limit of cuttings to 2.4 million m^3 in state forests (LRV 2003).

12. The fight of different groups of stakeholders for the highest principles or so called forestry mile – stones, for which German or Scandinavian forestry schools will be more embodied in Lithuanian forestry school. (Self impression after discussions).

5.3.3.   MAPPING THE INTERESTS AND THE POWER OF DIFFERENT STAKEHOLDERS

Figure 84 below presents the stakeholders' map of interest and power. Firstly, identified factors were classified according to the different stakeholders and then from it interests were formed. Finally, present power of different stakeholders was taken from previous analysis, see Figure 68. To sum it up, the most important interests of HLPDM, scientists and inventory bodies were to have functional LTSFS, the same time giving for it reasonable amount of wood to survive. Appearance of private forestry and theirs interest to use forest as much as possible today, sometimes even drastic, was the second factor for increase of harvesting level. Wood industry had influence, because of seller – buyer relations, but this impact could be seen as minor.

Influenced factors	Interests	Stakeholder groups	Power
1; 2;3;4;12;13;16;17;19;20;28;31;32;	Balance forest usage between state and private forests, help to survive LTSFS	HLFDM	1
1;2;3;4;5;6;7;8;9;15;17;	To have continuous forest usage, help to survive LTSFS	Inventory bodies	2
1;2;3;4;5;6;7;8;10;11;13;14;15;16;1 7;18;20;21;22;25;29;30;31;32;33;	Self sufficiency principle. To have at least zero profit ballance	GDSF and state forest enterprises	3
1;2;4;28;	Help to survive LTSFS, Development of Lithuanian forest sector	Scientists	4
1;11;13;16;21;22;24;25;26;30;	To have available sources of wood by reasonable price	Wood Industry	5
10;19;31;32;	Slow down increasing forest usage	NGOs	6
1;2;3;4;5;6;7;8;9;10;13;14;15;16;17 ;18;19;22;25;27;29;30;31;32;	Present maximal forest usage,	Private forest owners	7

Harvesting level in1988 - 2005 increased from 2,6 to 6 million m^3

Figure 84. *The map of interests and power of different stakeholders.*

6.   THE DISCUSSION

The reestablishment of Lithuanian independence in 1990 touched and changed the life of Lithuanian society. At the same time, it also had influence on the Lithuanian forestry. The social changes were projected into forestry by political system (Shanz 1999). During Soviet times, there was a good possibility to save Lithuanian forests by importing wood from Russia and in this way satisfying the needs of wood industry (Brukas and Kairiukstis 2003a). After the independence was restored, Lithuanian resources had to cover local needs (Brukas and Kenstavicius1992). In this period, local resources were taken into account because of several reasons: first of all, because of changes from planning system to market economy, secondly, because of absence for possibilities to import wood from Russia (Brukas and Kairiukstis 2003a).   Further, Brukas and Kairiukstis (2003a) stresses that after reestablishment of independence of Lithuania, was a good possibility to use local resources more intensively, since during the Soviet times, about 4 million m^3 of wood was accumulated in the forests each year. Until the beginning of 1990, Lithuanian wood resources were fully restored and their usage could be increased.

The results from the ecological part of this study show significant increase in certain forest figures, namely, the amount of mature woods, the total growth, the average volume per hectare, etc. when comparing them with the figures of the period 1987 – 1993. Because of social changes, forests did not start growing faster. Rather uutilization grew due to the adaptation to the new requirements of society. On the whole, the social changes and the emergence of market economy were the main driving forces in the mentioned period. Is it possible to talk about the influence of any group of stakeholders? The answer would probably be negative. A good possibility for the society's wealth and development existed in the environment of planned economy, during Soviet times, when wood was not a scarce resource and it was possible to import as much as needed from Russia. Not intensive forest usage helped to maintain ecological and recreational values of forests. To go further, is it possible to talk about the freedom of actions and possibility to express one's personal opinion or opinion of any group that was controversial to the common one in such environment? Only in democracy the right to create organizations, to express one's own will and show critical thinking can be accomplished in the daily life. However, the democracy after restoration of Lithuanian independence was very weak and different groups of stakeholders did not probably have any impact. Rather, it was a national interest to support national industry, at the same time supporting national economy that was very weak. "The major economic task of the forestry of Lithuania is transition to market economy by confirming to economic, ecological and social goals of forestry" (Mizaras 1993: 83).

The period from 1990 to 2000 is also worth to be looked at and analysed. In 1990, 3.072 million m^3 were harvested and yearly local usage was 5 million m^3 (Kenstavicius 1993). 1 million m^3 of wood per year was exported not as raw material, but as furniture, paper or cardboard (Kenstavicius 1993). Those

figures indicate the importance of forest sector to the national economy. By using more local materials, there was a possibility to get more, because the money that was paid for wood stayed within the country. In 1991, the economical reformation of Lithuanian forests was started. As a result, the prices of standing wood, wood and its assortments increased, the Forest Management Fund was founded, rights for hunting were given back to foresters and the salaries for foresters increased (Mizaras 1993). Mizaras (1993) also pointed out to the issues that should be taken into account because of transformation to market economy: forest privatisation, coordination of commercial and non commercial forest activities, free marketing and national regulation of the tasks of forests sector. On 1 of July 1992 state forest enterprises started selling wood according to the principles of free market (Mizaras 1993). However, the prices for wood were still regulated by the Ministry of Forestry (Mizaras 1993). In 1995 the Forest Management Fund was created from all incomes of state forests. (Mizaras 1996).

The new Act of Forest Law that came into force in 1994 coordinated different interests in forests that appeared because of the emergence of market economy. The new Forest Act had direct consequences on the harvesting level, because it set or rather reorganized forest groups and their management regimes. Thus, the new Forest Act introduced four forest management groups. Forests in the IV and III (with some restrictions) management groups were intended to produce wood, see Figure 25, Figure26 and Figure 27. The area of these forests made almost 85% of the total forest area. Group III had some restrictions, such as higher cutting ages and additional requirements to the harvesting. Before the Forest Act came into force, there were two forest management groups, 64% of which were commercial forests. As it can be seen in the Figure 7, in 1995 almost 6 million m^3 were harvested. It could be argued that the Forest Act and the reorganization of groups had no impact and such high harvesting level was only a consequence of diseases, bugs outbreak, droughts and wind throws, which occurred in the period 1992 – 1996. At this point, it is necessary to compare the years 1993 and 1995. In 1993 2.7 million m^3 trees were cut by sanitary cuttings and in 1995 it were 2.6 million m^3, see Figure 9. Yet, the main cuttings in 1993 decreased by 0.4 million m^3 as compared with 1992. The cutting norm for main cuttings in 1993 was 2.05 million m^3 and only 1.455 million m^3 was harvested, see Appendix A, Table 2. Thus, 0.6 million m^3 which could be harvested were left in the forests. However, in 1995, having the same amount of sanitary cuttings, the general amount of cuttings increased by 0.3 million m^3 when comparing with 1994. Thus, the cutting norm was fully used, because from the total of 2.17 million m^3, 2.121 million m^3 were cut. By looking at the forest harvesting rules as well as the principles and priorities of the main cuttings, it can be seen that forests of bad sanitary state should be cut in the first place, whereas all other mature trees should be cut at the end (LRAM 1999b). Yet, this principle did not work in 1995. Additionally, should be pointed out that those sanitary cuttings after period 1993 – 1995 staid higher than before, even there were no serious natural disasters.

In 1995, the methodology that calculated cutting norms of Lithuanian forests was also changed.

For comparison, Table 21 below presents the formulas, which were used before and after 1995. The main difference between the formulas is that in formulas before 1995, the age class covered 20 years period and after 1995 the age class covered the period of 10 years. As a consequence, because of the changes in the length of premature and mature age classes, denominators, used in the formulas, were affected.

Table 21. *The formulas used for the calculation of cutting norms before 1995 and after 1995. Q – Forest area, Qb – The area of mature trees, Q1 – The area of the first age class before maturity class, Q2 – The area of the second age class before maturity class, KA – Rotation age.*

		Before 1995	After 1995
Cutting norm		Forests of groups III –IV	Forests of groups III – IV
Continuous usage (Bt)		Q/KA	Q/KA
Second age (B2)		$\dfrac{Q_2+Q_1+Q_b}{60}$	$\dfrac{Q_2+Q_1+Q_b}{30}$
First age (B1)		$\dfrac{Q_1+Q_b}{40}$	$\dfrac{Q_1+Q_b}{20}$
Maturity (Bbr)		$\dfrac{Q_b}{20}$	$\dfrac{Q_b}{10}$

The main point here is that before 1995 all mature wood (hardwoods and conifers) could be cut in the period of 20 years, and after 1995 in 10 years. Table 22 below shows the differences between the denominators, used in the formulas.

Table 22. *The denominators used in the formulas for the calculation of the cutting norm before and after 1995. After 1995: BR – Maturity norm; BR1 – The first maturity norm; BR2 – The second maturity norm. Before 1995: Br – Maturity norm, Br1 – The first maturity norm, Br2 –The second maturity norm. According to years perspective BR=Br, BR2=Br1, BR4=Br2 and etc.)*

After 1995	BR	BR1	BR 2	BR3	BR4	BR5	BR6	BR7	BR8	BR9	BR10
Denominator, after 1995	10	20	30	40	50	60	70	80	90	100	110
Denominator, before 1995	20		40		60		80		100		120
Equivalent, before 1995	**Br**		**Br1**		**Br2**		**Br3**		**Br4**		**Br5**
Years to wait for cuttings	0	10	20	30	40	50	60	70	80	90	100

In 2002, a modified methodology was developed and adopted. However, the principles it discusses are the same, even if so called OPTINA methodology is used. Kenstavicius (2004), one of the forest management specialists in Lithuania, also writes that because of the new methodology, the cutting norm for main cuttings increased by 33% and the total cuttings by 25%. The harvesting norm, calculated for the main cuttings in the period 1992 -2005, increased only slightly from 2.013 million m^3 to 2.315 million m^3 in state forests.

At this point, it is necessary to return to the year 1995 and analyse some other factors for instance, forest privatisation, because reasonable part of respondents thought that appearance of private forestry significantly increased forest usage level in Lithuania. This was a very important factor taking into

account that from 1993 to 2000 the harvested volume in private forests increased from 0.1 to 1.4 million m^3. In fact, privatisation of forests increased the harvesting level in Lithuania. However, usage in the state forests also could not be forgotten. As an example, the year 1998 could be analysed. In this year 4.9 million m^3, 4.1 million m^3 in state forests and 0.8 million m^3 in private forests, were harvested. Yet, forest usage level in the period 1998 – 2005 did not differed significantly in state and private forests and was around 4 m^3/ha.

The quality of forest management was another question, discussed in the study. In 1999, private forest sector had to solve the following issues: creation of an organizational structure for forest management, adaptation of modern forest management technologies and investments to forest sector (Kuliesis 1999).

Some other important issues, concerning the year 1999, are necessary to note here too. Because of storms, cutting ages decreased, see Figure 28. The most serious reduction in the cutting age was observed for spruce. The cutting age was reduced by 15 years. As a result of these changes, volume of the mature woods increased from 59 million m^3 in 1998 to 74 million m^3 in 2001, see Figure 18.

The market demand in this period can be characterized by wood prices, see Figure 36 and Figure 37. Even, though, the results in the economical part are presented only in nominal prices for wood, they still show some tendencies. From 1994 to 1998, the prices increased for all types of wood. However, could not be clamed that wood prices anyhow influenced wood supply. In this period increased supply was determined by natural disasters. At the same time, the harvesting level decreased from 5.9 million m^3 in 1995 to about 5 million m^3 in 1998, see Figure 7. The exports of wood, see Figure 39, decreased from 1.8 million m^3 in 1995 to 0.8 million m^3 in 1998. The consumption of industrial wood, see Figure 43, decreased from 3.5 million m^3 in 1997 to 3.1 million m^3 in 1998 and 2.9 million m^3 in 1999. Only after the year 2000 the harvesting level as well as the prices for logs started increasing, but the prices for pulpwood were still decreasing. It seems that 1998 – 1999 was the period of stagnation for the forest sector in Lithuania.

Further, the situation from 2000 until our days needs to be mentioned as well. In this period the harvesting level increased from 5.3 to 6.1 million m^3, see Figure 7, and the nominal prices of logs in 2005 almost reached the prices of 1998, see Figure 36 and Figure 37. The amount of wood that was harvested from private forests increased from 1.4 to 2.5 million m^3, see Figure 7.

Now let us turn to the prognoses that were made in different years. In 2000 new, much more optimistic for wood users, prognoses were made by inventory experts (Kuliesis and Petrauskas 2000). The newest prognoses predicted that the harvesting level in 2010 would be around 7 million m^3, see Table 6, whereas until 2021 it would rise to even 9 million m^3. The prognoses, made in 1992, see Table 4, predicted that only in 2010 the harvesting level would reach around 6 million m^3. In 1997, see Table 5, the most optimistic prognoses for the period, starting with the year 2021, predicted also around 6 million

m^3. In fact, the harvesting level in 2001 was already higher than it was predicted in 1992 and 1997. It is necessary to mention that all prognoses were made by inventory experts.

The year 2000 could be seen as a new period in Lithuanian forestry, or as the beginning of adaptation to new situation and possible market needs for wood in the nearest future. A little later than 2000, a new evaluation of forest resources was started. When the data from the National Forest Inventory arrived, the total forest growth per year was the main object for discussions. It was argued that the total forest growth per year is 16 million m^3 and not 12 million m^3 (Kuliesis 2004). From 1998 to 2005 the total growth of wood stock increased from 348 million m^3 to 393 million m^3, see Figure 13, and the mean volume per hectare in the same period increased from 184 to 198 m^3/ha, see Figure 14. In addition, the gross annual increment in the same period increased from 11.6 to 12.8 million m^3, see Figure 21. From 2000 to 2005 the area of mature trees increased from 239 to 326 thousand hectares whereas the volume of mature trees increased from 60 to 80 million m^3, see Figure 17 and Figure 18. One of the explanations for the changes of forest inventory figures, discussed above, could be that after 2000, the discussions at governmental level on building a new celluloses factory, which would annually consume 2.5 million m^3 of wood, started or became sharper. In the program of the Lithuanian government for the period 2001 – 2004 it is approved to take actions for building a celluloses factory of state importance. In 2000 by the initiative of the Lithuanian Government, the investigation on the building of a celluloses factory in Lithuania, which was carried out together with the Swedish and Japanese experts, was completed (LRAM 2002c). As a matter of fact, the absence of a celluloses factory was a problem for forest management, because small dimension wood, such as pulpwood from the first commercial thinning, could not be used in the local market and prices for it were quite low. In 2000, in total 939.5 thousand m^3 were exported, from which 762.1 thousand or 81% was pulpwood (Morkevicius and Zuraulis *et al.* 2003). Thus, there was a necessity, for building a new celluloses factory, to prove that Lithuania had enough wood resources not only for a celluloses factory but also for further development of other branches of wood industry.

Further, it is worth to take a look to the society's opinion about forest values. According to the results, presented by company "Baltic Investigations" (2004), Lithuanian people give priority to the ecological and social values of forests, whereas very little attention is paid to the economical ones, see Figure 47. As a consequence, conflicts between different interests arise. It would probably be wrong to claim that conflicts arose only after the year 2000. In fact, later they became even more severe.

The interests of different stakeholders are described in the analysis of the results of the interview and questionnaire survey, see chapter 5.1.4.4. Briefly stated, private forest owners and state forest managers have an interest to harvest forests and get as much income as possible, because they need this income in order to survive. Wood industry depends on the availability of wood resources, because it is its raw material, which is further processed. NGOs have an interest to protect environmental values of forests. Scientists and representatives of inventory bodies seem to have no direct interests in utilisation of

forests. However, they have expert knowledge and values that can effect forest management. The group of HLFDM declared that their main interest was the balancing of other interests to the Lithuanian forests.

When looking at the respondents' opinion on the factors that influenced the harvesting level in 1991 – 2005, see Figure 53, it could be seen that the increased market demand and the emergence of market economy were only in the fourth place, whereas the appearing of private forestry was in the first place. Natural disasters were more important than market demand as well, even though natural disasters were of greatest importance only in the period 1992 – 1996. When naming three most important factors, see Figure 54, the respondents indicated that the appearing of private forestry was the most important factor, whereas the improved taxation figures and the emergence of market economy were respectively in the second and the third places.

By asking the question on which factors define the current harvesting level, see Figure 55, interesting results were obtained. It could be said that forest growth figures are the only factors influencing the harvesting level. Yet, this is not 100% true. It appears that public opinion is in favour of not intensive forest usage, traditions to use forests by saving them as well as of strict requirements to the protection of nature that limit forest usage. According to the respondents' opinion, the harvesting level does not react to market demand. Only 5 respondents told that it does. 22 respondents indicated that the cutting norm is calculated not taking into account the demands of wood industry. This could be true for state and partially for private forests, because the harvesting level in state forests in the period 2000 – 2005 decreased from 4 to 3.6 million m^3. The cutting norm in this period was not fulfilled by about 0.2 million m^3. The decrease could also be due to the decision, made in 2003, by the Government of Lithuania that in III – IV forest management groups, no more than 85% of annual increment could be used (LRV 2003). The regulation says that 85% were selected because of the rational usage of wood resources. Yet, different groups of stakeholders' understand rational usage differently.

