The Dutch Economic Contribution to Deforestation and Forest Degradation in Indonesia and Malaysia 1995-2007

Commissioned by
Greenpeace Netherlands

12 May 2009
Publication number A1780

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Contents

Samenvatting

Nederland is grootimporteur van tropische producten als hout, soja, palmolie en pulp. Voor deze producten worden natuurlijke bossen aangetast en verwoest. Dit onderzoek geeft een benadering van de druk die de Nederlandse import van deze producten legt op natuurlijke bossen. Door de sterke toename van import van palm olie uit Indonesië en Maleisië in de afgelopen jaren, richt dit onderzoek zich op deze twee landen. Hierbij is ook gekeken naar andere belangrijke producten uit deze landen zoals hout.

De resultaten zijn gebaseerd op cijfers over het totale volume van producten dat deze landen produceert en rekent door wat de impact is per product op de bossen ter plekke. Vervolgens is gekeken naar het aandeel dat Nederland importeert. Het onderzoek richt zich op de belangrijkste producten waardoor de werkelijke bosaantasting als gevolg van Nederlandse import nog hoger zal liggen.

Het beteugelen van ontbossing speelt een belangrijke rol in de aanloop naar een klimaatakkoord in Kopenhagen eind dit jaar. Het verdwijnen van bossen is namelijk niet alleen een bedreiging voor de biodiversiteit, maar ook een belangrijke oorzaak van klimaatverandering. De resultaten uit dit onderzoek plaatsen een grote verantwoordelijkheid bij Nederland en andere landen die land- en bosbouwproducten uit tropische landen importeren. De studie is zeer relevant voor de huidige discussie rond REDD (Reducing Emissions from Deforestation and forest Degradation), een cruciaal onderdeel van de klimaatonderhandelingen.

Het onderzoek maakt gebruik van beschikbare gegevens en informatie. Deze zijn echter in vele gevallen onvoldoende specifiek of actueel, bijvoorbeeld om een goede berekening te maken van de indirecte effecten. Daarom moeten de kwantitatieve resultaten worden bekeken met een belangrijke onzekerheidsmarge. De orde van grootte van de resultaten en de trends zijn echter wel degelijk betrouwbaar en relevant voor beleid.

Het blijkt dat over een periode van twaalf jaar in deze twee landen een oppervlak van ongeveer 370,000 ha is aangetast, wat overeenkomt met een gemiddelde aantasting van 32,000 ha per jaar. Het is vooral zorgwekkend dat in de laatste twee jaren (2006 en 2007) de intensiteit van aantasting sterk is toegenomen. Dit kan in verband worden gebracht met de uitbreiding van het areaal palm olie, vooral ten behoeve van export als biomassa grondstof naar Nederland.

De door de aan Nederland toe te schrijven bosaantasting in Indonesië en Maleisië veroorzaakte in de periode tot en met 2005 een broeikasgasemissie van12 tot 25 Mton/jaar, wat overeenkomt met ongeveer 5-10% van de totale broeikasgasemissies in Nederland zelf. In 2006 en 2007 was deze emissie als gevolg van de sterk toegenomen bosaantasting toegenomen tot 30-32 Mton/jaar ofwel 15% van de totale Nederlandse broeikasgas emissie.[1]

Landbouw en bosbouw in tropische gebieden kan ook op een duurzame manier. Er hoeft dus niet noodzakelijkerwijs een impact te zijn op bosgebieden. Duurzaam geproduceerd hout uit FSC-gecertificeerde bossen, zijn daarvan voorbeelden. Dit is verwerkt in de analyse.

[1] Zie Croezen en van Valkengoed (2009)

Introduction

Several studies and approaches look upon the ecological footprint of countries and cities, including the Netherlands. These studies show that the ecological footprint of the Netherlands has increased to about six times its current area in 2002 (GFN, 2009). An important component of the footprint is the impact of Dutch trade and consumption of agro-commodities, putting a claim on land.

This study takes a comparable but slightly different approach by looking at the contribution by Dutch imports of selected agro-commodities on the change of land-use from forests to degraded forests or croplands by deforestation. This transition is accompanied by a loss of various ecosystem services, especially habitat for biodiversity and carbon sequestration. The impact on deforestation and forest degradation generally has an irreversible character, and can be interpreted as the increasing proportion of land of which productivity is being focused at human consumption demands.

This study was originally inspired by the "*Regeringsstandpunt Tropisch Regenwoud*" policy (1991), and subsequent policy decisions, stating Dutch government commitments to contribute to the protection of tropical and temperate intact forests. These policy decisions include a variety of initiatives aimed at reducing deforestation, such as encouraging certification, afforestation and forest management projects, regional agreements to combat illegal logging (FLEGT (Forest Law Enforcement, Governance and Trade) and others), conventions to protect biodiversity, and development aid to strengthen institutional capacity in timber producing countries. On the other hand, there is increasing evidence that Dutch imports and consumption of commodities results in deforestation and forest degradation in the countries where those commodities are produced.

Curbing deforestation plays an important role in the negotiations towards a climate agreement in Copenhagen at the end of this year. The disappearance of forests is not only a threat to biodiversity, but also a major cause of climate change. The results from this research place a great responsibility with the Netherlands and other countries importing agricultural and forest products from tropical countries. The study builds on the current debate around REDD (Reducing Emissions from Deforestation and forest Degradation), a crucial part of the climate negotiations.

The aim of this study is to quantify the contribution of selected Dutch economic activities to impacts on natural forests, based on an objective, independently verifiable assessment of the best available data for the past decade. The study focuses on the adverse impacts of Dutch economic activities on natural forests. It also accounts for market driven better forest management practices, of which for example FSC (Forest Stewardship Council) timber, if relevant.

This report is a follow-up and update of an earlier study that was undertaken on this subject in 2007. The earlier study focused at deforestation and forest degradation over the period of 1990-2005. This updated study has included the period of 2006 and 2007. The aim of this extension is to gain insight in new trends.

The findings of the research are presented as a series of country studies with the aggregate global and regional results, as well as brief summaries for each country. Because of the serious increase of palm oil imports to the Netherlands in recent years, this follow-up report deals with the countries of Indonesia and Malaysia only.

1. Definitions

Impacts on natural forests (*aantasting van bossen*) include both deforestation and forest degradation. Deforestation is defined here as the permanent conversion of natural forest to another type of land use or the long-term (more than approximately 100 years) reduction of the tree canopy cover below 10%, which is the internationally accepted (FAO (Food and Agriculture Organization)) threshold for forest. Forest degradation is defined as loss of trees and woody biomass (mostly in primary forests) that does not result in deforestation, but involves (major) change in structure, species composition and productivity as a result of non-sustainable forest exploitation (usually logging). Given time and with management input, degraded forests may recover to their former condition. In the tropics, however, forest degradation is often a precursor to deforestation, especially in a forest frontier zone.

The emphasis of this research is on natural forests, since these harbour the highest biodiversity and provide the widest array of ecosystem functions. The area of natural forests is being assessed using the best available knowledge on forest cover and quality within each country study. The presence of intact forest landscapes, defined broadly as territories of at least 500 km2 of forests minimally disturbed by human economic activity, was the first criterion for selection of regions and countries for this research (Greenpeace, 2007).

2. Methods

2.1 Selection of countries and commodities

To provide a representative global overview, countries were selected for case studies according to the following process:

1. The first criterion applied for the selection of country case studies is the presence of intact forest landscapes, broadly defined as territories with at least 500 km2 (50,000 ha) forest cover that is minimally disturbed by human economic activity (Greenpeace, 2007). The quantification of the Dutch impacts on forests, however, refers to all natural forest within each country and not to intact forest landscapes specifically, because available statistics do not allow making the distinction between intact forest landscapes and other natural forests.

