

Impacts of Reduction of Illegal Logging in European Russia on the EU and European Russia Forest Sector and Trade

Andreas Ottitsch, Alexander Moiseyev, Nikolai Burdin and Lauma Kazusa



European Forest Institute
EFI Technical Report 19, 2005

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Andreas Ottitsch¹, Alexander Moiseyev¹, Nikolai Burdin² and Lauma Kazusa¹

¹ European Forest Institute

² Russian Research and Design Institute of Economics and Information for Forest, Pulp and Paper, and Woodworking Industries

Publisher: European Forest Institute
Torikatu 34, FI-80100 Joensuu Finland
Tel. + 358 13 252 020
Fax. + 358 13 124 393
Email: publications@efi.fi
<http://www.efi.fi/>

Editor-in-Chief: Risto Päivinen

Disclaimer: This report was commissioned by DFID-UK and The Finnish Ministry of Foreign Affairs. The views expressed are those of the authors and do not necessarily represent those of the European Forest Institute or the Ministry.

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Foreword

Illegal logging has been high on the agenda of forest policy processes throughout recent years. Aside from the problems related to tropical regions, from a European perspective the situation in parts of the Russian Federation has been of interest, not the least also because of a number of publications and interventions by NGOs highlighting the issue.

A central problem in the discussions around the issue of illegal logging and possible countermeasures has always been the availability of reliable information about the extent of the problem. Furthermore the economic impacts of illegal logging is being widely discussed as are the costs which might be related to possible countermeasures. While figures have been published by different actors from the fields of NGOs, industries and public authorities, there has been a need for independent scientific analysis of available information as well as for the methods currently being implemented. The study documented in this report has been a contribution towards this end.

The Royal Institute of International Affairs and the UK Department for International Development (DFID-UK) have over the past years been at the forefront of establishing a stakeholder discussion process related to all aspects of illegal logging, with a special emphasis to the implications of the EU-FLEGT action plan. Finland, as the most important European partner for the Russian forest sector has also a vital interest in this debate and has been active in all relevant policy processes in this context.

Together with the Finnish Ministry for Foreign Affairs. DFID-UK is to be thanked for having commissioned this study, which was set up with the aim of improving the scientific information base for discussions related to the issue of illegal logging in European areas of the Russian Federation.

Further thanks have to be expressed to the Russian Ministry for Natural Resources, which has been supportive in the provision of relevant data as well as in providing platforms for the distribution of project results to relevant stakeholders in the Russian federation.

In addition the authors also wish to express their gratitude for the manifold advice and information which they received throughout the project from representatives of NGOs, the private sector and public authorities, which often provided valuable additional input for the final compilation of information analysed in this report.

Last but not least a thank you has also to be said to the colleagues from scientific institutions both in the Russian Federation as well as in the European Union, whose contributions in meetings and workshops have been invaluable and whose comments and reviews to this report the authors are eagerly awaiting

Joensuu, October 2005,

For the authors:

Dr. Andreas Ottitsch

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Note on abbreviations and terminology

All abbreviations and acronyms are explained or written in full length at their first occurrence in the text.

The terminology for forest products is following the standards of UN-FAO (FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS).

Unless otherwise specified all measurements are given in metric units and according to SI (Système international d'unités) –standards.

For currency amounts, the following abbreviations are used:

EUR: Euro

USD: United States Dollar

RUB: Russian rouble

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Executive Summary

This report examines the potential impacts of implementing trade controls, such as the licensing scheme proposed in the European Union's FLEGT (Forest Law Enforcement, Governance and Trade) Action Plan, aimed at preventing trade in illegally logged timber between North-Western Russia. The results are based on three linked studies:

- 1) An assessment of the volume of timber of unknown origin (i.e. possibly from illegal logging) produced in North-West Russia
- 2) An assessment of existing controls that might prevent illegally logged material originating in the Russian Federation from entering EU-markets
- 3) A scenario analysis on the impacts of a possible Voluntary FLEGT Partnership Agreement between the European Union and the Russian Federation

Task 1 – Assessment of volume of timber from unknown origin (possibly from illegal logging) in NW Russia

This task involved compilation of currently available information on illegal logging in the Russian Federation. Estimates made by the major sources available are compared, and the method used for each estimate is described.

In addition, a comparison of production (including net imports) and consumption data was carried out and the results compared with the most widely cited estimates that have used a similar approach, i.e. those by WWF.

- **The raw result of the analysis suggests that 15% (as a percentage of total consumption) of the timber consumed in or exported from NW-Russia cannot be explained by production (including net-import) data.**

These estimates are somewhat below other published data using a similar approach. The possible reasons for the difference of the raw result to other published estimates are discussed in the report. Both for consumption as well as for production the study presented in this report identified considerably higher quantities than the currently most widely cited one (WWF – Brukhanov, 2003).

On the production side the main difference results from the fact that the WWF-estimates used GOSKOMSTAT-data (now ROSSTAT) for assessing the total wood harvest, whereas the estimates carried out by the European Forest Institute, EFI relied on statistics of the Ministry of Natural Resources of the Russian Federation (MNR) as the main source for wood production estimates. Since GOSKOMSTAT only records harvest by medium and large companies, they underestimate the total – officially recorded – wood harvest considerably. On the consumption side the study presented in this report included product groups (i.e. particle boards), which have not been considered at all in the WWF estimates. Some of the differences between the estimates can also be explained from different conversion factors used in the conversion of different forest products to round wood equivalents (RWE). The factors used in this report take into account that production for domestic markets – especially

in sawmilling – will use technology which results in lower conversion factors, thus resulting in lower RWE per unit of product than those used in the WWF publications.

The report further stresses the sensitivity of the “production-consumption comparison” method to data that cannot be directly measured. This includes local and small scale production and consumption, estimates on the use of wood residues and most importantly figures for internal trade within the Russian Federation.

Such factors can influence the result in terms of %-points increasing or decreasing the volume discrepancy as follows (see section 1.2.3 of the report for details)

- Consumption by small local sawmills which is not recorded by statistics could add to the balance on the consumption side and thus increase the discrepancy by 3%-points
- On the production side the production of pulp quality chips from sawnwood residues is underrecorded in official statistics in comparison to potentially available volume. Increasing this to 70% (instead of current 35%) of the theoretically available volume would increase the volume on the production side by 1.7 M m³ or around 3%-points
- Internal trade is poorly recorded. This becomes evident if wood-balance results for other large regions (okrygs) are also taken into consideration, which show considerable surplus volumes on the production side (see chapters 1.2.2 and 1.2.3.1.2). If only those oblasts within these regions are taken into account, which are immediately bordering the North-West region, the balance on the production side would be increased and consequently the discrepancy reduced by 1 M m³ or 2%-points
- Surplus volumes in other areas of European Russia could be taken into account to an even higher level. If half of these surpluses are taken into consideration this would result in additional 3 M m³ on the production side (as additional imports from internal trade). Such a quantity would mean a reduction of the deficit by 8 %-points

Thus, if only decreasing factors were effective, the discrepancy could reach levels as low as 5%, controversially, if only increasing factors were effective, it could go up to almost 20%.

It is difficult to make a precise statement on the exact level to which these factors are present. Assuming that factors both increasing as well as decreasing the discrepancy are at work, the following conclusion is made:

- **Taking into account factors potentially increasing or decreasing the discrepancy, a range of 10% to 15% (as a percentage of total consumption) is suggested as a realistic range for wood of unknown origin**

In addition to the examination of production and consumption volume data, a pilot study on the use of a combination of official management data and remote sensing technology has also been carried out. This used remote sensing data to assess harvest activities carried out without the knowledge (or approval) of official authorities for Novgorod Oblast. For the year analysed (2000) this analysis suggested that the clearcut area was 11% greater than that of officially recorded legal cuts. This result is remarkable since the production-consumption volume comparison for Novgorod renders a positive discrepancy – albeit for another period (2002).

Task 2 – Assessment of the effectiveness of existing controls on preventing exports of illegally logged timber

This task involved investigation of the official export requirements and additional measures by private companies in relation to their potential effectiveness in ensuring the legality of material exported from the Russian Federation to the EU.

Current official requirements do not appear to constitute a major obstacle for export of wood from unknown sources, mainly for the following two shortcomings:

- The current paper-based system for issuing logging licenses seems vulnerable to forgery and fraud, and also makes verification of licenses tedious and time-consuming
- For export formalities the logging license is only needed as proof of origin for obtaining a phytosanitary certificate. License documents are not routinely verified for their authenticity

The effectiveness of *official requirements* could be improved by switching from a strictly paper based system of license issuing and recording to an electronic one. Such a system would be less susceptible to forgery or fraud and also allow more regular validity checks for licenses by public authorities (e.g. phytosanitary and customs authorities). It could also assist the track of origin systems of private companies.

Existing measures by *private companies* are based on requirements to prove the origin of the material (most of them at the level of individual stands). In addition to a reliance on official documentation (logging licenses), the possibility of the buyers checking their suppliers' operations seems to be the strongest element of most measures analysed. Most of the companies examined have also already implemented a system of tracing of wood origin, including GIS-based mapping of supplies.

The measures by most private companies examined are covered by these companies' environmental management systems and as such are certified to ISO 14001 and/or EMAS. Although independent verification during certification audits is based on a "check of systems", rather than the regular verification of individual shipments, these do require audited companies to be able to demonstrate that they and their suppliers are complying with relevant legislation and to keep records of compliance as well as actions taken in case of non-compliance.

About 75% of the volume of timber imported from the North-West Russia into the EU is covered by a proprietary tracking system that is either certified to ISO 14001 or EMAS registered. As these systems explicitly include provisions to exclude illegal material, these should provide an adequate level of assurance that only legal timber is handled.

Unless negligence or worse is assumed within the process of issuing these labels, it may be stated that existing systems seem to be effective in achieving the tasks for which they were designed.

FSC certification (forest management and/or chain of custody), too, is based on an evaluation of systems and compliance checks within the framework of regular audits, rather than permanent control of operations. Currently the FSC-certified forest area amounts to around 2% of the total forest area in the North-West region.

Task 3 – Scenarios on the possible impacts of implementing trade controls

This final scenario analysis uses the conclusions from Task 1 and Task 2 to formulate scenarios on the possible impacts of a reduction in the trade of material from unknown origin from the Russian Federation to the European Union.

Two groups of scenarios were formulated. One group, labelled “Trade” in the report, assumes that FLEGT-measures would ONLY affect the export from the Russian Federation to the European Union (thus allowing for market substitution on the side of Russian exporters unwilling to participate in a license scheme). A second set of scenarios, labelled “RU_Harvest” in this report, assumes that measures would affect the supply of material in Russia directly, thus assuming that the FLEGT-measures would also affect practices within the Russian Federation in general.

Both groups of scenarios were calculated with different estimates of current levels of wood from unknown origin, assuming 5%, 10%, 15% and (only for the harvest scenarios also 20%) levels of wood from unknown origin, using the following rationale:

- For estimates of the levels of wood from unknown origin in the Russian Federation:
 - A range of 10% (low) - 15% (high) share of wood from unknown origin is considered a realistic range of estimates, based on the analysis carried out by EFI.
 - Two more scenarios were introduced in order to examine the potential impact of more extreme assumptions:
 - a “very low” estimate of 5% of wood from unknown origin
 - a “very high” estimate of 20% of wood from unknown origin

- For estimates of the levels of wood from unknown origin currently traded between the Russian Federation and the European Union the following considerations are made:
 - Assuming that wood from unknown origin in the North-West Region is in the 10% - 15% range, this amounts to between 4.8 M m³ to 7.1 M m³ per annum. The latter amount is roughly equivalent to that 25% of all international exports (roundwood and sawnwood (in RWE)) from the region, which is not considered to be covered by private sector measures.
 - It would thus **in theory** be possible to assume that even 25% of all exported material could come from unknown sources, if it is suggested that material from unknown sources is exclusively exported.
 - However, it does not seem to be logical to assume that material from unknown sources is exclusively exported, since official export formalities require at least an additional illegal act (forging of a logging license) and thus distribution via domestic markets offers a more risk-free alternative especially for parties less professionally organised. Domestic demand is sure to exist for such material.
 - For lack of any more precise empirical data regarding the share of material from unknown sources in export trade, it was thus eventually decided to use the approach taken by most NGOs in this context, which assumes that the share of material from unknown sources in export trade roughly equals that in domestic production.
 - For a 15% estimate of “wood of unknown origin” as share of the total consumption in North-West Russia a 15% share of such material in export trade to the EU would correspond to slightly more than half of all the “unknown” material directed into this export trade.

- Consequently the following scenarios for the amount of material of unknown origin in export trade are made:
 - A 15% -assumption, based on the considerations introduced above
 - In addition to the 15% -assumption for material from unknown sources in trade, also a 10% and 5% scenario were calculated, corresponding to the “low” and “very low”-estimates from the production-consumption comparison carried out by EFL.
 - For the trade-scenarios no “very high”-estimate (i.e. 20%) -scenario was formulated, as that would assume that 80% or more of all material exported and not covered by private measures is derived from unknown – possibly illegal sources.

Both groups of scenarios assume that measures would primarily affect the availability of material and thus prices. For lack of any sound basis for a different assumption, the scenarios assume an immediate 100% effectiveness of FLEGT-measures in relation to reducing the production and/or export of material from “unknown origin”.

With the “very low” and “low” scenarios FLEGT measures would have relatively modest impacts on both the “trade” and the “Russia internal” scenarios, with only relatively small reductions of exports, which would eventually be “evened out” by normal market developments.

The consequences of the “high” scenarios, however, would be “negative” for forest industries in that they would result in higher prices for raw material. For the same reason, however, they would to some degree be “positive” for forest owners in the EU, who would be able to achieve better prices for their production. Overall income effects on either side would be relatively marginal (in the range of 1%).

The results from the “RU_Harvest”-scenarios were also used to carry out different approaches to assess the financial damage from suspected illegal logging activities in the North-West Region. The following basic assumptions are required as preconditions for such an assessment:

- The assessed quantities of wood from unknown origin are used as proxies for amounts of illegal logging
- A current price per m³ for wood sold “at the mill” of 30 USD is assumed as an average across all species and qualities in the North-West region
- An average stumpage fee of 1.5 USD per m³ is assumed across all species, qualities and sites across the North-West region.

The resulting estimates are – for the most part – restricted to the direct economic damage to forestry operations “from the forest to the mill” in North-West Russia, including losses to the forest owner (i.e. the Russian Federation). Depending on the used approach, the following statements can thus be made:

- Direct losses of gross-income to the government from unpaid stumpage fees amount to 2.9, 5.3 or 7.6 M USD for the 5%, 10% and 15% estimated shares of illegal logging respectively.

- Taking into account the impact of assumed quantities of illegal logging on harvest volumes and timber sales prices, legal operators are currently losing 120.1, 201.3 or 274.4 M USD for the 5%, 10% and 15% suspected shares of illegal logging respectively. This is a loss in gross-income and also includes taxes which would have to be paid from such income.
- If the level of punitive fees, which authorities are collecting in cases of illegal logging brought to court, is used as an official estimate of the damage, the Russian society suffers from illegal logging activities, then the damage would reach levels of 187.5, 357.5 or 555.0 M USD for suspected levels of 5%, 10% or 15% of illegal logging in North-West Russia respectively.

1 Assessment of wood from unknown origin in NW-Russia

The purpose of this chapter is to compile available knowledge on the level of “illegal logging” in North-West Russia as one input into the scenario study carried out in this project. The chapter starts out with a literature review of available estimates on illegal logging and consequences of the phenomenon in the Russian Federation and in the North-West region in specific.

The currently most widely used approach to estimate the level of illegal logging is based on comparing statistics of forest products production (i.e. harvest level and net foreign trade) and forest product consumption (i.e. material use by processing industry and local uses (e.g. construction & fuelwood)). This method is not a priori giving information on the amount of illegal logging, but on the discrepancy of statistical data for wood production and consumption. If the amount of material consumed is larger than the amount produced and net-imported the method renders an estimate for “wood from unknown origin”.

In order to investigate the possibilities of this method more in detail, EFI, in co-operation with Prof. N. Burdin, also carried out an analysis using this method in order to assess the volume of wood from unknown origin for the North-West region. This result is then also compared to available results by WWF for the same region.

Another approach, used increasingly in this field, is the comparison of officially registered harvest areas with actual harvest activity, detected from remote sensing analysis. In the third part of this chapter such an analysis is performed for Novgorod oblast. The intention of this element of the study was to assess the feasibility of the method for implementation on a larger scale.

1.1 *Review of existing sources on illegal logging activities in NW Russia*

1.1.1 Understanding of “illegal logging”

Illegal logging is seen as a threat to sustainable forestry and national economies worldwide. It is a form of forest crime that may be accompanied with illegal timber processing, transport and trade. Often associated with organised crime and corruption, illegal logging harms economies of producer and consumer countries. It has a range of negative economic, governance, social and environmental impacts.

The North-West of European Russia is the origin of most forest products exported to Europe. Several publications have indicated illegal logging as a significant problem in the Russian Federation. Different assessments exist on the scale of illegal logging in North-West Russia – from less than 5% to 35%. Available information is fragmented and can be found in publications on the topic as well as in the mass media. However, this information must be evaluated critically and credibility of the source should be taken into account.

Illegal logging is an elusive concept defined differently by various authors and organisations. No single internationally accepted concept exists on what logging is illegal because what is illegal in one country may be legal in other. Various stakeholders use different definitions and estimation methods when addressing illegal logging. Definitions may accent the environmental damage, violations of legislation, tax-revenue loss and/or the lack of

government control over natural resources. There is a significant difference in the understanding of what illegal logging is, depending on the sector, country, and type of activities (WWF Latvia 2003).

According to the Resolution No.14 of the Russian Federation Supreme Court of November 5, 1998 illegal logging is defined as: 'Illegal forest felling operation (cutting) is cutting of trees, bushes and lianas without a felling ticket, order or cutting with a felling ticket, order issued with abuse of the existing cutting-practice rules, as well as cutting carried out at the wrong site or beyond a site's borders, exceeding the set quantities, cutting of wrong species or of trees, bushes and lianas that are not subject to felling ticket, order, before and after logging period fixed in felling ticket, order, logging of trees, bushes and lianas that are forbidden to log according to Resolution No.155 of the Government of the Russian Federation June 1, 1998, or after the announcement of a decision about temporary prohibition, restriction or complete discontinuance of forest user activities or the right to use forest area.' *The definition is related to the application of Article 260 of the Criminal Code of the Russian Federation.*

The same definition of illegal logging is given in Morozov's (2000) study published by Greenpeace. WWF in its Position Paper – Illegal Logging and Forest Crime (2002) states 'illegal logging occurs when timber is harvested, transported, processed, bought or sold in violation or circumvention of national or sub-national laws'. The harvesting procedure itself may be illegal, including corrupt means to gain access to forests, extraction without permission or from a protected area, cutting of protected species or extraction of timber in excess of agreed limits. Illegalities may also occur during transport, including illegal processing and export, mis-declaration to customs, and avoidance of taxes and other charges.

Legality applies to harvesting methods, sources, and timber trade, and the fulfilment of national regulations covering fees and other rules. For the Russian Federation it means that all requirements of the laws of the Russian Federation *On Environment Protection, On Protected Nature Areas, On Environmental Impact Assessment, On Wildlife, Forest Code and Water Code* must be fulfilled (Taiga Rescue 2000).

Some parties, for example WWF, have begun to address the issue of "timber of unknown origin" not "illegal logging". This is mostly due to the fact that most available methods used to assess the phenomenon on a larger scale are based on methods which aim to verify the origin of material or compare statistics on known timber harvest with other types of surveys (e.g. satellite imagery) on actual harvest activity. The estimates presented in sections 1.2 and 1.3. of this report are also based on methods which are designed to assess quantities of "timber from unknown origin".

1.1.2 Method and data

Literature studies were done to assess the current state of publicly available information on illegal logging activities in the study area. Information both in English and Russian was analysed. Additional statistical information was requested on the oblast (administrative units of regions) level from the Ministry of Natural Resources of the Russian Federation.

The problem of illegal logging is complex and unique. The issue is also discussed in mass media. The role of mass media is important in portraying various issues including illegal logging. Journalists usually refer to their sources of information. Some authors giving an overview on the issue and estimates on the scale of illegal activities repeat estimates published earlier. In such case following the cross-referencing it is sometimes possible to

detect the original source of information. Sometimes the same paper also provides several estimates, derived from various sources. (e.g. Brukhanov *et al.* 2003; Toyne *et al.* 2000).

The share of illegal logging is estimated usually as a percentage of total logging or of total timber usage. Available sources provide information on timber volume (in cubic metres) obtained violating forestry legislation. Additionally the economic loss in EUR (€), USD (\$) or national currency is published by some sources, using either the market value of the timber, the value of stumpage fees and lost taxation income or other evaluation approaches. Governmental sources, e.g. the Ministry of Natural Resources of the Russian Federation, often provide the information on the number of registered trespasses against forest legislation.

Data used in this study include official estimates, estimates given by non-governmental organisations, such as WWF and Greenpeace, and estimates published by other authors.

Official statistics only show crime level that was officially reported. Official statistics do not represent the full scope of the problem, but these statistics are certainly useful in the analysis of illegal logging trends - changes in volume of illegally harvested timber and number of registered breaches, and also the dynamics of estimated economic loss.

Information published by NGOs usually aim at illustrating the full scope of the problem, using mostly indirect methods (e.g. comparison of production and consumption statistics) in order to identify and illustrate the magnitude of illegal logging.

1.1.3 Available estimates on illegal logging in NW Russia

More than 40 estimates on illegal logging were analysed (for a complete list see Annex 2.) and three main information sources were indicated: Ministry of Natural Resources of the Russian Federation, Greenpeace Russia and WWF Russia.

1.1.3.1 The Ministry of Natural Resources of the Russian Federation's official estimates on quantities and economic impacts

The Ministry of Natural Resources estimates illegal logging through the share of harvest activities for which trespasses against harvest regulations have been registered. As a direct indicator of illegal logging this method would thus imply a 100% detection rate for this type of criminal or administrative trespasses. In addition this figure is sensitive to the level of administrative resources (personnel and material) available to monitor the harvesting activities and to their capacity to detect and register these offences. Some sources (Kakizawa, 2001) also claim that illegal logging cannot be conducted without co-operation with the officials, which is another factor to be considered when studying and evaluating such data. Some *leskhoz* (forest management districts) clearly admit that local forest services “are some of the most serious violators of forestry rules and regulations” (cited by BROCC *et al.* 2000), but discipline problems of officials are not officially confirmed by the forest administration (Kakizawa, 2001).

Illegal harvesting constitutes around 90% of all forest-related abuses (Ministry of Natural Resources of the Russian Federation 2003). Around 20% of all forest-related abuses are turned over for investigation, 16% taken to court and 3% are found guilty (WWF, 2002b). For example, a total of 24 847 cases of illegal logging were registered in 2002, only 3621 cases were turned over the court investigation. To take a case to court the person's guilt should be

proved. The guilt should be proved according to the law; in the case of forestry violations a protocol should be followed according to the Regulations of Goskomleskhoz of USSR issued in 1986. If the protocol is followed incorrectly it loses its legal power. Ignorance of instructions is a reason why cases are often turned down (Korelskiy 2001).

According to the Ministry of Natural Resources of the Russian Federation the volume of illegally harvested timber was 716 191 m³, which is approximately 0.6% of total logging volume in 2002. A total of 120 011,8 m³ or 17% from the total volume of illegally harvested timber in 2002 was logged in NW Russia. A total of 24 847 breaches was registered in the Russian Federation in 2002, and 3527 or 14% of those were in NW Russia.

There are ten regions, oblasts, in the North-West Region of the Russian Federation – Murmanskaya, St. Petersburg/Leningradskaya, Pskovskaya, Novgorodskaya, Vologodskaya, Arkhangelskaya, Kaliningradskaya Oblast, Republic of Karelia, Republic of Komi and Nenets Autonomous District. On average 0.4% of timber in NW Russia is harvested in violation of the forestry legislation, and the figure varies between 0.04 – 5.6% in different oblasts. According to the Ministry of Natural Resources the most severe situations with illegal logging in the North-West Region in 2003 were in the Republic of Komi (31.1 th. m³), Arkhangelskaya Oblast (30.8 th. m³), Vologodskaya Oblast (21.9 th. m³) and Leningradskaya Oblast (19 th. m³). The detailed table for illegal logging levels at oblast-level, as recorded by the Ministry of Natural Resources is presented in Annex I.

According to official statements illegal logging was not an issue during Soviet times. The problem appeared after the collapse of the Soviet Union, and was particularly severe after the economic crisis in 1998. Between 1996 and 2002 the highest number of illegal logging cases in the Russian Federation was between 1999 and 2001, after which the number has decreased. The illegal logging trend in NW Russia follows the same pattern (Figure 1).

According to statistics of officially registered trespasses, the volume of illegally harvested timber and the number of illegal logging breaches in NW Russia are less than 20% (of the volume) of total registered trespasses in the Russian Federation. According to these figures the majority of illegal logging activities take place outside NW Russia.

Russian authorities believe that the increasing trend of the average volume of each individually registered offence (Figure 2) proves the existence of organised groups of forest violators (Ministry of Natural Resources of the Russian Federation 2003). The average volume of illegally harvested timber per theft in NW Russia is slightly higher than the average in the Russian Federation. The high-low lines in Figure 2 show the minimum and maximum values in different Oblasts. For example in 2003, the smallest average volume in one of the Oblast's is 1.5 m³ and the largest 125.6 m³. While the former quantity could reflect "household" or even "subsistence" use, the latter seems to indicate a more professional activity (requiring more personnel and also heavy machinery for removal from the felling site and further transport).

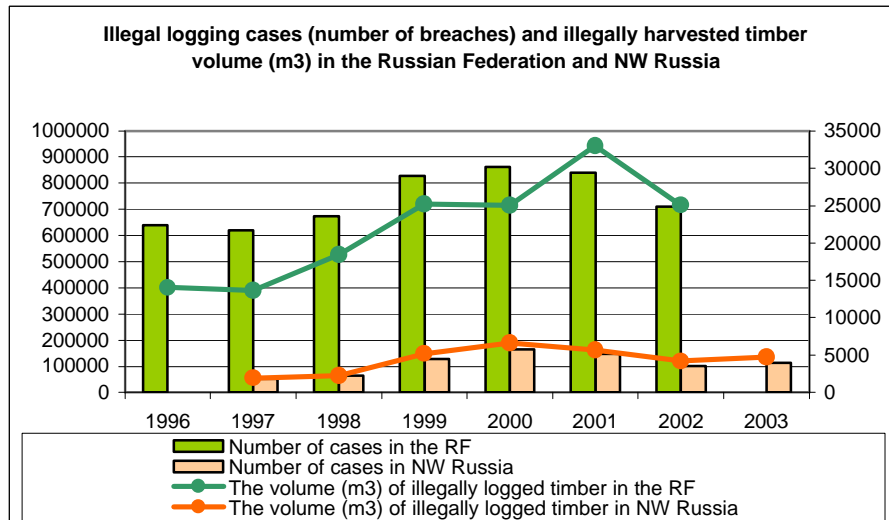


Figure 1. Illegal logging cases (number of breaches) and illegally harvested timber volume (m³) in the Russian Federation and NW Russia, Source: Ministry of Natural Resources of the Russian Federation

The Ministry of Natural Resources of the Russian Federation uses the amount of issued fines as a direct indicator for the financial damage caused by illegal logging.

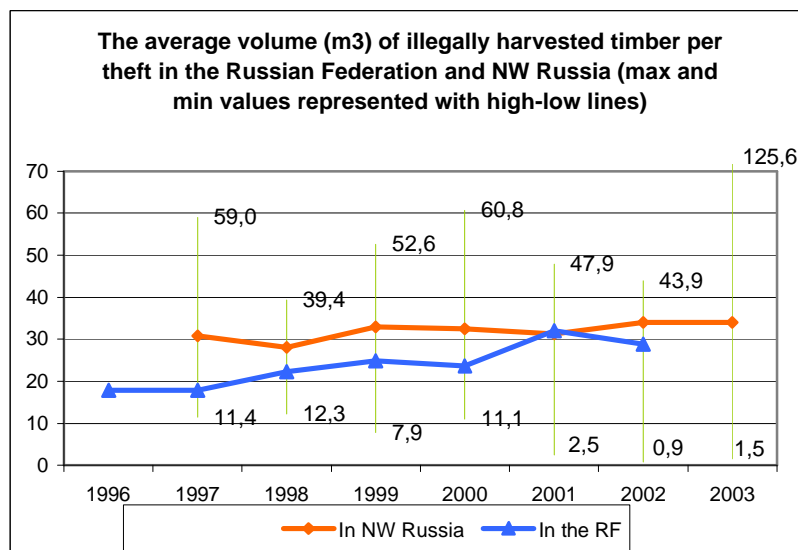


Figure 2. The average volume (m³) of illegally harvested timber per registered offence in the Russian Federation and NW Russia. Source: Ministry of Natural Resources of the Russian Federation

Thus, according to the Ministry of Natural Resources of the Russian Federation (Ministry of Natural Resources of the Russian Federation 2003) estimated loss due to illegal logging in the Russian Federation was 5.5 billion roubles (183.3 M USD) in 2002. It is the amount of money what theoretically should be recovered through fines if all cases would be detected and perpetrators found. Economic loss for the state through illegal logging has been increasing

together with the volume of illegally harvested timber. There is a significant increase of economic loss in 2001 and 2002 (Figure 3). Economic loss in NW Russia is around 16% of the total in the Russian Federation. In 2002 the volume of illegally logged timber was almost the same as in 2000, but the economic loss was more than 11 times higher.

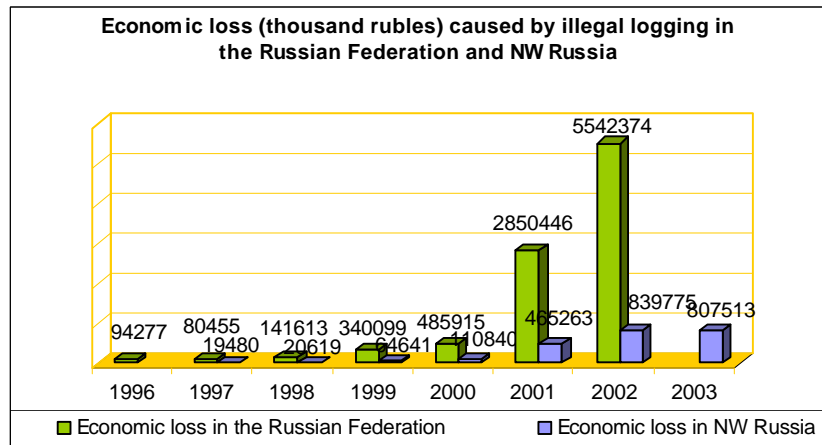


Figure 3. Economic loss in thousand roubles caused by illegal logging in the Russian Federation and NW Russia, according to the Russian Ministry of Natural Resources, based on issued fines. Source: Ministry of Natural Resources of the Russian Federation

For better comparison and to exclude the impact of conversion rate fluctuations and inflation, the values from Figure 3 have been converted to USD, using corresponding exchange rates for each year and deflators to 1996 USD-prices (Belousov 2003). This is presented in Figure 4, together with further details described below.

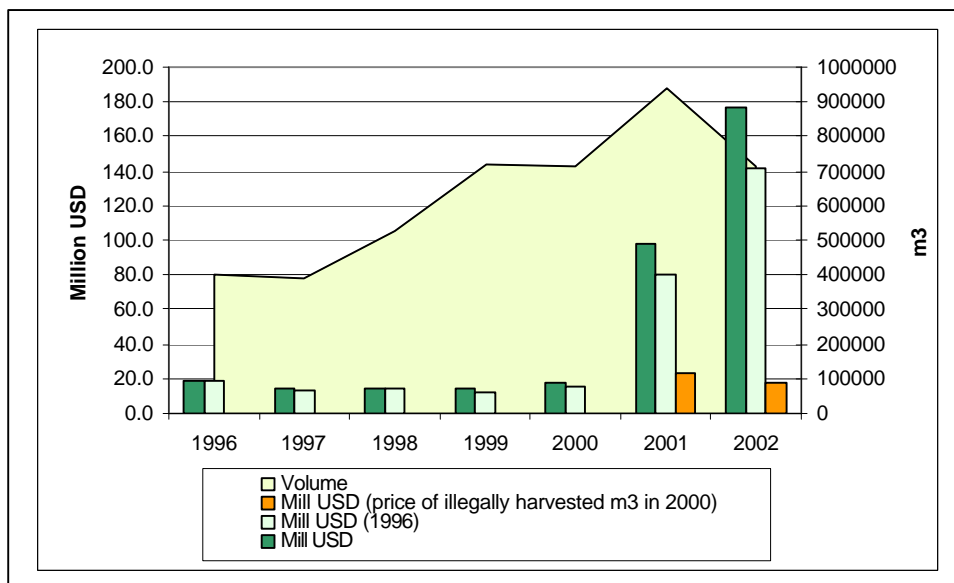


Figure 4. Economic loss in USD and USD (1996) and volume of illegally harvested timber in m³

The economic loss has slightly decreased since 1996 and in 2000 was close to the level of 1996. The volume of illegally harvested timber in 2000 is almost twice as high as in 1996. In the following years 2001 and 2002 the economical loss increases significantly more than the corresponding amount of officially registered trespasses.