This is probably the right time to discuss the interests and power of different groups of stakeholders. Let us now look at the graph that presents the opinion on the power of different stakeholders today, see Figure 68. It is important to note that this analysis of power was quite general, since it does not divide power into formal and informal, hidden influence. According to the results, three institutions were considered most powerful: The Ministry of Environment of Lithuania and its Department of Forests, forest inventory bodies as well as GDSF. This distribution of power possibly proves that in Lithuania approval of harvesting level process is rather pluralistic, then state retains the largest possible margin for action and decision making, than corporative, then state is interested in closer cooperation with associations (Krott 2005). Yet, changes in institutional set up of approval of harvesting level from 2003 - 2005 should be touched. Firstly, year 2003 will be described (LRAM 2003b). For state forests, the cutting norm was first calculated at estate level and then it was summed up at national level. During the second inventory meeting, the cutting norm was discussed by the representatives of the Ministry of Environment,

the State Service of Protected Areas, the GDSF, the LTSFS, the authors of the forest management projects, the State Forest Survey Service and the reviewers of forest management projects. Representatives of wood industry were excluded from the meeting, like other non governmental organizations. The discussed norm was then approved by the Minister of Environment. The state and private (forest management plan is the main document for cutting forests) cutting norm that was summed made the total cutting norm of Lithuanian forests and then the Minister of Environment gave it to the Lithuanian Government for the final approval. Thus, the minister of environment had the right to decrease cutting norm in state forests by 10%. To summarize, this process could be described as Top – down decision making process. Further, institutional set up for approval of harvesting level in 2005 was changed to more corporative side, see Figure 5. Additionally, serious arguments could be found, that the decision making process was changed to more bottom up approach (LRAM 2005b). Firstly, decisions for FMS and FMP for state forests are made in regional level, even it still should be approved by minister of environment. Secondly, all interested parts can participate in the FMS or FMP preparation process, when Inventory Technical council is summoned. Further, strategic environmental assessment and public evaluation of the projects are set as obligatory steps for approval of FMS or FMP in state forests. For private forest owners public evaluation is not necessary, but still they have to keep principles of FMS. In this way FMP has relations with public opinion. Minister of environment does not have the right to decrease harvesting level by 10%.

The power of different stakeholder groups in 10 years from now looks more evenly distributed, see Figure 69. According to the respondents, the power of the Department of Forests, at the Ministry of Environment, and forest inventory bodies will decrease, whereas the power of the other stakeholders, such as wood industry, NGOs and private forest owners will increase. The power of different stakeholder groups after 10 years is important not only for describing the system but also for describing the possible harvesting level in the nearest future. According to the respondents, wood industry will almost double its power and will be in the third place, close to the inventory bodies. However, even, though, the power of NGOs will increase as well, it will be only in the sixth place after the Department of Forests, inventory bodies, wood industry, scientists and GDSF. Oddly enough, in the future the respondents would like to see the Department of Forests, at the Ministry of Environment, forest inventory bodies and scientists as more powerful, see Figure 70 and Figure 71. All other groups, such as wood industry, NGOs, private forest owners, GDSF, according to the respondents, should be less powerful. It is probable that the power of NGOs and other organizations of forest protection will not counterbalance power of forest and its product users. It is clear that the harvesting level will increase because of finished forest restitution.

However, the question, on which harvesting/growth ratio for Lithuanian forests will be called rational after 2008, remains open. Will it be 60%, 80%, 90% or more? In general, three strategies could be applied. First, would be to harvest all mature forests in several years and later to harvest 100% of

increment. In this case, the rational harvesting level after 2008 would probably be 120%. This strategy would be in favour of private forest owners. The second strategy would be to harvest around 100% of annual increment and in this way please wood industry. Third strategy would be to harvest a little more than 80% and be in favour of state forests, or to harvest 40 - 60% and satisfy the requirements of NGOs. These suggestions were heard during the interviews with different stakeholders. However, considering the general opinion, the harvesting level in all Lithuanian forests is too low or optimal. According to the expectations of all stakeholders, see Figure 80, it should change from 60 – 80% nowadays to 80 – 100% after 10 or 20 years. As follows, the general opinion of stakeholders is that the harvesting level should increase. Thus, understanding of what is rational will change forest usage to a more intensive side. However, the calculations of the maximal yield cuttings show that, if continuous volume supply strategy is selected, with current resources no more than 8 million m^3 should be harvested yearly, applying the same forest protection strategies, see chapter 5.1.1.6.4. Otherwise, wood supplies in the future will decrease, if additional measures are not taken into account.

It is very important that the future harvesting level will depend on certain political, biological and economic factors. There is an opinion about economic factors that imports from the East will decrease, see Table 20, and all branches of wood industry will be developing. In addition, market demand will increase and the usage of wood as resource of renewable energy will probably increase as well. The finished forest restitution, increase in forest productivity, forest area and the volume of mature trees may be considered as compensation for the increased demand. However, the EU environmental policy and public opinion will play an important role. NATURA 2000 has already been implemented and a lot of key habitats were taken out from usage. Moreover, all state and a few private forests were certified. Regardless of the factors, mentioned above, the general impression is that in the nearest future, Lithuanian forests will need to satisfy the increased human demands for wood.

7. THE CONCLUSION

At the beginning of the study several hypotheses were raised and the conclusion will be based on them. The results of the ecological part proved the hypothesis that during the period 1988 – 2006 the change in forest yield (ownership categories, gross annual increment, total area of forests, total volume, volume and area of mature woods, species composition and forest area distribution in age classes) and management parameters (forest management groups and cutting ages) indicated a higher harvesting level at the end of the period, to compare with the beginning of the period. However, the species composition did not become better. The major changes included the loss of pine by even 2 % and the increase of grey alder by 1%. The changes in forest ownership and, especially unmanaged forests, left for restitution, significantly decreased the possible harvesting level. Forest deceases, drought and beetle outbreak increased the harvesting possibilities in 1992 – 1996, but it was done at the expense of losses in the future harvesting.

In the period 1988 – 2006, the political factors played a greater role than the technical and biological ones. However, this hypothesis was proved not by direct results, but rather by looking at the whole study.

The increased market demand was proved by the results of the economical part and the opinions of the interviewed experts. According to the respondents, the traditions of forest management were favourable to a lower harvesting level. In addition, orientation to economical profit in private forests appeared to be the truth. However, according to the respondents, in state forests it was not so significant. Despite this fact, market demand and the dependence of state and private forests on the income from forests created favourable conditions to increase the harvesting level. To summarize, forest management traditions, society opinion and inflexible procedure of calculation of cutting norm do not allow increasing harvesting level in Lithuania.

The decreased environmental concern at the end of the period 1988 – 2006 was not proved. On the contrary, the results of public opinion showed the increased environmental concern.

The results on the analysis of power do not confirm the hypothesis that in the period 1986 – 2006 wood industry and especially its associations, was the main driving force of the increase of the harvesting level. However, the importance of wood industry to the national economy most likely will lead to the increase of the harvesting level.

In the future, the dominant part of the most important stakeholders in Lithuanian forestry would like the harvesting level to increase. This hypothesis is proved by the questionnaire.

II. PART: COMPARATIVE ANALYSIS. TENDENCIES OF FUTURE HARVESTING LEVEL IN LATVIA, LITHUANIA AND POLAND

8. INTRODUCTION

8.1. FOREST SECTOR IN LATVIA, LITHUANIA AND POLAND, SHORT ANALYSIS

Policy principles or milestones in each country could be described by showing, which Scandinavian, intensive utilization, short rotations, even-aged management, low standing volumes and positive economic result, or German, rather passive utilization, long rotation ages, continuous cover forestry, high standing volumes and negative economic result, school principles are adopted in each country. Poland is situated close to Germany. This could be the reason, why German forest management traditions are very strong in Poland. Yet, Latvia is much closer to Scandinavia than to Germany, in addition, was historically tightened to Sweden. Lithuania's forest management traditions are located somewhere in between German and Scandinavian traditions.

Forestry always have played very important role in the economy and development of all three countries. At recent years, the wood industry sector is one of the most rapidly developing parts of industry in Poland, Latvia and Lithuania. What is more, wood industry sector is among the most export-oriented branch of the economy (Lasy i leśnictwo… 2006). The contribution of forestry and wood-industry sector to the gross domestic product in Poland, Latvia and Lithuania was accordingly 2.3%, 12% and 4.2% (Lasy i leśnictwo… 2006; Poland statement… 2006).

Forest area per capita in Latvia is 1.25 ha, in Lithuania 0.6 ha and in Poland 0.24 ha (Lasy i leśnictwo… 2006). Forest cover is the highest in Latvia (45%), followed by Lithuania (31.7%) and Poland (28.7%). Forest ownership structures are: in Poland 81.4 % state forests and 17.7 % private forests, in Latvia 50.8 % state owned forests and 45.7 % private forests, in Lithuania 49.8% State owned forests, 32.7 % private owned forests and 17.5% are left for restitution of property rights (Annual report… 2006; LMT 2006). The share of commercial forests in each country is in Poland 62 %, in Lithuania 70.8 % and in Latvia 87.4 % (Lasy i leśnictwo… 2006).

8.2. INSTITUTIONAL SET UP FOR THE APPROVAL OF THE HARVESTING LEVEL IN LATVIA, LITHUANIA AND POLAND

In this part, a comparative analysis of the power of different stakeholders in Latvia, Lithuania and Poland as well as their expected future harvesting levels will be analysed. As it was pointed out at the beginning of the thesis, the influences of associations are separated into two groups: formal influence potential and informal influence potential (Krott 2005). It is quite difficult to analyse informal ones. However, formal influence potential is anchored in the national law and is obtainable for the analysis.

In Latvia, the State Forest Service (further LVSFS) is responsible for preparing the special regulations for harvesting level, by which the Cabinet of Ministers confirms Cutting volume estimation (further CVE) for the period of 5 years. The requirements are developed according to the estimations of the LVSFS, which are done by the involved group of experts that consists of scientists, representatives of the Ministry of Environment, representatives of NGOs, representatives from the Ministry of Agriculture and directorate of state forests in Latvia "Latvijas valsts meži" (further JSC "LVM). The activities of private forest management are based on forest management plans.

The process of the approval of the cutting norm for Lithuanian forests is set in the order of the Minister of Environment (LRAM 2005b). More detailed description could be found in the chapter 5.1.1.1.1.

The Technical Economical Commission (further PLTEC) is a special assembly of people, summoned by the Regional Director of State Forests in Poland for discussion of cutting norms. PLTEC consists of the representatives of Regional Directorate of State Forests (further PLRDSF), Forest Districts (further PLFD), where inventory works are conducted, and inventory bodies, local authorities, representatives of national parks, social or environmental non-governmental organizations (Zarządzenie nr 65… 1999). Before the beginning the inventory work, PLTEC I is summoned. On the basis of information, presented by a forest manager of forest districts and the head of inventory unit, certain decisions and directions concerning the conducting of inventory works are made. PLTEC I, among the others, decide about dividing stands to particular forest function groups and particular regulation system group. Inventory methods, rotation ages and forms of forest utilization (e.g. cutting systems) are approved. After conducting the works in the field and after the preliminary breakdown of inventory results, II PLTEC is summoned. During II TEC, firstly, analyses of forest management in the previous period are made. The next step is judgment and acceptance of performed works as well as planned tasks. Finally, the prescribed yield of final felling as well as the prescribed yield of intermediate cuttings is approved. All the agreements of I and II PLTEC are put into protocol, which is sent to the local authorities and local NGO's. The project of Forest Management Plan is open to public review for 14 days. The regional director must inform about it the local press. Everyone, who is interested, can make his/her critical comments about the content of FMP. Regional director is obliged to consider and answer every comment (Zarządzenie nr 65… 1999). After its approval by the Ministry of Environment, the project of a FMP becomes the legal document (Instrukcja… 2003). Yet, State Forests National Forest Holding is the key player as regards the harvesting level in the country.

Moreover, it is good to compare the Institutional set up for the approval of the harvesting level between countries. The institutional set up for the approval of a harvesting level in Latvia provides almost all stakeholders with possibilities to participate in the process of the approval of the harvesting level. However, representatives of wood industry are excluded from this process. The institutional set up in

Lithuania, since 2005, (LVAM 2005b), was changed to more corporative (Krott 2005) side and the possibility to participate for all interested groups of stakeholders appeared. As Figure 5 shows, firstly, public announcement should inform that preparation of FMP is started. Secondly, interested parts can participate in FMP preparation stage, then Inventory Technical Council is summoned. Finally, public evaluation of the project in the regional level should be done. In Poland there are two PLTEC meetings, where stakeholders from social and environmental organizations can participate. In addition, everyone can make critical comments that should be taken into account even when more than 14 days pass after the approval of a harvesting level. Yet, it is difficult to say how it works in practice and how deeply the comments are analysed, but still, the institutional set up creates such possibilities. For comparison, it is very important to analyze, which organizations organize the meetings. In Latvia it is done by SFS. In Lithuania, since 2005, there is no centralized body, for preparation of FMS is responsible Ministry of Environment, and for FMP are responsible state forest managers. In Poland it is done by PLRDSF.

To summarize, the main document of forest management for private forest owners is forest management plan. Each forest owner has to keep it with out any freedom of choice.

8.3. THE AIMS OF THE COMPARATIVE ANALYSIS

The aim of this comparative analysis is to analyze following issues in Latvia, Lithuania and Poland:

1. To define ecological, social and economic factors that will form future interests of different stakeholder groups and influence the harvesting level for the following 10 years.

2. To define the future harvesting level that is expected by different stakeholder groups.

3. To define the present power of stakeholder groups and after 10 years.

4. To make a conclusion about the possible harvesting level in the future.

9. THE HYPOTHESES

The following hypotheses were raised:

1. According to the respondents from different countries, after 10 years, wood industry will be the most powerful stakeholder.

2. Most of stakeholders in each country expect the harvesting level to increase in the future.

3. Analyses of forest recourses show that there is a tendency for the harvesting level in Latvia, Lithuania and Poland to increase.

4. According to the respondents, interplay of ecological, social and political factors during coming years will lead to the increase of the harvesting level in Latvia, Lithuania and Poland.

10. MATERIALS AND METHODS

For making a conclusion on possible future harvesting levels in the three countries, the scheme, presented in the Figure 85 below, was created. According to the scheme, the decisive factors for a future harvesting level are: 1. Ecological, social and economic factors that create interests of various groups of stakeholders, 2. Desired harvesting level in the future of different stakeholders, 3. Power of different groups of stakeholders in the future, 4. Relations between different groups of stakeholders.
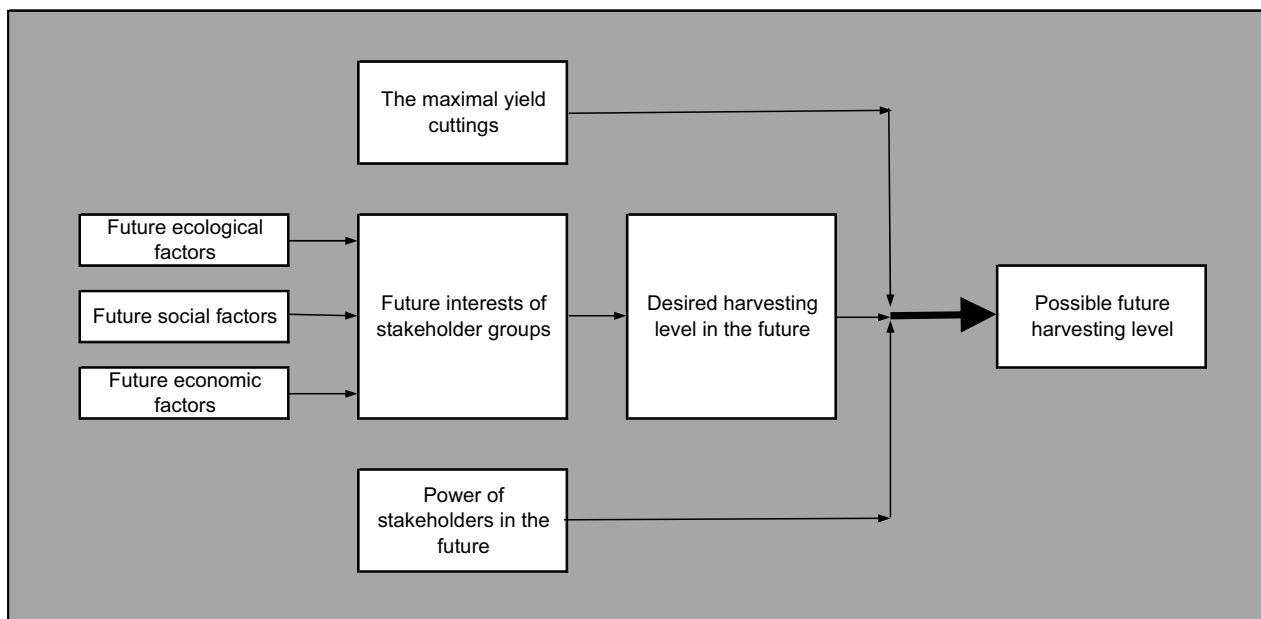
Figure 85. *A decisive scheme for a future harvesting level.*

For a comparative analysis, the data was taken from the interviews, performed in Latvia, Lithuania and Poland. Although, qualitative research methods were employed when completing this part of the study, some quantitative questions were involved as well, for description see Section 4.3. At large, the same methodology was used in all three countries. Thus, seven groups of stakeholders were chosen: **scientists, inventory bodies, NGOs, HLFDM**, **wood industry, private forest owners and managers of state forest.**

There were sampling differences between in the three countries that need to be mentioned here. In Poland and Latvia, 21 respondents were interviewed, interviewing 3 persons per each group of stakeholders, whereas in Lithuania there were 35 participants and 5 people per each group were interviewed. In order to have comparable results, Lithuanian results were multiplied by 21/35=0.6. It reduced the obtained values to the same level as Latvian and Polish results. In total, 77 respondents were interviewed. An interview with each stakeholder generally lasted from 60 to 90 minutes. The prepared

questionnaires had some minor differences because of peculiarities of each country. Still, for the comparison of results, the same questions were taken.