2. For the initial study we selected five regions that collectively hold 90% of the world's intact forest landscapes: Canada, Russia, South-East Asia, the Congo Basin (extended to include West Africa) and the Amazon Basin (extended to include the savannah forests and Atlantic forests of South America). This updated version builds on the current debate around REDD and therefore takes into considerations tropical regions only, thus dropping Russia and Canada. Côte d'Ivoire was also dropped because of the very limited timber exports to the Netherlands and limited intact forest area.

3. Within each of these regions, we identified (a) commodity production associated with impacts on forests and for which Dutch imports represent a relatively great share of global trade and (b) countries that represent a large share of Dutch imports or a large share of country exports. For the earlier study six commodities were selected. Because of the serious increase of palm oil imports from Indonesia and Malaysia, this follow-up study only focuses on these two countries.

This updated study thus focuses at the commodities with major impacts on tropical forests in Indonesia and Malaysia. The following matrix shows the selected country-commodity combinations for this study (Exhibit 1).

Exhibit 1: Selected country commodity studies, only South-East Asia is dealt with in this study.

Region / country		Soy	Palm oil	Timber	Pulp
South-east Asia	Indonesia		XX	XX	XX
	Malaysia		XX	XX	

Source: Aidenvironment, 2009.

2.2 Stepwise approach

To assess the Dutch contribution to deforestation and forest degradation, for each country study, the research followed the following steps, considering the period from 1995 to 2007 throughout:

1. Collation and assessment of quantitative data on deforestation and forest degradation.

2. Determination of the drivers of deforestation and forest degradation, including historical changes in the major drivers, the links between proximate and underlying drivers, indirect drivers, and the pathways from forest degradation to deforestation.

3. Determination of the contribution of the selected commodities to deforestation and forest degradation, including corrections for better management practices. Where possible both direct and indirect effects were considered.

4. Calculation of Dutch contribution to deforestation and forest degradation, based on trade statistics and on the estimated contribution of that commodity to deforestation and forest degradation for three periods: 1996-2000, 2001-2005 and 2006-2007.

2.3 Assumptions and interpretations

To calculate the Dutch contribution to deforestation and forest degradation, the following understandings and assumptions were used in the country studies.

The FAO Global Forest Resource Assessment (FRA) 2005 (FAO, 2005) represents the only source of worldwide forest cover statistics that is regularly published and updated. The FRA 2005 and the FAO State of the world's Forests (FAO, 2009) were therefore our primary sources of statistics on deforestation and forest degradation at the country level.

FAO has been criticized for underestimating deforestation rates because its statistics are not fully transparent in relation to the conversion of natural forests into plantation/planted forests (Rainforest Foundation, 2005; WRI, 2001[2]). Contrary to its 1980-1990 FRA, FAO does not any longer publish data on areas logged in previously logged and primary tropical forests. For this study, FAO's data were verified with alternative sources and in some cases we chose to use statistics deemed more credible.

The primary focus of this study is to assess to what extent Dutch commodity imports directly contribute to deforestation and forest degradation. However, in some contexts, the production of commodities also has indirect impacts. Indirect effects include effects on forests due to displacement of people, new immigrants, competition for food, agricultural and infrastructural activities as a result of opening up forestlands. One example is when palm oil plantations are established on areas where people grow their food crops. They then have to move to other forest areas. We attempted to assess indirect impacts associated with one commodity while preventing double counting of the impact.

Forest degradation essentially entails any tree canopy cover changes within a wide range of 10-100% crown cover within an area unit. Selective logging may thus involve the removal of crown cover from 100% to e.g. 11-15%. Selective logging is still heavily dependent on previously unlogged (primary) forests or on forests that were lightly logged ('creamed') many years ago. The residual stand or logged over forest is usually referred to as "secondary forest" in Southeast Asia, while the same term is used in Latin America to indicate previously deforested lands where forests have naturally regenerated. In this study, "secondary forest" refers to logged over natural forests. We do not take into account natural forest regeneration in previously cleared lands.

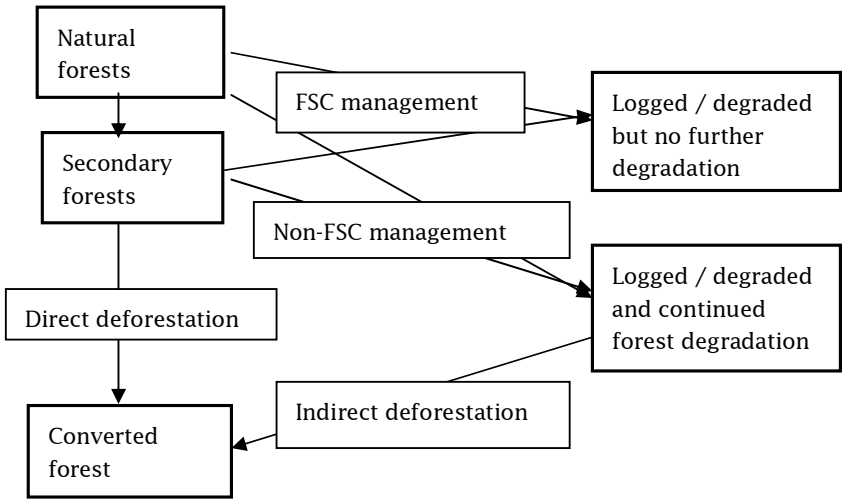
[2] News release 2001: WRI study reports deforestation may be higher than FAO estimates.

Deforestation occurs when activities in the forest cause the crown cover to drop below 10%. However, if natural forests are replaced by tree plantations with forestry production functions, the forest cover change is not recorded as deforestation by FAO. In this study we do consider such changes of natural forest into tree plantations as deforestation, as typical forest ecosystem services such as habitat for biodiversity are destroyed.

In this study, we assume that selective logging in the tropics results in forest degradation. Likewise, logging of forests that are already degraded (secondary forests) will cause further forest degradation. The only exception is made for logging in FSC-certified forests because FSC standards are the only one that effectively avoid further degradation of forests. This means that although forest degradation in FSC-certified forests takes place to a certain extent, further degradation is being prevented. For this reason, we included FSC in the corrections for better management practices. Other forest management standards (e.g. MTCC (Malaysian Timber Certification Council)) are thus not considered effective to avoid further forest degradation.

The following scheme (Exhibit 2) highlights the four possible situations and the interrelations:
1. natural forests, with high biodiversity and carbon sequestration
2. secondary forests, with lower biodiversity and lower carbon sequestration
3. degraded forests, due to non-sustainable management
4. converted forest, due to deforestation

Exhibit 2: Major states of forest quality, in transition from natural forest to managed or degraded forest and converted forest.



Source: Aidenvironment, 2009.

Increased production of commodities that are often accompanied by expansion into forest areas, and thus lead to deforestation, include palm oil, soy, fiber for pulp and paper (in Indonesia). The relative contribution to deforestation for these crops was determined through analysis of production trends and expansion in forested areas and comparison with trends and insights on the dynamics of deforestation. In doing so, we are aware of the risk of double counting. For example, timber exploitation and palm oil expansion at the expense of forests are narrowly linked (and so is cattle grazing for beef production and expansion of soy production). Timber (sawnwood, plywood etc.) and fiber for pulp and paper can come from multiple sources: natural primary forest, natural

secondary forest, timber plantations, or clearance of land for agriculture. Waste paper and residues from sawmilling can also be used as inputs in paper manufacturing. Care was taken to distinguish these different sources of wood and fiber to avoid double counting.

Likewise, there is possible overlap between forest degradation (through logging for timber) and forest conversion: first an area is degraded and within a timeframe of several years it is converted for example to oil palm. However, we also took into account this risk of double counting by separating both processes in terms of forest impacts. But we assumed that the chance that through Dutch imports of timber a particular forest area is degraded and within the period of ten years also is degraded through the Dutch imports of palm oil is fairly slim – although this might have occurred in regions as Riau, Sumatra.