The abrupt change from 2000 to 2001 can be explained with changes in existing legislation for the assessment of damages caused by violations of forestry legislation. Resolution No. 67 of Government of the Russian Federation (5.02.1992) was replaced with Resolution No. 388 (21.05.2001). According to Resolution No. 67 the economic loss was estimated ten times of the stumpage price, and if logged in protected areas, it could double.

The more recent figures (from 2001 onwards) are based on Resolution No. 388. Resolution No. 388 describes 19 types of violations including illegal logging of mature trees (Type 3). The fine for such an activity is 50 times the stumpage price for each illegally logged cubic metre of wood. The fine may include other values, e.g. if the logging is carried out in protected areas the fine may increase two to five times depending on the protection regime. Also other types of violations may be included in the total fine, e.g. damages to standing trees, and bushes. The same methodology is applied to estimate the fine, regardless of the wood being for industrial or fuel use. The fine is imposed both to civilians and legal persons. The average stumpage price in 2001 was 38.8 rub/m³ and 37.9 rub/m³ in 2002

Official documents do not provide any detailed information on the calculations the fee value is based on, such as factors that have been taken into consideration for evaluating the damage.

However, if the average damage value (24.17 USD per m³) of 2000 for each illegally harvested cubic metre is used for 2001 and 2002, then the economic loss stays at a roughly similar level as before.

The method of stumpage rate calculation was developed during Soviet times. It is not based on the market pricing mechanisms for forest products and it does not take into account the whole complex of the rent formation factors (Bosquet 2002). According to the Ministry of Natural Resources the average stumpage price in the Russian Federation in 2002 was 37.9 rub/m³. There are price differences between the regions and oblasts. Tree species, tax group, transporting distance from the forest and type of timber (without bark – large, medium, small and fuel wood) determine the stumpage rate. The highest minimum stumpage prices are for broadleaved species. In some oblasts, e.g. Kaliningradskaya Oblast, the highest rates are around 500 rub/m³ (~16 USD/m³) for beech, oak, maple and ash (Resolution of the Government of the Russian Federation 2001 (with amendments 2003)).

The officially recorded amount of economic damage demonstrated above is not the actual amount of state “income” from penalty fees, as not all registered offences result in fee convictions or even prosecution.

The following example (for the year 2002) illustrates this:

In 2002 there were 24 847 cases of illegal logging registered in the Russian Federation. For this year the official records list a total economic loss of about 5.5 billion roubles (Figure 3).

In total 3621 cases were turned over to official court investigation, resulting in convictions and imposed penalties at the level of 197 million roubles.

In 10 052 cases voluntary compensations for damages were paid, resulting in a total sum of 109 million roubles. Furthermore in 7096 cases administrative fines were imposed, resulting in a total of 3.3 million roubles.

If it is assumed that all fines and penalties would have been paid then the total amount of penalties would have been 309.3 million roubles in 2002. This amount constitutes to less than 6% of the estimated loss of 5.5 billion roubles. However, only 170 million roubles have actually been recorded as paid, which equals to 3% of estimated loss.

In the country report for UNECE/FAO Workshop on Illegal logging and trade of illegally derived wood products in the UNECE region in Geneva, 16- 17 September 2004, illegal logging is estimated 5–10%. No further figures are given. The representative of the Russian Federal Forest Agency, which is under the Ministry of Natural Resources of the Russian Federation, presented the report.

Concerning export statistics in Russia, one must be aware of their approximate character. The statistics field is under a process of development as the links between different institutions have collapsed and new ones have not yet been established.

1.1.3.2 Estimates by Greenpeace

Greenpeace estimates the scale of illegal logging as 20%. Morozov (2000) gives the figure in his report *Survey of illegal forest felling activities in Russia*. Greenpeace (2000) published the report and its summary. Some of the authors (Contreras-Hermosilla 2002a and 2002b; Tacconi *et al.* 2003; Toyne *et al.* 2002; Auer *et al.* 2003) mentioning illegal logging in Russia refer to the report's summary.

The assessment of Greenpeace does not specify the scale of illegal logging activities within different regions. Some regions, such as Caucasus and Far East, and export destinations (Turkey and China) and types of forest products (valuable hardwoods) are particularly affected, and the proportion of illegal timber can reach more than 50–70 %. These estimates are based on expert opinions.

Apart from the 20% figure, an estimate of more than 75% “wood being cut in violation of Russian forestry regulation” can be found (Green Nature, 2003). As the most common violation Greenpeace names logging without an ecological survey. According to the Federal Law “On Ecological Survey” the state ecological survey has to be carried out for the forestland transformation to non-forest land and for the forest management plans (State Duma, 1995). It is necessary to carry out the state ecological survey for the applied forest regeneration techniques and technologies to ensure sustainable forest conservation and regeneration (State Duma, 1997). Also it is one of the requirements to carry out clear-cutting practices, although the Regulations do not specify the size of the total clear-cut area (Federal Forest Management Service of Russia, 1993). According to the Oblast's regulations, Environmental Impact Assessment¹ should be carried out if the total cutting area exceeds 200 ha or in the case of forest land transformation to non-forest use area exceeding 20 ha (Government of the Republic of Karelia, 1999).

Most of the papers published by Greenpeace concern illegal logging in the Russian Far East. There is not much information on illegal logging activities in NW Russia given by Greenpeace.

¹ Ecological survey is same as Environmental Impact Assessment, both translations are correct.

Expert estimates are widely used to collect the information on the scale of illegal logging in a particular country. The method is carried out by contacting the national experts and summarising their opinions. Estimations on the scale of illegal logging are based on their knowledge and experiences in forestry. Some expert estimates can be partly based on the official statistics or be identical to official statistics. However, these estimations may be emotional and subjective, and not based on any data. There are significant differences in understanding what illegal logging is among experts (WWF Latvia, 2003). When estimating illegal logging some experts may apply a very broad definition that includes harvesting, transporting, processing, trade, etc., or a narrow definition that includes only harvesting. The weaknesses of expert estimates are the lack of criteria for distinguishing an expert from a layman and possible subjective and/or emotional estimates.

1.1.3.3 Estimates by WWF

The main sources of information on illegal logging activities in NW Russia are WWF publications. WWF estimates the scale of illegal logging from 10% to 50%, in some cases even 70% or 100%. The highest estimates of 50% or 70% concern illegal logging in the Russian Far East, and 100% in Caucasus, where red listed species like chestnut are logged (WWF, 2004). Illegal logging in NW Russia is estimated between 25% and 30%. The latest figures are 36% (Lopina *et al.*, 2003) and 27% (Brukhanov *et al.*, 2003).

The 36% (Lopina *et al.*, 2003) figure was derived from comparing the wood harvested in the region with the total wood consumed and exported from the region. For the comparison, data from the State Statistics Committee (GOSKOMSTAT, now ROSSTAT) were used.

Information on the sales of wood in other regions of the Russian Federation can be obtained from State Statistics Committee, although such information has not been used in Lopina's estimate.

WWF estimated that there is a difference of 11.2 M m³ between total legal industrial roundwood harvested and imported and consumed and exported in NW Russia. WWF Russia calculates the difference as 36% of the legal production that "may be obtained from illegally harvested wood (Lopina *et al.*, 2003)". In later WWF publications the illegal logging is estimated as 27% (WWF Latvia, 2003; Brukhanov *et al.*, 2003), which is 11.2 M m³, and authors of these publications refer to the figures showed in the publication of Lopina *et al.* (2003).

The report of Lopina *et al.* (2003) was the first where the derivation of 11.2 M m³ of possibly illegal timber was presented. The most often used estimates given by WWF before that were 25–30%. Other figures by WWF do not include detailed calculations; they are based on the expert estimates or on the results of inspections done by WWF and/or Greenpeace Russia.

Mass media (News Agencies Rosbalt and Regnum, newspaper Pravda and others) reporting the illegal logging estimate of 36% or 35% refer to WWF. In the International Conference "NW Russian Forest Sector Towards Responsible Business and Sustainable Forest Management"² Kotlobay from WWF Russia presented the calculations of the material balance for Arkhangelskaya and Vologodskaya

² 4 – 5 March 2004, Arkhangelsk

Oblasts, showing a misbalance of 1297 th. m³ in Vologodskaya and 5205.9 th. m³ in Arkhangelskaya Oblast. In percentage these are respectively 15.7% and 26.8% of timber that may be illegal.

WWF Russia estimates the economic loss caused to the State through illegal logging to be 1 billion USD (mostly unpaid taxes) and refers to the Federal Service of Fiscal Police of the Russian Federation (Lopina *et al.*, 2003; WWF, 2004). The basis for this estimate is not specified.

The material balance model was first given by Palmer (2000) to analyse illegal logging in Indonesia. WWF Russia (Lopina *et al.*, 2003) is using a similar approach to estimate the volume of illegally harvested timber in NW Russia. According to this model, illegal logging can be estimated as the difference between demand and supply.

When analysing the estimates of WWF, particularly the derivation of the figures 36% and 27% of illegal logging in NW Russia provoked the question of how such considerably different results were arrived at, if the discrepancy between industrial roundwood from known sources and its consumption amounts 11.2 M m³ in both cases (Lopina *et al.*, 2003 and WWF Latvia, 2003).

A closer look at the figures reveals that the base figure taken to represent 100% is the cause of the difference. If the “production of industrial roundwood” (31.0 M m³) is taken as 100% then indeed 11.2 M m³ is 36%. But with “total consumption and export of industrial roundwood” (43.2 M m³) as 100%, then 11.2 M m³ is 27% (the actual figure properly rounded is closer to 26%). WWF bases its estimate on ROSSTAT data of 2001.

The same ROSSTAT data for 2001 are in the report of Brukhanov *et al.* (2003); the illegal logging in NW Russia is estimated as 27% with the reference to Lopina *et al.* (2003). The difference between the legal industrial roundwood and its consumption is estimated as 12.1 M m³ in 2001 not 11.2 M m³ (see paragraph above and Figure 1). The difference arises because of different coefficients applied when calculating the roundwood equivalent to produce 0.5 M m³ of plywood and veneer sheets. In one case (Lopina *et al.*, 2003) the roundwood equivalent is 1.6 M m³ but in the second case (Brukhanov *et al.*, 2003) 2.5 M m³. The difference of almost one million m³ is significant.

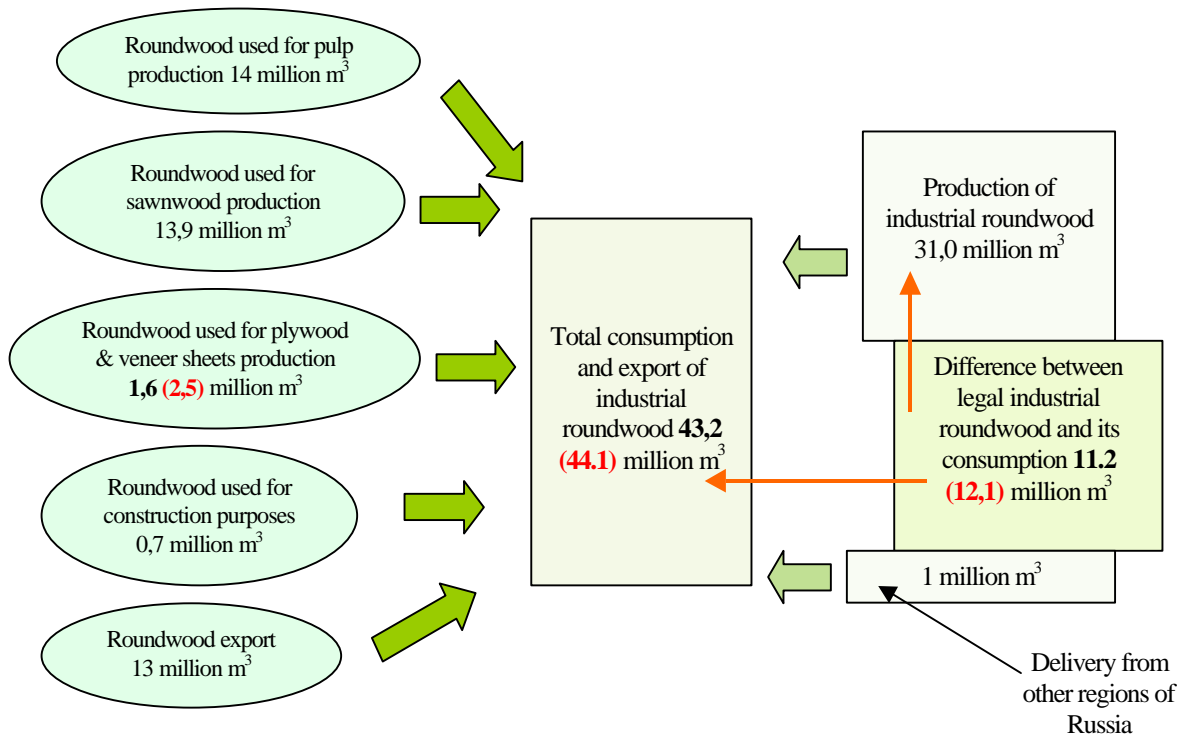
The detailed material balance model includes specified product groups. The demand side includes the exports of roundwood and mill products, domestic consumption and waste. Supply includes wood from legal logging, imports of roundwood and mill products and recycled wood products. Kotlobay (WWF) presented the results of such detailed material balance model for Arkhangelskaya and Vologodskaya Oblasts in the International Conference in Arkhangelsk in 2004³. The method has some weaknesses and to reduce errors some aspects should be taken into account when applying the method:

- Do the chosen forest product groups provide a comprehensive and objective picture of raw material use?

³ NW Russian Forest Sector Towards Responsible Business and Sustainable Forest Management, 4 – 5 March 2004, Arkhangelsk

- Does the applied coefficient for calculating the roundwood equivalent accord with realities?
- Data reliability, do they cover different sized wood harvesting and processing companies?

The discrepancies in raw material balance data indicate a relatively large amount of wood from unknown origin. If – as is the hypothesis – a considerable amount of this is assumed to originate from illegal logging, the difference between this figure and the official estimates would indicate that only a small amount of illegal activities is detected.



Production and consumption of roundwood in north-western Russia (Lopina et al. 2003 and Brukhanov et al. 2003)

Figure 5. WWF-assessment of production and consumption of roundwood in North-West Russia (Source: Lopina et al., 2003)

1.1.3.4 Other estimates

Seneca Creek Associates and Wood Resources International (SCA & WRI 2004) published a study on illegal logging recently. This study includes a chapter on illegal logging in Russia. The main focus is on illegal activities in the Russian Far East and Siberia.

SCA & WRI estimate that 15–20% of the harvests and approximately 25% of log exports in Russia may be illegal. The authors prefer the term legally suspicious origin instead of illegal logging. They have carried out an analysis of softwood and hardwood flows themselves. They estimate 17% of suspicious softwood and hardwood in total roundwood supply.

1.1.3.5 Estimates of illegal export

Estimates of illegal timber export vary between 10 to 35%. The average figure of all exports to the EU countries is around 20%. The main source of information is the publication by Toyne *et al.* (2002), published by WWF International. Toyne *et al.* do not refer to any source of information.

Many estimates of illegal export are based on comparisons of export statistics. When comparing custom statistics at the Vyborg Customs between Russia and Finland (University of Joensuu, 1996), it was noticed that exporters declared 20–25% less weight for timber trucks to the Russian Customs than to Finnish Customs. Authors suspect that the Russian Customs lack adequate means of controlling the weight of loads and cargoes, which opens plenty of opportunities for the exporters to avoid paying full customs fees.

Comparison of trade flow volumes as reported by trading partners (i.e. divergence between quantities reported by exporting and importing countries) could identify potential illegalities in trade. If trade data discrepancies are significant, it could be assumed that timber comes from illegal harvests. But there are also numerous other factors contributing to such discrepancies, for example: reporting periods, conversion factors, exchange rates, misdeclarations (which – if wilful – could be seen as constituting an illegal trade practice), and problems related to transit trade and simply incomplete statistic records. Studies carried out so far have not been able to distinguish between “normal” and an “abnormal” trade discrepancy (Eastin and Perez-Garcia, 2004). While lower export reports can be an identification of illegal or undocumented trade, export reports far in excess of imports are more difficult to interpret (Johnson, 2003).

1.1.3.6 Comparison of published estimates

There are significant differences among the figures given by different organisations. The table below (Table 1) summarises the main figures on illegal logging given by the Ministry of Natural Resources of the Russian Federation, Greenpeace and WWF.

Table 1. Main information sources on illegal logging in North-West Russia and figures given.⁴

	Source	Year	Percentage	Volume, m ³
Russian Federation	Ministry of Natural Resources of the Russian Federation	2001	0.7	941 500
		2002	0.6	716 191
		2004	5 – 10 ⁵	
	Greenpeace	Not indicated	20	
NW Russia	WWF	2001	27	11.2 M
		2001	27	12.1 M
		2001	36	11.2 M
		Not indicated	25 – 30 20 – 50	

⁴ For a complete list, see Annex 2.

⁵ Bolshakov 2004 (Federal Forest Management Agency of Russia that is under the Ministry of Natural Resources of the Russian Federation)

As can be seen, the Ministry of Natural Resources gives lower estimates than either of the non-governmental organisations. The different approaches used in estimating the figures are the obvious explanation for this discrepancy, as governmental figures are based on actually registered trespasses, while WWF is using an approach based on the comparison of timber production and apparent consumption highlighting “timber of unknown origin”, which is consumed or exported but is not accounted for in production statistics. The figures by Greenpeace are based on estimates by local experts, for which unfortunately no detailed methodological approach is described in published literature.

Available estimates on the scale of illegal logging indicate that there is no consensus on the definition of “illegal logging”. The estimates given by different organisations differ because various estimation methods are applied. The majority of quotes on estimates found in scientific as well as popular literature and other sources (including the internet) are reported by environmental NGOs. The estimates given by state authorities are lower than by NGOs. The state statistics usually refer to trespasses against the forest laws in general and harvesting regulations in specific. Normally they do not include violations of tax or labour legislation. Forest/harvesting violations are registered individually. Estimates given by NGOs are remarkably higher because they often include violations against a wider range of legislation, including especially taxation, as well as violations during timber transport, processing and trade.

WWF is the most widely used source of information for assessing the scale of illegal logging activities in NW Russia. WWF has been investigating the problem for the last few years and has a significant amount of background information and various estimates on the scale. However, some of the estimation methods applied, e.g. raw material imbalance, seem to suffer from the fact that there is no uniformity of the basic data, even when the reference is to the same year and source.

Official statistics focus only on a very narrow array of illegal activities, namely trespasses against logging regulations and by equalling the amount of registered trespasses with the assumed scale of the problem assume a 100% detection rate, which would be unique for any area of administrative or criminal trespassing.

1.2 Comparison of production and consumption data for the North-West Region

The objective of this part of the study was to assess consistency of major forest products production, wood harvest and trade statistics in North-West Russia at oblast level and the whole region. Possible inconsistencies may indicate problems with the statistics themselves and with some degree of certainty it may also indicate the magnitude of the scale of wood of “unknown” origin or wood suspected of being illegally harvested.

It is thus stressed that the method of comparing production and consumption of forest products only allows to assess discrepancies in the underlying statistics and points to quantities which obviously have not been properly recorded on either the production or the consumption side, without indicating the reason for any such discrepancy.

1.2.1 Methods and data

The wood flow both on the domestic and international markets is included in the balance calculations. The balance calculation scheme of production and consumption of industrial wood is the following:

I. Determining industrial wood resources, which includes the following components:

- a) Volume of roundwood (including firewood), harvested in republic / region;⁶
- b) Volume of industrial roundwood, harvested in republic / region;⁷
- c) Import & export of industrial wood with other regions of the Russian Federation;
- d) Import of industrial wood from abroad;

II. Determining the direction of industrial wood use, which includes the following components:

- a) Export to foreign countries;
- b) Processing of wood in sawmill, plywood, panel, pulp and paper and other industries;
- c) Roundwood used unprocessed (construction, repair, local needs, market, mining industry, power lines)

The data on the volumes of harvested wood were adopted from materials of the Federal State Unitary Enterprise (FGUP) “Roslesinform” of the Ministry of Natural Resources (MNR) of the Russian Federation “Felling by enterprises and forest groups in comparison with annual allowable cut by forest enterprises for 2002”. The volume of harvested wood includes all types of felling according to the current Forest Code of the Russian Federation. The types of felling are final, intermediate and other felling.

⁶ The terminology used for the report is based on FAOSTAT terminology. The term “roundwood” includes all material harvested and removed from the forest. A considerable amount of this is not considered to be suitable for industrial use and is therefore used as fuel wood.

⁷ The term “industrial roundwood” describes material which is considered suitable for industrial (and construction) use.

Final felling includes cutting of mature and over-mature stands for roundwood production (logs for building, sawmilling and plywood production, pulpwood for pulp and paper industry, etc). Fuel wood is harvested during final felling also. It is used as an energy source and partly as raw material in pulp and panel production. According to the Ministry of Natural Resources the production of industrial wood from the final felling in North-West region varies between 62.5% (Novgorod Oblast) and 90% (Murmansk Oblast). We estimate a slightly higher figure for production in our calculations. These include the production of raw material from fuel wood.

Intermediate felling includes thinning and reconstruction felling of low value stands. The yield of industrial wood from intermediate felling is considerably lower than from final felling and accounts for 50% on average of the total wood harvest.

Other felling includes sanitary cuttings, forest land clearing for construction of hydro-systems, pipe lines, layout of roads and establishing fire belts. The share of such felling is small (4.9% of the total wood harvesting volume). The proportion of industrial wood is assumed to be the same as from final felling.

The production volumes of basic forest products (sawnwood, plywood, particle board, fibreboard, chemical and mechanical wood pulp), the imports and exports from and to other regions of Russia are taken from official materials of former State Statistics Committee (GOSKOMSTAT, now Federal Service of State Statistics – “ROSSTAT”). Those are “Production of industrial products in terms of volume for the full range of producers, including small organisations and individual enterprises in 2002” and “Import (purchase) and export (sale) of industrial wood in 2002 (in terms of volume)”. Roundwood export statistics are from the State Committee of the Russian Federation “Custom statistics of foreign trade of the Russian Federation in 2002”.

Consumption of unprocessed wood was estimated from considering housing facilities in rural regions and retail markets for local needs based on expert estimates, taking into account construction of summer cottages, outdoor structures, fences, agriculture buildings and other local needs. Consumption of industrial wood in the mining sector for auxiliary and temporary building construction, hydro-engineering structures and power lines is based on data of Rosstat.

1.2.2 Results for wood-flow balance calculation

1.2.2.1 Total industrial roundwood production in the region (including net-imports)

There is detailed information on total wood harvest and industrial wood resources available at each oblast and republic level, the North-West region as well as the whole and total Russia. According to the Ministry of Natural Resources of Russia (see Table 2) the total roundwood harvest of the whole North-West region is 46.3 M m³. Industrial roundwood production is estimated on the basis of the region specific share of industrial roundwood from total roundwood production (based on ROSSTAT data). Total industrial wood resource of the whole North-West region is estimated at appr. 41.5 M m³.

1.2.2.2 Total consumption

Table 3 shows major wood based products production in North-West region. Production figures are from ROSSTAT. This table also shows conversion coefficients, which are used to convert wood based products into round wood equivalent (RWE). Sawnwood is one of the main wood based products in the whole North-West region, and wood pulp is another major product. These two together consume most of the industrial wood in the region.

Conversion rates for RWE are rather crucial figures for wood flow balance calculation. These rates are based on technological norms, company data and expert estimates. As an example, the conversion rate for sawnwood can be in a range of 1.6–2.2 m³ of sawlog per 1 m³ of sawnwood output. The particular value of the coefficient depends on the quality of sawlogs and the type and quality of the sawnwood produced. A rate of 1.6 can be applied to the lowest grade of sawnwood, which was a huge bulk in the USSR times. However, currently the lowest sawnwood grade is not typical. Average quality grade of sawnwood produced for domestic market consumes 1.8–1.9 of RWE m³. Export quality sawnwood may typically consume 2.1 of RWE m³ depending on the quality of sawlogs (higher diameter of sawlogs results in a lower conversion rate). Based on these considerations a conversion rate of 2 m³/m³ was applied for Karelia, Komi and Arkhangelsk regions. 50–65% of these regions' total production is export quality sawnwood. Pskov region produces over 90% of sawnwood for export, therefore a rate of 2.1 was used. Other regions produce sawnwood primarily for domestic market, and the rate of 1.9 was applied. These regional rates result in a weighted average rate of 1.97 for the whole North-West region.

Other wood based products do not differ so much in terms of conversion rates for different sub-regions, since there is no high difference within particular quality grades. It should be noted, that wood pulp is a case when different pulp grades are related to the type of technology used (sulphate pulp is the most advanced process, which consumes less wood input, whereas the old sulphite process consumes more wood, and the mechanical and semichemical pulps consume considerably less wood). It's very important to note, that paper and paperboard products are not used for the purpose of wood balance calculation, as the input of wood pulp is already accounted for.

1.2.2.3 Industrial roundwood consumption and supply comparison

Table 4 shows the resulting wood flow balance for the North-West region and sub regions. The largest user of industrial wood is the pulp industry, consuming 18.3 M m³ or 38% of the total wood consumed. Export of roundwood is the second largest consumer with 14.6 M m³ or 30% of the total consumption. Sawnwood is the third largest consumer with 10 M m³ and 20% of the total. All other wood processing industries consume 4.9 M m³ of wood or 10% of the total wood. The rest (1 M m³ or 2%) is used locally as industrial roundwood without processing.

There is a deficit of 7.34 M m³ of wood for the whole North-West region as the total consumption exceeds the total industrial wood resource, which is about 15% of the total wood consumption. This figure is largely based on the official statistics and partly on expert estimates regarding conversion coefficients. Although conversion rates for RWE used in the Table 3 are rather similar, small variations may result in some + / - 1–2 percentage point in addition to the 15% base figure. However, the major uncertainty comes from official statistics.

Table 2. Wood harvest and resources of industrial wood in North-West Region and Russia (quantities in 1000 m³)

Item	Republic of Karelia	Republic of Komi	Arkhangelsk region	Vologda region	Kaliningrad	Leningrad region	Murmansk region	Novgorod region	Pskov region	Saint-Petersburg	Total North-West region	Russia total
1. Total harvesting volume from all types of fellings,	6871	6187	11393	9047	340	7399	179	3338	1530	0	46284	164.9
of which: - <i>final felling</i>	6143	5551	10242	8352	77	5239	130	2847	1141		39723	122.8
- <i>intermediate felling</i>	443	242	961	450	99	1441	41	238	187		4102	25.1
- <i>other felling</i>	284	394	189	246	164	719	8	253	202		2459	17
2. Production of industrial wood,	6523	5497	10778	7434	234	5581	146	2057	1068	0	39317	121.5
of which: - <i>final felling</i>	5345	4718	8910	6364	58	3982	117	1780	829		32103	89.5
- <i>intermediate felling</i>	244	121	570	225	50	721	21	119	93		2163	12.5
- <i>other felling</i>	247	335	165	187	123	546	7	158	146		1915	12.4
- <i>pulp chips</i>	381	168	954	169		16					1688	3.3
- <i>fuel wood (for processing)</i>	306	154	179	488	4	317	1				1448	3.8
3. Net import of industrial wood from other regions of Russia	914	-318	1061	-1192	51	447	2	179	-20	153	1277	
3.1. Import of industrial wood from other regions of Russia	937	127	1836	137	51	642	5	227	6	153	4120	
3.2. Export to other regions of Russia	22	445	775	1329		196	2	49	25		2843	
4. Import from foreign countries					940						940	1
5. Total resources of industrial wood	7437	5179	11839	6241	1225	6028	148	2236	1049	153	41534	122.5

Table 3. Production of major wood based products and conversion rates to round wood equivalent (RWE) (quantities in 1000 m³ or 1000 t)

	Republic of Karelia	Republic of Komi	Arkhangelsk region	Vologda region	Kaliningrad	Leningrad region	Murmansk region	Novgorod region	Pskov region	Saint-Petersburg	Total North-West region	Russia total
Directions of use												
- sawmilling	722.8	585.4	1993	873.3	13.5	348.2	18.9	334.1	137.5	57.6	5084.3	19239.7
Conversion rate, m ³ /m ³	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.1	1.9		1.95
- plywood	22.2	221.3	66	140.6		13.6		136.2		116.5	716.4	1821.4
Conversion rate, m ³ /m ³	3.0	3.1	3.0	3.0		3.0		3.0		3.0		3.10
- particleboard	80.9	258.2		308.7		88.4					736.2	2737.8
Conversion rate, m ³ /m ³	1.5	1.5		1.5		1.5						1.50
- fibreboard		20.1	18.6	42.8							81.5	326.7
Conversion rate, m ³ /1000 m ²		9.6	9.6	9								9.40
- sulphate pulp	299	527.3	1436.7			350.6					2613.6	4323.6
Conversion rate, m ³ /t	4.75	4.75	4.75	4.75		4.75						4.80
- sulphite pulp	106.3		138.2	57.8	218.4	131.7					652.4	841.8
Conversion rate, m ³ /t	5		5	5	5	5						5.00
- mechanical woodpulp	440.7	173.7	270.8	25.5		8.2					918.9	1620.7
Conversion rate, m ³ /t	2.9	2.9	2.9	2.9		2.9						2.90

Table 4. Wood flow balance for North-West region and Russia (quantities in 1000 m³)

Directions of use	Republic of Karelia	Republic of Komi	Arkhangelsk region	Vologda region	Kaliningrad	Leningrad region	Murmansk region	Novgorod region	Pskov region	Saint-Petersburg	Total North-West region	Russia total
1. Export to foreign countries	3278.1	23.8	113.3	2675.5	108.2	3340.3	89.7	972.1	494.4	3541.3	14637	36800
2. Used for processing	5000.7	5597.8	13014	3375.3	1126.7	3274	36.91	1078.4	306.85	472.14	33282	82304
- sawmilling	1445.6	1170.8	3986	1659.3	25.65	661.58	35.91	634.79	288.75	109.44	10018	37517
- plywood	66.6	686.03	198	421.8	0	40.8	0	408.6	0	349.5	2171.3	5646
- particleboard	121.35	387.3	0	463.05	0	132.6	0	0	0	0	1104.3	4107
- fibreboard	0	192.96	178.56	385.2	0	0	0	0	0	0	756.72	3071
- sulphate pulp	1420.3	2504.7	6824.3	0	0	1665.4	0	0	0	0	12415	20753
- sulphite pulp	531.5		691	289	1092	658.5					3262	4209
- mechanical woodpulp	1278	503.73	785.32	73.95	0	23.78	0	0	0	0	2664.8	4700
- other use in processing	137.4	152.3	350.4	83	9	91.4	1	35	18.1	13.2	890.8	2300
3. Used unprocessed within the region	124.5	164.6	146	115	50	100	40	80	118.2	50	988.3	6000
4. Used within the region, total (2+3)	5125.2	5762.4	13160	3490.3	1176.7	3374	76.91	1158.4	425.05	522.14	34271	88304
5. Total consumption (1+4)	8403.3	5786.2	13273	6165.8	1284.9	6714.3	166.61	2130.5	919.45	4063.4	48907	125104
6. Total resources of industrial wood	7436.6	5178.8	11839	6241.4	1225.2	6027.9	148.1	2235.9	1048.8	153.2	41534	122500
7. Result (5-6)	-966.73	-607.4	-1434.4	75.63	-59.65	-686.41	-18.51	105.41	129.35	-3910.2	-7373	-2604
8. Result (5-6) as percentage of consumption (5)	-11.5%	-10.5%	-10.8%	1.2%	-4.6%	-10.2%	-11.1%	4.9%	14.1%	-96.2%	-15.1%	-2.1%

1.2.3 Discussion

1.2.3.1 Data problems and factors unaccounted for by official statistics

1.2.3.1.1 Factors contributing to a potential underestimate of wood consumption in small scale sawmills

The major drawback of official statistics (this concerns primarily ROSSTAT statistics) is that they collect data mostly from large and medium size companies. Practically all pulp and wood based panels producers fall under this category. Therefore figures for these products are regarded as more reliable.

For sawnwood the situation is more complex, as there is a large amount of small sawmills, in addition to large and medium sized ones. It should be noted, that small sawmills produce lower quality sawnwood for local markets. In most cases these small sawmills are allowed to have simplified accounting without reporting the volume of products, which they produce. There are thus uncertainties in the amount consumed by small sawmills, which may result in an underestimation on the consumption side.

Using a rough estimate of 10% extra sawnwood production for the whole of Russia would make an additional 2 M m³ of sawnwood or around 4 M m³ of RWE. This addition will result in 3.6% of wood resource shortage, which is still very modest.