As it was described in the literature analysis, not only ecological, social or economic factors are important when approving a harvesting level, but also the power and interests of different groups of stakeholders. Therefore, some selected questions are geared towards revealing power and other towards the interests in relation to the level of forest utilisation. Future harvesting factors explain what is behind the selection of stakeholders. However, some differences appeared within formulations of the questions. For example, in order to find out about future power of stakeholders, the respondents in Lithuania were asked to list five most powerful stakeholders after 10 years. The respondents in Poland were asked to clarify, which groups of stakeholders will increase or decrease their power. Yet, the participants in Latvia had to indicate, which factors will be decisive for the future harvesting level. This caused difficulties for comparing the figures.

The summed value for the analysis of power was obtained in the same manner in all three countries. First, the respondents were asked to enumerate 5 most powerful stakeholders by giving 1 point to the most powerful, 2 points to the second most powerful, etc. All unmentioned stakeholders were given 6 points. Afterwards, the points were summed up. Summing in this way meant that the most powerful stakeholder gets the smallest number of points. To make it clearer, the power of stakeholders was turned upside down in the following way. In Lithuania, the maximum score that could have been obtained was 35*6=210, while in Latvia and Poland it was 21*6=126. Thus, from 210 in Lithuanian case and from 126 in Latvian and Polish cases the summed value of the places was taken away. In order to get the results in the same scale, the Lithuanian results were multiplied by 0.6.

11. THE RESULTS

11.1. CURRENT POWER OF STAKEHOLDERS

Today the power of different groups of stakeholder in all countries seems to be rather similar. As Figure 86 shows, the Ministry of Agriculture is most powerful stakeholder in Latvia and Ministry of Environment in Lithuania. However, in Poland, the most powerful stakeholder is the State Forest Service (further PLSFS), whereas the Ministry of Environment is in the second place. This graph proves that process of approval of cutting norm in these countries is pluralistic, then state holds the highest possible power on decision making.
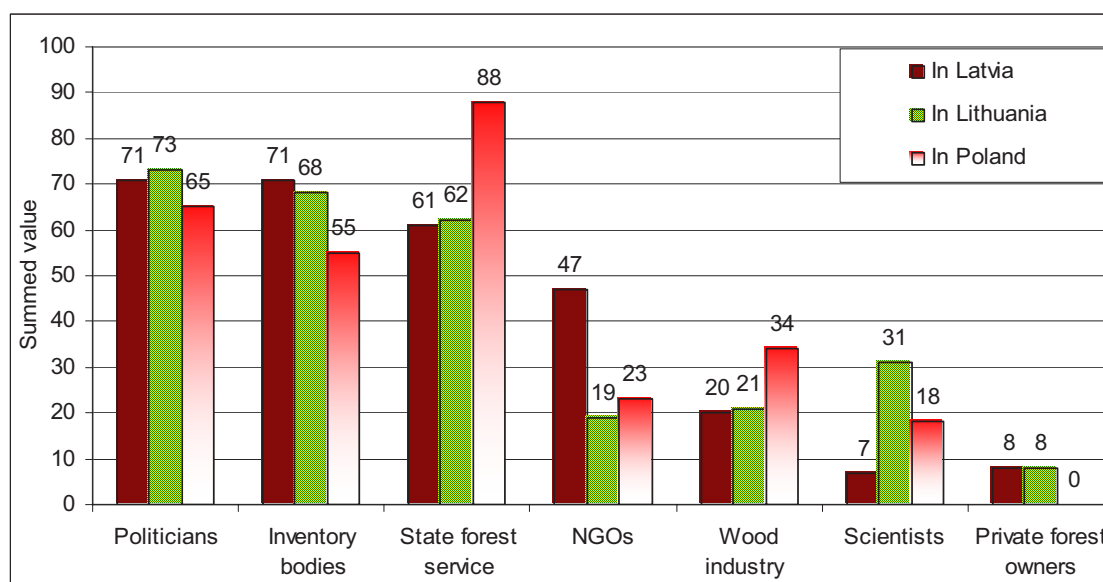
Figure 86 *The power of stakeholders today.*

Forest inventory bodies were in the second place in Lithuania and Latvia, but in Poland they were in the third place. Yet, forest inventory bodies had significant influence in all three countries. According to the respondents, their influences were embodied by gathering forest growth figures and by applying calculation methods, connected with the forest usage, and calculating annual cutting norms. To summarize, these organizations were the first body, which influenced harvesting level. Yet, being under direct subordination of politicians in Latvia and Poland, those organizations could be seen as primary tool of politicians for having impact on harvesting level. In Latvia forest inventory units are fully independent from politicians. Managers of state forests in Latvia and Lithuania appeared in the third place. Power of state forests in Poland is significantly higher than power of state forests in Latvia and Lithuania. It could be explained by absence of competitive private forestry in Poland.

In contrast, power of other groups of stakeholders varied more. To illustrate, NGOs were in the fourth place in Latvia, sixth in Lithuania and fifth in Poland. Wood industry was in the fourth place in Poland, but in the fifth in Latvia and Lithuania. Scientists were in the fourth place in Lithuania, they occupied the seventh place in Latvia and the sixth in Poland. Private forest owners were least powerful in Lithuania and Poland, but they considered to be a little stronger than scientists in Latvia. Wood industry is very important for Latvian economy, yet, the power of this stakeholder in Latvia is weak like in Poland or Lithuania. The importance of science in all countries is weak as well.

11.2. POWER OF DIFFERENT GROUPS OF STAKEHOLDERS AFTER 10 YEARS

Future harvesting levels in all three countries will depend on changes in stakeholders' power. According to the Lithuanian respondents, power of the Ministry of Environment and its Department of Forests as well as power of forest inventory bodies will decrease. At the same time, power of scientists, NGOs and especially of wood industry will increase. In Poland, according to the expectations of the Polish respondents, after 10 years power of wood industry as well as power of NGOs and managers of state forests will increase. The increase of the importance of wood industry is expected also by Latvian respondents. In a similar manner, importance of protective organizations will increase as well. To summarize, respondents mainly expect wood industry increase their power in all countries, because of development of wood industry, their financial recourses and lobbying of politicians. Yet, as balancing power will be NGOs, because of increased environmental concern in the society.

11.3. RELATIONS BETWEEN DIFFERENT STAKEHOLDERS

The relations between different groups of stakeholders can be defined as follows, see Figure 87. As a matter of fact, all countries have quite similar tendencies. According to the respondents, the relations between managers of state forests and wood industry are mainly cooperational or neutral. However, the relations between managers of state forests and NGOs seem to be cooperational rather than strained or neutral in all countries. The relations of wood industry with private forest owners, according to the respondents, are better than with managers of state forests. In Latvia and Lithuania, they are mainly considered to be cooperational and in Poland they are defined as neutral. In all three countries the relations between private forest owners and NGOs are strained or neutral. Finally, the relations between private forest owners and managers of state forests, according to the respondents, vary from conflict and control to cooperation and indifference. Lack of cooperation between state forests and wood industry in Poland, could be explained that Polish state sector is monopolist concerning wood resources. Better relations of private forest owners and wood industry in all countries, proves that private forest owners has better economical skills in wood trading.
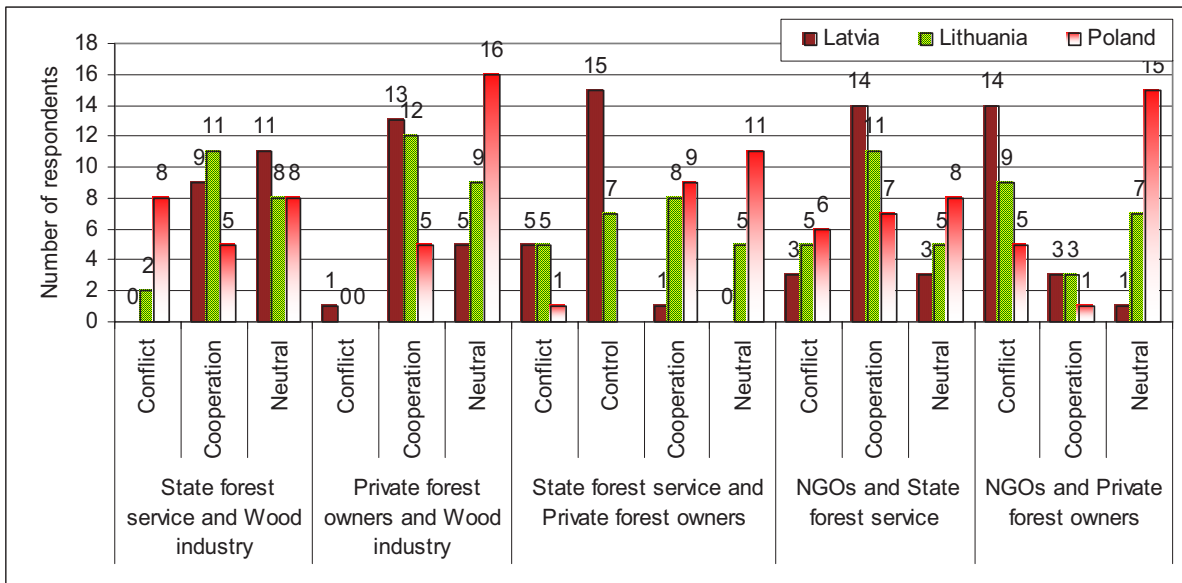
Figure 87. *The opinions on the relations between different groups of stakeholders.*

Relations between state and private forest owners in Latvia and Lithuania, shows competitive situation of these players in the market. Because of very small proportion of private forests in Poland, relations between state and private forests are mainly neutral. Further, relations between NGOs and state sector are better than between NGOs and private sector in all countries. It is because of unfavourable to environmental protection traditions of private forests. Looking to the results it is hard to talk about serious crosssectoral cooperation between different stakeholders in all countries. Likely, that private forest owners and wood industry can do lobbying together in Latvia. In all countries sate forests are not interested in closer cooperation with wood industry. It is because of strict methodology of calculating the cutting norm for state forests and serious market demand, then buyer is looking for seller. Then there is no market demand, seller is looking for buyer.

11.4. PRESENT FOREST USAGE

Figure 88 presents the opinions about forest usage in Latvia, Lithuania and Poland. The respondents in Latvia thought that forest usage in all Latvian forests was optimal, whereas when defining the private forest usage, their opinions divided quite equally between optimal and too high usage and in state forests mainly optimal usage was indicated. The opinion of Lithuanian respondents about forest usage in the country was as follows. It was indicated that in all Lithuanian forests the usage is too low or optimal. What concerns private forests, their usage was considered either too low or too high. Finally, usage of state forests, according to the respondents, was too low or optimal. To compare, the opinion of Polish respondents showed that forest usage in all forests was too low or optimal, in private forests it ranged from optimal to too high and in state forests it was considered either too low or optimal. The opinions about forest usage in the three countries reveal some general tendencies.
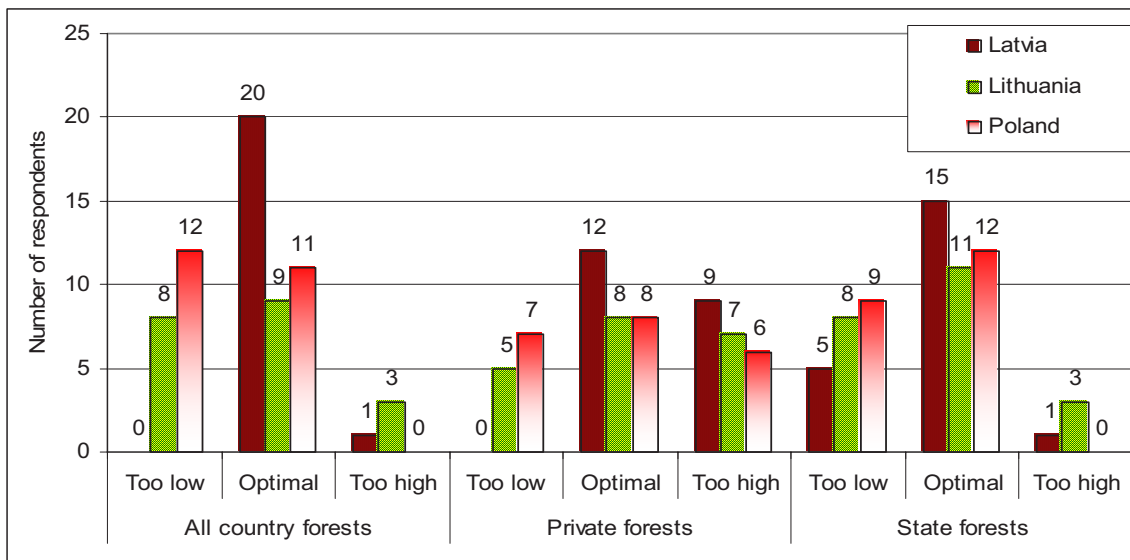
Figure 88. *The opinions about present forest usage in Latvia, Lithuania and Poland.*

Forest usage in private forests, according to the respondents, is optimal or too high, whereas in state forests it is too low or optimal. In Lithuania and Poland it is connected with state forest service's public relations, when state forest service is presented to be very orientated to the environmental values. To conclude, it seems that at present forest usage in Latvia is optimal, Lithuania and in Poland forest usage is too low or optimal.

11.5. FUTURE FOREST USAGE

The respondents' opinions about future forest usage in Latvia, Lithuania and Poland were quite similar. According to them, forest usage in 2007 should be from around 40% to 80%, see Figure 89. The respondents from Latvia were sharper and expressed the opinion that forest usage in Latvia should be 61 – 80%. The main reason for the choice that harvesting level should increase in the future in Poland is the present forest area distribution in the age classes. Soon the most frequent age classes will gain the maturity. In addition, stands, which emerged because of large-scale post war reforestation, will be utilized in the nearest future. It is important to stress that relation between harvesting and the growth must not be treated as the main indicator of forest utilization intensity. Economical development of the country will cause higher demand for wood, while the wealthier societies consume more wood products per capita. Accumulation of mature and over-mature stands will lead to higher harvesting level. In Lithuania soon forest restitution will be finished and because of it 17% presently not used forests will produce additional 1 million m^3. Furthermore, high amount of premature forests, in near future will be mature. In Latvia opinion, concerning next period cutting volume estimations, were more pessimistic, thought that the calculated cutting volume in state forests could be lower than for the period 2006-2010, because of uneven forest area distribution in the age classes and sanitary condition in the state forests.
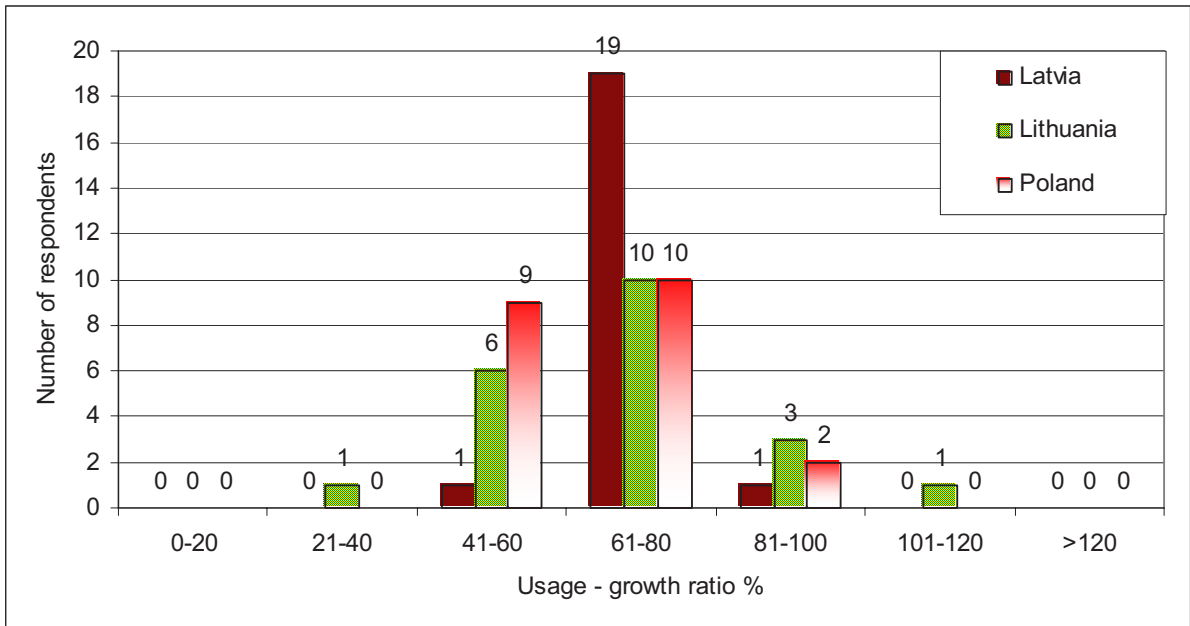
Figure 89. *Opinions about the forest usage in 2007 in Latvia, Lithuania and Poland.*