This study estimates the Dutch contribution to deforestation and forest degradation in relation to commodity production and trade, and does not take into account the impact of capital investment by Dutch financial institutions and policy efforts. Exports of processed products derived from activities or sectors contributing to forest impacts, such as furniture from Indonesia were also not included.

FAOstat (2009) and Eurostat (2009) were the main sources of import statistics. This study uses gross import statistics which means that re-export of products after processing in the Netherlands was not deducted. The study thus includes all imports with which economic activities have taken place in the Netherlands, but which might have been exported afterwards.

2.4 Corrections for good practices

A number of initiatives in different sectors are oriented at developing more sustainable production systems. Most of these initiatives are not yet operational at a significant scale. There is also debate about whether these production systems indeed take into account environmental issues, such as deforestation and forest degradation (being the subject of this study). In coordination with the client (Greenpeace), the following production systems were investigated.

Timber: FSC
As regards timber, we only consider timber obtained from FSC-certified forests as not leading to continued forest degradation (see for rationale above). Recently, total Dutch net import of FSC timber has been estimated (Aidenvironment, 2008). Net import of tropical FSC timber in the Netherlands is presented in below Exhibit 3. Between 2005 and 2007, the volume of FSC tropical timber imported by the Netherlands increased by more than 80%.

Exhibit 3: Total net import of FSC timber in the Netherlands 2001-2009 (in m3 RWE).

	2001	2003	2005	2006	2007	2008
Net import	22,197	47,709	67,484	88,868	122,282	171,966
Proportion of total import				2.8%	3.4%	

Source: Aidenvironment, 2009.

However, no information is available as regards the origin of FSC timber imported in the Netherlands. As part of this study, we made our own estimates on the basis of best judgments.[3] These estimates concern FSC imports in 2008. This gives an average contribution from different countries (see Exhibit 4). This same rate was then applied to FSC imports in earlier years 2006 and 2007 to estimate the amount of FSC timber exported to the Netherlands from different countries. For 2005 and the period before 2005, FSC timber in the Netherlands mainly originated from Brazil. Thus, here other sources of information apply.

Exhibit 4: Origin of Dutch FSC timber import.

Region / Country	Average share of Dutch import (2008)	Estimates of net Dutch import (m3 RWE)			
		2005	2006	2007	2008
South America	47,5%		42,212	58,084	81,684
Brazil	25,0%	30,000	22,217	30,571	42,992
Peru	7,5%		6,665	9,171	12,897
Bolivia	6,3%		5,554	7,643	10,748
Other	8,8%		7,776	10,700	15,047
SE Asia	21,5%		19,107	26,291	36,973
Vietnam	12,5%		11,109	15,285	21,496
Indonesia	4,5%	750	4,000	5,500	7,738
China	4,5%		4,000	5,500	7,738
Malaysia		0			
Africa	31,0%		27,549	37,907	53,309
Cameroon	13,5%	1,000	11,997	16,508	23,215
Rep. Congo Brazzaville	15,5%	0	13,775	18,954	26,655
Gabon		1,000			
Other	2,0%		1,777	2,446	3,439
Total	100%		88,868	122,282	171,966

Source: Aidenvironment, 2009.

Palm oil

The Round Table for Sustainable Palm Oil (RSPO) was established in 2004, with the objective to promote the production and marketing of sustainable palm oil. RSPO members have accepted that any conversion of primary and High Conservation Value Forests (HCVF) after November 2007 are not certifiable as “sustainable production”. However, there are still strong doubts whether palm oil certified under RSPO complies with sustainability criteria regarding forest impacts, because the RSPO focuses at HCVFs only. Therefore it will not be considered as a source of palm oil without forest impacts. Moreover, certified palm oil export under RSPO was nil up to end of 2008, although at present, the total forest area retained under RSPO certified companies is increasing and RSPO certified palm oil is becoming available on the global market.

[3] Experts consulted are A. van Noort – FSC Netherlands and A. van Eckeveld – Precious Woods (in March 2009).

2.5 Uncertainties and reliability

As can be observed in the above description of the method, there are several assumptions involved in the methodological approach. It is important to underline that this study cannot, and does not aim to, generate detailed data, as the variability due to various assumptions and uncertainties involved is relatively high. Rather, this study generates rough data of which the order of magnitude is correct and relevant to know for policy purposes. Also, different countries pose different methodological constraints, due to availability and reliability of data. Thus, it is not always easy to compare data between regions and countries.

One important source of uncertainty are the deforestation statistics. We have adopted official FAO or national statistics. These statistics are biased because FAO also considers plantation forests as forests. This bias has been taken into account in the calculations in this study. This means that FAO statistics have been consequently corrected for plantations forests and we therefore only included natural forests in the study. Also, FAO statistics are based on government data, which are in some cases unreliable and give lower deforestation rates than the reality. This is one reason why FAO statistics are often criticized by NGOs.

Another source of uncertainty are the estimates of indirect effects. These are based on best professional judgments as quantitative data are generally not available. Lastly, there are risks of double counting, e.g. impacts from timber harvesting and palm oil expansion. We are aware of these dynamics and have avoided such double counting.

This study has focused on two countries, being Indonesia and Malaysia, and therefore only considers a small proportion of the total global impacts of Dutch economic activities on deforestation and forest degradation.

3. Results

The results of the Dutch contribution to deforestation and forest degradation are summarized below in Exhibit 5 to 8 (deforestation volumes and trends, forest degradation volumes and trends), based on the different country case studies.

Exhibit 5: Dutch impacts on deforestation per country and per period (total ha) - Indonesia and Malaysia.

Region / country		**Deforestation – total ha., per period**			
		1996-2000	2001-2005	2006-2007	Total
South-east Asia	Indonesia (palm oil, timber, pulp)	120,000	54,000	53,000	227,000
	Malaysia (palm oil, timber)	13,000	16,000	15,000	44,000
Totals		**133,000**	**70,000**	**68,000**	**271,000**

Source: Aidenvironment, 2009.

All numbers rounded to nearest thousand; n.a. = not applicable.

Note that period 2006-2007 only covers two years.

Exhibit 6: Dutch impacts on deforestation per country and per period (annual rate, ha/yr) - Indonesia and Malaysia.

Region / country		**Deforestation – ha/yr, per period**			
		1996-2000	2001-2005	2006-2007	Total
South-east Asia	Indonesia (palm oil, timber, pulp)	24,000	11,000	27,000	19,000
	Malaysia (palm oil, timber)	3,000	3,000	8,000	4,000
Totals		**27,000**	**14,000**	**35,000**	**23,000**

Source: Aidenvironment, 2009.

All numbers rounded to nearest thousand; n.a. = not applicable.

Exhibit 7: Dutch impacts on forest degradation per country and per period (total ha) - Indonesia and Malaysia.

Region / country		**Forest degradation total ha., per period**			
		1996-2000	2001-2005	2006-2007	Total
South-east Asia	Indonesia (palm oil, timber, pulp)	26,000	31,000	12,000	69,000
	Malaysia (palm oil, timber)	11,000	13,000	8,000	32,000
Totals		**37,000**	**44,000**	**20,000**	**101,000**

Source: Aidenvironment, 2009.

All numbers rounded to nearest thousand; n.a. = not applicable. Note that period 2006-2007 only covers two years.

Exhibit 8: Dutch impacts on forest degradation per country and per period (annual rate ha/yr) - Indonesia and Malaysia.

Region / country		Forest degradation ha/yr., per period			
		1996-2000	2001-2005	2006-2007	Average
South-east Asia	Indonesia (palm oil, timber, pulp)	5,000	6,000	6,000	6,000
	Malaysia (palm oil, timber)	2,000	3,000	4,000	3,000
Totals		**7,000**	**9,000**	**10,000**	**9,000**

Source: Aidenvironment, 2009.