Table 5. Russian sawnwood production, export, apparent consumption and construction sector volumes

Period	Production M m ³	Exports - M m ³	Apparent consumption M m ³	Residential construction, M m ³	Renovation of residential buildings, M m ³	Residential construction in rural areas, M m ³	Non-residential construction, M m ³	Total residential construction & renovation, M m ³
1998	19.6	4.9	14.7	30.7	4.9	7.2	9.3	42.8
1999	19.1	6.4	12.7	32.0	4.1	7.8	13.8	43.9
2000	20.0	7.8	12.2	30.3	3.8	7.2	14.4	41.3
2001	19.6	7.7	11.9	31.7	4.8	7.4	16.0	43.9
2002	19.2	9.0	10.2	33.8	4.8	7.6	15.8	46.2

However, it is likely that in Russia small sawmills may produce more than 10% additional sawnwood. One possible approach to assess this additional sawnwood is to look at the recent trends of sawnwood production, export, apparent consumption and construction sector dynamics, which is a major consumer of sawnwood. Russian data referring to sawnwood production, export and apparent consumption are based on FAOSTAT data and construction sector volumes in millions of m³ are based on ROSSTAT data (Table 5). Residential construction and renovation constitutes about 75% of the total construction & repair volume in 2002. In addition, residential construction & renovation consumes a major bulk of sawnwood.

After 1990 and the brake up of the USSR, Russian construction activity has fallen dramatically. The residential construction volume in 1990 was 61.7 M m³ and residential building renovation volume was 29.1 M m³ according to GOSKOMSTAT. Residential construction declined to 30.7 M m³ (2 times reduction) in 1998. After that it started to grow slowly, reaching 33.8 M m³ in 2002. Residential building overhaul volume declined to 3.8 M m³ in 2000, after which it started to increase in 2001. Total residential construction,

renovation and residential construction in rural areas (last column of Table 5) grew by 7.9% during the 1998-2002 period.

A 7.9 % growth in construction sector is taken as a basis for the likely sawnwood consumption growth. Taking the Russian sawnwood apparent consumption in 1998 of 14.7 M m³ and applying the growth factor of 1.079 results in a potential estimate of 15.86 M m³ for sawnwood consumption in 2002. This calculation results in an extra 5.66 M m³ sawnwood consumption for the whole of Russia in 2002, which is 55% more than the apparent consumption in 2002, or appr. 30% higher than FAOSTAT production figure for 2002 (19.2 M m³).

However, it shall be noted, that this is probably an overestimate, as the ongoing substitution of sawnwood by non-wood material in construction and increasing prices of sawnwood, which in turn accelerates the substitution of wood, are not taken into account. Actual sawnwood consumption is therefore likely to stay around 1998 figure or just slightly exceed 15 M m³. This more cautious estimate may still result in some 4.8 M m³ of sawnwood consumed in the Russian domestic market in addition to 10.2 M m³ of perceivable sawnwood consumption in 2002.

The last estimate would still make 25% extra sawnwood production in addition to 19.2 M m³ officially reported for 2002. Taking the additional 4.8–5.66 M m³ sawnwood production will result in 9.4–11 M m³ of roundwood used, implying an average 1.95 conversion rate. The highest estimate of 11 M m³ additional roundwood used for small sawmilling will increase wood shortage up to 10% of the total wood consumption in the whole Russia.

Similar approach can be applied for the North-West region (Table 6). According to ROSSTAT data, the total residential construction in the whole region grew by 18% during the period 1998-2002.

Table 6. Russian North-West sawnwood production, trade and apparent consumption

Sawnwood	1998	2002
	M m ³	M m ³
Production	3.97	5.08
Export abroad	1.56	3.28
Net internal export	0.32	0.18
Apparent consumption	2.09	1.62
2002 adjusted for 18% potential consumption growth (2.09*1.18)		2.47
Potential underestimation of the 2002 apparent consumption (2.47-1.62)		0.85

A growth factor of 1.18 is applied to 1998 consumption volume, which produces an estimate of potential consumption for 2002 of 2.48 M m³. The estimated additional potential consumption for 2002 is 0.85 M m³, which would consume about 1.7 M m³ of RWE (0.85 * 2). Adding 1.7 M m³ of wood to the total consumption would increase the discrepancy by about 3%-points.

1.2.3.2 Factors contributing to a potential underestimation of wood production – small scale harvesting, origin of pulp chips and internal trade figures

Because ROSSTAT records the volume of wood harvested mostly by large and medium size enterprises, a considerable amount of harvested wood remains unrecorded. According to ROSSTAT, the wood harvested in 2002 is 98.1 M m³, but according to the Ministry of Natural Resources (MNR) of the Russian Federation the total harvested volume is 164.9 M m³. Due to incomplete coverage of harvesting statistics by ROSSTAT, MNR data were used instead.

Nevertheless, ROSSTAT data have also been utilized to estimate the share of industrial roundwood in the final felling for different sub regions of North-West region (ROSSTAT reports both total wood harvest and industrial roundwood production). In addition the use of wood chips (pulp chips and chips from fuel wood for technological purposes) was taken from ROSSTAT. However, statistics on wood residues is likely to be incomplete. Production of pulp quality chips from sawnwood residues is around 1.7 M m³, which is only about 35% out of potentially available volume. Assuming that this volume can be at least double, there will be another 1.7 M m³ of wood chips available for pulp and wood based panels manufacturing. This additional production-quantity would decrease the discrepancy by about 3%-points (as a share of the total consumption)

The other major issue related to incomplete official statistics from ROSSTAT is the volume of internal trade between the sub-regions within North-West region and between North-West and the rest of Russia. Because of incomplete internal trade statistics by ROSSTAT sub-regional shortage of wood looks much different⁸. With 15% average wood resource shortage in North-West, some regions have excess wood resources (Pskov, Novgorod and Vologda oblast), while Saint-Petersburg shows 96% deficit. Saint-Petersburg is the most interesting case. With 3.5 M m³ of roundwood export and 0.5 M m³ used for wood processing, the city does not have any official harvest and the officially reported inter-regional trade is only covering 4% of total wood consumption. Geographically the city of Saint-Petersburg can also be seen as a part of Leningrad region. Consequently 3.9 M m³ of wood shortage would be added to 0.7 M m³ of wood shortage of Leningrad region, resulting in the highest 43% shortage of wood among North-West sub-regions.

The extreme case of Saint-Petersburg also shows the potential problems in interpreting the results derived from the “production-consumption”-comparison method at sub-national levels. The method renders an amount of roughly 3 M m³ of wood from unknown origin as a result for Saint-Petersburg. Interpreting this amount as stemming from illegal logging activities within the city is obviously not a logical explanation, as this amount – at an assumed average roundwood harvest of 150 m³ / ha – would equal 20 000 ha clearcut within the city boundaries.

These extreme figures can, however, be explained if it is assumed that St. Petersburg’s harbour and railroad facilities serves as a major “exit-point” for wood exported from NW-Russia. Volumes unrecorded in internal trade statistics eventually may be registered as exports in this territory, a phenomenon, which is – at different scales – assumed to be present also in other regions (oblasts) with major points of export.

⁸ It should be noted that similarly to industry statistics, only large and medium size transport companies may report their transportation volumes. This means, that transportation carried by rail road (this is a large monopoly in Russia) is more or less fully recorded, whereas transportation carried out by trucks is largely underreported.

The same problem applies also to interregional trade between North-West region and other regions of Russia. The North-West net import of industrial wood is 1.3 M m³ based on internal trade reported by ROSSTAT. A comparison of this figure with wood-balance calculations from other neighbouring regions shows that this amount may be an incomplete statement. In 2002 just two of the nearby regions (Tver and Smolensk oblasts, which are part of the Central Federal Okryg) show an excess of wood resources at the level of around 1 M m³. In addition, another neighbouring region, Privolzhskiy Federal Okryg had an excess of industrial wood at the level of around 2.5 M m³, and Urals Federal Okryg had around 4.5 M m³ excess of wood.

If these “excess” amounts of wood in the neighbouring regions are taken fully into account, they would amount to almost 8 M m³. Some of that material may also be shipped unrecorded to Asian regions of Russia, but due to large distances and rather poor road infrastructure this is not considered to constitute a major element. It is not unrealistic to assume, that up to 4 M m³ (i.e. half of the available excess quantities) could be imported into North-West region from near by regions in addition to 1.3 M m³ officially reported. In the last case the total North-West region wood deficit will be reduced by 10%-points (from 15% to 5%) out of total regional wood consumption.

Thus, additional unrecorded import into North-West from other Federal Okrygs could be in the range between 1 M m³ (if only the closest oblasts are taken into account) and 5 M m³ (if more of the available “excess” is considered). Correspondingly, the wood shortage in the North-West region could thus be reduced by 2%–10% -points. In the last extreme case, the total North-West region wood deficit would be reduced down to 5% out of total regional wood consumption.

1.2.3.3 Summary of factors possibly affecting wood-balance results

In this section (1.2.3) factors possibly influencing the wood-balance results have been discussed. Incomplete recording of production, consumption and trade in available statistical data results in factors, which – if known – could increase or decrease production or consumption quantities respectively.

Table 7. A Summary of the possible factors affecting the wood balance results

	M m ³	% of total (41.5 M m ³) industrial roundwood harvest
Result of production-consumption discrepancy calculation by EFI (for year 2003)	-7.4	- 15%
Factors increasing or decreasing the discrepancy	+/-	+/-
Increase of discrepancy because of underrecording of small scale sawmill consumption	-1.7	- 3%
Decrease of discrepancy because of underestimation of available wood residues for pulp production	+1.7	+3%
Decrease of discrepancy because of underrecording of internal trade (based on available apparent “excess”-volumes in neighbouring federal regions (Okrygs))	+1 to +4	+2.5% to +10%
Possible ranges of quantities of unknown material	-1.7 to 9.1	-3% to -18%
High range, if underrecorded internal trade is not considered and other factors are considered to balance each other out	-7.4	-15%
Medium range assumed if decreasing as well as increasing factors are taken into account:	-4	-10%
Lower range, if underrecorded internal trade is considered fully and underrecorded production is considered to be more relevant than underrecorded consumption:	-2	-5%

The raw result of 7.4 M m³ discrepancy between production and consumption statistics (Table 7) could be considered too low (by about 1.7 M m³), because of the under recording of small scale sawmill production in ROSSTAT statistics, which only records the production of medium and large scale mills.

On the other hand, it could also be considered too high (also by about 1.7 M m³), because of the underestimation of material available for pulp production, which is now listed as “fuelwood” in official statistics.

The major unknown factor, however, remains in the underrecording of internal trade quantities in Russia. Production-consumption-comparisons for neighbouring European Russian regions result in estimates for excess raw material up to a total amount of almost 8 M m³. Even if only the closest and forest-richest oblasts in such regions are taken into account, there would be an available surplus of 1 M m³. Assuming, that about half of the excess material from the neighbouring regions could also be exported to either Asia or other parts of Europe, up to 4 M m³ could still be considered to be exported to the North-West region, and would thus reduce the discrepancy there by this amount.

These factors have been taken into consideration in arriving at possible ranges of wood from unknown material in the North-West region, which have also formed the basis for the scenario assumptions in this report (see section 3).

The raw result (15%) is taken as a “high”-scenario, which does not take underrecorded internal trade into account and assumes that “decreasing” and “increasing” factors are evening each other out.

An estimate of 10% of wood from unknown sources is assumed for a “medium”-scenario, which assumes that the increasing as well as the decreasing factors are relevant, but that decreasing factors have a higher quantitative impact.

An estimate of 5% of wood from unknown origin is assumed for a “low”-scenario, which corrects the raw result by the full amount of possibly underrecorded trade and assumes that underrecorded production is more relevant than underrecorded consumption.

1.2.4 Comparison with WWF estimates

Table 8 shows detailed comparison of EFI raw results and WWF Russia estimates on the extent of wood from unknown origin in the North-West region. The WWF approach is also based on taking wood harvest, trade and major wood based products from official statistics, and consequently calculating the regional wood flow balance for North-West Russia.

The EFI and WWF results may differ substantially, as the conversion factors for sawnwood, plywood and wood pulp into round wood equivalents (RWE) are different (Table 5).

Two different WWF reports are listed here mainly because different conversion rates have been applied for plywood in each of these. While EFI is using average rate for plywood around $3 \text{ m}^3/\text{m}^3$, Lopina (2003) uses 3.2, and Brukhanov (2003) uses 5. Because of the very modest volume of plywood production, the factor 3.2 used by Brukhanov (2003) versus the factor 3 used by EFI does not result in a substantial difference of roundwood consumed. More importantly, WWF's volume of plywood production is 30% lower than the figure used by EFI. As a result, EFI results show higher use of wood for plywood production.

Brukhanov uses a very high conversion rate ($5 \text{ m}^3/\text{m}^3$), which results in higher wood usage for plywood (15% higher than EFI's figure). However, these are still small differences in terms of absolute wood volumes.

A much higher influence on the “consumption side” is the fact that EFI takes into account the particleboard and fibreboard production, which were not considered at all in WWF's figures.

Consequently EFI calculations result in 4 M m^3 wood used for total wood based panel's production versus 2.5 M m^3 wood accounted by Brukhanov for plywood (other type of wood based panels were not accounted for in the WWF-publications).

Table 8. Comparison of EFI and WWF estimates

Item	Conversion rate for RWE (EFI)	EFI	WWF Lopina	WWF Brukhanov	Conversion rate for RWE (WWF)
1. Production of industrial wood,		39317			
- final felling		32103	31000	31000	
- intermediate felling		2163			
- other felling		1915			
- pulp chips (industry residues)		1688			
- fuel wood (used for processing)		1448			
2. Net import of wood from other Russia		1277	1000	1000	
3 Import from foreign countries		940			
4. Total resources of industrial wood		41534	32000	32000	
Directions of use					
5. Export to foreign countries		14637	13000	13000	
6. Used for processing		33282	29500	30400	
- sawmilling production, 1000 m ³		5084	6700	6700	
sawnwood in RWE, 1000 m ³	1.97	10018	13900	13900	2.07
- plywood production, 1000 m ³		716	500	500	
plywood in RWE, 1000 m ³	3.03	2171	1600	2500	3.2/5.0
- particleboard production, 1000 m ³		736			
particleboard in RWE, 1000 m ³	1.50	1104			
- fibreboard production, M m ²		82			
fibreboard in RWE, 1000 m ³	9.28	757			
- chemical pulp production, 1000 t		3266			
chemical pulp in RWE, 1000 m ³	4.80	15677			
- mechanical pulp production, 1000 t		919			
mechanical pulp in RWE, 1000 m ³	2.90	2665			
Woodpulp production, 1000 t		4185	3200	3200	
Woodpulp in RWE, 1000 m ³	4.38	18342	14000	14000	4.375
- other use in the sphere of processing		891			
7. Used unprocessed within the region		988	700	700	
8. Used within the region, total (6+7)		34271	30200	31100	
9. Total consumption (5+8)		48907	43200	44100	
10. Result (4-9)		-7373	-11200	-12100	
11. Result (4-9) as % of total consumption (9)		15.1%	25.9%	27.4%	

Both EFI and WWF use almost an identical conversion rate (4.38 m³/m³) for wood pulp. However, the WWF figure for total wood pulp production (different technological grades are not considered) 3.2 MT is considerably lower than EFI's 4.2 MT. Consequently, EFI shows 18.3 M m³ wood used for wood pulp production versus 14 M m³ by WWF. For the wood based panels and wood pulp production EFI shows 20.5 M m³ wood consumption compared

to 16.5 M m³ by Brukhanov (+ 4 M m³ extra wood estimated by EFI), and the roundwood used for sawnwood production is reverse.

WWF shows 13.9 M m³ of wood used for sawnwood versus 10 M m³ by EFI. The conversion rate 2.07 used by WWF versus 1.97 used by EFI (5% difference) explains some of the difference. However, the main difference comes from substantially higher figure of sawnwood production in the North-West estimated by WWF (6.7 M m³ sawnwood versus 5.1 M m³ by EFI). It should be noted, that due to a different statistical period of reporting used by WWF (2001) and EFI (2002), some differences (appr. 5%) in production volume statistics are inevitable. Nevertheless, one year's difference should only create a small difference for 2001 and 2002 statistics. The only explanation thought of was that perhaps Lopina was using preliminary statistics for 2001, since the report was published in January 2003, and the final statistics for 2001 became available only at the very end of 2002.

Therefore, it might have been difficult for WWF to incorporate final official statistics in their earlier report. Nevertheless, the other WWF report by Brukhanov (December 2003) could have used corrected production statistics figures, but has chosen not to do so. The later WWF report presents substantially higher wood consumption for sawnwood and lower consumption figures for wood pulp. It's only by accident, that both EFI and WWF (Brukhanov, 2003) report almost identical wood consumption for sawnwood, plywood and wood pulp all together (30.5 M by EFI / 30.4 M m³ by WWF).

Besides comparing wood consumption figures by EFI and WWF, other aspects of wood use should also be compared. As far as wood processing industries are considered, WWF does not account for particleboard and fibreboard production and other wood processing industries. These additional items accounted for by EFI result in 2.75 M m³ in addition to the total wood consumed in the North-West region. Also, appr. 1 M m³ of unprocessed roundwood within the region (mainly for local construction purposes) is accounted for by EFI versus 0.7 M m³ by WWF. As the Russian roundwood export has steadily been growing during the last years, EFI's figure on roundwood 2002 exports from North-West to other countries is 14.6 M m³ versus 13 M m³ for 2001 used by WWF. As an end result, EFI results are showing a total wood consumption of 48.9 M m³ for the whole North-West region and 44.1 M m³ by WWF (Brukhanov). EFI's estimate of total wood consumption for North-West is 4.8 M m³ or 11% higher than WWF's (Brukhanov) estimate.

WWF estimates total industrial wood resources available in North-West at 32 M m³. WWF (Brukhanov) estimates wood of "unknown origin" (which is consequently suspected as illegal wood) as a difference between total wood consumption in the region and total wood resource (harvest + net imports) available. Brukhanov calculates it as $44.1 - 32.0 = 12.1$ M m³ of wood shortage or 27.4% out of total wood consumption.

It should be noted that the estimate of 36% of illegal wood harvest reported by Lopina was based on total harvest (reported by GOSKOMSTAT) as a 100% base⁹. In order to compare the different calculations it is therefore necessary to put the wood deficit from WWF (Lopina) in relation to the total consumption. This was done for the comparison in Table 5 and results in a rate of 25.9% for the WWF (Lopina) report (using the total consumption as 100% base).

⁹ As has been described in the section "methods & data" of this chapter, this is the total harvest volume, which is considerably higher than the amount of "industrial roundwood", considered to be available for industrial and construction use.

However, as stated earlier in this chapter, roundwood harvest recorded by ROSSTAT for the whole of Russia was 98.1 M m³ in 2002 (comprised mostly from harvest reports by large and medium size companies), which is only 60% of the total harvest reported by MNR (including all types of felling: intermediate and other types). Although the WWF report also notes the huge difference in harvest figures reported by GOSKOMSTAT and MNR, this is just another kind of discrepancy in different sources of official statistics. WWF chooses to use lower harvest figure by GOSKOMSTAT without going into details of possible reasons of such differences or the rationale for choosing either of the two available harvest estimates.

In this study we use both MNR official data on all types of felling and ROSSTAT (former GOSKOMSTAT) for estimating regional shares of industrial wood in the total volume of wood harvest. A more comprehensive approach both on wood resource and wood consumption results in higher estimates on both sides compared to WWF estimates. While EFI's estimate of total wood consumption for North-West is 11% higher than WWF's (Brukhanov), the total industrial wood resource is 30% higher, than the WWF estimate. Consequently the estimates presented in this report result in a wood discrepancy of around 15%, versus the 26-27% estimates by WWF.

1.2.5 Conclusion

The raw result of the comparison of production and consumption figures by EFI for the North-West region is 15% of the total wood consumed. This figure is based on statistical data and the wood balance method outlined in 1.2.1–1.2.2. However, on the basis of the factors discussed in 1.2.3, there are factors which may lead to both underestimation and overestimation of this figure.

Taking into account the possible underestimation of consumption by small sawmills increases the deficit of wood by an extra 3% -points for the North-West region. On the other hand, taking into account higher utilization of sawmilling residues will decrease the result by 3% -points.

The largest factor, which may lead to an overestimation of the deficit of wood in North-West region is the interregional trade. Taking into account large excess of wood resources in several nearby regions, the 15% shortage of wood is likely to be lower (see discussion in chapter 1.2.3.1). A moderate estimate for the influence of this factor is 3%-points, which would take into account only the surplus volumes available in oblasts immediately bordering the North-West region.

Assuming that the factors decreasing the discrepancy as well as increasing the discrepancy are in place, a range of 10% to 15% of wood from unknown origin in the North-West region is considered as a realistic result.

The method used in this chapter due to incomplete statistical data does not allow making accurate estimates of the extent of wood coming from unknown sources. As has been shown above, taking into account the possible factors influencing the result in either direction, the range of estimates for material of unknown origin for the North-West region can be assumed to be between 10% and 15% as the most likely range. It is stressed again that “illegal logging” – while most likely included in this amount, is not necessarily the only explanation for this

discrepancy between statistics. For the purpose of conducting the econometric scenarios in this report, the discrepancy values are taken as a proxy for “illegal logging”.

A more accurate assessment would require additional detailed studies for all large regions, especially including internal regions and not solely the seemingly more interesting regions along the Western and Eastern borders of the Russian Federation.

1.3 Pilot study – assessment of discrepancies between official harvest data and actual logging activities using remote sensing technology

1.3.1 Introduction

As part of the work carried out in this project, also a small pilot project to develop and test a method to detect discrepancies between official records and physical measurements using remote sensing technology has been carried out.

It should be noted that the method as such can only reveal discrepancies between different data sources, without providing information for the underlying reason.

The aim of this element of the project is to identify the discrepancies between the official forest statistic data and independent satellite image analysis in Novgorod region (North-West Russia). To make this analysis several objectives have been defined:

- to carry out an analysis of digital remote sensing imagery (satellite images) in order to obtain the information on clearcut areas in Novgorod region in the year 2000¹⁰
- to overlay the results of the analysis with digital kvartal grid and forest statistics data;
- to calculate discrepancies, including an estimation of accuracies of measured data
- to make analysis on the total clearcut area categorized into different size classes

A detailed description of the analysis is provided in Annex 6, the following pages provide a short summary of the process and the results

1.3.2 Data and methods

1.3.2.1 Satellite imagery for clearcut assessment

A series of satellite images covering the study area (Novgorod oblast) was provided by the Centre of Forest Certification and Audit of Komi Republic. The images (Landsat TM, Landsat ETM+, ASTER) covered the period 1998 – 2002. The available imagery uses a pixel size of 15 x 15 m.

1.3.2.2 Forestry GIS data for the Novgorod region

Forest management GIS-data for the region were available at the European Forest Institute. These data include geometry, topology and thematic information for forest management, to the level of kvartals¹¹. In addition information on waterbodies and swamp-areas, roads and

¹⁰ Initially the objective had been to analyse years 2000–2003. However, due to the level of cloud cover on available images, it would only have been possible to sample less than 1% of the total area for the years 2002 and 2003, which was analysed as being too low to render representative results. Therefore eventually only the year 2000 could be analysed.

Remote sensing analysis has been carried out by Eugene Lopatin, Syktyvkar Forest Institute, Centre of GIS.

¹¹ A “kvartal” is the smallest spatial unit in forest management planning in the Russian Federation. “Management compartment” would be a close – though not literal – translation. The typical area of a kvartal can be in the range of 200 ha–400 ha, depending on the local conditions.

other infrastructure are available. The GIS-data were used to reference harvest data (information on clearcuts) as well as to assist image rectification and classification.

1.3.2.3 Official statistics on clearcut areas

Official records on clearcuts in the region were obtained from the State Forest Agency of Novgorod oblast. This information is collected regularly for forest management purposes.

1.3.2.4 Image classification and GIS-analysis

Clearcut areas were identified from satellite imagery using a maximum likelihood classification. The analysis was refined using subpixel image classification in order to deal with “mixed” pixels (clearcut & forest in the same pixel).

Originally a longer time series than the period eventually analysed was investigated, however, due to problems with cloud cover only one year (2000) provided a sufficiently large amount of sampled area to perform the analysis within a reasonable error margin.

By comparing the results of the analysed period (2000) with earlier years, it was possible to exclude areas, which might possibly have been misclassified as new clearcuts, such as swamps or earlier cuts. In addition smaller areas (<0.1 ha) and linear structures (roads or utility line-tracks) were also excluded from further analysis.

Clearcuts identified by remote sensing were then overlaid with clearcut-information based on official statistics (using the kvartal grid as reference). The overlay allowed comparison of official records of clearcuts for each kvartal with clearcut area measured from remote sensing for the same kvartal.

The remote sensing analysis was assisted by ground measurements for calibration of the analysis process. These measurements were taken during field trips during forest management operations in the area.

1.3.3 Results

1.3.3.1 Availability of satellite imagery with sufficiently low percentage of cloud cover

Because of budget restrictions, only satellite imagery already available for the subcontractor assigned with the remote sensing analysis could be used. This proved to be a major restricting factor considering the potential representativeness of the results. It was therefore necessary to focus the analysis only to one year (2000), instead of a period of three years (2000 – 2003), as had earlier been planned.

1.3.3.2 Corrections for biases in data-sources

The two main data-sources (clearcut-measurements from satellite analysis and official clearcut-data) are both potentially subject to methodological biases.

The accuracy of the satellite analysis was assessed using field-measurements. Based on this a systematic overestimation of clearcut-area measurements by satellite-analysis in comparison

to actual field-measurements was assessed. Clearcut areas measured by satellite-analysis tend to overestimate the area by 9.2% (in relation to the actual area).

For a comparison between the actual clearcut area and officially registered “legal” clearcut area, the result of the satellite measurements has to be reduced by the assessed systematic overestimation whereas the official clearcut data have to be increased by the assumed average underestimation.

On the other hand there is a potential underestimation of “licensed clearcut-areas” included in the official statistics, due to a measurement tolerance in the range of 10%.

1.3.3.3 Discrepancy between remote sensing result and official clearcut data

The result of the analysis carried out in this task is presented in Table 9. If only raw data are analysed, a discrepancy of 25.4% (+/- 2%) in clearcut area within the measured kvartals for the year 2000. Following the correction for the biases lined out in section 1.3.3.2, this discrepancy is reduced to 11%.

Table 9. Discrepancy between official clearcut area and clearcuts measured by remote sensing with and without the implementation of correction factors for systematic biases

	Number of kvartals analysed	Percentage of kvartals in study region	Clearcut area from official data, ha	Clearcut area measured from remote sensing, ha	Discrepancy, ha	Discrepancy in remote-sensing result, %
Raw data	9282	48.5	6494	8700	2206	25.4
with bias corrections			(+10%)¹² 7143	(-9.2%)¹³ 7900	757	11

1.3.3.4 Discussion

First it should be noted, that the method used in this section is based on a comparison of logged area, not of logged volume, with official figures.

The resulting discrepancy is different from the result provided for the same region from the data calculated in chapter 1.2 (production/consumption-comparison). The raw figures (i.e. without implementing the bias-corrections) is roughly in the range of NGO-estimates for the whole North-West region.

Implementing the measurement-correction (9.2% overestimation of clearcut area from satellite-measurements) and assuming a policy of 10% allowed tolerance of logging operators exceeding the area determined in the logging licenses, it is, however, well within the “medium” level of “discrepancy” calculated for the whole North-West region. If even higher tolerances for logging-operators were assumed, the discrepancy would even come close to the ranges “officially” acknowledged by Russian authorities.

¹² Correction for 10% tolerance for clearcuts to exceed area determined in logging license

¹³ Correction for systematic overestimation of clearcut-size from satellite analysis

As has been explained in the method-description for this task, by excluding very small areas identified as clearcuts, the chance of including natural or accidental clearings in the forest was greatly reduced. By using the analysis of imagery from a number of preceding years, the chance of mixing up older clearcuts as well as swamp-areas with clearcut has also been reduced considerably (i.e. this should be almost zero). On the other hand this restriction means that smaller areas of cutting activity, typically for (authorised or unauthorised) local and domestic use, are not registered as “clearcut area” by the remote-sensing measurement.

The main problem in the implementation of the method in this pilot study was the availability of satellite-imagery with reasonably low levels of cloud cover. As a result, the analysis finally could only cover one year, instead of the intended three years.

1.3.3.5 Conclusions

The purpose of including this pilot study into the current project was to test the feasibility of this approach for an assessment of possible discrepancies between officially registered and actual logging activities for a larger area. The study area for this pilot study was the Novgorod-region and the preliminary results point at a rather high level of discrepancies.

Due to the fact that it was financially not possible to obtain satellite imagery exclusively for the purpose of this project, the pilot-study had to be conducted using already available image material, and consequently only a one-year period (2000) could be analysed.

For the remote sensing analysis possible sources of image-misinterpretation (old clearcuts, swampland, very small areas, roads, utility-line tracks) were excluded. Corrections for methodological biases were also implemented. The error margin for the measurements was calculated at 2% (before the implementation of bias-corrections).

Based on the figures and corrections used for this analysis, a discrepancy of 11% between officially registered clearcut areas and actual clearcuts is assessed for the year 2000. This estimate is within the range of other results obtained for the North-West region in section 1.2. of this report for the year 2002, but more than the result obtained for Novgorod oblast therein. Aside from the different observation period, possible problems with the production-consumption method due to incomplete records for internal trade could be at the root of this discrepancy.

Concerning the feasibility of using this method as a tool to obtain relatively up to date information on activities carried out without the knowledge of the authorities in a specific region, this method is applicable only under the following conditions:

- 1 Official logging data must be available in a format and quality allowing for spatial referenciation (at least at kvartal-level)
- 2 There must be sufficient resources to obtain satellite imagery exclusively for this monitoring purpose
- 3 Ideally the study region for one analysis should be smaller than in this study area, thus increasing the chances for obtaining clear-conditions satellite imagery for approximately the same time

Condition 1 should – in theory – be a given at the level of the local forest enterprises. Regarding condition 2, it is admitted that the costs for satellite imagery are considerable, yet even if only levels of illegal logging according to official estimates (i.e. 5%) are assumed, the

necessary resources are considerably lower than the economic damage resulting from logging activities carried out without official permits. Condition 3 could be realised, if the analysis would focus on specific problem areas (based on the knowledge of local forest service staff), or if such analysis was carried out in the form of a series of “samples” (randomly distributed across a region), thus constituting a statistical approach with known values for representativeness and error probabilities.

2 Assessment of existing instruments in excluding illegally logged timber from the EU market

The aim of section 2 of this text is to study the measures taken by private companies and governmental institutions in Russia in order to avoid the export of illegally harvested timber into the European Union from North-West Russia. To make the assessment of those measures several sub-aims have been defined:

- to study existing export formalities in Russia to prevent the imports of illegally harvested wood;
- to describe and analyze the systems of wood origin tracing used by Russian, Finnish and international companies;
- to describe specific purchasing policies used by companies and that have been relevant to exclude illegally harvested timber;
- to clarify the reliability of private sector measures taken by companies and governmental institutions to combat illegal logging;
- to propose comparative assessment of policies and measures taken by companies involved in wood export from Russia.

2.1 Official measures to ensure the legitimate origin of wood exported from the Russian Federation

2.1.1 Material and results

The need to send a small consignment of wood from Komi Republic to a research institution in Germany as part of another project, was taken as an opportunity to assess the official export formalities using a practical example.

According to the Russian export legislation the process of wood export is similar for all purposes, i.e. our scientific samples go through all procedures required for export of wood. Additional materials received from companies and governmental organizations were a basis for this report.

2.1.1.1 Required documentation for export purposes

For importing wood from Russia to one of the EU countries the following documents should be presented to the customs committee in administrative regions:

- Application for customs procedures;
- Phytosanitary certificate (a copy is included in Annex 8)
- Statement of phytosanitary control;
- Status of organization;
- Company constitutive agreement;
- Statement of registration in State Committee on Statistics;
- Statement of registration in Tax office;
- Statement of registration in State List of Juridical person;
- Contract between the supplier and the customer;
- Passport of governmental contract registration;
- Bank accounts;

- Letter of attorney from the head of the organization to represent the organization in customs office

Aside from the company registration forms, which are not specific to the individual transaction, there are thus three documents, which have to be produced for each export of wood from Russia:

- 1) The applications form for customs procedure which requires
- 2) the phytosanitary certificate and
- 3) the contract between supplier and purchaser

The application for customs procedures contains the following key points:

- Supplier (name and address)
- Customer (name and address)
- Country of destination
- Country of origin
- Description of goods
- Code of product (in case of pine 4403203100, spruce 4403201100)
- Amount of goods, net weight, gross weight
- Price according to the State Statistics;
- Price of goods;
- Means of transportation;
- Invoice number;
- Contract number;
- Aim of export;
- Place, date, signature

This application form thus does not directly require proof of origin of the material.

An example for the phytosanitary certificate is presented in Annex 8. This document is issued by the state plant quarantine inspection. The process requires the presentation of a felling license (also included in Annex 8) as well as of samples of the material, in order to show that it is free of pests and diseases and has been treated against them to prevent any infection during transportation. The felling license is not needed further at customs inspections, but it is needed to gain the phytosanitary certificate.

In the actual phytosanitary certificate the origin of the wood is then mentioned only on the regional level (e.g. Komi Republic, which has a total area of 415 900 km²) and botanical names of plants with reference only to genus, not at species level. It is therefore not possible (or necessary) to identify the exact origin of the shipment, nor does the document require a closer identification of the species.

The possible consequences of the latter are presented in the following example:

The genus of Pine (*Pinus*) is represented in Komi by two species: Scotch pine (*Pinus sylvestris* L.) and Siberian pine (*Pinus sibirica* Du Tour). While the Scotch pine is a commonly traded species and perfectly legal to harvest (within the framework of existing

legislation), Siberian pine is an extremely rare species (0.08% of the total forest area) and it is therefore included in Red Data Book of Komi as an endangered species.