However, in 2017, the respondents in all countries would like forest usage intensity to be 61 – 80%, see Figure 90. Some respondents in Lithuania and Poland wanted forest usage intensity to reach 81 – 100%.
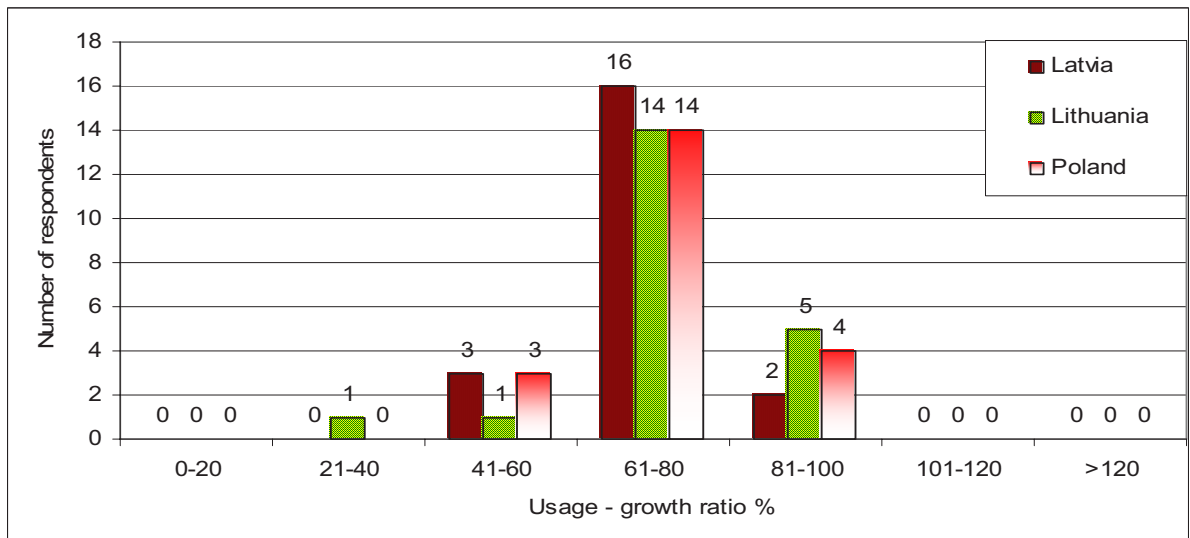
Figure 90. *Opinions about the forest usage in 2017 in Latvia, Lithuania and Poland.*

What concerns the forest usage in 2027, most of the respondents argued that the most favourable forest usage intensity would be 61 – 80%. Still, quite a big part of the respondents thought that forest usage might be 81 – 100%, see Figure 91.
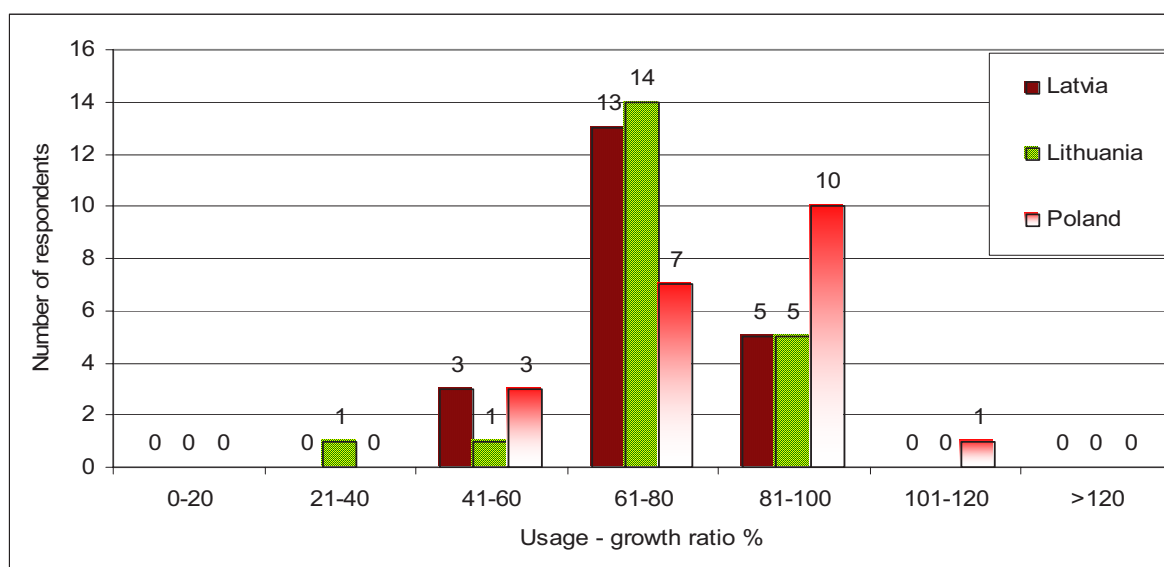
Figure 91. *Opinions about the forest usage in 2027 in Latvia, Lithuania and Poland.*

Summing up the results, it could be said that in general, the stakeholders expect that in the future the harvesting level will increase in all countries. Comparing figure 89, Figure 90, Figure 91, could be seen, that Polish respondents would like to see increased forest usage the most. For year 2007, 9 respondents were for 41 – 60% and 10 for 61 -80% intensity, yet after 20 years, 7 respondents would like to see 61 – 80% and 10 respondents would like to see 81 – 100% forest usage intensity.

11.6. FACTORS THAT WILL INFLUENCE FUTURE FOREST USAGE

The most decisive factors in Latvia seem to be changes in private sector, development of wood industry and availability of wood resources. However, some conclusion can be drawn here. Table 23 shows, which factors will be decisive in Latvia in near future.

Table 23. *Factors that will influence future forest usage in Latvia for next 10 years.*

Group of stakeholders	Comments
Scientists	Lobbying, legislation development.
	Political games, legislation.
Inventory bodies	Calculations of a cutting norm, legislation.
	Calculations.
NGO`s	Political influence, strong own opinion.
	Legislation, discussions.
HLFDM	Discussions, not scientifically based opinion.
	Lobbying in the government, through legislation development.
	Legislation development.
Wood industry	Knowledge and experience.
	Lobbying.
	Not scientifically approved norms.
	Debates, strong influence.
Private forest owners	Cooperation.
	Political opinion without compromise.
Managers of state forests	Legislation development, lobbying.

A more detailed account on the economic, ecological and political factors that will influence forest usage in Lithuania in the future may be found in the Table 20. Although a number of different factors was mentioned, the most important ones for next 10 years would probably be these: sustainable forest management, EU environmental policy, relations with other countries and possibility to import wood, finished forest restitution, lobbying of wood industry, development of usage of renewable resources, changes of private owners and their rights to property and finally, changes in the administration system of state forests. At this point, some speculation that the company "Lithuanian Forests" will be created, economical functions or 25% of state forests will be privatized and the leading form of ownership in Lithuania will become private ownership, may be done. In addition to this, ecological requirements should become softer and more rational, and decrease in number. Admittedly, policy of forest protection, NATURA 2000, or forest certification and stakeholders, who propagate environmental values, will play an important role as well. The main biological factors will probably include increased forest productivity, a better balanced age class structure, an increased amount of mature woods, an increased forest area and volume and optimisation of tree species. In the same way, natural disasters will also play an important role. Among a number of economic factors, these seem to be most influential on the future harvesting level: increased market demand for all types of wood, increased multipurpose use of wood, market for low dimension wood, probability that pulp mill will be built, development of wood industry, increased demand for fuel wood, decreased possibilities of wood import and market economy in forest sector.

For Poland, the Forestry Law and increasing significance of non-productive forest functions will be the most influential political factors for the utilization of a harvesting level in the coming 10 - 20 years. However, the increase of the role of wood industry, mostly by lobbing through politicians, is also expected there. In addition, harvesting will increase as a result of the need for larger-scale production of biomass energy and general needs of the national economy. The Table 24 below presents, which political, economic, technical and biological factors will influence forest usage in Poland in the near future.

Table 24. *Political, economic, technical and biological factors which will influence the forest usage in Poland for the next 10 – 20 years.*

Stakeholder group	Political factors	Economic factors	Technical biological factors
Scientists	Forestry Law.	No.	State and health of forests.
	As today.	As today.	The factor of forest growth will be decisive.
	Forest policy of the state.		Silvicultural needs, the growth rate.
Inventory bodies	Regulations within IUL.	None!	Structure of stands.
	Social needs.	Market situation.	As before.
	National interest.	Financial stability of the country.	None.
NGOs	Political decisions, explained by the needs of national economy.	Lobbying of wood industry.	Availability of water.
	Wood industry.	Regulations of European Union.	Private owners.

	Ecological aspects.	Big demand for raw material, building industry.	The rule of forest durability.
HLFDM	If there are no changes on the governmental levels, then forestry will stay within the same framework as it is today.		
	The increase of role of non productive forest functions.	None!	None!
	No influence.	No influence.	Only those will be decisive.
Wood industry	United wood industry.	Reorientation to profit maximization.	
	Too many factors that compete with each other!!!		
	No influence.	Need of flexibility on the market.	Ageing of the stands.
Private forest owners		Only those! The more expensive petrol, the bigger demand for wood!	
	SF monopoly continuation.	Costs increase will cause bigger harvesting.	Rebuilding of stands.
Managers of state forests	The rule of ecologization and sustainable development.	None!	Rotation ages, structure of age classes.
	No changes.		
	Forest policy of the state.	Lack of labour for forest services.	Rebuilding of stands.
	Awareness that forest management is the part of the national economy.		Bigger possibilities because of better state of forests.

Some interviewees claim that economic factors will not play any important role in the estimation of a cutting norm in the coming 2 decades. Still, there is common opinion that rising petrol prices, labour costs and larger range of non-productive forest functions will continuously generate higher expenditures of state forests. Keeping to the rule of self-sufficiency will require more harvesting in order to cover increasing costs. On the other hand, lack of forest workers can paralyze harvesting and silvicultural works (what can already be seen in some regions of the country). Among the main biological factors that determine a future harvesting level the enlargement of total growing stock and distribution in age classes are listed. In general, better condition of the timber resources and ageing of the stands will lead to the increase of the harvesting level. Yet, the need for conversion of the stands and sanitary cuttings will influence the decision-making processes in the coming 2 decades.

12. THE DISCUSSION

Firstly, it is necessary to focus on the changes of different stakeholders' power in each country. Polish forestry sector is the stage, where different interests of various stakeholders meet each other. State Forests National Forest Holding (further SFNFH) is the key player as regards the harvesting level in the country. New juridical regulations, which came into force over the last two decades, rather strengthened its position. Ministry of Environment and inventory units play important role, mostly by preparation and approval of forest management plans, however, practical performance of the goals, included in FMP, depends on state forests administration. Additionally, the rule of self-sufficiency and relative independence from authorities (at least at local level) contribute to the fact that SFNFH is the most important actor in Polish forestry. Nevertheless, set of legal regulations limits its activities. SFNFH as one of the main performer of forest policy goals and main subject of Forestry Act regulations must follow prescribed directions and fulfil entrusted tasks.

Lack of common strategy between foresters and wood industry is one of the biggest problems of Polish forestry sector nowadays. It is the factor, which does not enable effective planning of development of both mutually depended branches. There is still the risk that situation, when not needed wood will be decaying in the forests in the years of bad condition of wood industry, will repeat. On the other hand, there is also the jeopardy that lack of raw material or too high prices will be the reason of bankruptcy for big number of wood-processing manufactures. Environmental protection aspects play one of the leading roles as regards forest utilization in Poland. Nevertheless, strict rules are already accepted by most of stakeholders and its influence on decreasing of harvesting level is discussed. Non-governmental organizations can be very loud in the media, mostly when it concerns the conflicts at local scale. During decisive process, in Technical-Economical Commission, theirs importance is diminished. In addition, it should be noted that in Poland there is no stakeholder board for discussion of forest utilization, but such board is functional in Latvia.

LVSFS is responsible for the preparing of special regulation, by which Cabinet of Ministers confirm CVE for the 5 years period. Requirements are developed according to the LVSFS estimations, which are done by involved group of experts, which consist of scientists, representatives from Ministry of Environment, NGOs, representatives from Ministry of Agriculture and JSC "Latvia's state forests". LVSFS, which is not confirming, but only estimating by involving group of experts, confirming Cabinet of Ministers by Prime minister and Minister of agriculture, have colossal influence on defining level of forest utilization.

In Lithuania, decisions for FMS and FMP for state forests, since 2005, are moved to regional level, even it still should be approved by minister of environment. Further, all interested parts can

participate in the FMS or FMP preparation process when Inventory Technical council is summoned. In addition, strategic environmental assessment and public evaluation of the projects are set as obligatory steps for approval of FMS or FMP in state forests. For private forest owners public evaluation is not necessary, but still they have to keep principles of FMS, in this way FMP has relations with public opinion. However, the system is new, and how it works in practise, it is difficult to say.

The answers show that decisive power is concentrated in the hands of managers of state forests in Poland, while in Latvia and Lithuania it is spread among the Ministry of Environment, Forest Inventory and managers of state forests. However, it appears that those three stakeholders are most powerful in all three countries, whereas other stakeholders have significantly less power. To summarize, in all countries stakeholders do not have many chances to influence decisions, as division of power shows. On the other hand, having no legal possibilities, stakeholders can do lobbying by hidden power (Krott 2005).

The opinion of the respondents about future power, see chapter 11.2, of different stakeholders shows that power, especially of wood industry, because of development of wood industry, their financial recourses and lobbying of politicians, and NGOs will increase in the coming 10 years, because of increased environmental concern in the society.

It is necessary to keep in mind that power of different stakeholders in the future can be different as the results show and will depend on future economic, social or political factors. Thus, for more precise predictions on the future power of stakeholders, a deeper analysis is necessary. In spite of the above-mentioned possible errors, it appears that decision-making process in all countries will become more corporative and power will be shared between different groups of stakeholders.

Ecological, social and economic factors are discussed in the analysis of the results, see chapter 11.6. In general, the needs of larger-scale production of biomass energy, logs or pulp wood for wood industry and the importance of wood industry to national economy are expected to be the main driving factors that create interests of wood users for intensive forest usage. However, society's awareness of ecological and social functions seems to become more important in the future. Nevertheless, the increased forest usage will make NGOs more active and probably more powerful.

The desirable harvesting level that was indicated by different groups of stakeholders, in the three countries also reflects the future situation and the possible impact of economic factors. According to the respondents, the harvesting/increment ratio should change from 41 – 80% in 2007 to 61 – 100% in 2027, see Figure 89, Figure 90 and Figure 91.

Harvesting level in Poland will continuously increase in the coming decades. Bigger biological possibilities of forest utilization create the favorable conditions for further development of Polish forestry. It can enable successful dealing with productive and non-productive forest functions. However, there is the risk that productive abilities of Polish forests and accepted harvesting level regulations will not follow the rapid development of wood industry. It can increase the political pressure on the PLSFS for harvesting

bigger amounts of timber. Nevertheless, doing so could be possible only when forest legislation would change considerably, because within the current juridical frame any "revolution", as regards the forest utilization policy, is impossible.

From 1990 to 2005, the harvesting level in all countries increased. To illustrate, in Latvia it changed from 5 to 12 million m^3 (SFS 2006), in Lithuania it rose from 2.6 to 6.1 million m^3, see Figure 7, and in Poland it increased from 18 to 30 million m^3 (SFP 2005). None of the respondents indicated that demand for wood would decrease in the future.

However, even this figure could be questioned by some stakeholders. It depends on selected strategies on forest usage. The possible strategies that could be adopted are as follows: 1. Maximal forest usage, i.e. to cut all mature woods and then cut 100% of increment, 2. To cut 80 - 100% of increment constantly and propose maximal continuous forest usage, 3. To cut 60 -80% and propose environmental and social values of forests.

At the beginning of this work there were no intentions to make some reliable predictions about the harvesting level in the near future, because the main aim of the thesis was to point out policy drivers in each country. In order to make reliable predictions, much deeper analysis should be done. Nevertheless, this work reflects possible future tendencies for the harvesting level in all three countries. The increased power of wood industry, future economic factors and especially demand for wood fuel and other raw material will increase the desired harvesting level. In addition, the remaining forest reserves show that there is a tendency for the harvesting level to increase in the future. However, the gathered results do not reveal the extent of this increase.