All numbers rounded to nearest thousand; n.a. = not applicable.

While the impacts on deforestation and on forest degradation are separate processes, and the intensity of impacts is greatest with deforestation, there are good arguments to add both categories. Firstly, both deforestation and forest degradation lead to important losses of ecosystem services, with impacts on biodiversity and greenhouse gas emissions. Secondly, forest degradation is commonly a precursor of deforestation, particularly in countries with a forest frontier such as Indonesia and Malaysia.

Thus, the overall estimate of impacts on natural forests – through deforestation and forest degradation - due to selected Dutch commodity imports can be determined (Exhibit 9 and 10). Over the decade 1996 - 2007 the estimate for the two countries of Indonesia and Malaysia is around 370,000 ha. The average annual rate is estimated at 32,000 ha.

Exhibit 9: Dutch impacts (deforestation and forest degradation) per country and per period (total ha) - Indonesia and Malaysia.

Region / country		Forest impacts total ha,. per period			
		1996-2000	2001-2005	2006-2007	Total
South-east Asia	Indonesia (palm oil, timber, pulp)	146,000	85,000	65,000	296,000
	Malaysia (palm oil, timber)	24,000	29,000	23,000	76,000
Totals		**170,000**	**114,000**	**88,000**	**372,000**

Source: Aidenvironment, 2009.

All numbers rounded to nearest thousand. Note that period 2006-2007 only covers two years.

Exhibit 10: Dutch annual forest impacts (deforestation and forest degradation) per country and per period (annual rates in ha/yr.) - Indonesia and Malaysia.

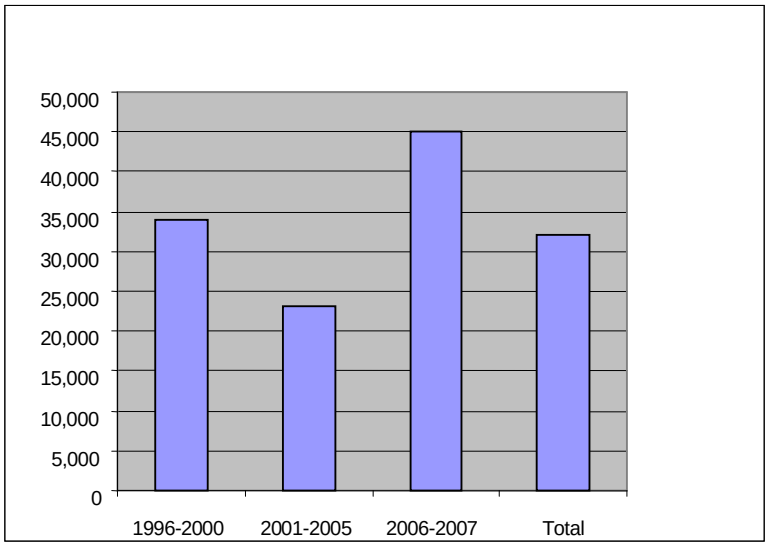
Region / country		Forest impacts, ha/yr., per period			
		1996-2000	2001-2005	2006-2007	Total
South-east Asia	Indonesia (palm oil, timber, pulp)	29,000	17,000	33,000	25,000
	Malaysia (palm oil, timber)	5,000	6,000	12,000	7,000
Totals		**34,000**	**23,000**	**45,000**	**32,000**

Source: Aidenvironment, 2009.

All numbers rounded to nearest thousand.

The annual rate of impacts on natural forests per period is also shown in shown in Exhibit 11.

Exhibit 11: Dutch impacts on deforestation and forest degradation per period, annual rates - Indonesia and Malaysia.



Source: Aidenvironment, 2009.

Over the three periods, the average annual rate has shown a sharp increase (doubling) in the last two recent years (2006-2007) as compared to the earlier period (2001-2005). This increase can be largely attributed to the increase in palm oil expansion and production, and concessions given out for such production.

These quantitative estimates need to be understood in relation to the methodological approach and assumptions made in the research, discussed in the previous section. The quantitative data therefore generally have a factor of variability in the range of 10-30%. However, the order of magnitude of these data is certainly correct and we have no doubts about the trends.

An important observation is that deforestation can almost entirely be attributed to palm oil expansion, while timber imports are responsible for most of the forest degradation. This suggests that the major threats to tropical forests are associated with agro-commodities. The recent surge in demand for biomass for biofuels may be one factor explaining additional pressure on tropical forests in Indonesia and Malaysia.

As stated in the methodology, the calculation of impacts was corrected by deducting trade in FSC certified forest products. However, the quantities are still very limited in both countries. For palm oil, certified products were not yet available in 2006 and 2007.

4. Summaries per region and country

In this section, brief summaries per region and country are presented. For detailed descriptions of the country studies, including data sources see chapter 5 and 6.

4.1 South-East Asia region: – Indonesia and Malaysia

Expansion of the palm oil sector is the major driver of deforestation in both Malaysia and Indonesia. Conversion of forest to plantations for pulp and paper is responsible for a small proportion of total deforestation only. The Netherlands is a major importer of palm oil from Malaysia and Indonesia, taking around 5% of total production in both countries. Volumes being imported have increased in recent years, but the proportion has remained rather stable due to similar increases in national production.

In Indonesia the impact of palm oil imports on deforestation has been great in 1996-2000, when the first palm oil plantations at a large scale were established. The decline of the impact on new deforestation in 2001-2005 took place because the increase of palm oil and pulp plantations has been less. However, in the recent years of 2006-2007 the contribution to deforestation has much increased, mainly because of a strong increase in palm oil land concessions being allocated and converted in these years.[4] Recent data (from 2008), which were not taken into account in this study, show a continuing increase of palm oil production and Dutch imports in 2008.

These data include estimates of indirect effects. One factor is the fact that areas allocated as palm oil plantation areas will sooner or later be deforested as the forest frontier moves forward and conversion of degraded forests proceed. As part of the indirect effects, we estimated that annually 5% of concession areas not yet planted with palm oil have been deforested, and that 10% of agroforestry lands being converted to palm oil plantation lead to displacement effects in natural forests. The indirect effects of pulp plantations are considered less important and have therefore not been calculated.

In Malaysia, the impact by palm oil imports on deforestation has remained high and stable between 1996 and 2005, and has further increased in recent years. The strongly increased contribution for the last two years can be attributed to two main factors. One is the continuous expansion of palm oil plantations in Malaysia, but in recent years entirely at the expense of primary forest. Second is the increase of Dutch imports. We did not look at indirect effects because these are considered to be relatively unimportant.

[4] In 2008 it appears that palm oil imports to the Netherlands have again strongly increased.

5. Country study 1: Indonesia

5.1 Trends in deforestation and forest degradation

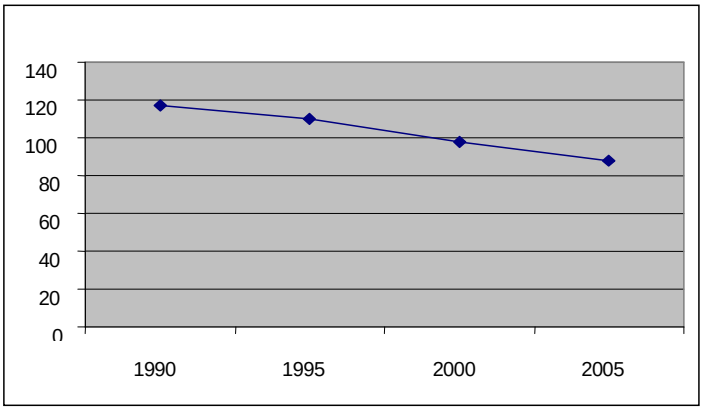
Deforestation
The data on deforestation according to FAO (2005a) are presented in Exhibit 12 and 13. There are no official data on total deforestation rates available for recent years. The data have been corrected for an increase in forest plantations (approximately 173,000 ha annually in all three periods, and a total planted area over 1996-2006 of 1,908,000 ha, according to the Ministry of Forestry.