Most of the stands formed by Siberian pine are under the government protection and are therefore – in theory – out of limits for any harvesting activity. Yet for customs documentation purposes, it would not be necessary to differentiate between these two species.

The third document, which could include information on the origin of the material, the contract of purchase between the supplier and the buyer, does not require any third party involvement and unless additional requirements by the buyer (as in the examples for “private sector measures” in section 2.2), specifically request so.

During interviews Russian customs officials were also asked about their current practices in combating the trade in illegally logged timber and especially what methods they use to identify such timber during their normal working procedures. The answer was that they are trying to identify suspicious contracts and to check their origin. But according to customs officials such checks are rather the exception than everyday practice, which is also confirmed by the numbers presented below.

In 2002 using this analysis of suspicious contracts the customs of Komi Republic identified 11 cases of illegal wood export in total value of about 5 680 000 roubles (approximately 180 000 Euro). The most common technique involved in uncovered attempts to send illegally harvested wood abroad is falsification of documents. Those cases are investigated by customs and police (Krylova, 2004).

The need, however, to produce at least a more or less credible forgery of a logging license, or to find other ways to bypass this, allows for the conclusion, that additional criminal activities are required in order to bring illegally logged material into export trade. This as well as the assumptions that especially more “occasional” forms of illegal logging are assumed to be more linked to local and thus domestic consumption has been considered in the final conclusions made for the scenarios in this study.

2.1.2 Conclusions regarding official export requirements

As has been shown in section 2.1.1, none of the three documents (export application, phytosanitary certificate, contract of purchase) required for export procedures carries a direct proof of origin of the exported material.

Indirectly, however, proof of origin in the form of a felling license is required in order to obtain a phytosanitary certificate. For phytosanitary purposes, however, proof of origin is of interest mainly in order to verify whether the material comes from areas where phytosanitary problems exist – which only requires a rough geographic allocation - not to verify the legality of the shipment as such.

Another problem involved in the process is linked to the current (status: summer 2004) practice of issuing and keeping track of felling licenses. The detailed description of this process as well as of relevant rules regarding the licenses is also lined out step by step in Annex 8. In summary this involves:

1. Printing of licence documents by national authorities and distribution of numbered license documents to forest administrations (leskhoz).
2. Issuing of licenses to logging companies, identifying location, quantity (measured in either volume, area or number of stumps) and payments due.
3. After finalisation of logging, actual amounts harvested and other relevant information are recorded on the backside of the license, copies of the license are kept at the leskhoz office.
4. Other relevant facts in relation to the licenses:
 - a. It is possible to issue “replacements” for lost licenses, which do not have to be printed on a specific pre-print form.
 - b. It is also possible to produce additional copies of licenses (officially only with permission of the leskhoz-director).
 - c. Licenses may also be filled out manually if the leskhoz-administration does not have adequate computer-equipment to allow for electronic management of the documents.

It is therefore in principle possible to check the validity of a harvest-license document either with the leskhoz-administration, who has – supposedly – issued it, or with the national authority, who is supposed to keep records on the serial numbers of license-documents sent to the regional offices. Due to the fact, however, that no central automated registration system exists for this, such a check could at best be done only by telephone and would then require additional – often manual – archive work by the contacted institution.

The only occasion upon which the harvest license has to be produced to another state authority during the shipping process, is the issuing of the phytosanitary certificate by the state plant quarantine inspection. The main purpose for providing proof of origin here is the question, whether the material comes from a region where there are known problems with pests and diseases, which would require special measures during transport (e.g. special treatment), or result in the need for quarantine or even interdiction of the shipment. The legality of the shipment is not the main factor of concern for the issuing of the phytosanitary certificate. Thus any physical checks of the material need only focus on whether the physical conditions of the material are in line with the harvest-license, on the infection status and whether required treatments have been applied.

After the phytosanitary certificate has been issued, the harvest license itself does not have to be produced to any other authority during standard export procedures. It would only have to be kept available for the – rather rare – instance of additional investigations by customs officials on the origin of material, which they consider suspicious.

The weaknesses of the current system are thus as follows:

- a) A system of pre-printed (albeit numbered) paper documents, printed on standard printing paper, does not provide strong obstacles for forgery and other forms of misconduct
- b) The possibility to issue – relatively free form – replacements for “lost” documents adds to the vulnerability of the system
- c) The fact that actually harvested volumes (and other possible relevant information recorded after carrying out the harvest) is recorded on the backside of the document is another possible weak point in connection with the possibility to use copies

- d) Regarding the recording of quantities in the licenses, it is also worth mentioning that providing timber quantities in terms of “harvested stumps” or “harvested area”, makes it more difficult to check whether the shipped volume corresponds to the quantity recorded in the license
- e) The fact that the only institution (the state quarantine plant), not directly involved in issuing the license, which regularly checks these documents is not responsible for checking the legality of the shipment, but only its potential risk from the point of view of disease-control means that legality of the shipment is not regularly checked
- f) The logging license is not directly necessary for the customs application (only indirectly for obtaining the phytosanitary certificate (see comment e)
- g) The current paper based system requires considerable effort if a specific license document is to be checked for its validity

The current system is not a very strong safeguard for keeping material of doubtful origin from export markets. While the necessity to obtain a phytosanitary certificate requires the presentation of a harvest license, it does not seem to require an excessive amount of criminal energy to produce such a document, either using outright forgeries, official pre-prints, that might have been “lost”, tampered copies of documents or other – more elaborate – approaches. Official records, too, indicate forgery as the most common approach used (Krylova, 2004). Thus, even without accounting for the possibility of involved civil servants abusing their official mandate, the system seems to offer considerable potentials for improvements.

2.1.3 Possible improvements of the system using existing structures

It is worth noting, however, that with the phytosanitary certificate there is already a document, which accompanies a shipment of wood from the location of harvest to processing (or export). In principle this document also requires a physical check of the material by experts with forestry expertise as well as a check of the logging license. Because phytosanitary certificates are also required for import into EU-countries, this document may constitute one possible starting point for attaching a “legality-license” as currently discussed under the EU-FLEGT-action plan. The key point for improving this system would constitute in:

- a) Ensuring that the validity of the logging license is checked in the process of issuing the phytosanitary license on a routine basis. For cost reasons it might be considered to restrict this to a random sample, unless an electronic tracing system for licenses has been installed, which would allow to check every single license
- b) Such a check should also involve a check-back with the issuing leskhoz-administration, including also the information recorded upon conclusion of the harvest activity
- c) as well as a possible registration in a central register to allow for tracking of shipments

Thus existing procedures could be improved by introducing a governmental information system for wood origin tracing. Such a systems should start from the forest management units and allow for a control of wood-flow to the phytosanitary control service, customs and also tax authorities. Countries interested in co-operation could then connect their own tracing systems at points of entry.

2.2 Private sector measures

Many private companies engaged in timber procurement in countries, where the legal origin of traded timber may be in question have established their own systems of obtaining proof of origin for their wood purchases. In this context it is of course important to note that especially larger companies which are involved in the supply of sometimes more than one large scale mill will have some form of “wood-flow-control” system installed. These are strictly for reasons of efficiency of operations in order to find the optimum balance between ensuring a steady supply with raw material and keeping storage capacities at economically feasible levels. While such systems might not have been initially installed with the aim of proof of legality in mind, they certainly are a good basis, upon which chain of origin systems can be developed.

Another need for companies to establish systems for proof-of origin, which were established even before the current international discussions on illegal logging, has been related to the need for companies to ensure compliance with environmental legislation as part of their environmental management systems (EMS). While the origin here might have been more related to exclude material originating from protected areas, such proof inevitably requires proof of origin of the material. Consequently the proofs of origin-systems of the companies are now part of their EMS’s and are published in their respective EMS-reports. In Europe ISO 14001 and EMAS are the two most commonly used systems for the certification of EMS’s. In the process of certification against either of these two schemes also a third party has verified the wood procurement control systems of the companies.

Another systems of origin allowing for tracing the origin of wood is related to chain-of-custody-systems based on certification systems for sustainable forest management (SFM). Of the two systems most widely used in Europe (Programme for the Endorsement of Forest Certification schemes (formerly Pan-European Forest Certification) PEFC-label and the Forest Stewardship Council’s FSC-label), the FSC system has also developed an elaborate system for chain of custody. The system is aimed at allowing for the use of FSC-labels on end-consumer products and thus require a – certain share of – FSC-labelled material throughout all production stages from timber harvest to the consumer product. Since FSC-criteria require adherence to relevant legislation as one of the basic conditions for SFM, it may be assumed that FSC-certification also encompasses the legality of operations.

Private sector measures are also considered to be one element of measures under the EU-FLEGT-Action Plan. Private companies, which have already built up systems for tracing of origin for example as part of their supply safety- or environmental management systems would prefer if such efforts could be taken into account if some sort of mandatory system of requirements would be adopted.

Furthermore the quantitative amount as well as the possible effectiveness of existing private sector measures is required as an input for the scenarios developed in this report, as this allows for estimates on amounts of wood in trade, for which already now some form of proof of origin other than the existing official requirements exists.

It was therefore decided to assess the existing systems aimed at, or suitable for providing proof of legal origin of wood as part of the research work carried out for this report. In order not to restrict companies’ replies and also to get an overview on the existing approaches, no initial set of criteria for legality was used in developing the survey and interview questions. It

was rather decided that it would be easier to compare the systems employed by companies to existing definitions of legality in an eventual comparative assessment.

2.2.1 Methods and data

The data and material were collected in the Russian Federation during the period 01.03. – 25.06.2004 via communication with companies and governmental institutions by visiting them, participating in meetings, taking part in conferences, communication by email, and studying company websites. During those contacts we asked organizations to provide the information about current export formalities used for exporting wood to the European Union, systems of wood origin tracing, presence of specific purchasing policies implemented by companies. Usually we asked companies to describe the following:

- 1 Please provide a description of the company's environmental policy
- 2 Please provide a description of system for wood origin tracing
- 3 Please provide examples of forms about wood origin used by your suppliers
- 4 Please provide a description of the analysis algorithm of such forms and rules for audit
- 5 Please show as "Clause "Ecology" from wood procurement contracts
- 6 What kind of "ecologically-oriented" criteria do you use when choosing a supplier?
- 7 Is it possible to get an example of an ecological audit form used in Russia?
- 8 In your opinion, what kind of measures will be the most effective to combat illegal logging in Russia?
- 9 Please provide general information about your company, i.e. types of forestry operations in Russia; annual procurement in regions of NW Russia

The list of dates and contacts with companies and governmental institutions is included in Annex 7.

The relative volumes of production and export from the NW Russia to EU for the surveyed companies are listed in Table 10. These figures are based on information given by the companies and are based on annual averages for the years 2000 – 2002.

Table 10. The relative volumes of production and export of surveyed companies in roundwood equivalents (RWE) (Source: Company data)

Company	Amount of wood originated from Russia used in production, th m ³ RWE	Amount of wood originated from Russia exported to EU, th m ³ RWE	Company's share of total wood exports from the Russian federation in %
IKEA	820	290	0.6
Solombalskiy LDK and Lesozavod ? 3	727	632	1.7
Stora Enso	6 700	6 500	17.5
UPM-Kymmene	3 700	3 400	9.1
Thomesto	3 000	3 000	8.1
Neusiedler Syktyvkar	2 600	1 500	4.0
TOTAL FOR SUVEYED COMPANIES	17 547	15 322	41 ¹⁴

The figure for “wood exported to EU” is for exports of roundwood and sawnwood given in roundwood equivalents (RWE). The total export from the Russian Federation to the European Union for these two categories (using the same calculation basis and conversion factors, based on FAO trade statistics (taken from EFI's trade-flow database)) amounts to appr. 25.7 M m³ roundwood equivalent. Consequently the amount covered by these companies equals 60% of the trade to the European Union. Similar systems have also been introduced by other major players in the sector, which leads to the conclusion that some 75% of the exports are covered by such or similar measures.

It should be noted, however, that the figures in Table 10 refer to the exports from the whole of the Russian Federation, not only North-West Russia. Due to the location of the companies' main production facilities the majority of this material is assumed to originate from the North-West region.

2.2.2 Results for measures by private companies

2.2.2.1 Introduction

After analysing the material received from the company contacts three major groups of measures undertaken by companies were identified:

- Measures for preventing imports of illegally harvested wood to EU countries
 - Companies involved in the export of wood and wood products from Russia into the markets of the European Union have developed their own measures for

¹⁴ 41% refers to all exports from the Russian Federation. This equals a share of 60% of trade with the European Union.

preventing exports of illegally harvested wood. In companies under consideration in this study there are several general measures taken by all companies and some company-specific measures implemented by one company. These policies and measures include both operations by the companies themselves as well as specifications for their suppliers.

- Systems for tracking the origin of wood shipments
 - One of the common ways of preventing illegal wood export from Russia is to develop information systems for wood origin tracing. A tracing system sets a framework for recording and verifying the information on the origin of wood. Most of the companies have developed such systems.

Details for each company's program are listed in Annex 8. The following section provides a summary for each company as well as a comparative evaluation of the programs.

2.2.2.2 Measures common to all surveyed companies:

A basic set of measures is common to all surveyed companies. While they differ in the level of detail they all include a set of basic elements, such as declarations of intent not to use material from illegal sources, or requirements for suppliers to provide proof of origin. Most of these measures are also set in a larger framework of environmental standards of the companies, and the exclusion of wood originating from protected areas or other sensitive zones seem to have been at their origin.

- Declaration to avoid illegally harvested wood
- Introduced information system of tracing wood origin, including the data from forest to mill.
- Principles of environmental responsibility for wood procurement
- Declaration that wood from especially protected territories and territories under the moratorium (i.e. potential future protection areas) will not be bought
- Supplier has to provide a special form about wood origin
- Companies reserved rights to check wood origin any time from the supplier
- Supplier provides full permission to enter any places related to wood procurement

2.2.3 Examples for individual companies' measures

Detailed descriptions of each company's measures as well as the full referencing to sources are included in Annex 8. The following gives a brief overview on the measures, citing the main elements and characteristics.

2.2.3.1 Solombalskiy timber processing mill

As a processing mill within the Russian Federation, the company's purchasing policies apply to all material acquired, regardless of its intent to export to the European Union.

The measures instituted by this company include:

- A declaration that all relevant legislation by the Russian Federation is adhered to
- A declaration that no wood from currently existing or planned protected areas is used
- Contractual commitments by suppliers to provide information on origin of wood at stand level

- Right of the client (i.e. Solombalskiy mill) to audit logging sites (audits are carried out by Solombalskiy employees)

At the time of data-collection for this report (summer 2004) this company was in the process of establishing a system for wood origin tracing, to be fully implemented by the end of 2004. This system includes the following main elements:

- Establishment of a database for all procured wood at the level of logging license and individual stand, including “chain-of-custody” information from the logging site to the mill
- GIS-based mapping of logging sites
- Public availability of all information

The tracing system is eventually intended to conform to FSC-standards for chain of custody.

2.2.3.2 Thomesto

Measures by Thomesto are for the most part imbedded in its ecological and environmental policies and include the following elements:

- A commitment to adhere to local legislation
- Identification of wood origin at the level of harvesting licenses
- Contract clauses committing contractors to adhering to all relevant legislation
- Contract clauses allowing the buyer (Thomesto) to audit logging sites and to declare the contract void if any breaches of legality are detected
- Support for PEFC and FSC certification systems

Thomesto has also established a system of tracking the origin of its supplies. This is based on:

- Collecting information at the level of logging licenses
- GIS-based mapping of logged stands
- Annual audits of its suppliers to verify the authenticity of provided information

2.2.3.3 Stora Enso

As one of the major importers of wood from North-West Russia into the European Union (with the majority of material imported into Finland), measures by Stora Enso are of specific relevance. The company’s policies are binding both for its own operations as well as for its contractors. They are based on the following main features:

- Commitment of the company and its contractors to adhere to local legislation and instructions
- No procurement from current or planned legally zoned conservation areas – unless harvest is in line with relevant conservation regulations and plans
- Supplier is able to verify the origin of all material
- Stora Enso has a right to audit suppliers, their logging sites and their systems of data collection and storage for wood origin

Stora Enso, too, has a system of tracing wood origin, which is based on the following main elements:

- GIS-based mapping of supply areas
- Possibility to trace origin of wood based on individual harvest site
- Keeping track of wood consignments (including volume data) from harvest site until it is taken into possession by Stora Enso (including keeping track of railroad loading and transport)
- Internal audits by the supplier and audits by Stora Enso
- External audits (ISO 14001 and EMAS)

2.2.3.4 UPM-Kymmene

UPM-Kymmene is also a major importer of material from North-West Russia. Its system for ensuring the legality of wood origin is also set within the framework of the company's environmental policy and is binding for the company's own operations and its suppliers. Its main elements are:

- UPM-Kymmene and its suppliers are committed to adhere to all relevant local legislation
- Material from current or planned protection areas or from sites otherwise excluded from logging is not to be used by the company nor by its suppliers
- Suppliers have to provide information on the origin of the wood at stand level (using map-co-ordinates as additional location reference)
- UPM-Kymmene has the contractual right to audit logging sites

UPM-Kymmene is also implementing a system for tracing of wood origin. This includes the following main elements:

- Information on origin (at the level of Leshoz (wood by rail or waterways, chips) or Lesnizestvo (road-transport))
- More precise information can be requested if delivery is made from a region with potentially problematic areas (e.g. protected areas in the same leshoz / lesnizestvo)
- Information on modes of transport and loading points
- Documentation for origin of individual parcels of wood must be available
- Database and GIS mapping program
- Audits by UPM-Kymmene at the site of origin, including a rating system and recommendations for corrective action
- External audits (ISO 14001 and EMAS)

2.2.3.5 Neusiedler Syktyvkar

This company, a part of the Austrian "Neusiedler"-group, is running a paper mill in Syktyvkar. The mill produces both for domestic as well as export markets. For the supply of its mill the company runs its own logging operations and is also contracting additional suppliers of wood and pulp from other sources. The policies are based on the following main elements:

- Commitment to adhere to all relevant legislation within the company's own logging operations

- Preparations for third-party certification (by FSC) of own forest operations
- Contractual commitment for suppliers to adhere to all relevant legislation
- No use of material from current or planned protected areas or areas otherwise excluded from logging operations
- Suppliers have to provide information on wood origin at the level of harvesting license (in advance of logging)
- Right of the company to audit suppliers logging sites
- Pulp suppliers have to be able to show information on their production processes (i.e. adherence to relevant environmental standards during pulp production)

Within this framework Neusiedler Syktyvkar is also implementing a system of wood origin tracing. This is based on:

- Proof of origin based on harvesting licenses
- Spatial information based on kvartal-network
- Information on harvesting and transport operations
- Audits of suppliers by Neusiedler Syktyvkar

2.2.3.6 Ikea

The furniture retail company Ikea has implemented a set of policies to trace the origin of all wood sources in solid wood, veneer, plywood and glue-laminated material in its products. The system was originally established as an element of the company's environmental policies. It is based on a "staircase model" for suppliers, which classifies suppliers into four levels of increasing environmental standards. It is thus combination of purchasing policy and wood origin tracing. The basic structure is as follows:

- Classification of suppliers into four level
 - Level 1: Origin of wood must be known and proven at the level of a region within a country, wood must not origin from intact natural forest or areas with high conservation value (according to national/regional recognition), unless material is certified by an independent certification label
 - Level 2: Production must be in accordance to national and regional legislation, wood must not origin from protected areas, unless independently certified, no wood from plantations established after November 1994 on natural forest land
 - Level 3: All of the above criteria, certification of forest management must be under preparation
 - Level 4: Production in accordance with official standards for well managed forests, developed in co-operation of all relevant stakeholders, certified by an independent party
- Producers on level 1 – 3 should be in the process of developing their operations to proceed to the next higher level.

Relevant rules for suppliers to proof origin of wood (i.e. tracing of origin):

- Records of origin (i.e. logging licenses) must be kept for 12 months, information on wood origin must be presented to IKEA or a third party appointed by IKEA within 48 hours upon request

- For material going through several processing stages:
 - Each element in the supply chain is responsible for the “up-stream”-elements to adhere to relevant standards
 - All suppliers along the chain must accept audits by IKEA or a third party appointed by IKEA

2.2.4 Comparative assessment

The six companies investigated in this report represent three basic constellations in context with efforts to ensure the legality of wood supply for forest products imported to EU markets. UPM and Stora Enso are both companies, which extensively use raw material from the Russian Federation as supply for their plants in EU-countries. They both have forestry-branches, in charge of carrying out logging operations for the companies and are also getting additional supply via contractors.

Thomesto has originally been set up to procure wood for the Metsäliitto-cooperative in Finland. It is now also providing wood for other companies in the European Union. The majority (85%) of wood procured in Russia is delivered to Finland.

Neusiedler Syktyvkar and Solombalskiy are both companies running processing mills in the Russian Federation, producing for domestic as well as export markets. They organise their supply both through their own forest operations as well as through subcontractors.

Ikea is an international furniture retail company, with an extensive branch-network in EU countries. It has recently also started retail operations in the Russian Federation. As a furniture production and retail company, Ikea is not directly involved in harvesting operations and it is implementing its policies for wood procurement from sound sources through guidelines for its suppliers. Ikea is also a good example for how to implement a tracking policy along several stages of a supply chain.

As has been mentioned earlier, any assessment of companies' systems has to be based on employing a specific definition on what constitutes illegal logging. The methods used in this study to assess possible quantities of illegally logged material are suited to identify material which has been logged without a logging license. Consequently it is this aspect of illegal operations which is to be assessed primarily. Furthermore possible trespasses against the conditions stipulated in a license contract, including payment conditions as well as other legal obligations should be considered.

The list of criteria used to compare the companies' policies is based on a suggestion submitted by DFID-UK (Hugh Speechly, Comments to intermediate report (draft) in December 2004). The result of this comparison is presented in Table 11.

Table 11. Comparative assessment of measures used by companies to prevent export of illegal wood

Indicator	Solombalskiy LDK	StoraEnso	UPM	Thomesto	Neussiedler	IKEA ¹⁵ L1,2/L3,4
Existing system requires more detailed information and verification than official requirements	0	1	1	0	1	0/1
Each consignment can be traced to origin (at stand level)	1	1	1	1	1	0/1
Official documents attesting harvest permit available	1	1	1	1	1	1
Geographic location of origin documented by map (or co-ordinates of stand)	1	1	1	1	1	0/1
Official record of volume and quality extracted	1	1	1	1	1	0/1
Records of payments due	1	1	1	1	1	1/1
Records of payments	0	0	0	0	0	0
Records of regular internal audits of system including actions taken for failures	1	1	1	1	1	1/1
Statements of findings of regular external audits that state “to provide assurance that all consignments of timber originate from legal harvest operations as defined by...” and list of corrective actions	1	1	1	1	1	1/1

Legend: “1”: indicator clearly present, “0”: indicator absent or not verifiable from available information

In the comparison IKEA’s systems receives a rather low score, especially for suppliers at levels 1 and 2. This results mainly from the lack of information on criteria related directly to forestry activities in the field. As can be seen from IKEA’s staircase-level-system, the company aims more at a “certification of suppliers” rather than a verification system for individual wood shipments. Suppliers at level 4 are supposed to have their operations certified by an independent certification institution. For primary producers (forest enterprises and wood delivery contractors), this means forest management certification (e.g. FSC, PEFC), for processing companies down the supply chain, this means the implementation of a custody-chain, which also has to be certified.

2.3 Role of third party verification

“Third party verification”, as used for the purpose of comparing companies’ systems for tracing of wood origin, encompasses the verification of these systems (e.g. in the form of regular audits), rather than the verification of individual shipments by either public or private institutions.

Currently there is no public system installed in the Russian federation, which would be in charge of recording the quantity or quality of individual wood shipments. Most of the larger companies involved in export of wood products from Russia develop their own system of wood origin tracing or forest certification. These systems are usually implemented as an element of a company’s environmental policy and as such may be certified under the ISO 14001 or EMAS-system. Stora-Enso, UPM-Kymmene and Thomesto have taken this step.

¹⁵ For IKEA the more detailed requirements for proof of origin (at stand level) only apply to suppliers at levels 3 and 4, for suppliers at levels 1 and 2 proof of origin is only required at REGIONAL level.

These certificates were designed to verify a company's environmental management system. They are issued by accredited certifiers and are thus subject to third-party verification. Evaluation of compliance has already been introduced to this standard in 1996. The latest version of ISO-14001 requirements, ISO-14001 2004, puts a stronger emphasis on evaluation of compliance (requirement 4.5.2), but for adherence to this requirement it is sufficient to: "... ensure that adequate records are available for periodical evaluation of compliance, and that there is an effective process for this evaluation (one mechanism could be via internal audit)." (DNV, 2004).

ISO 14001 therefore requires the records of audits, but leaves the possibility to conform to this requirement through internal audits. Based on the material available, the companies, which have been studied for this report, are not using third party verification services for evaluation of compliance at their own or their suppliers' operations.

2.4 Forest management certification

Another way of third party verification of wood origin is forest certification. At the time of collecting this information (Summer 2004) the only possible system for forest certification in Russia was FSC; the other systems (e.g. PEFC) were still developing standards and establishing the net of representatives.

According to the official website of Forest Stewardship Council (www.fscoax.org) 1.44.812 hectares of forest were certified by June 2004. 8 FSC certificates were issued for Forest Management (FM), 7 out of that are combined certificates (FM/COC) for Forest Management and Chain of Custody.

For the purpose of ensuring the legality of produced material, FSC certification of forest management and the certification of chain of custody are both relevant. FSC forest management certification is based on the following main elements

- Pre-audit to assess possible problems and inform the applicant on possibly necessary measures if certification is to be attained
- Certification audit, based on the applicant's documentation, how certification criteria will be met in future operations
- Regular (usually annual) audits to ensure that applicant continues to conform to certification standards

Proof of legality of operations (e.g. ownership or logging rights, adherence to relevant legislation) is among the criteria set as definitions for sustainable forest management.

FSC-certificates for forest areas within the North-West region are listed in Table 12.

The total FSC-certified area of roughly 2.25 M ha is equivalent to about 2 % of the total forest area of 118 M ha in the North-West region. (total forest fund area, including also protected areas, special management classes and forests under administration other than that of the forest administration, source: Pisarenko *et al.* 2001, p. 75).

Table 12.: FSC-certificates in the North-West region, status: May 31st, 2005, (Source: www.fsc.org)

Company name	Location (oblast/republic)	Forest area (ha)	FSC-certificate code
Holz Dammers Gmbh	Arkhangelsk	65.905	IMO-FM/COC-2099
CJSC Bely Ruchey	Vologda	398.000	GFA-FM/COC-1120
JSC Svetoserkles	Arkhangelsk	171.900	GFA-FM/COC-1114
JSC Maolshuyka	Akhangelsk	336.445	GFA-FM/COC-1078
Komilesbiznes OOO	Komi	62.727	SW-FM/COC-1499
Madok GmbH	Novgorod	31.200	SGS-FM/COC-0849
OAo Belozersky lespromkhoz	Vologda	221.492	SGS-FM/COC-1828
Priluzje Leskhoz Model Forest	Komi	794.409	SW-FM/COC-242
STF Strug (Pskov Model Forest)	Pskov	18.440	SW-FM-283F
TOTAL AREA		2.250.283	

2.5 Conclusions

The objective of this section was to determine in how far existing measures are already in place to keep illegally logged material from EU markets.

To this end official export documentation requirements as well as existing private sector schemes have been investigated.

Analysis of official export requirements shows that the logging license is only indirectly required, in that it is a prerequisite to obtain a phytosanitary certificate. It is thus not checked by an institution primarily interested in the legality of the consignment.

A possible weak point of the system is the current paper-based system of pre-printed and numbered licenses, which makes the verification of a license more difficult than an electronic system would. License are printed on standard paper with the numbering system itself being the only safeguard against forgery.

Forging of the pre-printed license document does not seem to require a high level of technical sophistication. In addition to the document also the stamps by officials (i.e. the leshoz-administration) would have to be forged, which, too, does not seem to be too much of a challenge in comparison to counterfeiting of money or other types of documents including water signs, holograms or other technically more sophisticated features.

The official system of logging licenses could be improved by switching from a paper-based system to an electronically managed system, whereby verification of the license information could be done with much less administrative effort and therefore also as a routine process.

The logging licenses are also at the basis of all of the systems implemented by private companies introduced in this report. But as all of these systems foresee the possibility for auditing of logging sites to verify the information from the official documentation, they are thus implementing an additional safeguard into their systems.

The private measures implemented by the companies presented in this report were all implemented as elements of their environmental information management systems and as

such were certified under the ISO 14001 or EMAS-labels. This certification ensures compliance of the system with the required standards. In both systems the auditing of compliance to individual criteria such as the legality of wood supply can be organised through internal as well as external audits.

The private measures implemented are considered to represent a considerable safeguard to ensure the legality of wood supply. If audits of suppliers are carried out by the companies themselves rather than third parties, only suspicion of fraud by the companies themselves would justify mistrust into their systems. However, during the process of ISO 14001 or EMAS-certification none such mistrust has been expressed by the issuing institutions.

Concerning the “level of legality”, which is validated by existing private sector measures, this is mostly restricted to the existence of logging licenses and the exclusion of material from current or planned protected areas. As far as information on payments is recorded on the license documents it is possible to verify this in the course of audits of suppliers.

In all cases contract clauses commit suppliers to adhere to all relevant legislation, which in principle should also include labour legislation, yet the available documentation does not provide detailed information how compliance to labour legislation would be assessed.

None of the systems investigated in this report makes a specific statement to verifying a supplier’s tax-records.

The main method employed in this report for arriving at estimates for illegal logging is based on using wood from unknown origin, as identified through discrepancies in production- and consumption statistics as a proxy for wood originating from illegal logging activities. Related to definitions of legality, this method also mainly would identify wood harvested without official records made (i.e. licenses issued) and does not allow for conclusions as regards license fees or tax payments made.

The systems assessed in this study are currently covering about 41% of all wood exports from the Russian Federation. Due to their location it may be assumed that among the group analysed in this report, the largest amount of wood is acquired in Western regions of the Russian Federation and that the main export destinations will be European Union countries. Related to exports to European Union (EU 15) member countries, the assessed companies’ exports represented 60% of this trade . The figures provided for wood procurement were given in roundwood equivalents, including thus also exports in the form of sawnwood or other more processed material. Based on these figures as well as available knowledge on activities by other large scale actors active in this trade, it is assumed that measures of the type which have been investigated in this report cover the larger (i.e. around 75%) part of all exports from North-West Russia to the European Union.

Most of other larger companies within the European union active in the Russian Federation employ also some sort of system akin at least to the more “basic” ones introduced in this report. Yet even if one assumes that all large scale exports from the Russian Federation to the European Union (and especially Finland) are covered by some sort of system, this would still leave quantities by smaller companies, who are not running any sort of system of verification of origin, other than the requirements by official legislation. Section 3.3 (Scenario assumptions) describes how this has been taken into considerations in developing the different scenarios for this study.

3 Scenario analysis of the impacts of a possible EU-Russia FLEGT Partnership Agreement

The global forest sector model EFI-GTM was applied to assess the impacts on the EU forest sector of implementing a licensing scheme in Russia through improved levels of forest law enforcement in the Russian federation (e.g. by improving the system for license issuing and license tracking) and/or trade related measures (e.g. by requiring special “legality licenses” for material to be imported from the Russian Federation into the EU).

3.1 Modelling method and main assumptions

The main function of the EFI-GTM is to provide consistent analysis of how and by how much production, consumption, imports, exports, and prices of roundwood and forest industry products might change over time as a response to changes in external factors. Examples for external factors are: economic growth, forest conservation protection, energy prices, trade regulations, transport costs, exchange rates, forest growth, consumer preferences and policy or trade related factors.

The model consists of a group of competing economies that are trading forest sector commodities whenever the trade increases their economic welfare. In each economy, consumers are assumed to maximize their utility and producers are assumed to maximize their profits under perfect competition. For each region we define demand functions for the final products (mechanical forest industry products, paper and paperboard), supply functions for waste paper and timber, as well as a set of technologies for producing intermediate (pulp, chips) and final products.

The EFI-GTM model is a regionalised, global partial equilibrium model for forestry and forest industries. The model has 61 regions (Europe is divided in 31 regions, and the rest of the world in 30 regions). The endogenous sector commodities include 6 wood categories, 26 forest industry products and 4 waste paper grades. For each region we define demand equations for the final products (mechanical forest industry products, paper and paperboard) that specify the quantity demanded as a function of real prices. The demand equations for the base year (1999) are positioned by base year consumption, base year prices and price elasticities. These equations are shifted inter periodically to reflect the exogenous assumptions of GDP changes and accounting for the econometrically estimated regional GDP-elasticities for the products. Assumed GDP growth rates are 2% p.a. in Western Europe for 2005–2010, and then 1.8% p.a. for 2011–2020. In Eastern Europe, it is 4% p.a. for 2005–2010 and 3.5% p.a. for 2011–2020, in Russia 5% p.a. and 4% p.a. for 2005–2010 and 2011–2020, respectively, in China 6.5% for 2005–2010 and gradually declining from 6 to 5% over 2011–2020, in Japan 1% for 2005–2020 and for other Asian regions GDP growths is assumed within interval of 4–5.5%, and in Latin America within 3–4%. GDP growth for 2000–2004 is according to IMF. The GDP elasticities for final products are based on FAO (1997). Price elasticities for final products are in a range of -0.2 to -0.3.