13. CONCLUSION

In all countries the pluralistic, then states holds highest power in decision making, principle is adopted, when harvesting level is decided.

The most powerful stakeholder in Poland, deciding harvesting level in the country, is PLSFS. Traditions of forest management, society's awareness of environmental protection, strong public relations highlighting that environmental considerations are taken into account of state forests, forest certification and, finally, bad examples of forest privatization in neighbour countries, then private forest owners are interested in present maximal cuttings and forgets to regenerate forests, ensures two things for PLSFS. First, that state forests will not be privatized and second, having 81.4% of total forests, PLSFS has and will have monopoly in wood resources.

Environmental considerations, society's opinion and settled self sufficiency principle by politicians ensure that from PLSFS will not be required to produce serious incomes. Having monopoly and because above mentioned reasons the main driving force for increase in harvesting level in Poland are and will be labour and forest administration costs. In other words, because of increasing expenditures, for seeking zero balance, PLSFS will need to increase harvesting level for covering costs.

The weakness of wood industry and passivity of politicians in highest level in Poland could be explained by low forest resources 0.24 ha per capita and very low share of wood industry and forest sector in GDP in Poland, only 2.3%.

Because of quite low forest usage/growth ratio and environmental considerations, NGOs do not need to be very active. In this way weakness of this stakeholder could be explained. Because of increasing labour costs, usage/growth ratio in Poland will have increasing tendencies and in near future will reach 60%.

Latvia, from other countries differs that there are common understanding that forest sector can produce serious incomes. In opinion of Latvian interviewees, Scandinavian model of forestry is more suitable to theirs economical and organizational conditions. Knowing the importance of forestry sector to their country, using the traditional German solutions would bring too many loses of incomes. Latvia has good reserve of forest resources, 45% of total are is covered by forests, more over, forest share per capita is 1.25ha. Finally, wood industry and forests sector applies for 12% in GDP in Latvia. That proves the importance of this sector to the country.

Being the most powerful stakeholder – politicians, shaped Latvian state forest service in the end of last century for the producing serious incomes to the state budget. It is clear that good profit from the forest sector could be got in two ways: firstly, by forming good forest management administration,

secondly, by possible maximal forest usage. Present forest usage/growth ratio is around 74% in Latvia. Finally, private forest owners are oriented towards seeking maximal profits. State and private forest sectors orientation towards seeking profit, means that usage/growth ratio will be more than 80%.

Lithuania is a country with Scandinavian and German traditions, having average forests resources, 32% of total area is covered by stands and forest share per capita is 0.6 ha. Wood industry and forest sector makes 4.2% in Lithuania's GDP. The most powerful stakeholder in Lithuania is HLFDM, which for state forest service set only self sufficiency principle, instead of seeking good profits. Like for state forests in Poland, for Lithuanian forests is also very important to have zero balance of incomes and expenditures. Present days it is quite difficult to reach it, because of decreased area of state forests till 49.8% and increased labour costs. The main driving factor in private forest sector is orientation towards today's maximal profits, not looking further in to future. This factor and inflexible calculation methodology of forest usage in state forests, makes wood supply in the market to be independent from the offered prices.

Passivity of wood industry in Lithuania could be explained that there are "promised" reserve of wood in the forests, left for restitution, which should be finished soon, and 17 percent of now not used forests will be taken into account. It is clear that "promised" yearly amount o wood is more than 1 million m^3. Increasing labour costs will lead to the reorganization of Lithuanian state forests or increased harvesting level there. Private forest owners, no doubt, will not start saving their forests. Finally, soon forest land reform should be finished. Because of those factors, forest usage level in Lithuania will be around 80%, 20% higher than it now.

Finally, should be kept in mind that according to the respondents from Latvia, Lithuania and Poland, after 10 years wood industry will not be the most powerful stakeholder. However, its power will increase significantly in all the three countries. It will put pressure for more intensive forest usage.

Additionally, future ecological, economic and social factors will be in favour for increase of harvesting level in all countries: the increase of the role of wood industry, mostly by lobbing through politicians, changes in private sector, development of usage of renewable resources, absence of possibility to import wood, increasing labour costs and larger range of non-productive forest functions will continuously generate higher expenditures of state forests. Keeping to the rule of self-sufficiency (in Lithuania and Poland) will require more harvesting in order to cover increasing costs. Ecological requirements should become softer and more rational, and decrease in number. Among the main biological factors that determine a future harvesting level the enlargement of total growing stock and distribution in age classes will be most important.

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Appendix A (Tables 1 - 20)

Table 1. *Forest ownership.*

(Source: VMT 2005).

Ownership	1938		1988		1993		1998		2004		2005	
	Area 1000 ha	%	Area 1000 ha	%	Area 1000 ha	%	Area 1000 ha	%	Area 1000 ha	%	Area 1000 ha	%
Forests of state importance	871	84,1	1292	66,9	1894	98,7	1007	50,9	1030	49,8	1042	49,8
Private forests	165	15,9			20	1	219	11,1	642	31	684	32,7
Forests of agricultural enterprises	-	-	564	29,2	-	-	-	-	-	-	-	-
Other forests, from 1998 forests left for restitution	-	-	75	3,9	75	3,9	752	38	397	19,2	365	17,5
Total	1036	100	1931	100	1920	100	1978	100	2069	100	2091	100

Table 2. *Cuttings in Lithuania in 1986 -2005. 1000 m³.*

(Source: Verbyla 1992; MUM 1993 – 1996; ZMUM 1996 – 1998; MSTD 2000; LRAM 2002d; GMU 2003 – 2006; LRAM 2005a).

Years	Cutting norm for the main cuttings	Main cuttings	Intermediate cuttings	Total cuttings in state forests	Total cuttings in private forests	Total cuttings in the country	Area of state forests	Usage/growth ratio %	Usage/growth ratio %	Usage/growth ratio %
1986		1649	946	2641	-	2641		31	31	31
1988		1709	1047	2821	-	2821		28	34	34
1992	2013,4	1815,5	1348,2	3163,7	-	3163,7		31	51	38
1993	2050,4	1455,3	3053,8	4509,1	0,1	4509,1		44	72	56
1994	1963	1816,7	2177	3993,7	0,2	3993,7	2052,6	39	64	50
1995	2167,6	2121,3	3158,8	5280,1	697,1	5977,2	2092,2	59	96	74
1996	2238,6	2278,9	2477,8	4756,7	774,2	5530,9	1990,2	54	89	69
1997	2100	2118,1	2133,4	4251,5	897,6	5149,1	1859,1	50	83	64
1998	2135	2130	1949,3	4086,6	793,5	4880,1	1763,9	48	78	127
2000	2237,2	2216,4	1715,8	3932,2	1413,7	5345,9	1666,7	52	86	139
2001	2349,1	2295,9	1385,7	3681,6	1790,2	5471,8	1480,9	54	88	142
2002	2448,7	2370,7	1485,3	3856	2400	6256	980,6	61	100	163
2003	2403,5	2374,6	1357	3731,6	2700	6431,6	941	63	103	167
2004	2400	2356,7	1229,3	3586	2700	6286	992,3	62	101	103
2005	2315,2	2239,8	1326,7	3566,5	2500	6066,5	1002,5	59	97	96

Table 3. *Intermediate cuttings in Lithuania in 1986 – 2006. 1000 m³.*

(Source: Verbyla 1992; MUM 1993 – 1996; ZMUM 1996 – 1998; MSTD 2000; LRAM 2002d; GMU 2003 – 2006; LRAM 2005a).

	State forests					Private forests
Years	Total cuttings	Cleanings	I commercial thinnings	II commercial thinnings merchantable volume	Sanitary cuttings merchantable volume	Total intermediate cuttings
1986	946	27		240	679	
1988	1047	24		342	681	
1992	897,3	12,4	228,8	160,3	499,1	
1993	2978,1	12,1	117,9	77	2771,1	
1994	2107	16,1	206,4	132,9	1751,4	
1995	2914,1	20,7	182,4	129,3	2581,7	631,8
1996	2300,9	13,3	130	96	2061,6	564,7
1997	2024,3	20,6	291,5	306,6	1405,6	559,9
1998	1875,8	29,6	348,7	490,3	1007,2	363
1999						388,9
2000	1663,7	27,2	234	376,3	1026,2	546,5
2001	1315,2	19,6	198,4	479,3	617,9	442,1
2002	1426,7	18,5	179,9	319,8	908,5	453
2003	1317,2	15,4	172,6	287,9	841,3	526,1
2004	1183,8	16,2	164	258,3	745,3	530,9
2005	1294,9	12,1	122	163	997,8	

Table 4. *The general characteristics of Lithuanian forests in 1988 – 2005.*

(Source: Brukas, Kenstavcius 1992; LVMI 1994; Rutkauskas 1997; VMT 2005).

Type of characteristics	Years					
	1988	1993	1996	1998	2004	2005
Forest area according to land assessment, 1000 ha	2098	2123		1975	2026	2038
Forest land area according to forest assessment, 1000 ha	1877,6	1920	1938	1978	2069	2091
Forest area covered by stands, 1000 ha	1776,2	1860	1871	1888	1968	1988
Of which plantations, 1000 ha				424	464	463
Total growing stock volume, m m³	297,27	334	347,5	347,6	387,9	393,2
Mean volume per ha, m³	174	180	186	184	197	198
Total volume of mature stands, m m³	26,14	43,6	58,9	59,4	79,6	81,5
Mean volume of mature stands per ha, m³	241	244	251	249	250	250
Gross annual increment, m m³	4,66	11,9	11,8	11,6	12,5	12,8
Annual current increment per ha, m³	3,8	6,3	6,3	6,2	6,4	6,4
Annual increment accumulating in the stand per ha, m³	2,1	3,7	3,7	3,5	3,3	3,3
Forest coverage, %	29	30,1	30,2	30,3	31,7	32
Forest area per capita, ha		0,51	0,51	0,53	0,6	0,61
Growing stock volume per capita, m³		89	89	93	113	115

Table 5. *The mean characteristics of forest stands in 1988.*

(Source: Brukas and Kenstavicius 1992).

Dominant tree species	Area		Age	Site index class	Stocking level	Growing stock, m³/ha		Increment, m³/ha
	1000 ha	%				All stands	Mature	Mean current annual
Pine	647,3	37,5	52	II.3	0,73	182	271	3,6
Spruce	359,8	20,8	54	II.4	0,67	220	264	3,8
Birch	380,0	22,0	41	I.5	0,71	145	229	3,6
Aspen	60,3	3,5	42	Ia.7	0,71	203	256	5,0
Black alder	94,9	5,5	43	I.6	0,69	170	258	4,1
Grey alder	105,5	6,1	23	I.9	0,71	97	155	4,2
Oak	29,2	1,7	78	I.8	0,6	164	241	2,3
Ash	40,5	2,3	44	I.4	0,67	132	250	3
Total	1727,0	100,0	48	II.0	0,7	175	242	3,8

Table 6. *The mean characteristics of forest stands in 1993.*

(Source: LVMI 1994).

Dominant tree species	Area		Age	Site index class	Stocking level	Growing stock, m³/ha		Increment, m³/ha	
	1000 ha	%				All stands	Mature	Mean current annual	Accumulating for final felling
Pine	695,3	37,4	56	II.2	0,73	193	278	6	3,4
Spruce	450,2	24,2	48	II.3	0,67	198	285	7,7	4,2
Birch	363,4	19,5	45	I.4	0,71	159	235	5,6	3,5
Aspen	50,4	2,7	45	Ia.6	0,71	215	261	7,8	5,1
Black alder	104,0	5,6	44	I.6	0,69	176	270	7	4,4
Grey alder	103,8	5,6	27	I.9	0,71	95	167	6	3,6
Oak	32,4	1,7	80	I.7	0,6	175	246	4	2,1
Ash	49,3	2,7	44	I.3	0,67	135	244	5,8	3,3
Total	1860,3	100,0	53	II	0,7	180	244	6,3	3,7

Table 7. *Mean characteristics of forest stands in 2005.*

(Source: VMT 2005).

Dominant tree species	Area		Age	Site index class	Stocking level	Growing stock, m³/ha		Increment, m³/ha	
	1000 ha	%				All stands	Mature	Mean current annual	Accumulating for final felling
Pine	719,3	36,2	64	II.1	0,75	237	300	6,7	3,4
Spruce	432,7	21,8	46	II.3	0,70	188	304	6,2	3,2
Birch	409,9	20,6	49	I.3	0,71	165	230	6,2	3,3
Aspen	62,9	3,2	45	Ia.7	0,71	206	271	7,0	4,0
Black alder	131,8	6,6	47	I.4	0,71	197	289	6,5	3,5
Grey alder	125,5	6,3	33	I.7	0,71	128	148	6,7	3,9
Oak	38,6	1,9	86	I.6	0,63	194	245	4,9	2,3
Ash	48,8	2,5	57	I.1	0,67	170	230	5,7	2,8
Total	1987,7	100,0	53	I.8	0,72	198	250	6,4	3,3

Table 8. *Volume distribution by tree species 1988 - 2005. 1000 m³.*

(Source: Brukas and Kenstavicius 1992; LVMI 1994; VMT 2001; VMT 2005).

Tree species	Total volume				
	1988	1993	1997	2001	2005
Pine	122652,1	134280	142400	155913	170336,3
Spruce	79832	88974	89800	86027	81536,4
Oak	4912,6	5692	6100	6561	7465,9
Ash	5358	6682	7300	8455	8307,5
Birch	55538,8	57775	59400	65221	67616,9
Black alder	16569	18285	19600	22047	25904,7
Aspen	12341,7	10833	10600	11982	12966,5
Grey alder	10283,7	9873	10500	13365	16087,4
other species	1409,5	1632	1800	2136	3015,7
Total	308897,4	334026	347500	371707	393237,3

Table 9. *Forest area distribution according to age classes 1988 – 2005. In hectares.*

(Source: Brukas and Kenstavicius 1992; LVMI 1994; VMT 2001; VMT 2005).

Years	Forest area distribution according age classes												
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
1988	58833	193101	281632	298313	280672	225674	187205	110349	66160	32136	15389	9249	15784
1993	121773	150608	226201	297001	278146	242240	203196	153333	92069	47012	19613	10663	18481
2001	125283,7	130713,6	162445,0	251534,4	313575,3	280288,4	226679,8	180439,0	119481,3	71127,0	31828,3	13071,3	21275,5
2005	161282	138437	148591	225874	309257	295128	241128	182246	130184	78395	39198	15488	22491

Table 10. *The distribution of forest land area by forest management groups. 1000 ha.*

(Source: Brukas and Kenstavicius 1992; LVMI 1994; VMT 2005).

Years	Forest management groups			
	I gr. Special purpose	I gr. Protective management group	II gr. Commercial forests	
1988	129,165	612,604	1357,136	
Percents	6,15	45,14	64,66	
Cuttings		323	1709	
Cuttings from 1ha		0,52725741	1,259269521	
	I Group	II Group	III Group	IV Group
1993	41,8	123,4	317,1	1640,9
Percents	2	5,8	14,9	77,3
2004	24,42	246,044	332,506	1466,149
Percents	1,2	11,9	16,1	70,8
2005	25,172	253,119	336336	1476,556
Percents	1,2	12,1	16,1	70,6

Table 11. *Applied cutting ages in 1979 – 2005.*

(Source: Brukas and Kenstavicius 1992; Kenstavicius 2000; VMT 2005).

Stands	1979 – 1994			1995 – 1998		1996 -….			1999 - …….		
	Commercial	Protective	Reserved	Forest group		Protective categories			IV	III	II
				III – IV	II	IV	III	II			
Pine	101 – 120	101 – 120	1221 – 140	105	170	105	120	170	101	111	170
Spruce	81 – 100	101 – 120; (81 – 100) for water protection forests	121 – 140	85	120	85	85	120	71	81	120
Oak	121 – 140	121 – 140	141 – 160	125	200	125	140	200	121	141	200
Ash	101 – 120	101 – 120	121 – 140	105	170	105	120	170	101	111	170
Birch	61 – 70	71 – 80	81 – 90	65	90	65	65	90	61	61	90
Black alder	61 – 70	71 – 80	81 – 90	65	90	65	65	90	61	61	90
Aspen	41 – 50	51 – 60	61 – 70	45	60	45	45	60	41	41	60
Grey alder	31 – 40	31 – 40	41 -50	35	50	35	35	50	31	31	50

Table 12. *Volume distribution of tree species by age classes. 1000 m^3.*

(Source: VMT 2005).