Exhibit 12: Deforestation in Indonesia 1991-2005 (x 1,000 ha).

Period	Total deforestation	Deforestation annually
1996-2000	12,339	2,468
2001-2005	9,757	1,951
Total	22,096	2,210

Source: FAO (2005a).

Exhibit 13: Dutch impacts on deforestation and forest degradation per period, annual rates.



Source: Aidenvironment, 2009.

The FAO data are in line with other studies on deforestation in Indonesia like those of Holmes (2002) and Forest Watch Indonesia /Global Forest Watch (FWI/GFW, 2002), and WRI (2006) of which the above figure is derived. Other sources like FERN et al (2005) indicate a higher deforestation rate (see Exhibit 14). Of the 44 countries which collectively account for 90% of the world's forests, Indonesia pursues the world's highest annual rate of deforestation with 1.9 million ha per year between 2000-2005, which corresponds to a rate of 2% annually (accepted as a record in the Indonesia Guinness book of records, 2008) (WRI, 2005).

Official data published by the Indonesian Ministry of Forestry indicate that the deforestation rate over the 2000-2005 period has been at average 1.09 million ha, which is substantially lower than the above FAO data. Another official source of information, however, suggests much higher rates over the 2005-2008 period, as large as 32 million ha (8 million ha per year) (Siaphut, 2009).

Exhibit 14: Deforestation rates in Indonesia according to various sources.

Source	Period	Total deforestation	Annual deforestation	Main drivers
Holmes (2002)	1985 - 1997	20 million ha	2 million ha	Timber plantations (11%); estate crops (14%); forest fires (10%); small investors (10%); pioneer farmers (7%). Only amounts to 9,7 mln ha
FWI/GFW (2002)	1950 - 2000	64 million ha	1.7 million ha 1990-1995 2 million ha 1995-2000	
Rautner et al. (2005)	1985 - 2005	17 million ha in Borneo (including Sabah and Sarawak)	Borneo: 850.000 ha in 1985–2005; Kalimantan: 1.2 million ha 2000–2002	(illegal) logging, palm oil development
FERN, Greenpeace, WWF (2005)	1985 - 2000		1.6 million ha 1985–1997; 3.8 million ha 1997-2000	

Source: Aidenvironment, 2009.

Within Indonesia there are considerable differences in deforestation rates between regions. Between 1985 and 1997 deforestation in West Papua was 1.8 million ha, compared to 10 million ha in Kalimantan and 6.5 million ha in Sumatra in the same period (DTE, 2002). Indonesia's lowland tropical forest has already been cleared in Sulawesi and is nearly cleared in Sumatra. With deforestation rates accelerating in Kalimantan, the frontier is expected to move to West Papua, which has been relatively untouched until recently (FWI/GFW, 2002; World Bank, 2006). In recent years (2005-2008), deforestation has been most rampant in Papua, East, Central and West Kalimantan and Riau, with these 5 provinces accounting for two-thirds (68%) of all deforestation in Indonesia (Siaphut, 2009).

The conclusion is that over 2006-2007 the deforestation rate has not declined, and remains at least 2 million ha per year, with a concentration at Papua, East, Central and West Kalimantan and Riau.

Forest degradation

Accurate data on forest degradation are difficult to obtain because different scope and definitions are used (Exhibit 15). For example, Forest Watch Indonesia refers to degraded logging concessions and not to degraded forest land in total. Some sources, like Purnomo and Guizol (2006), include deforested areas in the total degraded area, while other sources do not.

As of 2003, only 14.8 million ha of primary forest remained in Indonesia. Secondary (logged over) forest comprised 21.6 million and the bulk of the remaining primary and secondary forest is found in Kalimantan and Papua. In addition, there are some 18.4 million ha of non-forested lands within the forestland estate of 133.6 million ha (Indonesian Ministry of Forestry, 2007b). These data should be compared with FAO FRA's reported data of 48.7 million ha of primary forest in Indonesia in 2005.

Exhibit 15: Forest degradation in Indonesia according to various sources.

FWI/GFW (2002)	2000	13 million ha of the 44 million ha logging concessions
Indonesian Ministry of Forestry (2005)	2005	47.1 million ha
World Bank (2000)	1998	16.6 million ha due to logging operations
Purnomo and Guizol (2006)	2006	60 million ha

Source: Aidenvironment, 2009.

5.2 Drivers behind deforestation and forest degradation

This country study focuses on the economic drivers behind deforestation and forest degradation: demand for timber, palm oil and pulp & paper. Other drivers are coal, oil & gas, gold and copper mining, infrastructure development and demand for other agricultural commodities such as rubber, tea, highland vegetable farming. In some years, forest fires affect natural forests and, in some regions, non-traditional shifting cultivation affects natural forest cover. The contribution of these drivers to deforestation and forest degradation is presently difficult to quantify but it is clear that a variety of economic activities is increasingly encroaching into remaining forest area.

For example, in 2004 an amendment to the Forestry Act has made such encroachment in protected forests possible for mining companies within Protection Forests (hutan lindung). Since the Act was revised, 13 mining companies were licensed to operate in Protection Forests. There are estimates that the amendment may affect up to 11.4 million ha of forestland on the longer run (WALHI, 2004).

Infrastructure development, such as in the construction of new roads in forested regions in North Sumatra/Aceh, Papua and Kalimantan is opening up previously inaccessible forest areas and leads to forest fragmentation, movement of migrants in search for land and deforestation for plantation expansion.

The contribution to deforestation by agricultural crops like rubber, tea and coconut is small because these are old and established crops with lower expansion rates compared to oil palm plantations (FWI/GFW, 2002). Nonetheless, the Ministry of Agriculture Plantation Revitalization Program will affect a significant forest area because it is not limited to replanting of old plantations, but also contains an element of expansion for rubber and cacao with 1.8 million ha.

Selective logging and plantation expansion were nonetheless the main drivers behind forest degradation and forest loss over the 1995-2007 period. The three economic drivers behind forest conversion and degradation are often interlinked, especially in lowland areas. Selective logging in primary forests represents the first stage of forest degradation. In a second stage (illegal) early re-logging causes further forest degradation. In a final stage, the degraded forest is converted into plantations, based on the economic rationale that the opportunity cost of waiting for the forest to recover are outweighed by the benefits of conversion into other land use, foremost oil palm. In this rationale, no economic value is attached to the loss of (often still significant) ecological and social values of the remaining forest. According to our best professional judgment, possibly as much as

80% of plantation expansion takes place in lands claimed or used by local communities, typically in mixed landscapes which contain natural forests, agroforestry areas and rice fields.

Timber
According to Ministry of Forestry statistics, two-thirds (5.6 million m3; 62%) of total log production in Indonesia was produced from selective logging operations in natural forests in 2006, with the balance (3.4 million m3; 38%) originating from land clearing operations. According to the same source, log production from plantations (11.5 million m3) would already have surpassed total documented log production from natural forests (Indonesian Ministry of Forestry, 2009a). The proportion of timber from forest plantations has thus increased rapidly in recent years, according to the Ministry of Forestry (Exhibit 16).

Exhibit 16: Formal data on the origin of timber production in Indonesia (x Mt).

	log production (natural forest) from selective logging	**log production (natural forest) from land clearing**	**log production from plantations**
1995	16.9	5.4	2.5
2000	3.5	4.6	5.7
2006	5.6	3.4	11.5

Source: Indonesian Ministry of Forestry (2007a).