The wood supply in each region is characterized by equations that specify quantities of different wood categories as a function of real prices. Assumed price elasticities of log supply are within a range of 0.5–1.5, with 0.5 for Western Europe, 1.0 for Eastern Europe and 1.5 in

Russia. The supply functions are shifted inter-periodically reflecting the changes in growing stock of existing forest or plantation potential wood supply in the regions.

Supply of intermediate (pulp, chips, and waste paper) and final products is represented by production activities defined through input-output coefficients. These activities with limited capacities describe the technologies available in each region. Changes in forest industry production capacities are endogenous and depend on the profitability of the alternative production technologies specified as data. Thereby, forest industry technologies, e.g., the amount of recycled fibre used in a production of certain paper grade may also change over time.

For more details regarding model structure, assumptions and model data input we refer to Kallio *et al.* (2004)

3.2 Scenario assumptions

As a reference for “business as usual” the Base scenario was defined as continuing the recent tendencies and practices in the forest sector and the whole economy (e.g. regarding GDP growth) if no additional measures are taken either in Russia itself or by the European Union. This scenario provides comparison results to measure the assumed impact of FLEGT-measures against a situation without such measures.

Scenarios for analyzing the impact of FLEGT-measures are divided into two groups:

- The first group of scenarios (scenarios 1-3 defined below) reflects the implementation of FLEGT-measures (e.g. licensing schemes) for roundwood and sawnwood traded between Russia and EU countries. If a shipment of wood is of unknown origin (suspected to be illegally harvested), a valid proof of origin would not be possible and EU customs control would not permit such wood to enter EU market. Assuming that such a proof would not be possible to produce for currently estimated amounts of wood from unknown origin, this would result in a reduction of exported material.
- The second group of scenarios (scenarios 4-7 defined below) assumes reduction on the Russian industrial logs supply (on the basis of the estimate of wood of unknown origin from the total domestic supply) in 2006 due to introduction of 100% effective Forest Law Enforcement and Governance (FLEG) measures by Russian State.

The different assumptions for wood of unknown origin in either Russian production (i.e. “harvest”-scenarios) or Russian-EU trade (i.e. “trade-scenarios”) are based on the following rationale:

- For estimates of levels of wood from unknown origin in the Russian Federation:
 - A range of 10% (low) - 15% (high) share of wood from unknown origin is considered a realistic range of estimates, based on the analysis carried out by EFI.
 - Two more scenarios were introduced in order to examine the potential impact of more extreme assumptions:
 - a “very low” estimate of 5% of wood from unknown origin.
 - a “very high” estimate of 20% of wood from unknown origin.

- For estimates of levels of wood from unknown origin currently traded between the Russian Federation and the European Union the following considerations are made:
 - Assuming that wood from unknown origin in the North-West Region is in the 10 % - 15% range, this amounts to between 4.8 M m³ to 7.1 M m³ per annum. The latter amount is roughly equivalent to 25% of all international exports (roundwood and sawnwood (in RWE)) from the region, which is considered not to be covered by private sector measures.
 - It would thus in theory be possible to assume that even 25% of all exported material could come from unknown sources, if it is suggested that material from unknown sources is exclusively exported.
 - However, it does not seem to be logical to assume that material from unknown sources is exclusively exported, since official export formalities require at least an additional illegal act (forging of a logging license) and thus distribution via domestic markets offers a more risk-free alternative especially for parties less professionally organised and domestic demand is sure to exist for such material.
 - For lack of any more precise empirical data regarding the share of material from unknown sources in export trade, it was thus eventually decided to use the approach taken by most NGOs in this context, which assumes that the share of material from unknown sources in export trade roughly equals that in domestic production.

- Consequently the following scenarios for the amount of material of unknown origin in export trade were made in analogy to the scenarios for domestic supply:
 - A 15% -assumption, based on the considerations introduced above
 - In addition to the 15% -assumption for material from unknown sources in trade, also a 10% and 5% scenario were calculated, corresponding to the “low” and “very low”-estimates from the production-consumption comparison carried out by EFI.
 - For the trade-scenarios no “very high”-estimate (i.e. 20%) -scenario was formulated, as that would assume that 80% or more of all material exported and not covered by private measures is derived from unknown sources.

Both groups of scenarios assume that measures would primarily affect the availability of material (with indirect consequences on costs). For lack of any sound basis for a different assumption the scenarios assume an immediate 100% effectiveness of FLEGT-measures in relation to reducing the production and/or export of material from “unknown origin”.

Reduction of the Russian roundwood exports and harvests enters the model scenario analysis as a scenario assumption. However, for the reduction of the Russian roundwood harvest the assumption is only applied to a certain roundwood supply at a given price. Nevertheless, reducing the roundwood supply at a given price does not physically limit potential additional supply at an increased price. Practically this means, that if low costs illegal harvest is eliminated, it can be effectively substituted by legal harvest at a higher marginal costs. However, higher costs for roundwood supply may result in a lower roundwood demand from forest industries. With a new higher costs roundwood supply forest sector will be in a new equilibrium with a somewhat lower forest products production.

Alternative scenarios are thus defined as following:

- 1) “Trade5%” – share of the exported wood and sawnwood is estimated at a very low 5% level. Introduction of the export licensing scheme in 2006 results in reduction of the previous period exports by 5%.
- 2) “Trade10%” – share of the exported wood and sawnwood is estimated at a low 10% level. Introduction of the export licensing scheme in 2006 results in reduction of the previous period exports by 10%.
- 3) “Trade15%” – share of the exported wood and sawnwood is estimated at a high 15% level. Introduction of the export licensing scheme in 2006 results in reduction of the previous period exports by 15%.
- 4) “Ru_Harvest5%” – this scenario assumes reduction on the Russian industrial logs supply by 5% (on the basis of the moderate estimate of wood of unknown origin from the total domestic supply) in 2006.
- 5) “Ru_Harvest10%” – this scenario assumes reduction on the Russian industrial logs supply by 10% (on the basis of the moderate estimate of wood of unknown origin from the total domestic supply) in 2006.
- 6) “Ru_Harvest15%” – this scenario assumes reduction on the Russian industrial logs supply by 15% (on the basis of the moderate estimate of wood of unknown origin from the total domestic supply) in 2006.
- 7) “Ru_Harvest20%” – this is the same type of scenario as previous, based on 20% of illegal wood estimate resulting in 20% reduction of the Russian industrial wood supply in 2006.

It should be noted, that the scenarios assume a 100% effectiveness of FLEGT measures in reducing the amount of material from unknown origin. While 100% effectiveness has to be considered unrealistic for any type of control-measure, the exact level of effectiveness will depend on the – as of yet unknown – detailed design of such measures and their actual implementation, it is not within the scope of this study to make any more detailed assessment on this.

3.3 Scenario results

Results of the EFI-GTM model scenario runs are summarized in the Table 13. Due to very high dependency of Finland from the Russian wood supply (roundwood export from Russia to Finland was about 73% of the total Russian export to EU in 2002 or 13.7 M m³ out of 18.8 M m³) the major results are presented for Finland and European Russia. The impacts of the alternative scenarios on the other countries and total EU sector seem to be very minor. The main changes for wood based industries production, industrial logs harvest, prices and trade for the whole EU is largely related to the changes in the Finnish forest sector. Other countries are not so critically dependent on Russian roundwood supply, and some modest reduction of the Russian trade into other EU countries can be easily offset by minor changes in their own wood supply and/or small changes of the EU intra trade. For the Russian Forest sector, depending on the share of the illegal wood trade and harvest, the impact of the EU FLEGT measures can also be significant.

Table 13. Main results of scenarios for Finland and European Russia. (figures are in percentage of the 2005 production, harvest, trade and price level – 100% for the base scenario 2005 level)

Scenario	Finland			European Russia		
	2006	2010	2015	2006	2010	2015
	Pulp & Paper & Paperboard Production					
Base	101.8%	104.7%	113.4%	101.1%	109.9%	124.3%
Trade5%	100.9%	102.6%	110.6%	101.5%	109.9%	124.6%
Trade10%	100.0%	101.6%	109.2%	101.8%	110.1%	125.1%
Trade15%	99.6%	99.7%	107.8%	102.0%	109.9%	124.9%
RU_Harvest5%	101.9%	104.6%	112.7%	101.1%	109.0%	122.7%
RU_Harvest10%	101.8%	104.2%	110.8%	101.1%	108.5%	122.7%
RU_Harvest15%	101.0%	100.6%	106.9%	101.1%	107.6%	122.9%
RU_Harvest20%	100.6%	98.5%	102.1%	101.1%	106.8%	121.6%
	Sawnwood & Panels Production					
Base	98.8%	94.7%	90.8%	102.1%	103.5%	101.2%
Trade5%	98.7%	94.6%	91.9%	102.1%	103.1%	100.8%
Trade10%	98.7%	94.5%	92.1%	102.1%	102.9%	100.6%
Trade15%	98.7%	94.5%	92.3%	102.1%	102.7%	100.5%
RU_Harvest5%	98.9%	94.7%	90.5%	101.9%	101.9%	99.4%
RU_Harvest10%	98.9%	94.7%	90.6%	99.8%	99.2%	97.1%
RU_Harvest15%	98.9%	94.8%	90.6%	98.4%	95.6%	94.5%
RU_Harvest20%	98.9%	94.8%	90.6%	97.5%	94.8%	92.2%
	Industrial Logs Harvest					
Base	101.3%	105.0%	108.6%	102.0%	106.9%	111.3%
Trade5%	101.9%	105.3%	108.8%	100.6%	106.0%	110.7%
Trade10%	102.7%	105.7%	109.0%	99.8%	105.1%	110.1%
Trade15%	103.8%	106.0%	109.1%	98.9%	104.1%	109.6%
RU_Harvest5%	101.5%	105.0%	108.3%	101.9%	106.0%	109.8%
RU_Harvest10%	101.6%	105.1%	108.8%	100.8%	104.0%	108.0%
RU_Harvest15%	102.0%	105.6%	109.5%	99.0%	100.8%	105.7%
RU_Harvest20%	102.3%	105.8%	109.6%	98.6%	99.1%	102.2%
	Logs Import from Russia			Logs Export to EU		
Base	103.5%	112.3%	123.9%	101.9%	105.4%	111.3%
Trade5%	94.3%	107.7%	119.9%	93.4%	100.9%	107.4%
Trade10%	89.3%	103.6%	116.4%	88.4%	96.8%	104.0%
Trade15%	84.3%	97.8%	113.4%	83.4%	91.4%	101.5%
RU_Harvest5%	103.5%	111.9%	123.0%	101.9%	105.1%	110.6%
RU_Harvest10%	102.3%	110.7%	117.7%	100.9%	104.2%	106.3%
RU_Harvest15%	95.0%	102.0%	107.9%	95.0%	97.1%	98.4%
RU_Harvest20%	95.0%	96.4%	97.3%	95.0%	92.7%	89.9%

Pulpwood Coniferous Price						
Base	103.1%	109.7%	115.8%	100.9%	110.6%	122.5%
Trade5%	105.2%	110.4%	116.5%	98.6%	109.6%	122.0%
Trade10%	106.1%	111.3%	117.3%	97.2%	108.7%	121.6%
Trade15%	107.8%	111.8%	118.0%	95.9%	106.9%	120.6%
RU_Harvest5%	103.8%	109.7%	113.7%	105.0%	115.1%	127.1%
RU_Harvest10%	104.3%	109.5%	115.4%	110.6%	119.7%	132.1%
RU_Harvest15%	105.7%	110.9%	117.7%	113.3%	123.4%	136.7%
RU_Harvest20%	106.4%	112.5%	118.9%	119.3%	126.6%	139.0%
Scenario	Finland			European Russia		
	2006	2010	2015	2006	2010	2015
Pulpwood Non-Coniferous Price						
Base	103.1%	104.3%	110.4%	101.4%	111.1%	123.0%
Trade5%	105.2%	103.8%	110.2%	99.1%	110.1%	122.6%
Trade10%	114.9%	107.3%	109.9%	97.7%	108.8%	122.1%
Trade15%	129.1%	112.1%	109.5%	96.3%	107.4%	121.2%
RU_Harvest5%	103.8%	106.6%	112.8%	105.5%	115.7%	127.6%
RU_Harvest10%	104.3%	109.0%	115.4%	111.1%	120.3%	132.7%
RU_Harvest15%	105.7%	110.9%	117.7%	113.8%	124.0%	137.3%
RU_Harvest20%	106.4%	112.5%	118.9%	119.8%	127.2%	139.6%

3.3.1 Development of forest industries in Finland and European Russia

Reduction of the roundwood and sawnwood trade from European Russia (scenarios 1–3) will result negatively on Finnish pulp & paper production (Figure 6), which in these scenarios would show slower growth rates in comparison to the Base-scenario. Reduction of the Russian roundwood harvest (scenarios 4–7) will also have negative impact on Finnish pulp & paper industries. Short term impact will be rather small (about 2 percentage points change between base and 15% reduction of exports and only 1 percent difference at the most for Russian harvest reduction). In the medium (2010) and long (2015) term differences between the Base scenario and other scenarios becomes more substantial and more the impacts of the “Trade” and “RU_Harvest” scenarios approach each other.

However, it should be noted, that RU_Harvest 5% and RU_Harvest 10% do not show significant impacts for Finnish pulp & paper industries, whereas in RU_Harvest 15% and RU_Harvest 20% the impact is increasing non-linearly and is very significant in the medium to long term in the case of RU_Harvest 20%.

The impact of all scenarios is not significant for Finnish sawmilling and wood based industries with slight positive impact of the reduction of the Russian roundwood and sawnwood trade.

For the European Russian pulp & paper industries scenario results are not very sensitive (Figure 7) for the reduction of trade (scenarios 1–3) or Russian harvest (scenarios 4–7), where reduction of roundwood & sawnwood exports leads to slide additional growths and reduction of Russian harvest results in a very modest reduction of growths for Russian pulp & paper industries. However, reduction of Russian harvest will result in much more adverse impact on Russian sawmilling and wood based panel industries. (Figure 8)

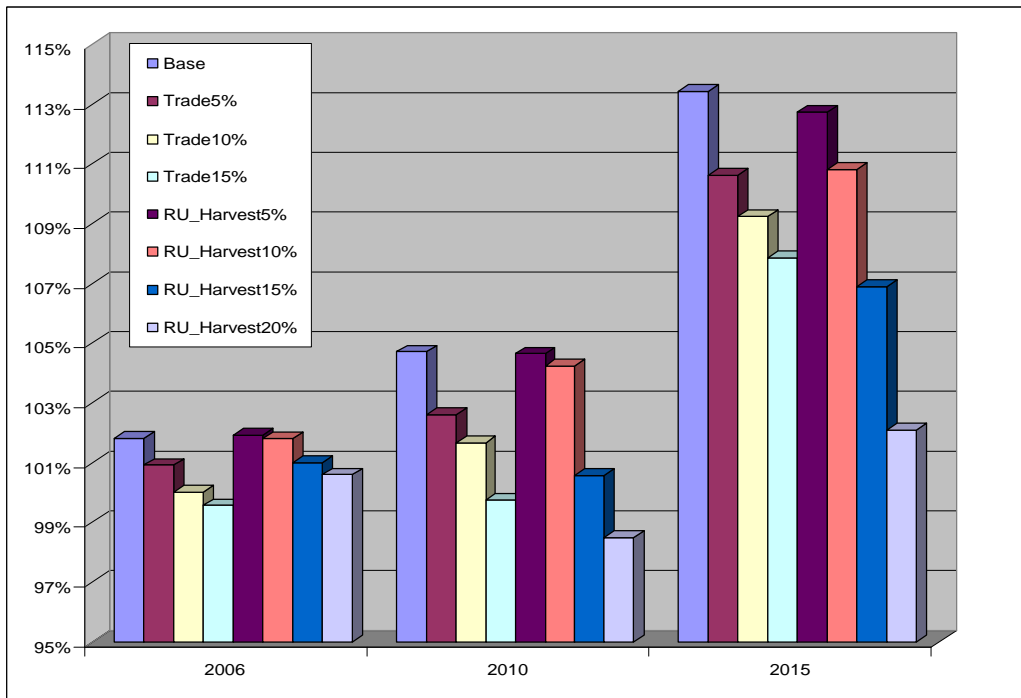


Figure 6. Pulp & paper production growth in Finland in 2006/2010/2015 (2005 Base scenario level is 100%)

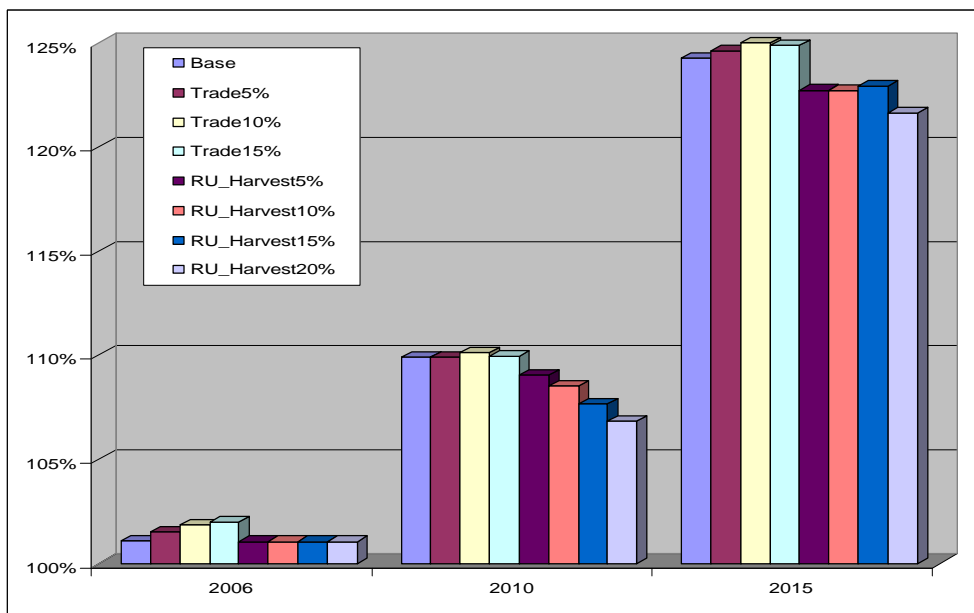


Figure 7. Pulp & paper production growth in European Russia in 2006/2010/2015 (2005 Base scenario level is 100%)

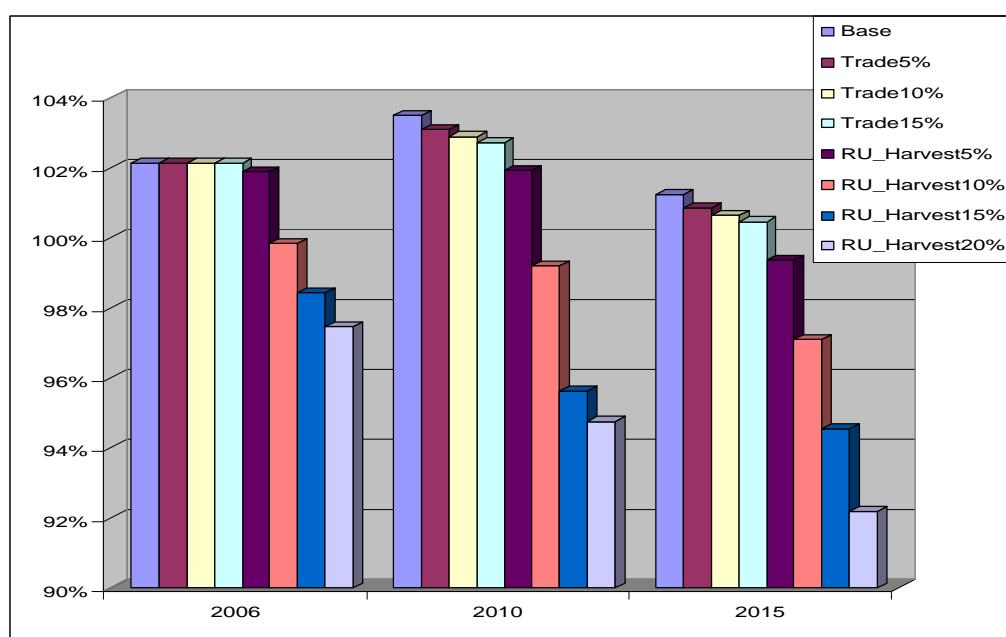


Figure 8. Sawnwood and wood based panels production growth in European Russia in 2006/2010/2015 (2005 Base scenario level is 100%)

Overall, the impact of reduction of the Russian roundwood export and harvest reduction within 5–15% range is resulting in the reduction of the future growth of both Finnish and European Russian forest industries growth mostly in the range of 1–5% with more substantial impact on the Finnish pulp & paper industries from the reduction of the Russian exports in the short term and more substantial impact on both Finnish and Russian forest sector in the long term from the reduction of the Russian harvest.

3.3.2 Industrial roundwood harvest and trade in Finland and European Russia

As it was shown above, reduction of roundwood exports and harvest in Russia by 5–15% results in the possible reduction of forest products production in the range of 1–5%. Similar range of possible impact on the Russian roundwood harvest is also observed from Figure 9. In the short term both trade and harvest scenarios are showing similar impact, whereas in the medium to long term harvest reduction scenarios are showing stronger effect.

Both trade and harvest reduction scenarios are showing much stronger impact on the Russian roundwood exports (Figure 10). Reduction of roundwood and sawnwood trade by 15% results in almost 19% reduction of roundwood exports from European Russia to EU15 countries. The impact of Russian harvests reduction is much less in the short term, whereas in the long term the impact of the Russian harvest reduction becomes more substantial.

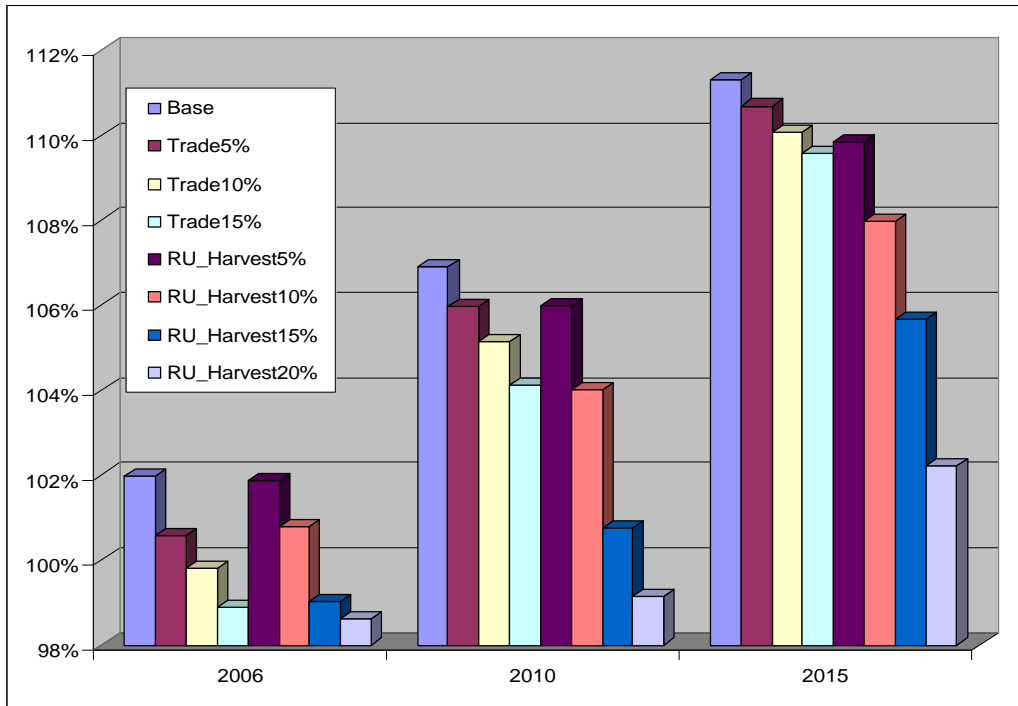


Figure 9. Industrial roundwood production growth in European Russia in 2006/2010/2015 (2005 Base scenario level is 100%)

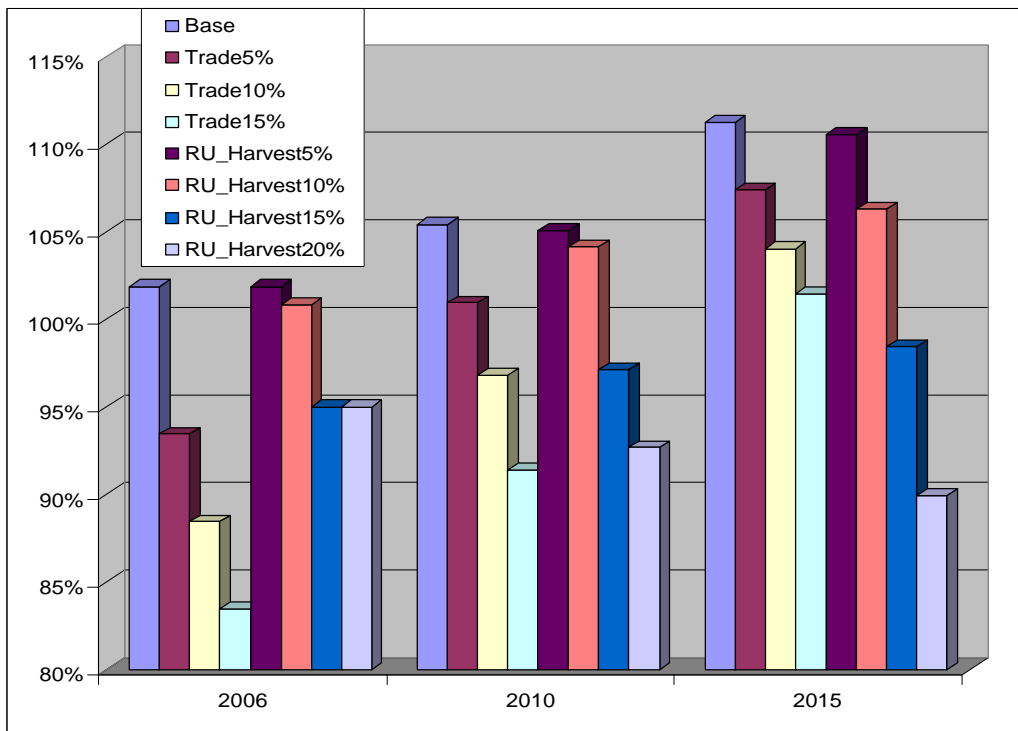


Figure 10. Industrial roundwood export growth from European Russia to EU15 in 2006/2010/2015 (2005 Base scenario level is 100%)

Finnish roundwood harvest is to some extent dependent on the reduction of the European Russian roundwood export in the short term, whereas in the medium to long term the impact is very minor. However, the impact of both trade and harvest reductions scenarios is rather high and similar to the situation shown on Fig. 10 for European Russian roundwood exports.

3.3.3 Impact on price developments

Figures 11 and 12 shows the impact of the trade and harvest reduction scenarios on the Finnish and Russian non-coniferous pulplogs prices respectively. The highest price impact is seen for Finland in the short term as a result of 15% roundwood export reduction from European Russia. However, in the long term the impact on Finnish roundwood prices from the trade reduction is very minor, and the impact of Russian harvest reduction will become more substantial, but relatively modest compared to short term impact of the trade reduction.

In Russia, the situation is almost opposite. The reduction of exports will result in lowering prices at a modest scale in the short and medium term. The impact on higher pulplogs prices of the Russian harvest reduction is much more substantial from short to long term.

Higher pulplog prices can potentially increase Finnish forest owners income and lower profits of Finnish forest industries through higher roundwood material costs. However, high price increase is seen only for non-coniferous pulplogs and mostly in the short term. In the medium and especially long term price difference is less substantial and is able to increase prices for chemical price around 1% only.

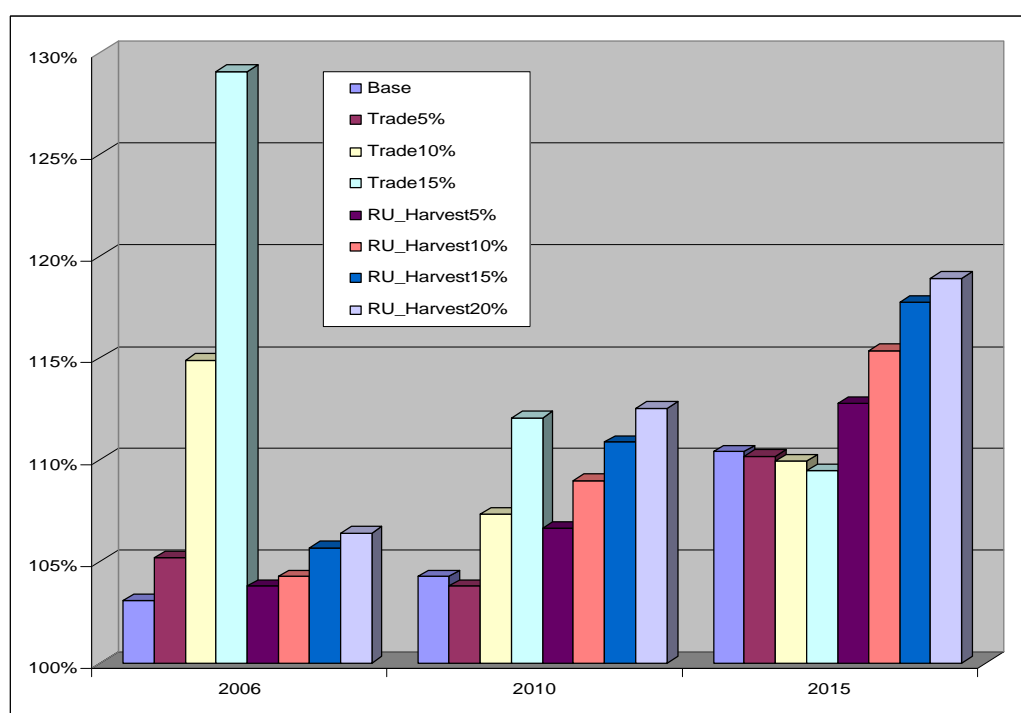


Figure 11. Non-coniferous pulpwood price development for Finland in 2006/2010/2015 (2005 Base scenario level is 100%)

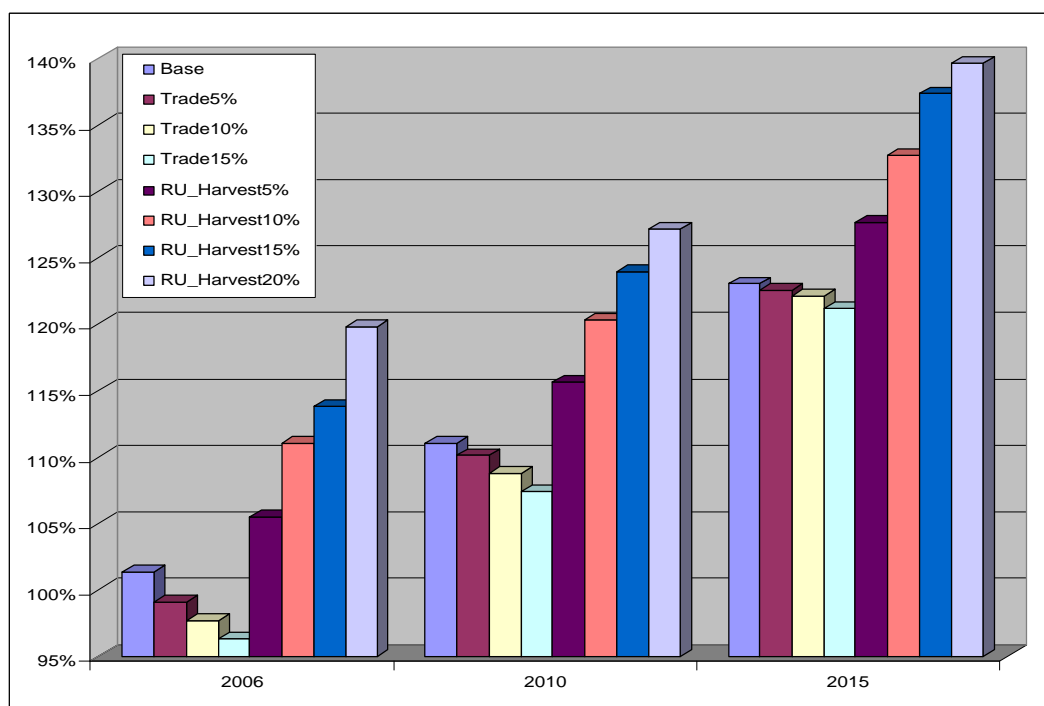


Figure 12. Non-coniferous pulpwood price development for European Russia in 2006/2010/2015 (2005 Base scenario level is 100%)

3.4 Use of study results to assess economic impacts

The possible economic impact of currently suspected illegal logging activities is a key argument used in public discussions on the subject. By assessing the economic damage of illegal activities it is also possible to engage into cost-benefit considerations as regards possible countermeasures. Such deliberations, however, should not put aside other motives in the strive to abolish illegal activities, such as social and ecological impacts as well as principal ethical considerations.