Dominant tree species	Age class (10 years)													Total 01.01.2005
	1	2	3	4	5	6	7	8	9	10	11	12	≥13	
Pine	134,1	936,6	3443,1	12943,6	26095,5	24592,3	22361,4	22792,4	22393,8	1770,0	9570,0	3429,7	3942,9	170336,3
Spruce	429,4	2439,9	4622,9	6630,2	8210,8	10710,3	17275,7	16378,2	9429,7	3222,3	1286,9	541,8	358,5	81536,4
Birch	330,8	1258,8	2478,2	5927,1	15627,5	20611,2	13008,1	5768,7	2258,1	314,7	30,8	2,2	0,7	67616,9
Aspen	188,1	400,6	384,7	1115,4	3159,2	3859,8	2503,4	1060,7	271,8	19,7	3,2	0,0	0,0	12966,5
Black alder	107,6	883,3	1630,7	2912,4	5124,3	5986,0	5109,0	2679,5	1109,9	305,7	37,5	16,2	2,6	25904,7
Grey alder	219,0	1566,0	3685,4	6667,3	3454,5	451,2	41,6	1,5	0,9	0,0	0,0	0,0	0,0	16087,4
Oak	5,5	11,6	28,2	130,6	491,4	718,0	887,8	868,5	836,5	680,1	513,7	436,3	1857,8	7465,9
Ash	20,3	117,7	287,2	628,9	1312,3	1757,2	1627,9	1133,9	761,5	337,4	169,4	94,1	59,7	8307,5
Total 2005	1440,2	7671,5	16699,2	37325,9	64073,2	69299,9	63257,1	50996,6	37223,7	22787,0	11666,2	4546,7	6250,1	393237,3

Table 13. *Possible harvesting level for 100 years. Million m³.*

Species	Average volume of mature woods	Cutting ages	Yearly cuttings									
			1 -10 years	10 - 20 years	20 - 30 years	30 - 40 years	40 - 50 years	50 - 60 years	60 - 70 years	70 - 80 years	80 - 90 years	90 - 100 years
Pine	300	101	1,69	1,76	2,30	2,43	2,54	3,01	3,49	2,08	0,89	0,65
Spruce	304	71	3,12	1,73	1,12	0,95	1,03	1,20	1,56	2,45	3,11	1,73
Birch	230	61	2,14	2,34	2,04	1,00	0,63	0,62	0,63	2,16	2,34	2,04
Aspen	271	41	1,09	0,16	0,08	0,14	0,24	1,09	0,16	0,08	0,14	0,24
Black alder	289	61	0,93	0,68	0,69	0,50	0,38	0,94	0,68	0,69	0,50	0,38
Grey alder	148	31	1,06	0,46	0,27	0,08	1,06	0,46	0,27	0,08	1,06	0,46
Oak	245	121	0,19	0,05	0,06	0,08	0,10	0,10	0,11	0,10	0,10	0,08
Ash	230	101	0,03	0,03	0,08	0,12	0,18	0,21	0,18	0,11	0,08	0,06
Total			10,2	7,2	6,6	5,3	6,2	7,6	7,1	7,7	8,2	5,6

Table 14. *The exact figures from calculations of the maximal yield cuttings in cubic metres.*

Time period

Species	Average volume of mature woods m³/ha	Cutting ages	For next 10 years		For next 10 – 20 years			For next 20 – 30 years			For next 30 – 40 years			For next 40 – 50 years		
			Volume of mature woods. m³	Yearly cuttings. m³	Area of mature woods. Ha	Volume of mature woods. m³	Yearly cuttings. m³	Area of mature woods. ha	Volume of mature woods. m³	Yearly cuttings. m³	Area of mature woods. ha	Volume of mature woods. m³	Yearly cuttings. m³	Area of mature woods. ha	Volume of mature woods. m³	Yearly cuttings. m³
Pine	300	101	16942630	1694263	58699	17609610	1760961	76743	23023020	2302302	81142	24342600	2434260	84584	25375080	2537508
Spruce	304	71	31217300	3121730	56899	17297174	1729717	36971	11239306	1123931	31198	9484192	948419	33896	10304323	1030432
Birch	230	61	21383280	2138328	101558	23358317	2335832	88693	20399390	2039939	43642	10037752	1003775	27524	6330566	633057
Aspen	271	41	10877700	1087770	5785	1567816	156782	2926	792973	79297	5091	1379634	137963	8899	2411629	241163
Black alder	289	61	9260370	926037	23467	6781819	678182	24001	6936318	693632	17217	4975626	497563	13058	3773849	377385
Grey alder	148	31	10617080	1061708	30777	4554937	455494	17926	2652974	265297	5120	757760	75776	71655	10604970	1060497
Oak	245	121	1857820	185782	1862	456239	45624	2347	574893	57489	3143	769913	76991	3964	971058	97106
Ash	230	101	323200	32320	1503	345759	34576	3446	792488	79249	5220	1200577	120058	7855	1806650	180665
Total			**102479380**	**10247938**		**71971671**	**7197167**		**66411361**	**6641136**		**52948054**	**5294805**		**61578124**	**6157812**

Time period

Species	Average volume of mature woods m³/ha	Cutting ages	For next 50 – 60 years			For next 60 – 70 years			For next 70 – 80 years			For next 80 – 90 years			For next 90 – 100 years		
			Area of mature woods. ha	Volume of mature woods. m³	Yearly cuttings. m³	Area of mature woods. Ha	Volume of mature woods. m³	Yearly cuttings. m³	Area of mature woods. ha	Volume of mature woods. m³	Yearly cuttings. m³	Area of mature woods. ha	Volume of mature woods. m³	Yearly cuttings. m³	Area of mature woods. ha	Volume of mature woods. m³	Yearly cuttings. m³
Pine	300	101	100168	30050490	3005049	116355	34906560	3490656	69302	20790690	2079069	29666	8899680	889968	21561	6468420	646842
Spruce	304	71	39422	11984136	1198414	51301	15595443	1559544	80517	24477168	2447717	102455	31146320	3114632	56899	17297174	1729717
Birch	230	61	26963	6201398	620140	27445	6312350	631235	94117	21646818	2164682	101558	23358317	2335832	88693	20399390	2039939
Aspen	271	41	40243	10905799	1090580	5785	1567816	156782	2926	792973	79297	5091	1379634	137963	8899	2411629	241163
Black alder	289	61	32369	9354497	935450	23467	6781819	678182	24001	6936318	693632	17217	4975626	497563	13058	3773849	377385
Grey alder	148	31	30777	4554937	455494	17926	2652974	265297	5120	757760	75776	71655	10604970	1060497	30777	4554937	455494
Oak	245	121	4223	1034660	103466	4449	1089932	108993	3912	958489	95849	3912	958489	95849	3083	755433	75543
Ash	230	101	9272	2132491	213249	7943	1826913	182691	4799	1103701	110370	3313	761898	76190	2422	556991	55699
Total				**76218407**	**7621841**		**70733807**	**7073381**		**77463917**	**7746392**		**82084934**	**8208493**		**56217823**	**5621782**

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Table 15. *Value added in GDP from different forest sectors in 1995 – 2005.*

(Source: VMT 2005; VMT 2006).

Years	Gross domestic product (GDP) at market prices in Lithuania	Total from forest sector		Forestry		Woodworking industry		Pulp and paper industry		Furniture industry	
	Million LTL	Million LTL	%	Million LTL	%	Million LTL	%	Million LTL	%	Million LTL	%
		Total from forest sector	Total from forest sector	Fore-stry	Fore stry	Wood-working industry	Wood-working industry	Pulp and paper industry	Pulp and paper industry	Furniture industry	Furniture industry
1995	25567,9	762,4	3,20	233,8	1,00	221,7	0,90	123,1	0,50	183,8	0,80
1996	32289,8	811,1	2,70	234,3	0,80	263,3	0,90	124,0	0,40	189,5	0,60
1997	39377,7	924,2	2,70	237,1	0,70	304,8	0,90	132,7	0,40	249,6	0,70
1998	44377,4	1050,4	2,60	242,8	0,60	368,8	0,90	125,9	0,30	312,9	0,80
1999	43359,4	1020,7	2,70	200,4	0,50	407,4	1,10	99,0	0,30	313,9	0,80
2000	45848	1238,1	3,04	246,8	0,61	524,0	1,29	115,0	0,28	352,3	0,87
2001	48563	1395,7	3,24	248,5	0,58	610,3	1,41	136,0	0,32	400,9	0,93
2002	51948	1619,6	3,51	263,7	0,57	715,9	1,55	139,8	0,30	500,1	1,08
2003	56772	1901,7	3,74	284,3	0,56	856,9	1,69	149,7	0,29	610,7	1,20
2004	62440	2251,5	4,02	300,1	0,54	973,1	1,74	151,3	0,27	827,0	1,48
2005	71084	2525,4	4,08	235,9	0,51	1166,7	1,82	162,3	0,25	960,5	1,50

Table16. *The prices of roundwood logs in 1994 -2005.*

(Source: MUM 1994 – 1995; ZMUM 1996 – 1998; MSTD 2000; LRAM 2002d; GMU 2003 – 2006.)

Year	Average price of commercial wood LTL/m³	Average price of roundwood LTL/m³	Average price of conifer roundwood LTL/m³	Average price of soft broadleaves LTL/m³	Average price of hard broadleaves LTL/m³
1994	84	86	88	54	186
1995	99	118	119	83	217
1996	88	117	117	84	263
1997	101	143	152	96	281
1998	105	147	165	106	228
1999		121	136	94	227
2000	91	136	141	97	223
2001	85	128	132	96	219
2002	85	124	129	98	239
2003	85	124	126	101	249
2004	100	138	140	110	307
2005	114	153	150	129	319

Table17. *Pulpwood prices in 1994 – 2005.*

(Source: MUM 1994 – 1995; ZMUM 1996 – 1998; MSTD 2000; LRAM 2002d; GMU 2003 – 2006).

Year	Average price of pulp wood LTL/m³	Average price of spruce pulp wood LTL/m³	Average price of pine pulp wood LTL/m³	Average price of birch pulp wood LTL/m³
1994	73	72	79	81
1995	101	98	103	121
1996	57	54	67	70
1997	70	65	72	81
1998	82	76	73	94
1999	69	70	66	72
2000	62	66	60	62
2001	51	59	54	49
2002	51	59	50	48
2003	51	53	50	52
2004	61	64	62	60
2005	75	67	71	90

Table 18. *Investments in tangible fixed assets in wood industry in 1995 – 2005.Million LTL.*

(Source: VMT 2005; VMT 2006).

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Wood and wood products	43,8	32,8	38,5	30,4	48,1	32,0	79,4	124,4	109,9	155,0	160,4
Pulp, paper and paper products	7,0	34,6	23,5	16,7	18,3	7,3	14,6	20,1	20,8	23,5	25,5
Furniture	9,3	7,7	37,0	37,1	27,3	31,9	36,7	47,5	58,1	92,4	115,1
Total	60,1	75,1	99,0	84,2	93,7	71,2	130,7	192,0	188,8	270,9	301,1

Table 19. *Foreign direct investments into wood industry. Million LTL.*

(Source: VMT 2005).

	1997	2000	2001	2002	2003	2004	2005	2006
Wood and wood products	102,2	112,4	131,9	131,7	156,4	194,8	217,8	210,3
Pulp, paper and paper	15,0	77,2	101,0	113,0	127,5	155,5	161,3	204,9
Furniture	27,8	23,3	31,6	36,0	37,6	62,8	58,5	88,5
Total	145,0	212,9	264,5	280,7	321,5	413,1	479,2	503,7

Table 20. *Sales of industrial production in 1998 – 2005. Million LTL.*

(Source: VMT 2005; VMT 2006).

	Total industry	Manufacture of wood	Manufacture of pulp, paper	Manufacture of furniture	Total
1998	22 719,6	708,2	265,2	491,5	1 464,8
1999	21 226,4	803,4	214,9	496,0	1 514,3
2000	23 953,1	1 045,4	247,7	601,8	1 894,9
2001	26 610,2	1 150,2	291,4	697,4	2 139,0
2002	26 333,8	1 323,8	296,2	869,7	2 489,7
2003	30 322,3	1 616,4	317,6	1 068,6	3 002,6
2004	35 297,1	1 836,9	320,3	1 408,8	3 566,0
2005	37 873,8	2 066,9	352,7	1 579,6	3 999,2

Table 21. *Exports from Lithuania in 1994 – 2005. 1000 m^3.*

(Source: VMT 2005; VMT 2006).

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Sweden	460	584	257	373	384	506	620	565	671	579	510	336
Latvia	24	38	28	36	88	47	44	79	172	232	201	122
Poland	4	18	73	26	93	205	285	310	170	148	162	416
Russia	210	784	442	273	213	148	222	186	226	202	141	72
Finland	6	34	8	16	-	16	13	138	91	99	79	173
Norway	78	93	5	-	3	-	0	0	0	22	61	0
Germany	-	-	1	-	4	15	3	24	42	22	12	0
Ukraine	72	112	72	12	-	-	-	-	-	-	-	-
Others	33	106	66	28	7	1	13	14	48	74	12	12
Total	887	1 769	952	764	792	938	1 200	1 316	1 420	1 378	1 178	1 131

Appendix B (Questionnaire for Expert interviews in Lithuanian)

LIETUVOS MIŠKO RESURSŲ NAUDOJIMO KLAUSIMYNAS

Šis klausimynas yra tarptautinio projekto, atliekamo Latvijoje, Lietuvoje ir Lenkijoje dalis. Klausimyno tikslas – ištirti dabartinę situaciją miško naudojime ir ateities perspektyvas. Labai svarbu, kad šis tyrimas atspindėtų kiekvienos šalies pagrindinių interesų grupių nuomonę. Tikimės kad Jūsų nuoširdūs atsakymai ir pagalba padės tinkamai įvertinti esamą padėtį. Rezultatai pateiksime taip, kad butų garantuotas Jūsų konfidencialumas.

Data …..…./…../…../

1. Asmeninė informacija ir duomenys apie atstovaujamą organizaciją

1.1 Gimimo metai: ……….

1.2 Lytis: ☐ Moteris   ☐ Vyras

1.3 Išsilavinimas. Jūsų įgytas paskutinis išsilavinimas :

☐ Miškininkystės mokslai
☐ Kiti mokslai (nurodykite): …………………………………………...

1.4 Jūsų užimama pareigybė nurodytoje organizacijoje:

....

1.5 Jūsų užimamos pareigybės rangas:

☐ Aukščiausio lygio organizacijos vadovas (organizacijos vadovas,direktorius, direktoriaus pavaduotojas arba jiems prilygstantys vadovai)
☐ Vidutinio lygio vadovai (padalinių lyderiai arba jiems prilygstantys)
☐ Vedėjas, Vadybininkas arba jiems prilygstanti pareigybė.
☐ Padėjėjai
☐ Kita (nurodykite):………………………………………

1.6 Kaip jūsų organizacijos interesai susiję su miško naudojimu Lietuvoje? Trumpai apibūdinkite:

....
....
....

1.7 Kokios yra pagrindinės problemos, trukdančios įgyvendinti jūsų organizacijos interesus?:

....
....
....

2. Miškininkystės tikslai

Kokia turėtų būti miškininkystės kryptis per ateinančius 10 metų. Kokia būtų jūsų asmeninė nuomonė? Pažymėkite. "X"

2.1 Miško gamtosauga (saugomų miškų plotai, kirtimų amžiai, pagrindinių kirtimų būdai)

| Švelnesni gamtosaugos apribojimai valdant ir naudojant mišką iška | | Griežtesni gamtosaugos apribojimai valdant ir naudojant mišką |

Daug švelnesni   švelnesni   šiandienos situacija   griežtesni   Labai
griežti

2.2. Miško nuosavybė

| Didesnė privačių miškų dalis | | Didesnė valstybinių miškų dalis |

100% privatūs   75% privatūs   50:50   75% valstybiniai   100% valstybiniai
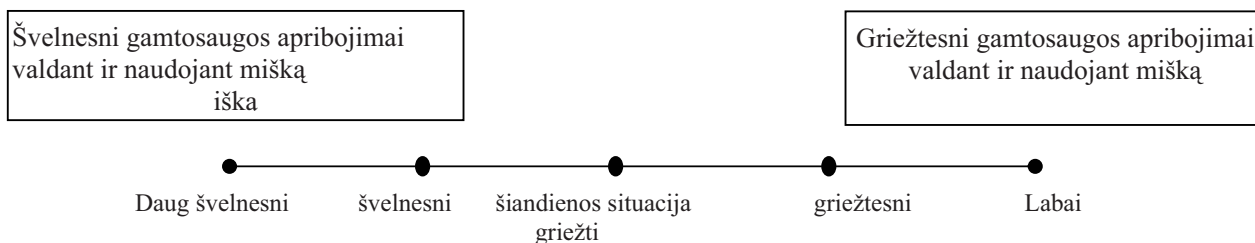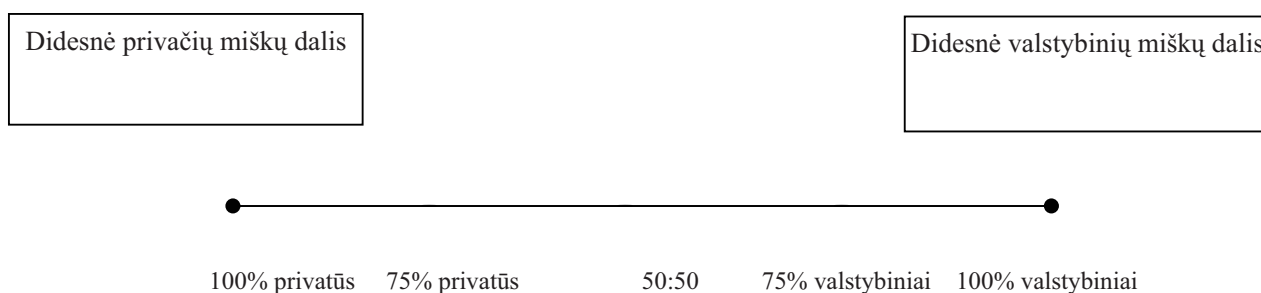
2.3 Pasirinkimo, sprendimų laisvė ir savininkų kontrolė naudojant mišką.

| Daugiau laisvės miško savininkams ir valdytojams | | Daugiau kontrolės miško savininkams ir valdytojams |

visiška laisvė, valstybė duoda tik patarimus   šiandienos situacija   griežta reguliacija ir valstybės kontrolė
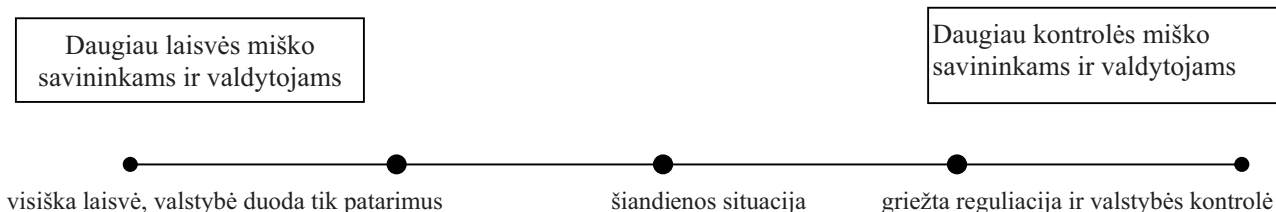
Kodėl jūs taip manote? Pakomentuokite 2.1 – 2.3 punktus:

....
....