Selective logging has been, and continues to be, intense and damaging to the residual stand. Most forest areas have been logged over at least once and along with the decline in timber yield, the logging concession area has been declining too. The 600 concessions covering 64 million ha in the early 1990s have now been downscaled to some 322 active concessions with a total area of 28,778,923 ha in 2006 and the decline goes on (Indonesian Ministry of Forestry, 2009a). As of November 2008, 312 concessions remained, with a total area of 26,859,188 ha (Indonesian Ministry of Forestry, 2008).

The collapse of formal concession forestry came along with a country wide illegal logging boom during the 1998-2004 period, as well as the increasing conversion of forest concessions to palm oil plantations. This development was also facilitated by decentralization policy. Since 2004, small scale illegal logging has been in decline, but (illegal) deforestation for oil palm expansion has been increasing along with the recovery of the Indonesian economy.

Oil palm plantations
Oil palm plantations are typically planted in monoculture systems for which the original vegetation is completely removed. Whether or not plantation development contributes to deforestation depends upon the land cover which is being replaced by the plantation. It has been estimated that 55-66% of the oil palm plantations between 1990 and 2005 were developed at the expense of natural forests (Wakker, 2004; Lian Pin Koh & David S. Wilcove, 2008).

Over the years, Indonesia's targets for the oil palm expansion area have increased from 5.5 million ha in the early 1990s to 9.13 million ha in 1996 and since the 1999-2001 decentralization years, numerous local governments have publicly announced a range of ambitious expansion plans which, when added up, amount to some 18-20 million ha across the country (Wakker, 2004). This would seem unrealistic compared to the oil palm acreage of 2000 (4 million ha) but in the same

year, no less than 1,896 investors had applied for permits to develop plantations in an aggregate area of 30,167,594 ha.[5] As of 2007, already over 7 million ha were planted, and some 18 million ha of land in the country are considered suitable for oil palm (Wakker 2004).

No official data are published by the Indonesian government as to the total national area licensed out to oil palm expansion, but it is clear that numerous new plantation concessions overlap with the forestland area which is managed by the Ministry of Forestry on behalf of the general public. As of 2008, some 10.7 Million ha of convertible forestland remains, but oil palm concessions which overlap with the forestland area cannot commence land clearing without formal release of their current land use status. Since 2001, the Ministry of Forestry has been highly reluctant to release forestland. The total area released between 2003 and 2006 was only 255,000 ha, all for (oil palm) plantation development (Indonesian Ministry of Forestry, 2006). However, the relevant regulations are widely ignored, bringing into question the legality of numerous oil palm plantations in Indonesia.

Tree plantations
Pulpwood plantations are also typically planted in monoculture systems for which the original vegetation is completely removed. Around three quarters of the tree plantation area licensed out in Indonesia is set to produce fibre for the pulp & paper industry, with the balance for wood working purposes. Pulpwood plantations are to a large extent, but not exclusively, developed in the vicinity of pulp & paper industries, such as in Riau, South Kalimantan and East Kalimantan.

As of November 2008, a total area of 9,807,417 ha had been licensed out or was in the process of being licensed out for tree plantation development, in 222 separate units. Following a new policy in 2007, the Ministry of Forestry had received requests for 179 tree plantation licenses with a total area of 10,889,055 ha per November 2008 (Indonesian Ministry of Forestry, 2008).

5.3 Production of selected commodities and deforestation

5.3.1 Palm oil

Exhibit 17 presents the deforestation which can be attributed to oil palm plantations, for the periods of 1990-1995, 1996-2000, 2001-2005 and recent years 2006, 2007 and 2008. The deforestation is calculated as follows. First, the planted area of palm oil plantations is given in column (a). The majority of palm oil plantations development comprises of conversion of natural forests (an estimated 2/3 or 67%), while the remaining part largely comprises clearing of community agroforestry systems and rubber plantations (estimated 30%). Altogether an estimated 97% of all palm oil development is due to forest conversion. The remaining estimated 3% would be palm oil plantations established at non-forested land.

[5] Menteri Kehutanan dan Perkebunan Republik Indonesia. Penghatian/penangguhan pelepasan kawasan hutan. Nor.603/Menhutbun-VIII/2000.

Exhibit 17: Area indications to compute deforestation attributed to palm oil (x 1,000 ha).

	Realized oil palm plantations Cumulative area	Increase	Realized at the expense of primary forests (67%)	Realized at the expense of agro-forestry and plantations (30%)	Total allocated oil palm concessions	Difference between (a) and (e), potentially cleared at expense of forests
	(a)	(b)	(c)	(d)	(e)	(f)
1990	1,127					
1995	2,025	898	593	270		
2000	4,158	2,133	1,429	640		
2005	5,600	1,442	964	433	10,000	4,400
2006	6,200	600	400	180		
2007	6,600	400	266	120	18,000	11,400
Total		**5,473**	**3,652**	**1,643**		
2008	7,100	500	335	150		

Source of primary data: Indonesian Ministry of Forestry (2007a); USDA (2007).

Indirect effects

As indicated in the above table, total land allocated to palm oil concessions is much more than planted area, amounting to 18-20 million ha currently. Column (f)) gives the difference between realised and allocated area, by comparing total land bank with planted area. This land may have been cleared, or logged, but this is largely unknown. Incomes from logging operations in allocated but not realised ('undeveloped') areas may have been used to finance the palm oil plantations. It is assumed that 100% of the non-realised palm oil plantation concessions will be selectively logged, so will lead to forest degradation. However, for the period of 2006 to 2007 we assume that 50% of the concession areas are logged, not 100%. Comparing the data of 2004 and 2008, about 5% of the land being allocated but not yet converted to palm oil is being converted to palm oil plantations annually. This should thus be added to the forest land being converted annually.

Agroforestry and rubber plantations being converted to palm oil plantations (estimated 30%) would need to be included as forest conversion according to the FAO definition of forest cover, but is not conversion of primary forests. However, land-use from these agricultural systems will be partly displaced and will lead to expansion of land-use in other forest areas. This is especially to be expected in areas where local landowners are displaced by immigrants who are 'imported' to palm oil plantations as labourers. We estimate that this indirect effect has contributed to displacement effects for 10% of the land being lost, contributing to forest conversion in other forest areas. This assumption is based on the fact that in the majority of palm oil expansion areas there is a predominance of migrant workers being employed on the plantations, so that local communities will need to find agricultural croplands in other forested areas. It must be underlined that this is a very rough assumption. On the other hand, the calculations (see below) will show that this displacement effect is low as compared to the other effects.

Overall effects

Thus, palm oil plantations have lead to deforestation and forest degradation in variable degrees, as follows:

- direct conversion of forest land (67% of the established plantations);

- forest conversion of remaining land concessions but not yet planted with oil palm (5% of remaining concessions);
- forest conversion due to displaced communities not employed in plantations (10% of agroforestry land being cleared);
- forest degradation on all remaining concession lands, due to selective logging (in order to finance palm oil plantation establishment), and due to fires which were started in order to clear land for palm oil plantations.

The following Exhibit 18 provides the computed data based on the above findings, as regards total deforestation and forest degradation due to palm oil.

Exhibit 18: Area of forest converted and forest degraded due to palm oil (x 1,000 ha).

	Direct conversion (= column (c) in Exhibit 17)	**Indirect conversion: converted but not yet planted (= 5% of column (f) in Exhibit 17)**	**Indirect conversion due to displacement effect (= 10% of column (d) in Exhibit 17)**	**Total converted (a-c) – per period**	**Forest degradation (= remaining area column (f) in Exhibit 17 not converted)**
	(a)	**(b)**	**(c)**	**(d)**	**(e)**
1990					
1995	593		27		
2000	1,429	113	64	2,226	
2005	964	113	44	1,121	4,180 (100%)
2006	400		18		
2007	266	545	12	1,241	5,415 (50%)
Total	**3,652**	**772**	**165**	**4,238**	
2008	335		15	350	

Source: Aidenvironment, 2009.