Three different approaches will be used to produce assessments of economic impacts from illegal logging. The first approach will use the results from the scenario studies in this project, based on differences in timber prices and harvesting quantities. The second approach will use average stumpage prices related to the assessed quantities of wood from unknown origin. The third approach will be based on the method applied by the Russian Ministry of Natural Resources, as cited in section 1.1.3.1 of this report, using the average level of fees levied by the authorities in cases of illegal logging which resulted in court procedures. While the formula for determining the level of this fee has not been published by Russian authorities, it is taken as a proxy for an official assessment of the damage to the Russian society from such activities.

Except for the latter approach, which is assumed to take other represent a more global estimate, the approaches for economic evaluation of damages presented here, only refer to potential direct losses related to timber production and do not take more wider economic evaluations of ecological or social impacts into account. They are thus representing rather conservative estimates.

3.4.1 Loss of gross income to timber production as a result of lower roundwood prices (at the mill)

In this approach the economic impact of suspected illegal logging activities is assessed using the following chain of conclusions:

- The amount of wood from unknown origin, as assessed by the production/consumption –comparison approach in this study is used as a proxy value for the amount of illegal logging.
- The difference in roundwood prices (at the mill) between the “Base”-scenario and the Russian Harvest”-scenarios (RU_Harvest), all of which result in higher roundwood prices, is used as an indicator for the economic impact of illegal logging activities.
- When comparing the gross-income (i.e. roundwood price x harvest volume) between the “RU_Harvest” and the “Base”-scenarios it has to be considered that in the “Base”-scenario a certain amount of the timber harvest is considered to come from “unknown sources” and consequently also the related gross-income is considered to flow to these “unknown sources”, whereas in the “RU_Harvest”-scenarios all harvest is assumed to be from “known sources”. Thus when assessing the economic impact of illegal logging activities to the comparison has to focus on income to “known sources”.
- This approach assesses the current economic damage from suspected illegal logging activities for actors along the forestry-wood chain “down to the mill-gate” and within the Russian Federation.
- The approach does not allow for a more precise allocation of the price-difference (i.e. the damage) between forest owners (i.e. the Russian government) or harvesting operators.

The results in Table 14 show, that – depending on the assumed share of wood of unknown origin there loss in income to “known” (and thus assumed legal) harvest activities is assumed to be in the range of 120.1 M USD and 274.4 M USD, the share of 10% of wood from unknown origin, which is assumed the most likely assessment in this report lies roughly in the middle between these two extremes and would result in a loss of gross income of 201.3 M USD. These scenarios are based on an assumed current average price for industrial roundwood of 30 USD / m³ across all assortments and qualities.

While overall harvest activities would be reduced, due to higher wood prices, the income to operators delivering wood from known sources would increase, both because their share in the harvest would increase (i.e. according to the assumptions in this report to a level of 100% of total harvest) and they would be able to realise higher wood sales prices. For those quantities which are currently assumed to stem from known sources, legal operators would be able to realise the price increases as net-profits, for those amounts surpassing these quantities they would of course also occur higher variable costs.

Table 14. Comparison of income to KNOWN sources between Base-scenario and RU_Harvest scenarios

	Harvest volume (M m ³)	Average industrial roundwood price (M USD)	Wood sales income	Difference of income from KNOWN activities in RU_Harvest scenarios to income from KNOWN activities in BASE-scenario (M USD)
Wood of known origin (WoKO) in harvest in BASE scenario, depending on likely assumptions for wood of unknown origin				
(LOW) 5% WoUO = 95% WoKO	40.9	30.0	1227.0	
(MEDIUM) 10% WoUO = 90% WoKO	38.5	30.0	1155.0	
(HIGH) 15% WoUO = 85% WoKO	36.0	30.0	1080.0	
Wood of unknown origin (WoUO) in BASE scenario ¹⁶				
(LOW) 5% WoUO	2.5	30.0	75.0	
(MEDIUM) 10% WoUO	4.9	30.0	147.0	
(HIGH) 15% WoUO	7.4	30.0	222.0	
Total harvest Base_scenario	43.4	30.0	1302.0	
Total harvest after elimination of WoUO (lower harvest volume, higher prices)				
RU_Harvest 5%	42.9	31.4	1347.1	120.1
RU_Harvest 10%	42.1	32.3	1356.3	201.3
RU_Harvest 15%	41.0	33.0	1354.4	274.4

3.4.2 Assessment of economic impacts based on a comparison of possible income from stumpage fees

The second approach presented in this report is based on a simple comparison of possible losses to the forest owner (i.e. the Russian Federation) from unpaid stumpage fees. This is based on the following assumptions:

- The amount of wood from unknown origin, as assessed by the production/consumption –comparison approach in this study is used as a proxy value for the amount of illegal logging.
- For wood currently assumed to come from unknown sources there is no income from stumpage fees
- For wood currently assumed to come from known sources all stumpage fees are paid.
- An average stumpage fee value of 1.5 USD/m³ across all species and site conditions is assumed for the whole North-West region.

¹⁶ These quantities are calculated as percentages of the TOTAL WOOD CONSUMPTION (roughly 49 M m³). They do therefore not correspond to the respective percentages of the assessed total harvest volume in the base scenario (43.4 M m³), which has been calculated by subtracting import quantities from the total wood resource in the region. Current quantities of harvest from KNOWN origin are calculated by subtracting the assumed amounts of wood from unknown origin from the total harvest volume.

- Stumpage fees are assumed to stay at the same level, independent of a projected wood-price increase in the RU_Harvest scenarios.

Table 15. Difference between current realisable stumpage fee income from wood of known origin and income realisable according to the RU_Harvest scenarios

	Harvest volume (M m3)	Average stumpage price	Income from stumpage fess	Economic impact of IL activities in relation to income to KNOWN sources in BASE-scenario (M USD)
Total harvest Base_scenario	43.4	1.5	65.1	<- income if all current harvest was coming from "known" sources and fees paid
Wood from known origin in harvest in BASE scenario				Difference between theoretical fee income (86.8) from current harvest and theoretically realisable income from KNOWN sources
(LOW) 5% WoUO = 95% WoKO	40.9	1.5	61.4	3.8
(MEDIUM) 10% WoUO = 90% WoKO	38.5	1.5	57.8	7.3
(HIGH) 15% WoUO = 85% WoKO	36.0	1.5	54.0	11.1
Total harvest after elimination of WoUO (lower harvest volume, higher prices)				Difference between income based on reduced harvest quantities in scenarios and current assumed income from KNOWN sources
RU_Harvest 5%	42.9	1.5	64.3	2.9
RU_Harvest 10%	42.1	1.5	63.1	5.3
	Harvest volume (M m3)	Average stumpage price	Income from stumpage fess	Economic impact of IL activities in relation to income to KNOWN sources in BASE-scenario (M USD)
RU_Harvest 15%	41.0	1.5	61.6	7.6
Total harvest after elimination of WoUO				Difference between income in scenarios and current theoretically realisable income from KNOWN sources

In Table 15 the loss in income from stumpage fees is calculated in two ways. First, the difference between the total assumed wood harvest (43.4 M m³) in the region and the amount of harvest assumed to come from known sources is calculated. The resulting values are in the range of 3.8 M USD to 11.1 M USD, with the value for the most likely share of 10% of wood from unknown origin assumed to be at 7.3 M USD. This approach is based on current harvest quantities.

The second approach is based on the – overall reduced – harvest volumes based on the results for the RU_Harvest scenarios and calculates the difference between stumpage fee income in these scenarios and assumed current stumpage fee incomes based on the assumed shares of wood from unknown origin. This approach considers the fact that overall harvest quantities will be reduced in the scenarios. However, there will still be higher income from stumpage fees, since all harvest will be from known sources, for which stumpage fees will be fully realised. These values range from 2.9 M USD to 7.6 M USD, with the value for the most likely estimate of 10% of wood from unknown origin being at 5.3 M USD.

These values have to be considered net gross-income. The higher income will be realised because of a higher amount of harvest from known (i.e. legal) sources. The authorities will, however, also incur higher transaction costs, due to an increase in issued licenses.

3.4.3 Assessment of economic impact based on the value of punitive fees

The fees which are prescribed in those cases of illegal logging which ultimately lead to a conviction at court can be considered as a form of official estimate of the damage from such activities to society at large. For this simply the currently assumed amounts of wood from unknown origin are multiplied with the average punitive fee value / m³, which in turn is assessed as 50 times the value of the average stumpage fee.

The following assumptions and conclusions are behind this approach:

- The amount of wood from unknown origin, as assessed by the production/consumption –comparison approach in this study is used as a proxy value for the amount of illegal logging.
- An average stumpage fee value of 1.5 USD / m³ across all species and site conditions is assumed for the whole North-West region.
- The value of the punitive fees (i.e. 50 x the stumpage fee) is considered to constitute an evaluation by Russian authorities of the damage incurred from illegal logging activities. This follows the example cited in section 1.1.3. (Table 1)

Table 16. Assessment of economic impact of illegal logging activities based on the value of punitive fees, if realised for the assessed quantities of wood from unknown origin

Wood from unknown origin in BASE scenario	Harvest volume (M m ³)	Value of punitive fee (50 x average stumpage fee)	Damage from illegal logging activities, based on the total value of punitives fees realisable for quantities of wood from unknown origin (M USD)
(LOW) 5% WoUO	2.5	75.0	187.5
(MEDIUM) 10% WoUO	4.9	75.0	367.5
(HIGH) 15% WoUO	7.4	75.0	555.0

According to the results presented in Table 16 the economic damage from illegal logging activities would be in the range of 187.5 M USD to 555 M USD, with the value for the most likely assessment of a 10% share of wood from unknown origin being at 367.5 M USD.

This approach uses the “price” which Russian authorities put on illegal logging in the form of punitive fees as a proxy for the damage which the Russian society incurs from such activities. As has been mentioned already in section 1.3.1.1 of this report, there considerations which have led to determining this fee value have not been published. Using this results in the highest values for economic damages incurred from illegal logging activities.

3.5 Conclusions from scenario studies

The two groups of scenarios (“RU_Harvest” and “Trade”) analysed in this study, reflected two possible results of the introduction of FLEGT-measures for the Russian Federation. The “Trade”-scenario assumed measures only affecting export trade. The introduction of mandatory export licenses as part of a voluntary agreement between the Russian Federation and the European Union would be one example for such measures, as would be the wider

introduction of public as well as private procurement policies discriminating against any material not accompanied by proof of legality other than existing export documents.

The “RU_Harvest” measures on the other hand assume that any newly introduced system or policies would ensure that no material from unknown sources would be found on domestic North-West Russian markets either. Stricter supervision by authorities along with the possible introduction of a more profound system allowing for the verification of logging licenses would be examples for such an approach.

The scenarios analysed the impact on key figures related to forest sector development both in North-West Russia as well as the European Union. The development of round wood prices and harvest quantities as well as income development for forest owners as well as forest industries are examples for the indicators investigated. All scenarios were compared against a “Base”-scenario, in which the development of these indicators were predicted based on existing assumptions on the future development of general economic indicators and forest growth scenarios.

Finnish forest industries, especially the pulp and paper and paperboard production sector would show reduced growth rates after the introduction of FLEGT-policies. In general the impact would be stronger if policies also affecting harvest activities in Russia itself were introduced, rather than measures affecting only wood exports from Russia. In both groups of scenarios sizeable (i.e. more than 2%-points differences to the “Base”-scenario in medium term production output growth development) consequences would be felt only if one assumes today’s rate of either illegal logging within North-West Russia or in international exports from the region to be at rates of 10% or higher.

All scenarios assuming policies with an impact on harvest activities in North-West Russia itself result in reduced growth rates for North-West Russian forest industries. In general sawmilling and panel –industries would be affected more strongly than pulp, paper and paperboard industries in the region.

Timber harvests in Finland would be affected only to a maximum level of slightly less than 1% production increase in Finland in a long term perspective if current levels of 15% or more of wood from unknown origin as share of wood consumption are assumed in North-West Russia or as a share of total exports from Russia to the EU respectively.

The growth of harvest activities in the North-West Russia would be slowed down in all the assumed scenarios. If only trade-related measures would be introduced, these impacts would be felt more significantly (i.e. at around 2%-points difference to the “Base”-scenario) in the “Trade_15%” scenario (i.e. when assuming that currently 15% of exports from North-West Russia are from unknown sources). Measures affecting harvest activities in North-West Russia directly would already show significant impact if material from unknown sources is assumed to be at 10% or higher as share of the total consumption in the region.

Roundwood trade between North-West Russia and the European Union would be the one variable affected most strongly in all scenarios and also the one where long term impacts would be strongest. Measures affecting trade exclusively and thus directly would show immediate and long lasting impacts already if current levels of unknown material in trade is assumed only at 5%. Measures directed at harvest activities in Russia would show stronger

impacts only if current levels of material from unknown sources is assumed to be at 10% or higher as share of the total consumption in the region.

Regarding the development of roundwood prices, the development in Finland and in the Russian Federation has to be seen separately. Measures affecting trade between Russia and the European Union exclusively would result in increased prices in Finland (in comparison to the “Base”-scenario) and lower prices in Russia. However, such impacts would only be at a significant level (i.e. more than 2%-points difference to the “Base”-scenario) if current levels of material from unknown origin are assumed to be at 15% of the total trade volume.

If introduced policies affected roundwood harvest in North-West Russia directly, consequently roundwood prices in Russia would be affected significantly, even if shares of wood from unknown origin are assumed to be at only 5% of total consumption in the region. Roundwood prices in Finland, however, would only increase significantly if current levels of wood from unknown origin as share of total consumption in North-West Russia, are assumed to be 10% or higher.

Since the results of the scenario studies are relatively complex and can only be fully assessed if the individual variables are interpreted in context with each other, it is also possible to use the results of this study for a more straightforward – albeit somewhat simplified – assessment of direct economic impacts of suspected quantities of illegal logging, measured by the amount of material of unknown origin as a share of total consumption in North-West Russia.

The annual loss to the government from non-realizable stumpage fees ranges from 2.9 M USD to 7.6 M USD, with the most likely amount assumed to be at 5.3 M USD.

The gross-income loss to legally operating actors in the forest sector amounts to between 120.1 to 274.4 M USD, with the most likely amount assumed to be at 201.3 M USD. This approach takes higher wood prices on Russian markets as well as reduced overall harvest volumes into account. Since this is gross-income before taxes, there are also non-paid taxes included in this amount. These amounts occur as “damage” to actors operating along the forestry-wood chain “from the forest to the mill”, forest industries are experiencing these amounts as lower costs.

If the level of punitive fees is taken as a scale for the damage from illegal logging activities, then the annual damage from currently suspected amounts of illegal logging for the North-West region would be in the range from 187.5 M USD to 555.0 M USD, with the most likely level assumed to be at 367.5 M USD.

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Annex 1. Illegal logging estimates in NW Russia given by the Ministry of Natural Resources of the Russian Federation from 1997 to 2003

Year	Region	Logging, m ³		Illegally harvested m ³ per case	Illegal logging, %	Number of breaches	Economic loss, throubles	
		total	illegal					
1997	Arkhangelsk (GUPR)		2 693	20,72		130	400	
1998			4 869	28,47		171	1 023	
1999				14 475	52,64		275	3 841
2000			10 046 400	37 432	60,77	0,37	616	17 658
2001			9 252 000	30 835	47,88	0,33	644	45 140
2002			8 881 800	19 986	32,34	0,23	618	78 318
2003				30 756	34,75		885	112432
1997	Kaliningrad (UPR)		1 940	11,41		170	1 570	
1998			3 345	18,08		185	2 014	
1999				2 688	8,32		323	3 018
2000			96 800	3 475	11,10	3,59	313	5 815
2001			70 100	3 927	15,96	5,60	246	91 475
2002			65 400	2 360	13,33	3,61	177	129 361
2003				3 566	19,92		179	186 251
1997	Karelia (UPR)		4 053	23,16		175	2 000	
1998			6 842	24,01		285	2 690	
1999				15 482	28,88		536	9 470
2000			6 368 500	18 772	30,04	0,29	625	17 334
2001			6 502 700	16 322	30,97	0,25	527	56 955
2002			6 118 500	10 372	32,31	0,17	321	60 388,3
2003				13 686	40,61		337	66 909,8
1997	Komi (GUPR)		2 806	15,59		180	659	
1998				6 668	25,65		260	1 981
1999				11 765	26,80		439	3 720
2000			7 230 600	14 259	31,48	0,20	453	5 459
2001			674 100	14 498	32,22	0,22	450	21 061
2002			5 547 400	9 393,7	30,30	0,17	310	28 134,8
2003				31 151,4	125,61		248	79 736,27
1997	Leningrad (GUPR)		27 011	47,81		565	10 820	
1998			21 071	39,02		540	6 812	
1999				18 519	27,93		663	8 412
2000			3834 200	31 666	28,55	0,83	1 109	22 356
2001			4 246 900	39 962	29,78	0,94	1 342	112 011
2002			4 430 700	3 8902,7	40,74	0,88	955	327 833,7
2003				18 986,9	17,86		1 063	180 170,5

Year	Region	Logging, m ³		Illegally harvested m ³ per case	Illegal logging, %	Number of breaches	Economic loss, th roubles	
		total	illegal					
1997	Murmansk (UPR)		4 189	59,00		71	925	
1998			3 284	30,69		107	1 599	
1999			1 054	7,87		134	484	
2000			139 500	2 960	22,60	2,12	131	2 557
2001			162 800	229	2,49	0,14	92	1 219
2002			129 700	52,8	0,89	0,04	59	234,1
2003				145,12	1,54		94	338,5
1997	Novgorod (UPR)		4 351	33,47		130	1 232	
1998			9 135	39,38		232	2 719	
1999				56 026	45,62		1 228	25 364
2000			2 754 900	41 045	31,89	1,49	1 287	22 115
2001			2 862 200	20 787	31,59	0,73	658	45 856
2002			2 827 000	12 905	43,89	0,46	294	76 480,7
2003				9 857,41	35,33		279	56 978,5
1997	Pskov (UPR)		2 229	16,63		134	494	
1998			2 118	12,31		172	608	
1999				8 901	28,81		309	4 842
2000			831 600	12 206	26,14	1,47	467	8 372
2001			826 800	9 969	25,69	1,21	388	34 917
2002			737 700	6 054	25,33	0,82	239	40 161
2003				4 409	19,95		221	27 184,1
1997	St. Petersburg		589	73,63		8	133,0	
1998				147	36,75		4	4,0
1999				130	32,50		4	49,0
2000								
2001			73 000	76	12,67	0,10	6	163
2002			53 200	186,3	31,05	0,35	6	617,7
2003			87 500	592,2	45,56	0,68	13	1 506,3
1997	Vologda (GUPR)		6 042	23,98		252	1 244	
1998			6 828	20,82		328	1 169	
1999				19 619	32,11		611	5 441
2000			6 390 100	26 270	33,81	0,41	777	9 173
2001			6 427 200	24 575	30,60	0,38	803	56 412
2002			5 984 700	19 799,3	36,13	0,33	548	98 226,1
2003				21 897,7	34,11		642	96 005,5

Year	Region	Logging, m3		Illegally harvested m3 per case	Illegal logging in %	Number of breaches	Economic loss, thousand roubles
		total	illegal				
1997	NW Russia (MPR)		55 903	30,80		1 815	19 480
1998			6 4307	28,16		2 284	20 619
1999			148 659	32,87		4 522	64 641
2000		37 765 600	188 084	32,55	0,50	5 778	110 840
2001		37 138 000	161 180	31,26	0,43	5 156	465 263
2002		34 810 400	120 012	34,03	0,34	3 527	839 775,4
2003			135 045	34,09		3 961	807 512,47

Annex 2. Illegal logging and export estimates from different information sources.

Illegal logging estimates can be given in percent of total logging, volume in cubic metres or as economic loss for government in monetary terms (USD, EUR or national currency).

Estimates	References
12%	Bosquet, 2002 → WWF 2000 (unable to find on the list, only WWF 1999)
20%	Contreras-Hermosilla, 2002 (a, b) → Greenpeace, 2000
20%	Tacconi et al., 2003 → Greenpeace, 2000
20%	Toyne et al., 2002 → Greenpeace, 2000
20%	Auer et al., 2003 → Greenpeace, 2000
20%	Katis, 2001 → Greenpeace
20%	Morozov, 2000 (from Greenpeace)
20–50%	Gelder et al. 2003 → Contreras-Hermosilla, 2002 (a) → Greenpeace, 2000
>75%	Green Nature, 2003 → VOA News, March 4, 2003 → Greenpeace
17% (15–20%)	SCA & WRI, 2004
35% NW Russia	Rosbalt, 2003 (a) → WWF
35%	Regnum.ru 2003 → WWF
27% or 12,1 M m ³ in 2001	Brukhanov, 2003 (WWF) → Lopina, 2003 (WWF)
36%, 11.2 M m ³ , 1 bil USD in 2002 NW	Pravda.ru, 2003 → Ptichnikov A., WWF
10–20%, 1 bil. USD	RPO Bulletin, Winter 2001/2002 (WWF)
11,2 M m ³ or 36% in 2001	Lopina, 2003 (WWF)
27%	WWF, 2004
11.2 M m ³ or 27% in 2001	WWF Latvia, 2003 → WWF Russia
25%	Forestry & British Timber, 2003 → Lopina, 2003
1 bil. GBP annually	Forestry & British Timber, 2003 → Francis Sullivan, WWF UK conservation director
20–30%	WWF Russia 2003
20–50%	FERN, 2002 → WWF, 2002
20–50 %	Guertin, 2003 → FERN, 2002
25–30 (50)%	WWF Russia, 2003
25–30%	Natural Resources of Pskov Region, 2004 → WWF
25–30%	Newsletter Forestry and Wood Certification, 2002 → WWF
25–30%	Kurukulasurya, Kotlobay (WWF)
25–30% in NW 1 bil. USD	WWF Russia 2002
25–35%	Ruswoodorigin.ru → WWF
1–30 (100)%	Kakizawa, 2001 (independent research)

	Estimates	References
	21 M m ³ , 15–20% (half of it FE)	Bosquet, 2002 → Medetsky, A. 2000
	25–30%, Vologda, Pskov 60 th ³ , 1.6 M USD	Infoline.spb.ru → WWF?
	2.85 bil. Roubles or 100 M USD	WWF Latvia, 2003 → Report of the Ministry of Natural Resources of the Russian Federation on activities of the State Forest Service in 2001
	5.5 bil. rub. 716 th. m ³ in 2002	Rosbalt, 2003 (a) → Valery Rashupkin (deputy minister Ministry of Natural Resources of the Russian Federation)
	941 500 m ³ , 1%, 100 M USD in 2001	Brukhanov, 2003 → Ministry of Natural Resources of the Russian Federation, 2002
	Vologda 48 th m ³ in 2003, 1640 cases, 7 M USD	Minkevitch, 2003 → drevesina.com, wood.ru
	716,1 th. m ³ (0.6%) in 2002, 5,5 bil. roubles	Ministry of Natural Resources of the Russian Federation, 2003.
	183,3 M USD, 716 000 m ³	Guertin, 2003 → Rosbalt News Agency, 2003 (b) → Ministry of Natural Resources
	5–10%	Bolshakov, 2004 (Ministry of Natural Resources)
	<5%	Russia's Forest Newsletter, 2004 → Roshchupkin V. (Ministry of Natural Resources)

Share of illegal export to European countries

	10–15% exp. to Finland in 1999	Bosquet, 2002 → University of Joensuu 1996
	25% exp. to EU	Toyne et al., 2002 → WWF, 2001
	20–25% from Vyborg unreported	Bosquet, 2002
	25–35% exp. to Sweden	Toyne et al., 2002 → Boske, 2001
	20% exp. to Finland	Toyne et al., 2002 → ?
	20% exp. to Sweden	Toyne et al., 2002 → ?
	20% exp. to Denmark	Brukhanov, 2003
	~20% exp. to Sweden	Lopina, 2003 → Control and Inspection Department of the President of the Russian Federation
	35% of all exp. in NW	Toyne et al., 2003 → ?
	~25% exp. to Germany	Toyne et al., 2003 → ?

Annex 3. Wood harvest and resources of industrial wood in North-West Region and Russia.

Item	Republic of Karelia	Republic of Komi	Arkhangelsk region	Vologda region	Kaliningrad	Leningrad region	Murmansk region	Novgorod region	Pskov region	Saint-Petersburg	Total North-West region	Russia total
Harvesting volume from all types of fellings,	6871	6187	11393	9047	340	7399	179	3338	1530	0	46284	164.9
- final felling	6143	5551	10242	8352	77	5239	130	2847	1141		39723	122.8
- intermediate felling	443	242	961	450	99	1441	41	238	187		4102	25.1
- other felling	284	394	189	246	164	719	8	253	202		2459	17
1. Production of industrial wood,	6523	5497	10778	7434	234	5581	146	2057	1068	0	39317	121.5
- final felling	5345	4718	8910	6364	58	3982	117	1780	829		32103	89.5
- intermediate felling	244	121	570	225	50	721	21	119	93		2163	12.5
- other felling	247	335	165	187	123	546	7	158	146		1915	12.4
- pulp chips	381	168	954	169		16					1688	3.3
- fuel wood (for processing)	306	154	179	488	4	317	1				1448	3.8
2. Net import of industrial wood from other regions of Russia	914	-318	1061	-1192	51	447	2	179	-20	153	1277	
2.1. Import of industrial wood from other regions of Russia	937	127	1836	137	51	642	5	227	6	153	4120	
2.2. Export to other regions of Russia	22	445	775	1329		196	2	49	25		2843	
3. Import from foreign countries					940						940	1
4. Total resources of industrial wood	7437	5179	11839	6241	1225	6028	148	2236	1049	153	41534	122.5

Annex 4. Production of major wood based products and conversion rates to round wood equivalent (RWE).

	Republic of Karelia	Republic of Komi	Arkhangelsk region	Vologda region	Kaliningrad	Leningrad region	Murmansk region	Novgorod region	Pskov region	Saint-Petersburg	Total North-West region	Russia total
Directions of use												
- sawmilling	722.8	585.4	1993	873.3	13.5	348.2	18.9	334.1	137.5	57.6	5084.3	19239.7
Conversion rate, m3/m3	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	2.1	1.9		1.95
- plywood	22.2	221.3	66	140.6		13.6		136.2		116.5	716.4	1821.4
Conversion rate, m3/m3	3.0	3.1	3.0	3.0		3.0		3.0		3.0		3.10
- particleboard	80.9	258.2		308.7		88.4					736.2	2737.8
Conversion rate, m3/m3	1.5	1.5		1.5		1.5						1.50
- fibreboard		20.1	18.6	42.8							81.5	326.7
Conversion rate, m3/1000m2		9.6	9.6	9								9.40
- sulphate pulp	299	527.3	1436.7			350.6					2613.6	4323.6
Conversion rate, m3/t	4.75	4.75	4.75	4.75		4.75						4.80
- sulphite pulp	106.3		138.2	57.8	218.4	131.7					652.4	841.8
Conversion rate, m3/t	5		5	5	5	5						5.00
- mechanical woodpulp	440.7	173.7	270.8	25.5		8.2					918.9	1620.7
Conversion rate, m3/t	2.9	2.9	2.9	2.9		2.9						2.90

Annex 5. Wood flow balance for North-West region and Russia.

Directions of use	Republic of Karelia	Republic of Komi	Arkhangelsk region	Vologda region	Kaliningrad	Leningrad region	Murmansk region	Novgorod region	Pskov region	Saint-Petersburg	Total North-West region	Russia total
1. Export to foreign countries	3278.1	23.8	113.3	2675.5	108.2	3340.3	89.7	972.1	494.4	3541.3	14637	36800
2. Used for processing, total	5000.7	5597.8	13014	3375.3	1126.7	3274	36.91	1078.4	306.85	472.14	33282	82304
- sawmilling	1445.6	1170.8	3986	1659.3	25.65	661.58	35.91	634.79	288.75	109.44	10018	37517
- plywood	66.6	686.03	198	421.8	0	40.8	0	408.6	0	349.5	2171.3	5646
- particleboard	121.35	387.3	0	463.05	0	132.6	0	0	0	0	1104.3	4107
- fibreboard	0	192.96	178.56	385.2	0	0	0	0	0	0	756.72	3071
- sulphate pulp	1420.3	2504.7	6824.3	0	0	1665.4	0	0	0	0	12415	20753
- sulphite pulp	531.5		691	289	1092	658.5					3262	4209
- mechanical woodpulp	1278	503.73	785.32	73.95	0	23.78	0	0	0	0	2664.8	4700
- other use in the sphere of processing	137.4	152.3	350.4	83	9	91.4	1	35	18.1	13.2	890.8	2300
3. Used unprocessed within the region	124.5	164.6	146	115	50	100	40	80	118.2	50	988.3	6000
4. Used within the region, total (2+3)	5125.2	5762.4	13160	3490.3	1176.7	3374	76.91	1158.4	425.05	522.14	34271	88304
5. Total consumption (1+4)	8403.3	5786.2	13273	6165.8	1284.9	6714.3	166.61	2130.5	919.45	4063.4	48907	125104
6. Total resources of industrial wood	7436.6	5178.8	11839	6241.4	1225.2	6027.9	148.1	2235.9	1048.8	153.2	41534	122500
7. Result (5-6)	966.73	-607.4	1434.4	75.63	-59.65	686.41	-18.51	105.41	129.35	3910.2	-7373	-2604
8. Result (5-6) as percentage of consumption (5)	-11.5%	-10.5%	-10.8%	1.2%	-4.6%	-10.2%	-11.1%	4.9%	14.1%	-96.2%	-15.1%	-2.1%

Annex 6: Description of remote sensing analysis

Material

Satellite images

Series of satellite images for the territories of the study for the period 1998-2002 were provided by the Center for Forest Certification and Audit of Komi Republic. For mapping, clearcuts Landsat TM, Landsat ETM+ and ASTER data were used.

The inclusion of images prior to the year of analysis (2000) was crucial in order to ensure that in subsequent analyses only new clearcuts in the respective calendar year would be included. In addition, this allowed for a calibration of the image analysis algorithms in relation to the age of relatively “fresh” clearcuts.

Landsat Thematic Mapper (TM) is a multispectral scanning radiometer that was carried on board of Landsats 4 and 5. The TM sensors have provided nearly continuous coverage from July 1982 to present, with a 16-day repetition cycle. TM image data consists of seven spectral bands with a spatial resolution of 30 meters for most bands (1–5 and 7). Resolution for the thermal infrared (band 6) is 120 meters. The approximate scene size is 170 x 183 kilometres. The ETM+ instrument on the Landsat 7 spacecraft contains sensors to detect earth scene radiation in three specific bands:

- visible and near infrared (VNIR) bands - bands 1,2,3,4 (ground resolution 30 m) and 8 (PAN, ground resolution 15 m) with a spectral range between 0.4 and 1.0 micrometer.
- short wavelength infrared (SWIR) bands - bands 5 and 7 with a spectral range between 1.0 and 3.0 micrometer, ground resolution 30 m.
- thermal long wavelength infrared (LWIR) band - band 6 with a spectral range between 8.0 and 12.0 micrometer, ground resolution 60 m.

The ASTER On-Demand L2 Surface Reflectance is an on-demand product that contains atmospherically corrected visible and near-infrared data. It is generated by using the 3 VNIR bands between 0.52 and 0.86 from an ASTER L1B image. Atmospheric correction involves deriving a relationship between the surface radiance/reflectance and the top of the atmosphere (TOA) radiance from information on the scattering and absorbing characteristics of the atmosphere. Once this relationship is established, it is used to convert ASTER VNIR's original radiance values to atmospherically corrected surface radiance and reflectance values. The atmospheric correction algorithm for VNIR is based on a Look-Up Table (LUT) approach that uses the results from a Gauss-Seidel iteration of the Radiative Transfer Code (RTC). This methodology derives from the reflectance-based vicarious calibration approach of the Remote Sensing Group (RSG) at the University of Arizona. Data Set Characteristics: area covered by 1 image ~60 km x 60 km; spatial Resolution VNIR = 15 m; projection Universal Transverse Mercator (UTM). To identify boundaries of clear cuts the images from ASTER and Landsat ETM+ with spatial resolution 15 m were used. Series of images from Landsat TM were also used for better dating of clearcuts. The Data from Landsat ETM+ were transformed using standard resolution merge procedure in ERDAS Imagine, in order to receive 15 m spatial resolution for all bands used in the analysis. Satellite images were transformed into Gauss-Kruger projections that allow combining them with kvartal grid in

vector. Then they were rectified to the digital map of the territory in order to achieve better accuracy of analysis.

Forestry GIS data for Novgorod region

The Forestry GIS on Novgorod region was provided by the European Forest Institute and includes cartographic and attribute information on kvartal level from 24 forest state management units (leskhozes). The following layers were used in image rectification, image classification and GIS analysis:

Topographic layers

- water (lakes, rivers, brooks etc.);
- roads (with classification);
- swamps and over-moisture areas;
- relief;
- cities, towns, villages etc;
- administrative borders.

Thematic layers

- borders of forest management units (leskhozes);
- borders of forest management divisions(subunits, lestnichestva);
- borders of kvartals.