2.4 Valstybės ekonominė politika apimanti, valstybinius ir privačius miškus.

| Miškų sektorius turėtų įnešti svarų įnašą į valstybės biudžetą | | Valstybė turėtų subsidijuoti miškų |

šiandienos situacija
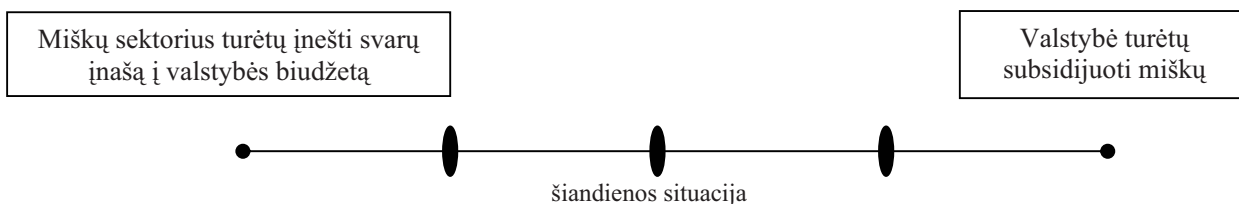
2.5 Kaip, jūsų nuomone, keisis šalies visuomenės nuomonė apie pagrindines miškų funkcijas

| Miškas yra skirtas tik gamtai išsaugoti | | Miškas yra tik pajamų šaltinis |

šiandienos situacija
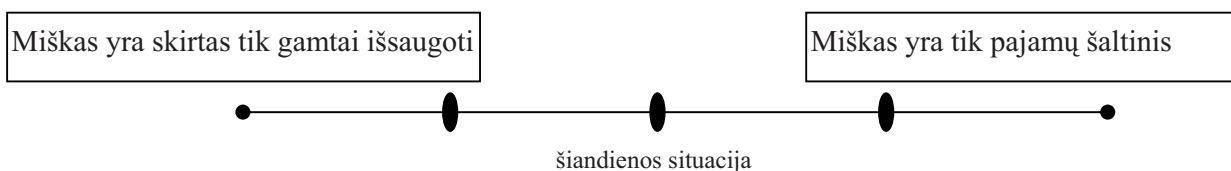
2.6 Kodėl jūs taip manote? Pakomentuokite 2.4 – 2.5 punktus ;

....
....
....

2.6 Ar, Jūsų nuomone, ūkininkavimas Lietuvos miškuose turėtų būti artimesnis vokiškajai mokyklai/tradicijoms, (pasyvus naudojimas, aukšti kirtimų amžiai, vyrauja neplyni pagrindinio naudojimo kirtimai, dideli sukaupti tūriai, neigiamas ekonominis rezultatas)? Ar skandinaviškajai mokyklai/tradicijoms (intensyvus ūkininkavimas žemi kirtimų amžiai, plyni pagrindinio naudojimo kirtimai, maži sukaupti tūriai miške, teigiamas ekonominis rezultatas)?

☐ Vokiškoji mokykla
☐ Skandinaviškoji mokykla

Pakomentuokite savo pasirinkimą:

....
....
....
....
....

3. Miško resursų įvertinimas

3.1 Kaip jūs vertinate sukaupto tūrio, ir metinio tūrio prieaugio miške, Lietuvos miškų ūkio oficialios nacionalinės statistikos duomenų tikslumą:

Valstybiniuose miškuose

☐ Duomenys pakankamai patikimi, su nedidele matavimo paklaida.
☐ Duomenys nepatikimi - realus sukauptas tūris ir metinis prieaugis daug didesni.
☐ Duomenys nepatikimi - realus sukauptas tūris ir metinis prieaugis daug mažesni.
☐ Sunku pasakyti.

3.2 Kaip jūs vertinate sukaupto tūrio, ir metinio tūrio prieaugio miške, Lietuvos miškų ūkio, oficialios nacionalinės statistikos duomenų tikslumą:

 Privačiuose miškuose

☐ Duomenys pakankamai patikimi, su nedidele matavimo paklaida.
☐ Duomenys nepatikimi - realus sukauptas tūris ir metinis prieaugis daug didesni.
☐ Duomenys nepatikimi - realus sukauptas tūris ir metinis prieaugis daug mažesni.
☐ Sunku pasakyti

3.3 Kaip jūs manote, kurios inventorizacijos pateikti duomenys, yra tikslesni :

☐ Sklypinės inventorizacijos
☐ Nacionalinės statistinės inventorizacijos

Kodėl

....
....
....
....
....

4. Miško naudojimo veiksniai

4.1 Žemiau pateiktas kirtimų apimties kitimo grafikas.Kas, jūsų nuomone, lėmė gana žymų kirtimų apimčių svyravimą 1991 – 2004 metais? Pažymėkite lentelėje, kurie teiginiai teisingi, kurie ne :

Kirtimų apimtys 1921 - 2004

Šaltinis: Generalinė miškų urėdija, Valstybinė miškotvarkos tarnyba
Source: General Forest Enterprise, State Forest Survey Service
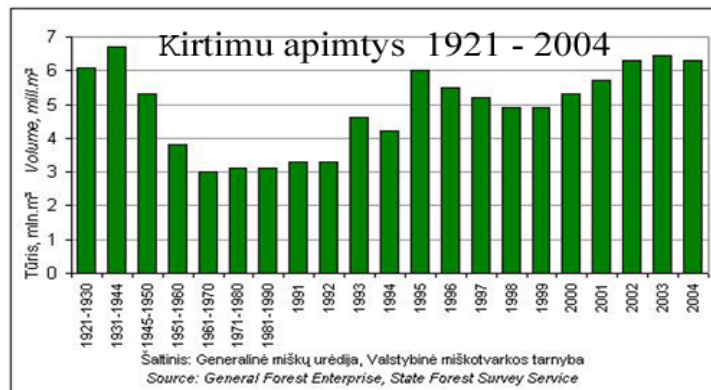
Teiginiai	TAIP	NE
1994 metų miškų grupių ir kategorijų įvedimas		
Atkūrus Lietuvos nepriklausomybę, rinkos ekonomikos santykių atsiradimas		
Kirtimų normos skaičiavimo metodologijos pakeitimas, OPTINA pritaikymas		
Lietuvos miškų taksacinių rodiklių gerėjimas, brandžių medynų pagausėjimas		
Medienos paklausos didėjimas rinkoje		
Miško išteklių apskaitos gerėjimas		
Privačių miškų bendro ploto didėjimas		
Stichinės nelaimės (vėjovartos, kenkėjų invazijos)		
Žemės reforma, privatizuotinų miškų ,skirtų nuosavybės teisių atkūrimui minimalus naudojimas, smarkiai sumažino galimas miško naudojimo apimtis Lietuvoje		
Kita...		
Kita...		
Kita...		

4.2 Nurodykite 3 svarbiausius veiksnius pažymėtus TAIP. 1- pats svarbiausias, 2 – antras pagal svarbumą.

1. ....
2. ....
3. ....

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4.3 Šiuo metu Lietuvos eksploataciniuose (III ir IV grupių) miškuose pagal oficialią statistiką iškertama apie 65% likvidinės (realiai panaudotinos) medienos prieaugio. Kokios priežastys lemia tokį naudojimo lygį (t.y. miško naudojimas yra žymiai mažesnis už medienos prieaugį)? Pažymėkite kurie teiginiai teisingi, kurie ne!

Teiginiai	TAIP	NE
Aukšti minimalūs kirtimų amžiai		
Griežti gamtosauginiai reikalavimai		
Įtakingos NVO organizacijos (žalieji, Lietuvos gamtos fondas ir kt.)		
Lėtai vykstanti žemės reforma		
Maža paklausa medienai rinkoje		
Miško naudojimo apimtys nustatomos neatsižvelgiant į medienos pramonės poreikius		
Miško naudojimo lygis Lietuvoje jautriai reaguoja į situaciją rinkoje		
Neintensyviam miško naudojimui palanki visuomenės nuomonė		
Per daug griežta miško naudojimo valstybės kontrolė		
Tradicijos naudoti mišką jį tausojant		
Vienas iš miškų urėdijų veiklos tikslų – nulinis pelningumas, kad pajamos padengtų išlaidas (o ne galimo didžiausio pelno siekimas)		
Žemas vidutinis medynų amžius, per mažai brandžių medynų		
Kita...		
Kita...		
Kita...		

4.4 Nurodykite 3 svarbiausius veiksnius pažymėtus TAIP. 1- pats svarbiausias, 2 – antras pagal svarbumą.

1. ....
2. ....
3. ....

5. Interesų grupės

5.1 Ar jūsų organizacija suinteresuota dalyvauti politiniuose procesuose, lemiančiuose miško naudojimo intensyvumą?

□ Visai ne
□ Taip, mes domimės
□ Mes esam labai suinteresuoti

5.2 Ar jūsų organizacija kada nors dalyvavo miško kirtimų mastus lemiančiuose politiniuose procesuose?

□ Taip
□ Ne

Jeigu taip, tai kokia jūsų patirtis, įspūdžiai?

....
....
....
....

5.3 Jūsų nuomone, kurios organizacijos ar politinės grupės (*medienos pramonės atstovai ar asociacija, mokslo atstovai, NVO (žaliųjų judėjimas ir pan.), privačių miškų savininkų asociacijos, miškotvarkininkai, generalinė urėdija, Lietuvos miškininkų sąjunga, miškų departamentas, valstybinių miškų valdytojai – urėdijos ir kt.*) turi didžiausią įtaką patvirtinant kirtimų apimtis Lietuvoje?

Nurodykite 5 įtakingiausias organizacijas ar politines grupes. 1- pati įtakingiausia, 2 – antra pagal svarbumą.

1. ....
2. ....
3. ....
4. ....
5. ....

5.4 Kaip pasireiškia jų įtaka?

....
....
....
....

5.5 Kaip interesų grupių ar organizacijų įtaka pasikeis per 5 –10 metų? Kurių interesų grupių įtaka sumažės ir kurių padidės? 1- bus pati įtakingiausia, 2 – antra pagal svarbumą.

1. ....
2. ....
3. ....
4. ....
5. ....

Kodėl? ....
....
....
....
....

5.6 Kurias politines grupes jūs norėtumėte matyti labiau įtakingas, o kurias mažiau, politinių sprendimų priėmimo procese po 5 – 10 metų ? 1- būtų pati įtakingiausia, 2 – antra pagal svarbumą

Labiau įtakingos	Mažiau įtakingos
1	1
2	2
3	3
4	4

Kodėl? ....
....
....

5.7 Kaip jūs vertinate mūsų šalies medienos pramonės įmonių ir valstybinių miškų valdytojų santykius miško naudojimo klausimais?

☐ Konfliktiniai (atviri nesutarimai ir ,,paslėptieji ,,žaidimai '')
☐ Bendradarbiavimas (bendros strategijos, aktyvios konsultacijos, pasitarimai)
☐ Abejingumas (mažas abipusis poveikis, silpni santykiai)

Komentarai:

....
....
....
....

5.8 Kaip jūs vertinate mūsų šalies medienos pramonės įmonių ir privačių miškų valdytojų santykius miško naudojimo klausimais?

☐ Konfliktiniai (atviri nesutarimai ir „paslėptieji žaidimai '')
☐ Bendradarbiavimas (bendros strategijos, aktyvios konsultacijos, pasitarimai)
☐ Abejingumas (mažas abipusis poveikis, silpni santykiai)

Komentarai:

....
....
....
....

5.9 Kaip jūs vertinate mūsų šalies privačių miško savininkų ir valstybinių miškų valdytojų santykius miško naudojimo klausimais?

☐ Konfliktiniai (atviri nesutarimai ir „paslėptieji žaidimai '')
☐ Kontrolė (valstybinių miškų valdytojai kontroliuoja, kaip privačių miškų savininkai naudoja mišką)
☐ Bendradarbiavimas (bendros strategijos, aktyvios konsultacijos, pasitarimai)
☐ Abejingumas (mažas abipusis poveikis, silpni santykiai)

Komentarai:

....
....
....
....

5.10 Kaip jūs vertinate mūsų šalies NVO (žaliųjų), ir valstybinių miškų valdytojų santykius miško naudojimo klausimais?

☐ Konfliktiniai (atviri nesutarimai ir „paslėptieji žaidimai '')
☐ Bendradarbiavimas (bendros strategijos, aktyvios konsultacijos, pasitarimai)
☐ Abejingumas (mažas abipusis poveikis, silpni santykiai)

Komentarai:

....
....
....

5.11 Kaip jūs vertinate mūsų šalyje NVO (žaliųjų), ir privačių miškų valdytojų santykius miško naudojimo klausimais?

☐ Konfliktiniai (atviri nesutarimai ir „paslėptieji žaidimai ‘‘)
☐ Bendradarbiavimas (bendros strategijos, aktyvios konsultacijos, pasitarimai)
☐ Abejingumas (mažas abipusis poveikis, silpni santykiai)

Komentarai:

....
....
....

5.12 Ar Jūs sutinkate su teiginiu, kad vienas iš slaptų valstybinių miškų valdytojų tikslų yra nulinis pelningumas – nesukurti didelių pelnų, bet ir nenešti didelių nuostolių (nesvarbu, kokios priežastys tai lemtų)?

☐ Taip
☐ Ne

Komentarai:

....
....
....
....
....
....

6. Optimalus miško naudojimas

Tarp Baltijos Jūros Regiono šalių yra esminių miško naudojimo skirtumų. Pavyzdžiui, miško naudojimo santykis (santykis tarp iškertamo tūrio ir bendrojo šalies prieaugio) Vokietijoje – 45 % o Švedijoje, Suomijoje 90%.
Įvertinkite kirtimų apimtis Lietuvoje, atsižvelgdami į europinį regioninį kontekstą. Kurie politiniai (interesų grupių įtaka, valdymo tikslai, ir t.t.) ar techniniai – biologiniai faktoriai (miško augimo parametrai, stichinės nelaimės, inventorizacijos metodai) lems kirtimų apimtį Lietuvoje? Vertindami atsižvelkite į nacionalinę ekonomiką, ūkininkavimo tradicijas, gamtosaugos ir socialines vertybes, nuosavybės formas, pelno motyvaciją iš valstybinių ir privačių miškų, interesų grupes miškų sektoriuje.

6.1 Kokia jūsų nuomonė apie šiandieninį miško naudojimą? Pažymėkite po vieną atsakymą ties kiekviena atskira grupe a), b) ir c) :

	Per mažas	Optimalus	Per didelis
a) Visi miškai	☐	☐	☐
b) Privatūs komerciniai miškai	☐	☐	☐
c) Valstybiniai komerciniai miškai	☐	☐	☐

Kodėl?

....
....
....
....

6.2 Kokia jūsų nuomonė apie šiuo metu Lietuvoje leidžiamus kirtimų amžius? Pažymėkite vieną :

☐ Per ilgi
☐ Optimalūs
☐ Per trumpi

Kodėl?

....
....
....

6.3 Koks būtų optimalus bendrojo šalies vidutinio metinio prieaugio ir kirtimų santykis? Parinkite po vieną alternatyvą, kiekvienais nurodytais metais. Vidutiniškai per metus bendrasis vidutinis metinis prieaugis Lietuvoje yra nuo 12 milijonų kietmetrių

Kirtimų santykis %	2007	2017	2027
0 - 20			
21 - 40			
41 - 60			
61- 80			
81 -100			
101 - 120			
>120			

Kokios jūsų pasirinkimo priežastys?

....
....