5.3.2 Pulp and other forest products

Increase of pulp and other forest plantations for the 1996-2000 period has been 216,000 ha newly planted tree plantations per year. For the 2001 – 2005 period this figure is 121,000 ha newly planted tree plantations per year (Indonesian Ministry of Forestry, 2009b). For the year 2006 the total increase is 232,000 ha. On average the planted area has increased by 174,000 annually between 1996 and 2006 (Indonesian Ministry of Forestry, 2009a). There are no data for 2007 but we assume a similar increase as in 2006, as there are no indications that a policy change has taken place with respect to pulp plantations and the promotion of pulp exports. On the contrary, requests for licenses for pulp plantations have soared in 2007 and 2008 (see above).

As of 2006, the total tree plantation area is 6,187,272 ha, of which 4,682,022 ha (76%) is pulpwood plantation. Note that the total is more than indicated below in column (a) because forest plantations started well before 1995. Especially during the 80's the government promoted the creation of large-scale industrial pulp plantations of fast-growing species, mainly acacia, pinus and gmelina to feed the pulp and paper industry.

Exhibit 19 presents the deforestation which can be attributed to pulp plantations. The deforestation is calculated as follows. First, the planted area of pulp plantations is given in column (a). Based on literature (see above) it is assumed that for pulp plantations 50% has been developed at the expense of original forests, while it is assumed that the remaining 50% was already cleared. The proportion of pulp plantations developed at the expense of original forest is lower than for palm oil plantations, as the latter currently tends to be the main driver of deforestation in Indonesia and pulp plantations are often established at locations with secondary forests or less high quality soils. Deforestation due to pulp plantations is listed in column (c). Column (d) gives total area allocated to pulp plantations. Column (e) gives the difference between realised and allocated. It is assumed that 100% of the non-realised pulp plantation concessions have at least been selectively logged, so are degraded. Sooner or later, these areas will be totally converted to pulp plantations. We do not have data to estimate which proportion of these concessions would already have been logged but not yet planted annually.

Thus, for pulp plantations a total of 1,469,000 ha of forest has been directly cleared, and is being planted with pulp trees, while another 2,090,000 ha of forest has probably been selectively logged, or partly cleared but not (yet) planted. Contrary to the case for palm oil plantations, we do not consider indirect effects, because we have no data or information about indirect impacts occurring in relation to pulp plantations. Moreover, the most serious effects are currently associated with expansion of palm oil plantations, and not with pulp plantations. Even if indirect effects would occur with pulp plantations, these are unlikely to affect intact forests but rather contribute to further forest degradation.

Exhibit 19: Area indications to compute deforestation attributed to pulp plantations (x 1,000 ha)

	Realized pulp plantations. Cumulative area	**Increase**	**Realized at the expense of forests (50%)**	**Total allocated to pulp concessions**	**Difference between (a) and (d), potentially cleared at expense of forests**
	(a)	**(b)**	**(c)**	**(d)**	**(e)**
1995	609	609	305		
2000	1,755	1,080	540		
2005	2,360	605	302	4,286	1,926
2006	2,592	232	161	4,682	2,090
2007	No data	Assumption: 232	161		
Total			**1,469**		**2,090**

Source: Primary data Indonesian Ministry of Forestry (2007a).

5.3.3 Logging and forest degradation

While palm oil can only be obtained from palm oil plantations, pulp and timber can be obtained from natural forests or forest plantations. A CIFOR study on the paper and pulp industry world-wide found that in Indonesia until 2000 only 10% of the total timber supply for the pulp and paper

sector originated from plantations. Recent data indicate that this proportion has increased to 30% from plantations. The remaining 70-90% of timber for the pulp and paper sector originates from non-sustainable forest management practices (Barr, 2001). For timber, the proportion derived from natural forests is even higher. In 2000 the total annual processing capacity of the Indonesian wood industry (pulp and timber) equalled 74 M m3 RWE, but the area for which a concession license had been provided equalled only 23 M m3 RWE. Thus, a gap of 51 M m3 RWE per year (almost 70%) was sourced illegally (UNEP, 2007). If we assume that the shortfall between official roundwood production and processed wood industry round wood consumption is sourced from illegal round wood, it is quite clear that processed wood industries consume huge quantities of illegal timber in their production process. In 2002, the amount of illegal round wood consumed by the timber industry was estimated at 42.3 M m3, later falling to 20.3 M m3 in 2005 (Indonesian Ministry of Forestry, 2007b).

To convert a certain quantity of round wood equivalents (RWE) to forest area exploited we need a conversion factor based on yield per hectare. Many studies have been conducted during the last three decades to determine yields per hectare in Indonesia. The results of the studies vary considerably, maximum clear-cutting yield is reported to be as high as 247 m3 RWE/ha in Kalimantan (Sist et al 1998), others refer to a maximum of 150 m3 RWE/ha for Indonesia as a whole (Schoening, 1978). Selective logging yields also vary considerably, for example 20 m3 RWE/ha (Schoening) to 40 m3 RWE/ha (Kuusipalo, 1997) and 67 m3/ha (Muladi, 1996). The studies refer to different regions which make comparison difficult: in Kalimantan commercial yields are a lot higher than in Sumatra, where most of the forest is already degraded. In addition all studies are several years old and make use of even older data, therefore the reported yields per hectare may be an over estimation of the current yields per hectare. For calculating purposes, a national average yield figure of 40 RWE m3 logs/ha will be used, representing the range from highly selective logging through to intensive logging associated with supply to the pulp and paper industry.

Timber or pulp sourced legally or illegally from natural forests is not only unsustainable as such, but in addition the exploitation method, is generally not sustainable either (i.e. leading to strong forest degradation). Several studies on Indonesian forest operations have indicated that timber-logging operations are extremely predatory (Schroeder-Wildberg and Carius, 2003; UNEP, 2007). As explained before, it is assumed that only when certified by the FSC, forest degradation through logging or sourcing for pulp is less strong and will not lead to irreversible forest degradation or ongoing forest conversion. Pulpwood or timber derived from clearing natural forests is intrinsically unsustainable, while pulpwood from plantation forestry is assumed here to have no further impact on forest degradation or loss, after the initial clearing. The use of palm oil fibre for paper and engineered wood products is not considered here.

In order to quantify the contribution of the timber and pulp industry to Indonesian deforestation and forest degradation we need to know the proportion of timber and pulp obtained from:
1. pulp and timber plantations, managed sustainable (FSC) or not managed sustainable;
2. clear cutting of plantation concessions: these are indicated in Exhibit 16 and 17;
3. legal selective logging in forest concessions;
4. illegal logging in natural forests.

Only from category (1) reliable information is available. Based on various assumptions and the above estimate of the proportion of pulp and timber illegally sourced, a best professional judgement would be that 10% of timber and pulp is obtained from forest plantations, 30% from other plantations, and the remaining 60% from selective (legal and illegal) logging in natural forests, and thus contributing to forest degradation.

5.4 Best practices

In 2006, 740,000 ha of Indonesian forest were certified for sustainable forest management (FSC, 2007). In 2008, certified forest area increased to 902.642 ha (FSC, 2008). As of early 2009, the total FSC certified forest area in Indonesia is 1,424,281 ha, among which 334,338 ha held by a pulp and paper company (FSC, 2009).