Kvartal grid is a vector GIS layer representing boundaries between minimal management units similar to compartments. Kvartals were checked for consistency, and duplicates or kvartals without numbers (former agriculture forests) were excluded from the analysis. The total number of kvartals is 20 201. From them 19 135 kvartals were selected for the analysis. The rest were with wrong numbers or without any identification (which is quite common for the former agricultural forests). Excluded kvartals are equally distributed over the territory.

Official statistics on the area of clearcuts

Official forest statistics data were obtained from the State Forest Agency of Novgorod oblast. The data were collected with the help of information system WinPLP, which is installed in all forest management units of the oblast. This system is a basis for the state forest account in forest management units. The basic data is introduced in the system as a result of forest inventory on the territory of a forest management unit. The forest inventory database contains all the data describing stands in the kvartals (compartments). When some of the stands are harvested and then harvesting sites checked by forest service the data on area of clearcuts are inserted into the system. This database contains all the information about the current state of forests in a particular forest management unit. On 1st January of every year a copy of the whole database should be sent from the forest management unit to the State Forest Agency of Novgorod oblast. This allows receiving aggregated information on the state of forest resources at the beginning of each year. The State Forest Agency of Novgorod oblast collected the data during several last years. The data were received from the State Forest Agency of Novgorod with the official permission.

The inquiries were created for the databases in the State Forest Agency of Novgorod and database on all clearcuts in Novgorod oblast was provided for the years 1997-2003. But the

data for the period from 1997 till 1999 were not usable because of the absence of kvartal-identification. Databases were processed in a specially developed program that allows converting them from the format of WinPLP to the format of MS Excel. Areas of clearcuts at specific years were determined for each kvartal.

Methods

Image classification

Using differences in spectral properties of forest covered and open lands maximum likelihood classification was performed in ERDAS Imagine image analysis software (Cihlar *et al.*, 2003; Magnussen *et al.* 2000). This will allow creating a raster layer containing pixels classified as clearcuts. A semi-automated process of comparing between a series of images allows dating the year of each clearcut (at pixel level). If there are more than 4 pixels sided (1pixel = 15 x 15 m) next to each other, they will be grouped in an area of possible clearcuts (i.e. minimum area of clearcut is 0.1 ha).

In order to solve the problem of mixed pixels (pixels containing clearcut and forest with unknown proportions), subpixel image classification was performed for pixels candidate to clearcuts. The Subpixel Classifier is a quantitative classifier and will provide pixel fraction information if desired. As indicated by the gradation of greens in the key, the amount of tree cover in each pixel is provided. This allows identifying the percentage of the pixel representing clearcuts. Delineation of clearcuts was done using standard automated vector to raster conversion procedures. Areas of clearcuts dated for different years were calculated in ArcGIS.

GIS analysis

Using spatial joint procedure the clearcuts identified by automated image analysis were assigned to kvartals, this allows receiving database on annual area of clearcuts. Clearcuts from previous years were excluded from clearcuts of the current year. A comparison between the database acquired by using satellite images, and the official forest statistics data shows us the difference between the officially registered area and suspicious clearcuts.

All clearcuts on specially protected territories and clearcuts over 50 ha (maximum allowed area of one clearcut in Russia) were identified. Comparison of the annual area of clearcuts at the region level, reported in the official forest statistics with the area of clearcuts detected using satellite images, allows to identify the discrepancy percentage. The clearcut area was analyzed on kvartal basis through comparison of the area reported by the official statistics for the certain kvartal in a certain year (or period of years) with the area identified by the satellite images in that specific year (or period of years). Clearcuts with an area less than 0.1 ha were excluded from the analysis. Sites representing roads and electric lines (linear objects) were also excluded from the analysis. Their identification was based on a semi-automatic procedure of comparison between Area/Perimeter index and visual image interpretation.

The area of clearcuts for official forest statistics is reported for the beginning of the year following the year of acceptance of the clearcut by an organization harvesting the timber on the clearcut. That is why only images that were acquired during the second half of the year (October for 2000; December for 2001; August for 2002; October for 2003) were included into the analysis. This is possibly due to the fact that according to Russian forestry legislation

the area of clearcut could be included into official forestry statistics only after acceptance of the clearcut by representatives of a forest management unit. During the visit to Novgorod region an expert of the State Forest Agency said that the share of clearcuts completed in the previous year and reported in the following is around 5%. It was impossible to get satellite images for January 1st of every year but due to particularities of timber harvesting in Novgorod region the authors assume that it is possible to use this data summarized for several years. Selected images cover 72% of the analyzed kvartals.

Due to the absence of a possibility to obtain a complete database of official forest statistics from the State Forest Agency, discrepancies were calculated only for kvartals with official forestry statistics data and kvartals covered by satellite images for the same period and the period before. The series of images for the same territory were used for exclusion of wetlands and clearcuts from earlier years.

Field survey

Ground truth data about clearcuts of different age were collected during the observation visit in September 2004 (coordinates of clearcuts with different age were measured by GPS receiver and marked on satellite images). A field survey on preliminary detected, potentially illegally logged and legally logged areas were done with consultations from forest management units' staff in order to determine the accuracy of clearcuts area measurements from satellite data. During the field survey, boundaries of 33 logged clearcuts were measured by laser tape-line in order to identify the accuracy of mapping and create a ground truth point database on different types of clearcuts (Franklin *et al.*, 2002). Those clearcuts for field survey were randomly selected using a automatic generation of random numbers of kvartals for surveying in GIS at 500 m from the road. The results of the field survey allow improving automatic image classification and identifying accuracy of the method. The corners of the clearcuts were measured by GPS receiver in order to estimate current geographical position. The geometric shape of the clearcuts and absolute length of the segments were measured by laser tape.

Results

Availability of satellite imagery with sufficiently low percentage of cloud cover

Because of budget restrictions only satellite imagery already available for the subcontractor assigned with the remote sensing analysis could be used. This proved to be a major restricting factor considering the potential representativeness of the results. It was therefore necessary to focus the analysis only to one year (2000), instead of a period of three years (2001 – 2003), as had earlier been planned.

Consequently, also the final result on the discrepancy between official clearcut data and the remote sensing analysis provides an estimate for the overall discrepancy throughout the three analysed years, rather than a time-series of three results for three years.

Corrections for biases in data-sources

The two main data-sources (clearcut-measurements from satellite analysis and official clearcut-data) are both potentially subject to methodological biases.

The accuracy of the satellite analysis was assessed using field-measurements (as described in section 1.3.3.3 in the main text). Based on this a systematical overestimation of clearcut-area measurements by satellite-analysis in comparison to actual field-measurements was assessed. Consequently clearcut areas measured by satellite-analysis tend to overestimate the area by 9.2% (in relation to the actual area).

On the other hand there is a potential underestimation of “licensed clearcut-areas” included in the official statistics. This is due to the fact that when these areas are measured and marked in the field, there is a tolerance of 10% for terrestrial area measurement. The official reason for this policy is related to the difficulties of obtaining accurate field-measurements of clearcut-site-areas, especially before the introduction of laser-equipment or (referenced) GPS-measurements for distance measurement. In addition specific small scale landscape factors, such as ditches, are considered to reduce the area actually available for logging operations, thus justifying such a tolerance. Thus a clearcut-area, which exceeds the officially registered area within these tolerance limits are still considered to be legal.

Based on the contractor’s knowledge of forestry operations in the study region as well as from the interviews with local forestry officials an average value of 10% underestimation of actual clearcut areas from the official statistics is assumed.

Discrepancy between remote sensing result and official clearcut data

The result of the analysis carried out in this task is presented in Table 1. If only raw data are analysed, a discrepancy of 25.4% (+/- 2%) in clearcut area, within the measured kvartals for the year 2000. Following the correction for the biases lined out in the section above, this discrepancy is reduced to 11 %.

Table 1. Discrepancy between official clearcut area and clearcuts measured by remote sensing with and without the implementation of correction factors for systematical biases

	Number of kvartals analysed	Percentage of kvartals in study region	Clearcut area from official data	Clearcut area measured from remote sensing	Discrepancy	Discrepancy in % of remote-sensing result
Raw data	9282	48.5	6494 ha	8700 ha	2206 ha	25.4%
with bias corrections			(+10%) ¹⁷ 7 143 ha		757 ha	11 %
			(+15%) 7 468 ha	(-9.2%) ¹⁸ 7 900 ha	432 ha	5,5 %
			(+20%) 7 793 ha		107 ha	1,3%

In order to check the result for the sensitivity in relation to the 20% tolerance-limit explained above, the discrepancy was also calculated assuming a systematic underestimation of legal clearcut area from official data by both 15% as well as 20% (maximum tolerance level). This decreases the discrepancy value to 5.5% and 1.1% respectively.

¹⁷ Correction for 10% tolerance for clearcuts to exceed area determined in logging license

¹⁸ Correction for systematic overestimation of clearcut-size from satellite analysis

Representativeness of results

Representativeness of results and the error margin resulting from the available sample size is calculated as:

$$e = t * s / n^{0.5}$$

where:

e: error margin

t: t-value

s: variance

n: sample size

with: $t=2$, $s=100$ (100% possible range for discrepancy), $n=9\ 282$

The resulting value for $e = 2.07$

Annex 7 – Contacts with organizations for data collection under section 2 (public and private sector measures)

Date	Way of receiving data	Contacted organizations
4-5.03.2004	International Conference “Forest Sector of the North-West Russia: Towards Responsible Business and Sustainable Forest Management”, Archangelsk	<p>“Solombalskiy LDK and Lesozavod ? 3”</p> <p>Neusiedler-Syktyvkar</p> <p>Archangelsk pulp enterprise</p> <p>IlimSeverLes Ltd</p> <p>WWF Russia</p> <p>Greenpeace Russia</p> <p>Union of forest industry and exporters of forest products from Russia</p> <p>Timbex Ltd.</p> <p>Forest Service of Russia</p> <p>Thomesto/Metsäliitto</p> <p>Ilim Pulp Enterprise Ltd.</p> <p>GFA Terrasystems GmbH.</p> <p>Mondi International / Mondi Forest</p>
28.03.2004	Meeting at St. Petersburg office of Stora Enso Forest	Stora Enso Forest
28-30.04.2004	Meeting at Petrozavodsk and Suojärvi (Russian Karelia)	<p>Stora Enso Nord</p> <p>Zapkarelles CO (supplier of Stora Enso)</p>
08.04.2004 – 04.07.2004	Requests by email	<p>UPM-Kymmene</p> <p>Neusiedler-Syktyvkar</p> <p>Stora Enso Forest</p> <p>IKEA</p> <p>Aranna</p> <p>Volga Paper</p> <p>Ilim Pulp</p>
20.05.2003	Meetings at governmental organizations related to timber export in Komi Republic of Russia	<p>Komi Forest Service</p> <p>Frontier State Inspection on Plant Quarantine (Komi Branch of State organization “Rosgoskarantin”)</p> <p>Komi Branch of Russian State Customs</p> <p>Internalterminal plus Ltd.</p>

Annex 8: Material used in section 2.1 (public measures)

Document 1: Phytosanitary certificate

МИНИСТЕРСТВО СЕЛЬСКОГО ХОЗЯЙСТВА И
ПРОДОВОЛЬСТВИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
ГОСУДАРСТВЕННАЯ ИНСПЕКЦИЯ
ПО КАРАНТИНУ РАСТЕНИЙ
РОССИЙСКОЙ ФЕДЕРАЦИИ



MINISTRY OF AGRICULTURE AND FOOD OF THE
RUSSIAN FEDERATION
STATE PLANT QUARANTINE INSPECTION
OF THE RUSSIAN FEDERATION

ГОСУДАРСТВЕННАЯ ИНСПЕКЦИЯ ПО КАРАНТИНУ РАСТЕНИЙ РОССИЙСКОЙ ФЕДЕРАЦИИ
ПО РЕСПУБЛИКЕ КОМИ
STATE PLANT QUARANTINE INSPECTION OF THE RUSSIAN FEDERATION FOR THE
REPUBLIC OF KOMI

ФИТОСАНИТАРНЫЙ СЕРТИФИКАТ PHYTOSANITARY CERTIFICATE № 11-01-3932

Организации по карантину и защите растений (страна) Германия
To: Plant Protection and Quarantine Organization of (country)

I. Описание груза – Description of Consignment

Лопатин Евгений Валерьевич, г.Сыктывкар Малышева,11-133

Экспортер и его адрес
Name and address of exporter
Получатель и его адрес
Name and address of consignee
Количество мест и описание упаковки
Number and description of packages 5 мест
Отличительные знаки
Distinguishing marks Без маркировки
Место происхождения
Place of origin район Республики Коми
Способ транспортировки
Declared means of conveyance самолетом
Пункт ввоза
Declared point of entry
Наименование продукции и ее количество
Name of produce and quantity declared Образцы древесины 300 штук
Ботаническое название растений
Botanical name of plants Picea sp., Pinus sp.

Настоящим удостоверяется, что растения, растительная продукция и/или другие карантинные грузы, описанные выше, были обследованы и/или проанализированы согласно соответствующим официальным процедурам и признаны свободными от карантинных вредных организмов, перечисленных импортирующей договаривающейся стороной и отвечают действующим фитосанитарным правилам импортирующей договаривающейся стороны, включая таковые для контролируемых не карантинных вредных организмов.

This is to certify that the plants, plant products or other regulated articles described herein have been inspected and/or tested according to appropriate official procedures and are considered to be free from the quarantine pests, specified by the importing contracting party and to conform with the current phytosanitary requirements of the importing contracting party, including those for regulated non-quarantine pests.

II. Дополнительная декларация – Additional Declaration

Не предъявлена

III. Обеззараживание – Disinfestation and/or Disinfection Treatment

Дата /Date/ Обработка /Treatment/
Химикат (действующее вещество) /Chemical (active ingredient)/
Экспозиция и температура /Duration and temperature/ Концентрация /Concentration/
Дополнительная информация /Additional information/
Печать инспекции Сыктывкар
Stamp of the Inspection Place of issue: И.В.Кузнецова
Подпись /Signature/ И.В.Кузнецова
Имя /Name/ the State Plant Quarantine Inspector
Дата /Date/ 01 января 2008 г.

Никаких финансовых обязательств в отношении настоящего сертификата не налагается ни на Госинспекцию по карантину растений, ни на кого из ее инспекторов или представителей.

No financial liability with respect to this certificate shall attach to State Plant Quarantine Inspection or any of its officers or representatives.

Document 3: Process for issuing harvesting licenses

Process for issuing harvesting licences

1. The federal authority issues harvesting licences based on a decision on required amounts for each consecutive year.
2. Harvesting licences are printed on A4 paper (70g/m²) with three levels of security showing numbers and letter combinations.
3. The federal authority sends the forms by post and the regional unit should inform how many they have received and have on stock.
4. Each regional unit should maintain records on each harvesting licences – based on the serial number, when it was issued and to whom.
5. Damaged harvesting licences are rendered void (stroked through) and kept separate.
6. If a harvesting licence is lost a report is written and a new harvesting licence is issued. On the new licence the same serial number and “replacement” are written. Such a “replacement” document does not require an official pre-printed form.
7. If necessary, additional photocopies of licenses can be made with permission of the leshkhoz director.
8. After harvesting operations and necessary follow up formalities second and third copy of harvesting licences are kept at leshkhoz office.
9. A harvesting licence is issued according to regulations to accompany harvested material.
10. A harvesting licence specifies the place where timber has been harvested, type of felling, type of timber (dead wood, standing timber etc.), type of accounting (by volume, area, stumps etc.), reason for issuing, what kind of taxes are paid, when harvesting will be done etc.
11. If a regional unit cannot maintain its recording electronically they can fill in the harvesting licences by hand.
12. After harvesting the actually harvested volume, area etc. and other details are specified on the backside of harvesting licence.
13. Any changes to the written text have to be done in red. Changes should be approved with an official stamp (of the issuing leshkhoz administration).

Annex 9: Detailed information on private sector measures

Solombalskiy LDK and Lesozavod ? 3

The information about the system of wood-origin tracing on enterprises of the group “Solombalskiy LDK and Lesozavod ? 3” was received via personal communication from Ms. Antonina Dracheva, the head of “Timbex”.

Enterprises of the group “Solombalskiy LDK and Lesozavod ? 3” are situated in one of the forest rich regions of Russia - Archangelskaya oblast. The group consists of 2 timber-processing mills, 10 timber procurement companies, and 2 transportation enterprises. The share of groups harvested and transported wood in the annual balance of wood of Archangelskaya oblast in 2003 was 8%, which is appr. 727 000 m³. Groups share of sawn wood in total volume of 2003 in Archangelskaya oblast was 22%.

Enterprises of the group “Solombalskiy LDK and Lesozavod ? 3” have special purchasing policies that are included into the contract:

At present time this includes the following clauses:

- Wood is harvested according to legislation of the Russian Federation and local legislation;
- Wood materials were harvested on territories of forest fund not included into the list of especially protected territories and territories included into the projects for protection in future prepared by the governmental institutions.

When the system of wood origin tracing will be completely implemented:

- The supplier provides the information about wood origin by the current contract according to the special form for 1 day of every month;

The client has a right to make audits of wood origin at any time and for this purpose the supplier provides access to all his territories and to all documents allowing wood harvesting and following measurement of wood materials

- Intends to certify the chain of custody for the whole company using FSC.
- System consists of 4 parts: information about the chain of custody, audits, information from government controlling authorities, reports publication.
- Contract with requirements on legality of wood origin (wood should be harvested according to the current legislation base of Russia), maps of especially protected territories and high conservation value forests.
- Wood origin in the system is identified with a specification of the stand.
- Audit is carried out by a person with special education and experience.

System of wood origin tracing on enterprises of the group “Solombalskiy LDK and Lesozavod ? 3” (Archangelskaya oblast, Russia)

The system of wood origin tracing was created in 2003. Final implementation (i.e. at all suppliers) was expected to be at the end of 2004. The aim of the system is to implement the system of harvested wood control, legality of timber procurements, wood origin tracing in the chain from forest to customer. The main requirements of the system are:

- Use of current reporting system;
- Availability of information for internal users and external stakeholders;
- Minimum of additional costs

The system of wood origin tracing contains several parts:

- Information about wood flow;
- System of audits;
- Information from state institutions;
- Publication of reports for the society.

Information about wood flow includes:

- Contract with clearly specified requirements on wood origin;
- Description of technological processes included into the chain of wood flow from a company-supplier, accounting system, control for safety of wood materials;
- Maps for the territories of wood supply with the boundaries of especially protected territories or virgin forests;
- Data base, which includes:
 - data on receipts of accepting wood materials from every supplier, on quality and quantity;
 - information from suppliers for 1 day of every month.
 - Information included into the reference:
 - Name of the enterprise;
 - Administrative region;
 - FMU (“leshoz”)
 - FMU division (“lesnichestvo”)
 - Compartment number (“kvartal”);
 - Stand number;
 - Harvesting license number;
 - Group of forest (harvested stand do not belong to the especially protected forests);
 - Age of the stand;
 - Stand composition;
 - Type of harvesting;
 - Deadline of harvesting and transportation;
 - Volume of harvested wood (on tree species);
 - Volume of transported wood (on tree species);
 - Volume of loaded wood materials (on tree species and quality dimensions)

In addition, the group “Solombalskiy LDK and Lesozavod ? 3” developed their own system of audits to control suppliers and own companies. Audits are carried out by specialists of the timber-procurement company’s management department who have special degree and the

necessary experience. To carry out the audits the group developed a special methodological manual and timetable of audits. In case of finding some discrepancy with the ecological policy of the group at the suppliers' companies, special measures will be implemented. For the big suppliers the group sends a letter of warning and organizes additional audits.

At present time the system is still in the process of being implemented. The group is assuming that finally it will allow for an increase of the level of staff's ecological responsibility, provide transparency of ecological policy, to be a medium stage to forest certification and to improve an internal system of control and production registration.

Thomesto

The system implemented by Thomesto is based on the following principles:

- Following principles of economic, ecological and environmental sustainability:
- Continuous improving practice of environmental care
- Following local legislation and rules
- Assisting sustainable forestry practice to minimise environmental impact
- Environmental information and education of suppliers through audits, seminars and informal meetings.
- Wood origin in the system is identified at the level of harvesting license.
- Support both FSC and PEFC certification systems.

- Example from the contract clause "Ecology" from wood procurement contracts:

7.1. Deliveries from Asian parts of Russia are forbidden.

7.2. The Seller is responsible for carrying out all logging operations in accordance with local legislation. Regarding the wood itself, it is prohibited to harvest in both those areas that are officially protected and designated for such protection. The Seller has to follow the state and local laws (forest practice, environmental standards, etc.).

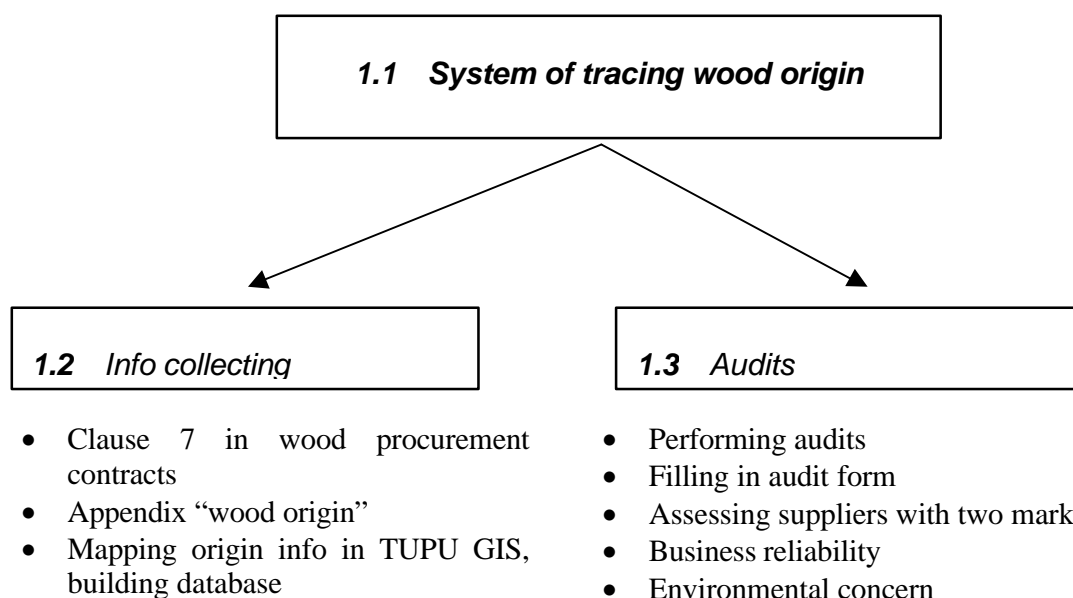
7.3. The Seller has to inform the Buyer about origins of the pre-delivered wood raw material agreed under this Contract (see enclosed Appendix 4). If requested, the Seller must show the logging sites to representatives of the Buyer. If any violation is revealed during audits, the Buyer can consider cancelling the contract.

7.4. Radioactivity in wood is not allowed.

7.5. If the Seller fails to fulfil any of the above-mentioned terms the Buyer has the right to stop deliveries and terminate the Contract.

Wood Tracing System:

The information about Thomesto Wood Tracing system was also received by the personal communication with Thomesto ecology and quality manager Dr. Mikhail Tarasov. The scheme of Thomesto system of wood origin tracing is presented in Figure 1 below:



Result/actions: annual report to be discussed with Thomesto managers responsible for wood procurement

Figure 1. Scheme of Thomesto system of wood origin tracing

Audits of suppliers in Thomesto are carried out on annual basis according to the annual audit plan. The criteria of choosing suppliers to be audited are the following:

- Volume of wood deliveries
- Previous image (based on previous audit results, other information)
- Ecological sensitiveness of logging area
- Geographical distribution
- Inquiry for quality consulting from suppliers
- After the audits responsible managers in the company preparing the Annual audit report.

Stora Enso

An environment and wood origin clause is included in wood purchasing contracts to ensure a supplier’s commitment to Stora Enso policies and practices. The following commitments are required:

- Wood must be procured and logged in accordance with local legislation and instructions
- Wood is not purchased from protected areas, areas planned for protection or other agreed restriction areas unless purchase is in line conservation regulations, goals and plans
- Supplier knows and is able to verify the origin of wood
- Stora Enso has the right to audit suppliers, their logging areas, and the systems used for collecting and storing data on the origin of wood origin tracing. This contains the following main elements:

Stora Enso Wood Supply tracing system

The information about Stora Enso Russian Wood Supply wood tracing system was received by the personal communication from a responsible person in Stora Enso Ms. Anna-Liisa Myllynen.

Stora Enso Wood Supply Russia's wood traceability system is ISO 14001 and ISO 9002-certified and registered in the European Union's Eco Management and Auditing Scheme EMAS.

Successful implementation of the corporate policies requires country-level approaches and business practices. Stora Enso's strategy in Russia is to be permanently in place, through comprehensive representative's network and subsidiary companies. Representative offices all around our operation area in Russia control and verify purchased wood. The following strategies help to implement traceability system and verify the origin of wood:

- Recognize and carefully analyse the risks
- Have local representative network to control and verify
- Choose the suppliers with utmost care: focus on long-term partnerships with a selected group of suppliers
- Keep the supply chains as short as possible
- Have mechanisms in contracts to ensure supplier's commitment to Stora Enso policies and principles
- Develop technical tools, e.g. it-systems and GIS mapping systems
- Offer training and cooperation to promote supplier's awareness of the importance of the matter
- Have active stakeholder dialogue to get new ideas and to recognize new emerging risks.

Traceability covers wood procurement all the way from the cutting area until it first comes into Stora Enso's possession. Traceability system gives possibility to verify that wood procurement complies with national legislation and the system gives possibility to set higher ecological standards whenever necessary. The structure of traceability system is shown in Figure 2.

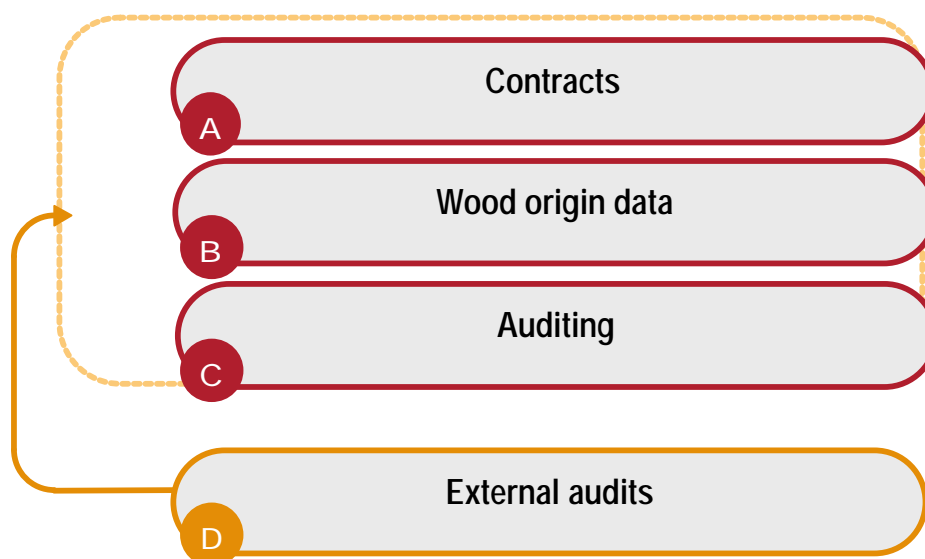


Figure 2. Structure of traceability system of Stora Enso

A. CONTRACT CLAUSES

Environment and wood origin clause is included in wood purchasing contracts to ensure supplier's commitment to Stora Enso policies and practices. The following commitments are required:

- Wood must be procured and logged in accordance with local legislation and instructions
- Wood is not purchased from protected areas, areas planned for protection or other agreed restriction areas unless purchase is in line conservation regulations, goals and plans
- Supplier knows and is able to verify the origin of wood
- Stora Enso has the right to audit suppliers, their logging areas, and the systems used for collecting and storing data on the origin of wood

B. WOOD ORIGIN DATA

Wood origin data on every harvesting area is collected into Stora Enso's database or data can be stored by the supplier if Stora Enso or a third independent party has approved and verified the system. Wood origin data is determined according to:

- Location of harvesting sites (Republic, forest management unit, sub-unit, kvartal, stand and harvesting site number)
- Legal data on the ownership or harvesting right of the wood
- Environmental values (key biotopes, scenic values, recreational values, endangered species)
- Type of forest harvesting

- Forest management class (I, II, III)
- Forest certification data
- Railroad loading point
- Volume of harvest and volume of delivery to Stora Enso
- Forest conservation data

C. STORA ENSO AUDITS

- a) Internal audits are for management purposes and improvement of the system.
 - b) Supplier audits are for improving suppliers' environmental performance. Random selection of auditing objects can be used or audits are focused into areas and suppliers with high risk, such as new suppliers, uncertified suppliers with high volumes and suppliers who failed in implementing Stora Enso policies and principles.
 - c) Field audits
 - are used to verify the data on wood origin
 - and to give an opportunity to verify forestry practises, compliance with legislation, biodiversity aspects and social responsibility aspects. Field audit always takes place in cooperation with the supplier. Preferably also the forest management unit's representative participates in order to discuss the legality, tenure rights, management practices etc.
 - Field audit verifies:
 - Location of harvesting sites
 - Location of forest conservation areas and other restrictions
 - Harvesting documents, ownership, tenure rights and forest management plans
 - Public forest authority's inspections and nine different official documents
 - Environmental values, e.g. valuable habitats, rare species etc.
 - Forest certification status and developments
 - Environmental management systems, certificates and developments
 - Worker safety responsibilities, instructions and training
 - Forest regeneration
- In case of system or supplier failure corrective action is demanded. Training and support can be offered if needed. In serious cases supplier's deliveries are halted.
 - If repeated failures occur or corrective actions by a supplier are insufficient, the contract clauses give the possibility to terminate the contract.

D. THIRD PARTY VERIFICATION

To increase transparency third party verification and certification of Stora Enso's traceability system is in place

- ISO 14001 in place since 1998

- ISO 9002 in place since 1998
- EMAS in place since 2001 (pre-registration in 1999)

These certificates were designed to verify a company's environmental (or in the case of ISO 900x quality-) management systems. They are issued by accredited certifiers and are thus subject to third-party verification. They were not primarily designed to monitor compliance, even though evaluation of compliance has already been introduced to this standard in 1996. The latest version of ISO-14001 requirements, ISO-14001 2004, put a stronger emphasis on evaluation of compliance (requirement 4.5.2), but for adherence to this requirement it is sufficient to: "... ensure that adequate records are available for periodical evaluation of compliance, and that there is an effective process for this evaluation (one mechanism could be via internal audit)." (DNV, 2004)

The traceability system can be accompanied with forest leaser's voluntary forest management certification.

E. SUPPORTING TOOLS

Advanced technical tools are necessary for good management. Information systems facilitate the required flow of information. As is common practice in today's forest management activities, Stora Enso makes extensive use of GIS-technology in its forest management planning. Stora Enso GIS -mapping system contains kvartal-level information on:

- Forest management structure
- Republic/oblast, leskhoz, lesnichestvo, kvartal
- Forest conservation data
- Existing conservation areas of different types
- Planned conservation areas of different types
- Protection status and allowed forestry practices
- Other data, restriction areas, potential nature values.

The information stored in this GIS-based database provides a good basis for further monitoring of forest management activities and also – if regularly updated with field survey data (e.g. satellite imagery analysis) – would allow for quick detection of activities outside planned management schedules (i.e. unauthorised harvesting activities).

UPM-Kymmene

UPM-Kymmene requires its suppliers to operate according to the nationally and internationally agreed principles of sustainable development through contract terms of agreement. The Forest Division's own environmental policy further demands that:

- "The Forest Division observes the legislation and statutory regulations of respective countries"
- " The Forest Division does not fell or accept wood which originates from statutory protected forests, forest areas included in nature conservation programmes or sites which have been notified by the authorities to be excluded from felling".

UPM-Kymmene reserves the right not to purchase timber in specific areas, and to terminate deliveries from any area where special nature values have been identified.

UPM Kymmene Criteria for contracting partners

UPM's Forest Division requires that its contract partners operate according to the principles of sustainable development and monitors the origin of wood they receive. The contract partner must be responsible and reliable, and adhere to the country's legislation, statutes or regulations.

In addition, contractors must comply with the company's Environmental Policy and fulfil the following general environmental management related requirements:

- must be familiar with UPM-Kymmene Forest Division's operating principles and operational guidelines, and commit themselves and their personnel to complying with them
- manage social commitments on behalf of their company and workers
- take care of their workers skills
- take care of their equipment and ensure they meet normal environmental standards
- take care and organise waste management as appropriate

As part of any contract, the contractor is informed about the Forest Division's Environmental Policy and operational aims.

UPM-Kymmene Forest Operating and Environment Policy

1 General principles

The majority of UPM-Kymmene's production is based on a renewable resource, wood. In accordance with its environmental policy, the Group uses its own initiative and actively takes care of environmental protection and management in all its activities.

UPM-Kymmene Forest is responsible for the procurement of wood raw material for the Group's domestic mills and for the utilisation and management of Group owned forests in Finland. The Forest Division takes its share of responsibility for preserving the environment and for following the principles of sustainable development. The aim in forest management and wood procurement is to minimize the load on nature and the environment. Biodiversity and the functions of the forest ecosystem are maintained in accordance with internationally and nationally approved principles.