6.4 Ar turėtų būti didinamas miško naudojimas valstybiniuose miškuose

☐ Taip
☐ Ne

Jeigu taip, eikite prie klausimo 6.5
Jeigu ne klausimą 6.5 praleiskite

6.5 Kas, jūsų nuomone, galėtų padidinti miškų naudojimą mūsų šalies valstybiniuose miškuose? Įvertinkite siūlomas alternatyvas 1 – pati efektyviausia alternatyva, 3 – Mažiau efektyvi

… Ekonominio nusistatymo pakeitimas valstybiniuose miškuose nuo 0 „tikslinio '' pelno iki galimo maksimalaus pelno.
… Miško pramonės įmonių dalyvavimas nustatant galutinę metinę kirtimų normą.
… Padidėjęs miškų produktyvumas
… Papildomi mokesčiai valstybinių miškų valdytojams už naudojimąsi valstybiniu turtu
… Valstybinių miškų privatizavimas
… Kitos (nurodykite):………………………………………………………………..
… Kitos (nurodykite):………………………………………………………………..

6.6 Kurie veiksniai bus lemiami nustatant kirtimų apimtį Lietuvoje ateinančiais 10- 20 metų

Politiniai
1. ....
2. ....
3. ....

Gamtiniai - biologiniai
1. ....
2. ....
3. ....

Ekonominiai
1. ....
2. ....
3. ....

6.7 Įvertinkite nuo 1 iki 3 kurios veiksnių grupės bus svarbiausios. 1 – pati svarbiausia, 2 – antra pagal svarbumą :

.........Politiniai

.........Gamtiniai - biologiniai

.... Ekonominiai

Appendix C (Questionnaire for Expert interviews in English)

QUESTIONNAIRE ON FOREST UTILISATION IN LITHUANIA

This questionnaire is conducted within an international research project that investigates the current status and future possibilities of forest utilization in Latvia, Lithuania and Poland. It is important that the survey would reflect opinions of all major stakeholders in each country. Your honest answers will make important contribution to clarifying the true situation. Results will be presented in a way that will guarantee your anonymity.

Date …..…../…../…../

4. Personal and organizational background

1.1 Year of birth: ……….

1.2 Gender: ☐ Female ☐ Male

1.2 Educational background. Your last educational degree was earned in:

☐ Forestry
☐ Other discipline (indicate): …………………………………………………...

1.3 Official entitlement of your job position:

1.4 Your position within the organization:

☐ Highest level administration staff of a large organization (head, deputy director or corresponding)
☐ Mid level administration staff (head of a subdivision or corresponding)
☐ Manager, officer or corresponding
☐ Assistant or corresponding
☐ Other (indicate):…………………………………………

1.5 What are the main interests of your organization in relation to forest utilization? Describe shortly:

1.6 What are the main problems in pursuing these interests:

5. Desired goals of forestry

What is the desired direction for forestry in coming 10 years, in your personal opinion? Mark with an "X"

2.1 Environmental considerations (area of protected forests, forest rotations, types of felling, etc.)

Reduced environmental restrictions on forest management				Increased environmental restrictions on forest management
Much reduced	slightly reduced	as today	slightly increased	much increased

2.2. Forest ownership

Higher share of private forests				Higher share of State forests
100% private	75% private	50:50	75% State	100% State
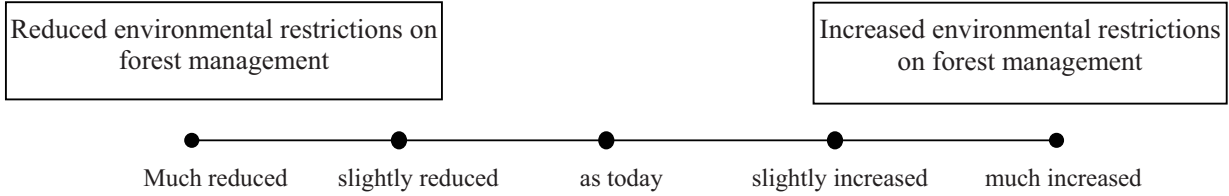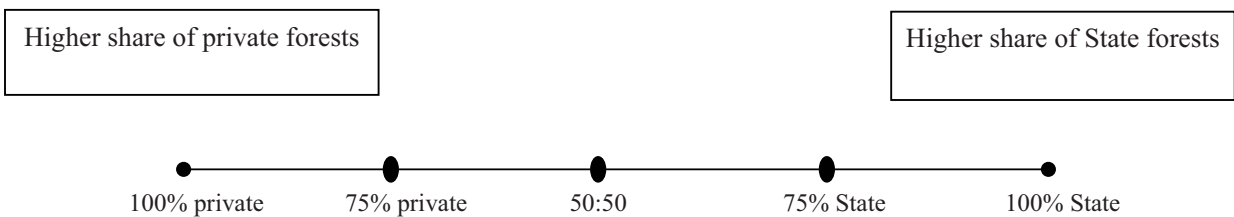
2.3 Decision freedom versus control of forest owners in terms of forest utilization.

More freedom to forest owners and managers			More control of forest owners and managers
Full freedom, State gives advice	as today		Rigid regulations & State control
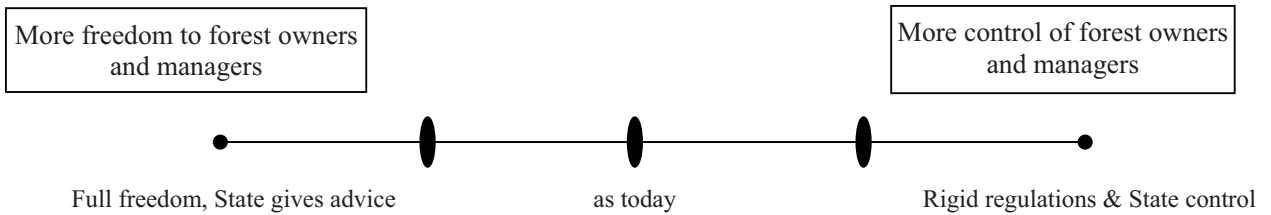
Comments on 2.1-2.3:

....

....

2.4 State economic policy in relation to State and private forestry

Forestry should make significant economic contribution to State budget			State should heavily subsidise forestry
	As today		
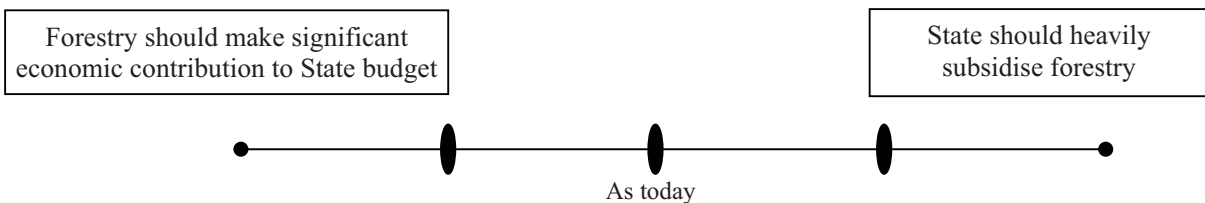
2.5 What do you think, how will change society attitude to the forests

Forests should be only for nature conservation			Forests only source of income
	As today		

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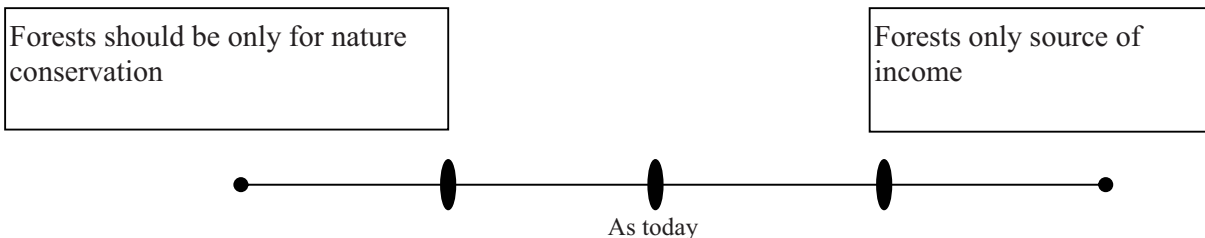
Comments on 2.4-2.5:

....
....
....
....

2.5 In your personal opinion, the future forest management practice in Lithuania should be closer to the *German* management school/tradition (rather passive utilization, long rotation ages, continuous cover forestry, high standing volumes, negative economic result) or *Scandinavian* management school/tradition (intensive utilization, short rotations, even-aged management, low standing volumes, positive economic result)?

☐   German school
☐   Scandinavian school

Comment your choice:

....
....
....

6.   Assessment of forest resources

3.1 How do you evaluate the accuracy of national official inventory data about standing volume and volume increment?

In the State Forests
☐   rather reliable, within few % of measurement accuracy
☐   not reliable, real standing volumes and increment are much higher
☐   not reliable, in reality standing volumes and increment are much lower
☐   hard to say

3.2 How do you evaluate the accuracy of national official inventory data about standing volume and volume increment?

In the private Forests
☐   rather reliable, within few percent of measurement accuracy
☐   not reliable, real standing volumes and increment are much higher than official data
☐   not reliable, in reality standing volumes and increment are much lower than official data
☐   hard to say

3.3 Which inventory type is more accurate?

☐   Plot inventory
☐   National statistical inventory
Why?

....
....
....

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4. Driving forces behind forest utilization

4.1 Bellow you can see the cutting graph. What do you think, which factors had impact on the dynamics of harvesting level since 1991? Please mark in the following table, which statements are true, which are false.
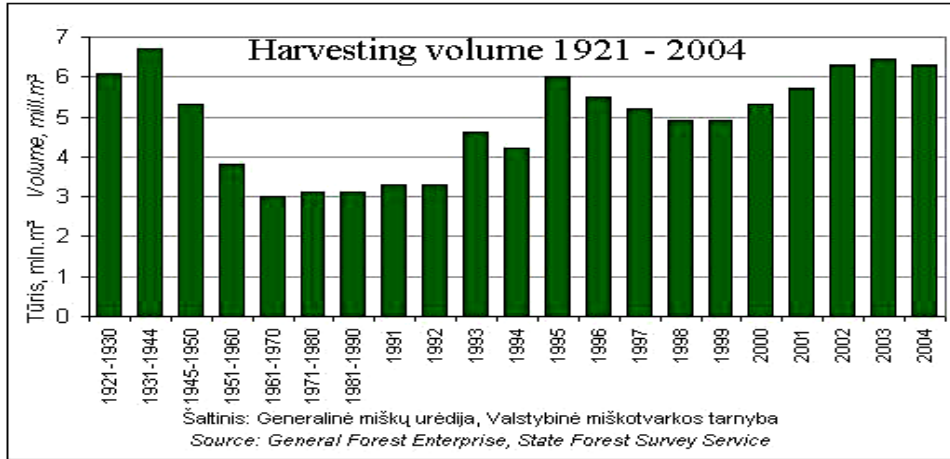
Factors	Yes	NO
Changes in forest management groups in 1994		
After restoration of independence, the emergence of market economy		
Changes in methodology, for calculating of cutting norm, the adaptation of the formula OPTINA		
Improved forest growth figures, increased amount of mature woods		
Increased market demand		
Increased quality of inventory system		
Increased area of private forests		
Naturall disasters		
Lasting for too long land reform		
Other..		
Other..		
Other..		

Can you select 3 most important factors from marked true. 1 – the most important, 2 – second important

1. ....
2. ....
3. ....

4.2 Currently, harvesting makes 60% of total merchantable gross annual increment in commercial forests. What are the reasons for such harvesting levels? Mark true of false!

Factors	TRUE	FALSE
Too high minimal cutting ages		
Very strict requirements for the protection of nature		
Powerful NGOs		
Slow land reform		
No market demand		
Cutting norm is calculated with no account of the requirements of industry		
Forest usage sensitively reacts to market demands		
Favorable society's opinion for un intensive forest usage		
Too strict national control of forest usage		
Traditions to use forests, together saving it		
One of the targets of state forest enterprises - zero profit		
Low average forest age, not enough mature woods		
Other...		
Other...		
Other...		

Can you select 3 most important factors from marked true. 1 – the most important, 2 – second important

1. ....
2. ....
3. ....

5. The stakeholders

5.1 Is your organization interested in participating in the process of defining the national harvesting levels?
□ no, not really
□ moderately interested
□ very much interested

5.2 Have you ever participated in such processes?
□ yes
□ no

If yes, what was your experience?

....
....

5.3 What people, organization or political groups have the strongest influence in defining the level of forest utilization? (Here we need to say which stakeholders, that people understood, NGO, private associations, forest inventory representatives, general enterprise, foresters union, state enterprises). List 3 to 5 most powerful stakeholders, in order of importance, from 1 (most important), 2 (second most important), etc.

1. ....
2. ....
3. ....
4. ....
5.

5.4 How do they exert their influence?

....
....
....

5.5 Do you expect any changes in coming 5-10 years as it comes to the most influential stakeholders? In what ways?

1. ....
2. ....
3. ....
4. ....
5. ....
....

5.6 Which of political group (if any) should lesser and which of bigger influence in the decisive processes concerning forest utilization? Why?

More powerful	Less powerful
1	1
2	2
3	3
4	4

5.7 How do you evaluate the dominant relationship between the national state forestry administration and forest industries, concerning forest utilization in the country?

☐ Conflict (open disagreements as well as hidden "games")
☐ Cooperation (joint strategies, joint lobbying, advice, etc.)
☐ Indifference (little mutual impacts)

Comment:

....

5.8 How do you evaluate the dominant relationship between the national state forestry administration and private forest owners concerning forest utilization in the country?

☐ Conflict (open disagreements as well as hidden "games")
☐ Control (State forestry organizes and carries out utilization control of forest owners)
☐ Cooperation (joint strategies, joint lobbying, advice, etc.)
☐ Indifference (little mutual impacts)

Comment:

....
....

5.9 How do you evaluate the dominant relationship between private forest owners and forest industries, concerning forest utilization in the country?

☐ Conflict (open disagreements as well as hidden "games")
☐ Control (State forestry organizes and carries out utilization control of forest owners)
☐ Cooperation (joint strategies, joint lobbying, advice, etc.)
☐ Indifference (little mutual impacts)

Comment:

....
....

5.10 How do you evaluate the dominant relationship between the national environmental NGO and national State forestry administration, concerning forest utilization in the country?

☐ Conflict (open disagreements as well as hidden "games")
☐ Cooperation (joint strategies, joint lobbying, advice, etc.)
☐ Indifference (little mutual impacts)

Comment:

....
....

5.11 How do you evaluate the dominant relationship between the national environmental NGO and private forest owners, concerning forest utilization in the country?

☐ Conflict (open disagreements as well as hidden "games")
☐ Cooperation (joint strategies, joint lobbying, advice, etc.)
☐ Indifference (little mutual impacts)

Comment:

....
....

5.12 One of the "hidden goals" of State Forests is to make 0 profits, i.e. not to generate either significant positive or significant negative economic result (whatever are reasons behind it). Would you agree with this sentence?

☐ Yes
☐ No

Comments:

....
....

6. The optimal level of forest utilization

There are big differences between countries of Baltic Sea region in goals and traditions of forest management. For example, the harvesting/increment ratio ranges from around 45% in Germany to 80-90% in Sweden in Finland.

Consider harvesting levels in Lithuania in the regional perspective. Which political factors (power of various stakeholders, management goals, etc.) or technical-biological factors (forest growth parameters, natural disasters, forest inventory methods, etc.) have been the most important in defining the current harvest levels in Lithuania? Consider the national economy, environmental and social values, ownership, profit motivation in State and private forestry, management traditions, stakeholders in the forestry sector, etc.

6.1 What is your opinion about current harvesting levels? Mark one for each option a-c:

	Tow low	Optimal	Too high
a) All forests	☐	☐	☐
b) Private commercial forests	☐	☐	☐
c) State commercial forests	☐	☐	☐

Why? ....
....
....

6.2 What is your opinion about current minimum allowable cutting ages in Lithuania? Mark one

☐ Too long
☐ optimal
☐ too short

Why?
....
....
....
....

6.3 What would be optimal harvesting/increment ratio? Choose one option for each indicated year.

Harvesting ratio %	2007	2017	2027
0 - 20			
21 - 40			
41 - 60			
61- 80			
81 -100			
101 - 120			
>120			

What are the reasons for your choice?

....
....
....
....

6.4 Should harvesting level be increased in state forests?

☐ Yes
☐ No

If yes go to question No 6.5, if no skip question 6.5

6.5 What, in your opinion, could be the most realistic and effective means for increasing forest utilization in State forests in Lithuania? Rank three best options from "1" to "3":
    … Change of the economic set-up of the State forestry, from "0 profit goal" to profit maximisation
    … Enabling forest industries to participate in decision-making on annual cutting norm
    … Increased forest productivity
    … Introducing taxes for State forest enterprises at the same level as for enterprises in other sectors
    … Privatizing management of State forests
    … Other: (indicate):……………………………………………………………………..
    … Other: (indicate):……………………………………………………………………..

6.6 What factors do you expect to be decisive in deciding the harvesting levels in 10-20 years from now?

Political
    1.
    2.
    3.

Biological technical
    1.
    2.
    3.
Economical
    1.
    2.
    3.

    6.7 Rank the importance of following factors (listed in question above/6.5) from 1 to 3,1- most important, 2- little bit less important.
.........Political

.........Biological

.........Economic