The Forest Division observes the legislation and statutory regulations of respective countries.

2 Wood procurement

In all its operations, the Forest Division takes into consideration the economic, ecological and social sustainability of forest utilisation. The Forest Division requires that its external suppliers operate according to the principles of sustainable development. The Forest Division monitors the origin of the wood it receives. The Forest Division does not fell or accept wood, which originates from statutory protected forests, forest areas included in nature conservation programmes or sites, which have been notified by the authorities to be excluded from felling.

3 Company forests

The Forest Division manages and utilises the Group's own forests so that they produce high-quality wood in an effective, sustainable and economical manner. The Forest Division also takes into account other forest-related ecological, cultural and social values as well as the environmental impacts of forestry.

4 Implementation of the environmental policy

The management of the Forest Division annually reviews operations and the level of environmental protection. The management also establishes operational and environmental objectives, and monitors their implementation on an annual basis. The Forest Division's head office, procurement regions and districts set targets for achieving these objectives and they are realised as part of the planning, implementation and monitoring of all operations.

5 Development

The Forest Division continuously improves its operations, environmental protection and the quality of environmental management. The Forest Division actively co-operates with the authorities, researchers, customers and other interested groups in order to take account of the latest information available. The Forest Division trains its personnel and contractors to ensure they are all familiar with the Division's operating principles and objectives related to wood procurement, forest management and the environment, and also that they are committed to following them.

6 Environmental communications

The Forest Division on its own initiative openly communicates on environmental issues with employees, customers and other interest groups. The Forest Division's operational and environmental policy is available at all Forest Division offices

UPM Imported Wood Delivery Contract

Environmental Protection clause

- The seller commits to felling and supplying timber according to the laws of the country in which timber harvesting has been carried out. Wood will not be supplied which has been harvested in forest nature protection areas or forest areas, which the authorities have prepared forest protection programmes.
- For the purposes of determining the origin of wood, the seller is obliged to provide the buyer information on the forest area or stand to be harvested, from which according to this agreement, the wood to be supplied has come from. For this purpose, the seller must provide the buyer with the information requested on the attached form, specifically the names of the leshoz and lesnichestvo and map grid number for the area harvested, before the beginning of harvesting, or if harvesting has started, then before the signature of this agreement so that the buyer has the information before deliveries commence.
- The buyer or his representative has the right to carry out an ecological audit on the felling site from which the wood has been supplied either before delivery or at any time during the period of the contract.
- Radioactive wood is not permitted.
- The buyer has the right to terminate wood deliveries and annul the contract in situations where the terms of this agreement are breached.

The information about UPM-Kymmene Forest Division Traceability system was received by the personal communication with a responsible person in UPM-Kymmene Mr. Robert Taylor and via the report Tracing Russian Wood Imports (2001b).

Since the 1950s, UPM-Kymmene Forest has imported wood to Finland for reasons of availability and quality. The volume of imports is 3–4 million cubic meters annually, representing about 15% of the total wood raw material requirement of UPM-Kymmene's Finnish mills. The majority of imported wood, about 90 %, comes from Russia. The other main sources are Estonia and Belarus. UPM-Kymmene Forest has a specialized imports department, which is responsible for the procurement and transport of imported wood to UPM-Kymmene's Finnish mills. The imports department is based in Kouvola, in eastern Finland, and has a staff of appr. 15 people. Imports-staff regularly visits Russia to plan, supervise and monitor delivery contracts.

Wood imported from Russia comes from three main types of supplier; logging companies, timber merchants and trading houses. UPM-Kymmene claims to choose its suppliers on the basis of long-term business relationships, reliability and awareness of environmental responsibility.

In 1996, UPM-Kymmene became the first forestry company to start developing an information system for tracing the origin of wood. It is a part of an operating system, which incorporates a Quality Assurance System according to ISO 9002, and an Environmental Management System according to ISO 14 001. UPM-Kymmene has also been approved as a wood supplier in accordance to the EMAS (Eco Management and Audit Scheme) regulation. One of the main objectives from the beginning was to create a system that could be utilized to communicate information about the Group's timber procurement from Russia and Russian forestry in general, to their own staff, customers and other stakeholders. The development, implementation and running cost of the system is approximately 100 000–150 000 euros per year, depending on the accounting method, plus the annual salaries of two full-time employees, travel and other expenses.

The system consists of three main elements:

1. a statement of origin
2. database and GIS mapping program
3. audits at the site of origin

1. Statement of origin

A written statement of origin is required for each timber supply contract. If the statement is not provided within one month of the commencement of deliveries, UPM-Kymmene reserves the right to terminate the contract. There are three versions of the statement of origin according to the raw material to be imported and the mode of transport used. The information required is as follows:

Pulpwood or logs, by road:

- seller, or his representatives name and contact details
- contract number
- method of delivery
- sub-suppliers name and contact details

- estimated timber quantity in m³
- harvesting site location (Oblast, Leshoz and Lesnizestvo)
- (Information on the location of the forest must be provided by the sub-supplier)

Pulpwood or logs, by rail or water vessel:

- seller, or his representatives name and contact details
- contract number
- method of delivery
- sub-suppliers name and contact details
- estimated timber quantity in m³
- loading terminal or port, including code number
- harvesting site location (Oblast, Leshoz)

Chips by road, rail or water vessel:

- seller, or his representatives name and contact details
- contract number
- supplier sawmill or plywood mill
- felling quantity in m³ (conifer or birch)
- method of delivery
- roundwood suppliers name and contact details
- origin of roundwood (Oblast and Leshoz)

In addition the Group expects the seller or his representative to possess at all times the necessary documents, which confirm the origin of individual parcels of timber. The seller can also be asked to supply a more exact statement of origin, for example which provides the stands precise location and felling permit number. This is required when the loading terminal is located near a disputed area of nature concern.

2. Database and GIS mapping program

Database

The imports database contains information on all suppliers and delivery contracts. The database also records information from the statement of origin and audits. Imports Unit staff are responsible for entering all information to the database. During 2000, over one hundred different suppliers delivered wood to UPM-Kymmene from Russia. Each individual supplier's contact information is recorded in the database and includes company name, address, phone/fax, and contact person. It is important that these details are correct, and also that they are kept up to date, to ensure that UPM-Kymmene knows exactly who is responsible for each delivery. Delivery contract information is divided into 4 parts; basic information, contract detail, additional information and historical record. The delivery contract section also provides a direct link to any audit, which has been undertaken and the relevant statement of origin. The basic information includes the supplier's details, the contact person, the contract period and contract date of signature. Contract details include amongst others timber assortment, total purchased volume and unit price. The additional information section allows the supervisor to note issues not covered in the contract detail. The historical record provides valuable reference on contract amendments and price differences.

GIS Mapping program

Wood coming from Russia by rail is monitored with the help of a GIS mapping programme. GIS (Geographic Information System) is a computer-based system for creating, storing, managing, and modelling geographically controlled information. The advantages of a GIS include easy updates, sharing of the same data by different individuals and groups, customization for each user's needs, and accessibility to both vector (lines, points, polygons) and raster (e.g., photographs, satellite images) data. The original proposal for the imports GIS mapping programme was made by Jukka Olkkonen, Environment Manager of the Imports Unit, in February of 1998. The basic requirements of the program were identified by Mr. Olkkonen and in conjunction with UPM-Kymmene's Information Technology department; a suitable application called TuontiGIS (ImportGIS) was designed during 1999.

UPM-Kymmene's TuontiGIS program allows detailed information about imported wood deliveries to be recorded, queried and displayed instantly on screen. It can then be presented as required to produce a variety of maps, charts or reports for management purposes.

High quality maps can be output at the user's desk or centrally on large digital plotters. Initially TuontiGIS only displayed information related to the origin and volume of timber delivered by rail. However, during 2000 functions were added which provided access to basic contract information, notes and photographs from sites where supplier audits had been carried out. The GIS and database are interactive so that changes entered on the database automatically amend the map.

At present the GIS mapping programme covers wood delivered by rail. This represents the majority (75%) of all wood raw material imported from Russia. The system is currently being considered for extension to deliveries by road and water vessel. UPM-Kymmene owns the TuontiGIS application and was responsible for its design and development. Updating and future development of the application will be carried out by the specialized staff of UPM-Kymmene Forest's Information Technology department.

Use of the database and GIS-system for tracing of shipments

All rail carriages arrive with a consignment note displaying the supplier and loading station's name and code number. This information is then saved to UPM-Kymmene's forest operating system, which also records it on the Russian map. The mapping program allows us to reliably trace information on specific deliveries and collect statistics on all wood deliveries.

The GIS is based on two maps - the base map, which provides general information such as land, water, topography, built up areas, etc., and the function map which displays all regional boundaries, railway stations and audit locations. As part of the function map, two different themes are available which provide an instant picture of delivery quantities and product assortments on station or regional basis.

In addition, the information listed below can be accessed according to the user's chosen criteria for a selected time period:

- supplier
- sub-supplier
- contract number
- loading station's name and code number
- timber assortment

- volume (m³)

The location of each audit is recorded as a red square in the GIS mapping program. By “clicking” on the audits’ location, the user can view a brief version of the full audit. The brief includes:

- contract number,
- supplier
- operational notes (full audit details on file)
- photographs

3. Audits at wood origin sites

The long-term aim of auditing is to make observations based on sound practice and to strengthen co-operation with the suppliers. UPM-Kymmene’s imports department staff mainly target delivery audits to imports from Russia. An agreed number are examined on the accuracy of the statement of origin and the procurement documents, and a number of sites from each supplier will be checked on the ground. In addition, notes and photographs are taken by the auditor to provide additional information on the method of operation used, and competence in environmental management. Photographs are an important part of the audit. They can often provide more information than pages of text, and importantly provide proof of actually making the site visit. Audits can be made without prior notice but are more often carried out as part of a notified day visit. Post-felling audits can take place during the week, month or year after felling, and sometimes during the following year. Audits can also be carried out either during felling or before felling (once the supplier has received the felling licence).

In each year auditing is carried out on suppliers responsible for 80% of the annual total imported quantity. Regular suppliers are audited at least every second year, but the supplier will be audited automatically if the contract quantity exceeds 20 000 m³ in any one year. Approximately 50–60 audits are carried out per year, and in connection with these 150–200 individual felling sites are checked. As part of the audit, the operation is given a general classification of good, normal or poor according to the following criteria:

- **Good:** Environmental matters actively addressed and legislation requirements exceeded
- **Normal:** Felling implementation fulfilled country of origin's legislation requirements
- **Poor:** Felling implementation was worse than the required code of practice

The classification “poor” is rarely given. UPM-Kymmene claims that the strong enforcement of official codes of practice by the forest authorities is the reason for most operations adhering to legally required standards. However a poor classification can be given for example, when the soil and retention trees have been badly damaged during harvesting and extraction.

UPM-Kymmene considers each poor observation and takes appropriate action. For example, deliveries can be discontinued if the supplier operates outside the contract terms and conditions, such as delivering timber from a prohibited area. UPM-Kymmene has in the past restricted suppliers’ deliveries. A key part of the audit is also to provide the supplier with information about UPMKymmene’s environmental policy and auditing procedure.

In 2003 UPM carried out field audits on 145 felling sites in Russia. Half of the sites checked were given an overall evaluation of good and half were acceptable. Ten major non-conformities and fourteen minor non-conformities were discovered. The reasons for the non-conformities were discrepancies between the felling license and felling boundaries, location of felling site, harvesting imprint or poor work site management. As a result of the non-conformities, deliveries from 2 supply contracts have been terminated and 3 will continue subject to additional contract conditions. A written warning was given for 7 of the sites and a verbal warning for 12 sites.

ISO 14001 certification for UPM-Kymmene

UPM-Kymmene Forest has an overall management system for wood procurement and silviculture, which incorporates a Quality Assurance System according to ISO 9002 and an Environmental Management System according to ISO 14 001. An independent third party auditor, Det Norske Veritas awarded UPM-Kymmene Forest the ISO 9002 and ISO 14 001 certificates for wood procurement and forest management on 7.9.1998. During 1999, the Finnish Environment Institute approved UPM-Kymmene as a wood supplier entering the national test register in accordance with the European Union's EMAS (EcoManagement and Audit Scheme) regulation. The approval was based on the environmental statement made by the Forest Department. EMAS is a voluntary eco-management and auditing scheme of environmental issues for industrial enterprises. In November 2000 Det Norske Veritas was asked to assess UPM-Kymmene Forest's system for tracing the origin of imported wood. The tracing system is based on a series of documents, which are a part of the overall management operating system.

This audit focussed on logging sites in the Novgorod-region, because at the time of the audit UPM's internal audits had not been carried out on felling sites in that region. As a final result, DNV provided a positive assessment of UPM's tracing system and the operations of its contractors in the investigated region. A copy of the summary of this report is included below.

External auditor is responsible for providing non-confidential information about audits to all stakeholders, including NGOs. Those parties could participate in audits. For example Greenpeace of Russia participated in several audits of UPM Kymmene organized by DNV (www.dnv.ru).

Assessment of the UPM tracing system by DNV in November 2000 (Tracing Russian Wood Imports 2001b)

As part of the ongoing assessment, DNV (Det Norske Veritas) checked how the origin of wood has been traced during the period from the 6-10th November 2000. This assessment focused on rail transport and delivery. This focus was chosen because wood deliveries by rail account for a large proportion of the imported volume. Furthermore, interim terminals at railway stations and the operations taking place are where the problems occur when assessing how well the tracing has been done.

The assessment made was based on document checks, site visits and interviews with people connected with selected supply contracts. The area chosen for this assessment is the Novgorod Region, a major area for UPM Kymmene with regard to imported volume. The

Novgorod Region has protected areas where logging is restricted or banned outright. These include, for example, national parks and shore areas near lakes and streams. Felling areas in Novgorod were chosen for auditing because at the time of assessment UPM-Kymmene had not carried out any of its own field checks in the region.

The assessments aimed at the most comprehensive possible sample in the Novgorod Region. The areas selected were:

- west of Novgorod (towards Estonia and Latvia)
- the Okulovka region
- the Pestovo region

UPM-Kymmene considers the origin of wood to be properly traced when it has access to statements of origin from the suppliers, and when the wood suppliers (logging companies) have logging permits for all logging sites. According to UPM-Kymmene's system, statements of origin should contain correct information on: the seller, or his representatives, name and contact details; contract number; delivery method; sub-suppliers name and contact details; estimated timber volume; loading terminal or port (including code number), and harvesting site location (Oblast, Leshoz). The accuracy of the statements of origin, relevant to the selected sites and suppliers, was examined.

Logging permits confirm that logging sites are not in protected areas. The logging companies checked were asked to provide the logging permits for the selected sites. In addition to the logging permits (which are in fact sufficient for tracing the origin of wood), many logging entrepreneurs had quadrant maps for relevant areas showing the predominant tree species and protected areas. However, not all companies had such maps, because they were not provided by the forestry authorities.

It is essential to check bills of freight when auditing logging terminals and railway stations because these state the supplier and loading station information which is entered to UPM-Kymmene's system. All carriages of timber should have a bill of freight. Tracing the origin of wood in practice was assessed at logging sites, logging terminals and railway stations. The assessments showed no non-conformities in procedures for tracing the origin of wood.

UPM-Kymmene Forest's field assessments also include matters other than those used to trace the origin of wood, such as whether the country's relevant laws or sound forestry practices are observed. Assessments showed no deficiencies in meeting the legal requirements.

Logging was carried out in accordance with logging permits and technical work instructions. Logging conformed with all the relevant regulations. The logging sites assessed were all final fellings, in which practices are changing; natural regeneration is increasingly encouraged by leaving undergrowth intact in stands of spruce. At certain sites, an exemplary job of preservation was being carried out.

Logging in the Novgorod Region is a significant source of livelihood for many people, especially in peripheral areas where there is no industry and where logging is practically the only source of livelihood besides farming and the service sector. This is why logging is often a practical necessity in the current infrastructure. Logging employs a significant number of people in the Novgorod Region. A logging company fells some 15,000 to 20,000 cubic metres

a year. This employs about 30 people, which, given the average size of families in the region, provides income for about 100 people. This makes logging an important source of employment in Russia. When employees of the logging companies assessed were interviewed, the points most frequently raised were that companies want to observe the law and regulations they were happy to have work they wanted to have work in the future as well. Assessments showed that at the moment UPM-Kymmene's subcontractors are complying with the company's system for tracing the origin of wood.

Helsinki, November 15, 2000
Kimmo Haarala, Head of auditing

Neusiedler Syktyvkar

Neusiedler Syktyvkar is an Austrian company operating in Russia. At the beginning it was a huge enterprise built in Soviet times. Syktyvkar Forest Enterprise joined the NEUSIEDLER Group in 2002. At the end of year 2003 it had 15 252 employees. NEUSIEDLER Syktyvkar mainly supplies the markets in Russia and the Middle and Far East that are currently posting impressive growth rates. Exports to Western Europe have also picked up considerably. The production capacity of the Syktyvkar paper mill currently amounts to a total of just under 700 000 tons per annum, of which around 330 000 tons is uncoated wood-free paper for office communication and paper for offset applications. Further capacities of approximately 180 000 tons per annum each are also available for the production of newsprint paper and/or white top liner and cardboard. In addition, the mill produces approximately 500 000 tons of pulp and 170 000 tons of CTMP per year. Syktyvkar has a total of four paper machines.

Neusiedlers policy regarding their own logging operations:

- Neusiedler is not only committed to comply with the relevant national forestry laws, it aims to implement the best suitable and most sustainable management practices within their own logging operations.
- To ensure and to prove the ecologic, social and economic sustainability of our forest management practices, we develop and promote reliable and internationally accepted systems for forest certification.
- If there is evidence, that forests of high ecological value are present on areas, where our logging operations are located, we will perform all necessary inventories to identify and protect such forests.
- We will communicate openly and actively engage in dialogue with our neighbours , customers and all other interested stakeholders, such as NGOs, about our management practices and programmes for improvement.

Neusiedlers policy regarding origin of contracted timber and pulp:

- We request our pulp and timber suppliers to submit confirmation, that they comply with all relevant national laws and that all supplied raw materials are sourced from sustainable forest management practices, which, therefore, must be consistent with the key elements of social, ecological and economic principles.
- Neusiedler encourages and supports sustainable forest management practices among all of its wood and pulp suppliers and prefers suppliers with internationally accepted certified forestry management systems.

- We do not accept raw materials that are sourced from protected forests and reservations or from key-biotops and forests, where protection is planned. We purchase pulp from tropical areas only, if it is sourced from sustainably managed plantations.
- To prove our commitment we will regularly request from our suppliers to provide information about the origin of the supplied raw material. If there is evidence, that suppliers do not fulfil our requirements and also not take immediately our requested corrective measures, they will not be considered for future contracts.
- We shall provide information about our progress in continually increasing the share of certified raw materials regularly to our customers and other stakeholders.
- Neusiedlers policy regarding the environmental performance of contracted pulps:
- We ask our pulp suppliers on a regular basis to publish their environmental key data and information about their production processes and use this data for benchmarking of our suppliers.
- We commit our suppliers to continuously improving their environmental performance and consider it as a decisive criteria for our supplier assessment, which is the basis of our supplier selection.
- We only purchase elemental chlorine-free (ECF) and total chlorine-free (TCF) bleached pulp.
- We shall give information about our progress in the continual improvement of our environmental performance of our mills and our products by regularly providing of Environmental and Sustainability Reports.

The harvesting operations of NEUSIEDLER Group are carried out in Republic of South Africa and in North-West part of Russia (Komi Republic, Syktyvkar). Neusiedler Syktyvkar is developing the system of wood tracing based on the Russian legislation in forestry since February 2004. The system contains of 2 parts:

1. Wood origin contracts:

- Three days before supplying the wood to the forest department of Neusiedler Syktyvkar the supplier should provide:
 - Harvesting license (or copies with the stamp of forest management unit)
 - Technological scheme of harvesting site
 - Cost sheet for harvesting site;
 - Scheme of forest management unit (based on kvartal network) with harvesting areas.
 - The supplier should deliver the products only by special transport especially adopted to transporting wood;
 - During harvesting and transportation the supplier should follow Russian Forest Code and Law about the forests and their use in Komi Republic.
 - The wood should be harvested only in forests that doesn't belong to the especially protected territories or included in to the projects of especially protected territories, prepared by governmental institutions.
 - The radioactive wood is forbidden.
 - The wood from high conservation value regions (according to the opinion of governmental institutions) is forbidden.
 - The customer reserves the right to come to harvesting site and check wood origin.
 - In case of violation against the above mentioned conditions customer reserve right to terminate wood supply.

2. System of audits

Responsible persons in the company's forest department randomly select the suppliers to check wood origin. Usually they contact forest management units, and then visit harvesting sites. The results of audits are reported in arbitrary shape report. In case of problems the contract could be terminated.

There are no specially approved methodological guidelines how to do audit of the suppliers. The information in paper form (copies of official documents signed by forest management unit) collected at the forest department of Neusiedler Syktyvkar. There are no special rules how long to keep this information and how to work with it. The origin of wood is known on stand level. The forms of audit are very similar to the forms of Stora Enso. We asked the head of the forest division Mr. Kalevi Kyyrönen if there had been cases where customers asked about the origin of paper sources. He answered that it never happened, but could be in the future. Neusiedler Syktyvkar is in the process of certifying (FSC) its forests in Komi Republic. The head of the forestry department said that forest certification is necessary but it can't substitute the system of wood origin tracing. Therefore, the system of wood-origin tracing is an additional competitive advantage for the company.

IKEA

The purpose of IKEA's Forest Tracing System is to trace the origin of all wood sources in solid wood, veneer, plywood and laminated glued wood used in IKEA products and classify the wood sources according to the corresponding level in the staircase model (see summary of this model below). The Forest Tracing System is also a tool to verify that the suppliers' wood purchasing routines and raw material sources comply with IKEA's requirements and a tool to make prognosis of the future demand for wood in IKEA products. This is a step in IKEA's striving to minimise damaging effects on the environment as a consequence of its activities.

IKEA's STAIRCASE MODEL FOR WOODEN MERCHANDISE

- **Level 1.** *Supplier start up requirements and action plan to achieve level 2 requirements. The solid wood, veneer, plywood and layer glued wood must not originate from intact natural forests or nationally/regionally recognised and geographically identified high conservation value forests unless independently verified as coming from well managed sources, i.e. forests certified according to a "level 4 standard" recognised by IKEA. Moreover, the origin of the wood must be known. The supplier must be able to state from which region within a country the wood originates.*
- **Level 2.** *Minimum requirements. Solid wood, veneer, plywood and layer glued wood fulfilling the following demands:*
 - *The wood must be produced in compliance with national and regional forest legislation and other applicable laws.*
 - *The wood must not originate from protected areas (national parks, nature reserves, forest reserves etc.) unless independently verified as coming from well managed forests, i.e. forests certified according to a*

“level 4 standard” recognised by IKEA or felled in accordance with management prescriptions for the protected area.

- *The wood must not originate from plantations established after November 1994 by replacing intact natural forests.*
- **Level 3. Wood. Forest management in transition towards level 4. The Wood standard is developed, governed and revised by IKEA. The purpose of 4Wood is to promote a transition of forest management towards verified well-managed forests, i.e. forests managed and certified according to a Level 4 standard.**
- **Level 4. Forest management in accordance with official standard for well-managed forests. Forests managed according to a standard that includes established performance levels cooperatively developed by a balanced group of environmental, economic and social stakeholders and verified by an independent third party. Note! All high value tropical tree species (teak, meranti, mahogany etc.) must be on level 4!**

IKEA’s long-term goal is to source all wood used in the IKEA range from forests managed in a responsible way, i.e. according to the requirements on level 4. As a first step to reach this goal, all solid wood raw material, veneer, plywood and layer glued wood used in IKEA products must be traced, classified and the requirements and time schedules stated for level 1 & level 2 in the staircase model must be met.

In all Trading Areas the tracing and classification shall be carried out once a year during the period September - November for all suppliers using solid wood, veneer, plywood and layer glued wood in IKEA products. The result of the forest tracing must be reported back to Trading Global by December 1st each year. For new suppliers, the forest tracing and classification of all solid wood, veneer, plywood and layer glued wood sources used in IKEA products must be completed before startup of business.

MAIN PLAN FOR LEVEL 1 AND LEVEL 2 REQUIREMENTS

Level 1 (see: The staircase model for wooden merchandise) represents start up requirements that all suppliers using solid wood in IKEA products must fulfil. New suppliers to IKEA must fulfil these requirements before start-up of business with IKEA.

The minimum requirements on Level 2 for suppliers using solid wood are valid from 1st September 2000. Minimum requirements for veneer, plywood and layer glued wood are valid from January 1st 2003. New suppliers to IKEA not fulfilling the minimum requirements must have an action plan showing how the minimum requirements will be met within 3 months. Apart from the requirements given on Level 1 and Level 2, the supplier must upon request by IKEA, or a third party appointed by IKEA, within 48 hours be able to report the origin of the wood.

The supplier is also obliged to keep records of the origin of the wood for at least 12 months and must be able to show how wood sources that fulfil IKEA’s requirements are separated from wood sources that do not. Moreover, the supplier undertakes to inform all concerned employees and sub-suppliers about the content of IKEA’s requirements and ensure that they comply with these terms and conditions. Each part in the wood supply chain is responsible for securing that the next part in the chain agrees with IKEA’s requirements. The supplier and all sub-suppliers in the wood supply chain must accept audits by IKEA or a third party appointed by IKEA.

CLASSIFICATION OF WOOD SOURCES

All wood sources used by the supplier are classified according to the corresponding level in the staircase model for wooden merchandise. Wood sources including any wood not fulfilling the requirements on level 1 or level 2 (including 3 months for implementing level 2 action plans) are classified as not acceptable sources. Note that the supplier is not classified in the forest tracing. A classification of suppliers is carried out in the IWAY-audits and for Wood audits.

Each Trading Area is responsible to carry out the Forest Tracing for suppliers using solid wood, veneer, plywood and layer glued wood in IKEA products. The questions formulated in the document “Forest tracing questionnaire” should be properly answered for each supplier and all raw material sources used in IKEA products. Moreover, each supplier must summarise the result of the Forest Tracing using the “Forest tracing system summary”. For Wood approved suppliers, with a complete procurement register, only FOREST TRACING SYSTEM SUMMARY is necessary to fill out. The Trading Areas shall make an assessment of the validity of the answers given and report to Trading Global. The Trading area, or an appointed third party, shall make random checks of the wood supply chains.

The IKEA supplier shall, through IKEA’s Forest Tracing System document, provide IKEA with information about the origin of all wood sources that have been used in IKEA products. The questionnaire is a supplier assurance used to classify all wood sources used by the supplier according to the staircase model. The IKEA supplier shall support wood supply chain audits conducted by either; an IKEA audit team, an independent auditor(s) or audit organisation appointed by IKEA.

On its policies regarding suppliers, IKEA states:

At IKEA, we shall always strive to minimise any possible damaging effects to the environment, which may result as a consequence of our activities. Therefore, IKEA and its suppliers shall continuously reduce the environmental impacts of operations.

Suppliers must:

- *work to reduce waste and emissions to air, ground and water,*
- *handle chemicals in an environmentally safe way*
- *handle, store and dispose of hazardous waste in an environmentally safe manner,*
- *contribute to the recycling and reuse of materials and products,*
- *use wood from known areas and, if possible, from sources that are well managed and preferably independently certified as such.*
- *Suppliers must not:*
- *use or exceed the use of substances forbidden or restricted in the IKEA list of “Chemical Compounds and Substances”,*
- *not use wood originating from national parks, nature reserves, intact natural forests or any areas with officially declared high conservation values, unless certified.*

FSC-Forest management certification (FMC) and chain of custody certification (COC)

Forest management certification

FSC, as an umbrella organisation, undertakes no certification itself. Instead, the main task of FSC is to evaluate, accredit and monitor certification bodies. Certifiers commit themselves in particular to accept the goals and principles of FSC and to mirror these in their certification work. The certification process for forest enterprises can take different forms, according to the specific needs, but generally includes the following steps:

- Step 1 Decision: The forest owner decides to obtain certification for his operations according to FSC requirements and chooses an accredited certification body to carry out the certification
- Step 2 Contracting: A contract must be signed between the two parties. At this time initial discussions will be held on forest management, the certification process and its course. Certifier signs contracts for a period of five (5) years.
- Step 3 Pre-Audit: Usually, the certifier conducts a pre-audit (pre-scoping) of the forest operations. This gives the certifier an initial overview of the structure, management and individual environment of the operation and the forest owner gets more acquainted with the requirements of the certifier. The main aim of the pre-audit is the identification of those areas, which that may require further work or attention from the forest manager before the main audit is carried out. Additionally, it helps the certifier to prepare for the main audit, which makes the evaluation more efficient. Amongst others, the relevant stakeholders that will be consulted during the main evaluation will be jointly identified.
- Step 4 Review of the management documents: The forest owner provides the most important documents in advance to the main-audit in order to enable the certifier to gain a thorough insight into the distinctive features of the planning and management process. This is required for the preparation of a timesaving and effective main audit.
- Step 5 Main Audit: Once all inadequately addressed aspects that became apparent during the pre-audit have been resolved, the on-site assessment of the company can be scheduled. In countries in which acknowledged standards of a national FSC working group exist, these form the basis for the evaluation. In countries in which such national standards have not yet been developed, each certifier will use their own FSC-approved standards after adapting it to the local situation.

The basis for certification is not the current status of the forest, but the quality of forest management and its future direction. Progress towards sustainable management will be controlled through regularly repeated inspections. Activities during the audit include the evaluation of the management infrastructure and personnel and the planning documentation in detail, as well as interviews of all involved and stakeholders ("stakeholders", e.g.: local people, environmental organisations, hunting organisations, etc.) Thereafter, the results of the evaluation will be discussed with the executive management. On the basis of the audit, the certifier produces a report, which will either recommend certification, or set out corrective actions to overcome the shortcomings.

- Step 6 Peer Review: The certification report will be reviewed by 2 or 3 acknowledged independent experts. These will evaluate the work and recommendations of the certifier and make a recommendation that will be forwarded to the certifier's decision board for final judgement.

- **Step 7 Certification and Registration:** If all steps have lead to positive results, the forest enterprise will be awarded a certificate. If necessary, conditions may be attached, which must be met before a specified date. Marketing activities using the certificate and the use of the FSC logo as a registered trademark are strictly controlled.
- **Step 8 Monitoring Audits:** At regular intervals (generally once per year) the certifier will carry out a short on-the-spot audit of the forest operation in order to check the implementation of the conditions defined in the report and to evaluate the general progress of the organisation towards quality forest management.

The entire process of certification can take several months. The duration is dependent on the number of shortcomings that have to be eliminated. The pre-audit generally takes only one or two days, while the main audit requires, dependent on the size and complexity of the enterprise, between 2 and 14 days. The process described above only refers to the certification of forest management and ends at the "forest gate". If semi-processed or processed forest products are intended to be marketed with the FSC Logo, a separate certification of the chain of custody is necessary as additional step.

Chain of custody certification

The certification of the chain-of-custody is a more technical process and differs considerably from the certification of forest enterprises. Environmental and social aspects in the production process are not considered. The involvement of relevant interest groups (stakeholders) is not intended. The main aspect is the traceability of certified final products back to the forest of origin. Process and standards are similar to quality management systems known from other industry sectors.

- **Step 1 Decision:** The owner of a timber processing or timber trading company decides to obtain certification for his operations according to FSC requirements and chooses an accredited certification body to carry out the certification. Based on first information on the company, the certifier judges the prospect of a successful audit.
- **Step 2 Contracting:** Following a positive first judgement, a contract is signed between the two parties. Certifier signs contracts for a period of five (5) years. This is the time of validity of the certificate.
- **Step 3 Audit:** The audit is carried out in arrangement with the owner of the company. The main aspects of the audit are:
 - Product identification
 - Product separation (certified and non-certified material)
 - Documentation system (incl. bookkeeping)
 - Training and information of personnel
 - Proper use of FSC Logo
 - Critical control points within the company will be identified and measures to comply with the standards will be discussed and reported.
- **Step 4 Certification report:** On the basis of the audit, the certifier produces a report, which will either recommend certification, or set out corrective actions to overcome the shortcomings. The report will directly be forwarded to the certifier's decision board for final judgement.
- **Step 5 Certification and Registration:** If all steps have lead to positive results, the company will be awarded a certificate. If necessary, conditions may be attached, which must be met until a specified date. Marketing activities using the certificate and the use of the FSC logo as a registered trademark are strictly controlled.

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- Step 6 Control Audits: At regular intervals (generally once per year) the certifier will carry out a short on-the-spot audit of the company in order to check on the implementation of the conditions defined in the report. Bookkeeping, input-output controls and the use of the FSC Logo are the main aspects of these audits.

The entire process of chain-of-custody certification takes about two to three months. The duration is dependent on the number of shortcomings that have to be eliminated. The audit itself generally takes only one or two days, dependent on the size and complexity of the enterprise and the number of products and production sites.

The certification of forest management is confirming that the wood was produced according to the principles and criteria's of FSC, but does not allow wood origin tracing with needed precise. It is because the certificate could be issued for the whole forest management unit. It is possible to check legality of the certificate in information system of FSC (<http://www.fsc-info.org/>). More than 2.000 companies worldwide participate in the FSC certification system today.