It is safe to assume that before 2000, the Netherlands did not import any FSC timber from Indonesia. After 2000 the volume was still marginal. Based on information of Dutch timber traders and FSC Netherlands, the estimated volume of FSC timber imported to the Netherlands from Indonesia in 2005 was 750 m3 RWE, increasing in 2006 to about 4,000 m3 RWE and 5,500 m3 RWE in 2007. The volumes are expected to increase in coming years.[6]

5.5 Export data and share by the Netherlands

Palm oil
Exhibit 19 lists the data on crude palm oil (CPO) production in Indonesia and Dutch CPO imports from Indonesia. It can be calculated that the proportion of Dutch imports from total Indonesian palm oil production has declined from 5.4% in 1996–2000 to 4.8% in the next period and 4.2% in recent years (2006-2007). However, this is only because over the years the increase in absolute production has been greater than the import from Indonesia in the Netherlands. The relative decline is due to the strong Indonesian palm oil production increase in order to serve other producer markets (India, China). Note that over the first half of 2008 the Dutch imports from Indonesia were 506,600 Mt, which implies an increase of about 40% compared to the first half year of 2007 (Sihombing, 2009). This suggests a substantial recent increase, which might be attributed to the biofuels production.

Exhibit 19: Average annual crude palm oil production in Indonesia (x 1,000 Mt) and Dutch imports from Indonesia.

	1996 – 2000	2001 – 2005	Trend (%) 1996-2005	2006 - 2007	Trend (%) 2005-2007
Indonesian CPO production	5,810,519	10,765,000	+ 85%	18,204,000	+ 83%
Dutch CPO imports from Indonesia	315,700	513,260	+ 63%	750,000	+ 46%
Proportion Dutch CPO imports	5.4%	4.8%		4.2%	

Source: Mielke (2008).

Pulp
Exhibit 20 gives data on Dutch pulp imports from Indonesia, in metric tons. The proportion of Dutch imports from total Indonesian pulp production was very limited: 0.61% in the period of 1996– 2000, and 0.29% in the period of 2001–2005, but has increased in recent years to around 1%.

[6] Personal communication with FSC Netherlands. June 2007

Exhibit 20: Average annual pulp production in Indonesia and Dutch pulp imports (x 1,000 Mt).

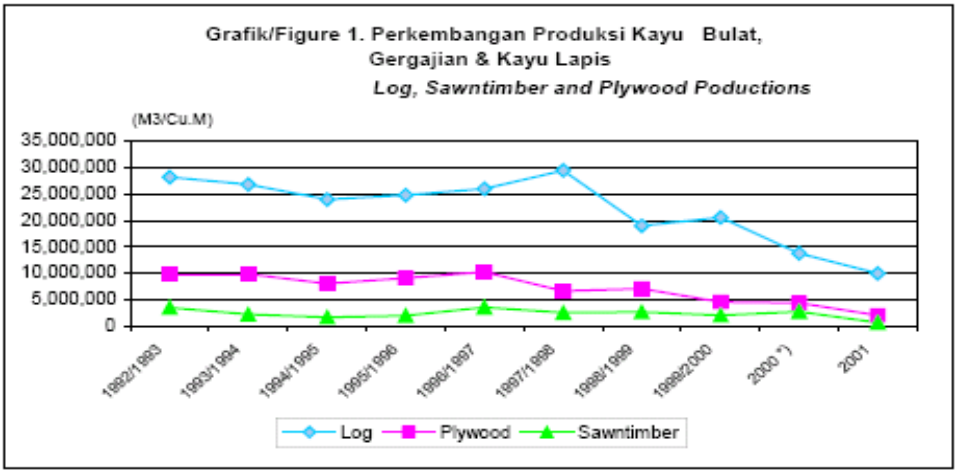
	1996 – 2000	2001 – 2005	2006	2007
Average annual pulp production Indonesia	2,577,200	5,587,000	3,577,000	5,177,000
Average annual Dutch pulp import from Indonesia	15,691	16,102	40,123	49,085
Proportion of Dutch imports	0.61%	0.29%	1.12%	0.95%
			Average for 2006-2007: 1.05%	

Source: Production data: FAOstat. Import data: Eurostat.

Timber

Available data of timber production in Indonesia show that production has shown a gradual decline in the 1990s (Exhibit 21). Exhibit 22 gives an estimate of average annual timber production in Indonesia for three periods.

Exhibit 21: Trend of Indonesian timber production (logs, sawn timber and plywood)



Source: Statistik Kehutanan Indonesia (2001).

Exhibit 22 also lists the data on total Dutch timber imports (logs, sawn wood, plywood, veneer) from Indonesia, in m3 Round Wood Equivalent (RWE). The data for 2001 – 2005 are corrected for the average annual import of 750 m3 RWE FSC timber, as this quantity will not contribute to forest degradation or deforestation. It can be observed that the proportion of Dutch imports from total Indonesian timber production is very limited, varying from 0.23% (1996–2000) to 0.74% (2001–2005) and 0.50% (2006-2007). However, it must be stated that a considerable amount of Indonesian timber is being imported to the Netherlands through other countries, such as Belgium, Singapore, China and Malaysia and is not accounted for in this study.

Exhibit 22: Indonesian timber production and Dutch timber imports from Indonesia (including (logs, sawn wood, plywood, veneer (x 1,000 m^3).

	1996 – 2000 Total	1996 – 2000 Annual average	2001 – 2005 Total	2001 – 2005 Annual average	2006 / 2007	2006 – 2007 Annual average
Average annual timber production Indonesia		~ 40,000		36,000	33,398 40,429	36,914
Dutch timber imports from Indonesia	906	181	1,113	222	220 162	190
FSC timber imports				2005: 1.8	2,2 3.1	2.6 (-/-)
Proportion of Dutch imports		0.23%		0.74%		0.50%

Source: Indonesian timber production data are based on Indonesian statistics for 1998 (period 1996-2000) and for 2001 (period 2001-2005). Data from 2003 to 2005 are based on ITTO (2005a). For the period of 2006 and 2007 statistics are based on FAOstat. Unfortunately, these statistics do not always totally match.

Dutch timber data are based on Eurostat.

For conversion from m3 to tons, the round off FAO factors weigh- to-volume have been used: wood in chips (1.5 m3/t), wood in the rough (1.6 m3/t), veneers/plywood (1.4 m3/t).

For conversion from m3 to m3 RWE, conversion factor based on FAO and the Forestry Commission (UK) were used, varying from 1 (wood in the rough) to 1.8 (roundwood), 1.9 (veneer) and 2.3 (plywood).

As indicated above, we will assume that of Dutch timber imports 60% is obtained by selective logging, while the remaining part is largely obtained from plantations (which are largely established by forest conversion). A small part is obtained as FSC timber from sustainable managed forests, as indicated in above Exhibit 22.

5.6 Results and conclusions

Introduction

The available data and calculations that were made can now be used to estimate the contribution by timber, pulp and palm oil to deforestation and forest degradation in Indonesia, and the proportion taken by imports in the Netherlands.

The 29 million ha of deforestation that Indonesia has experienced between 1991 and 2005 is based on an annual rate of forest loss of almost 2 million ha. There are no new data for 2006 and 2007, although some statistics suggest a strong increase. By lack of other data, we therefore assume that the deforestation rate has not changed. In addition, there are vast areas of forest degradation, of which less reliable data are available.

The majority of forest loss can be attributed to three main economic drivers: timber, pulp and palm oil production. Since these three economic drivers are closely interlinked in time and/or in space, it is difficult to indicate exactly the proportion of each of these drivers to deforestation. Also, the processes of forest degradation and deforestation are closely interlinked, as selectively logged forest is in most cases gradually being converted. However, it can be safely stated that palm oil and pulp plantation development has triggered deforestation and has allowed the timber processing

industry to survive the rapidly declining supply of roundwood from selective logging operations. Timber production has continued in spite of regulations to manage forest concessions.

Palm oil
For palm oil the direct contribution to deforestation in Indonesia is presented in Exhibit 17. The Dutch contribution can be calculated as indicated in Exhibit 23.

Exhibit 23: Dutch contribution to deforestation in Indonesia associated with palm oil

Period	Proportion Dutch palm oil imports (%)	Deforestation due to palm oil in period (ha)	Dutch contribution	
			In period (ha)	Annual rate (ha)
1996 – 2000	5.4	2,226,000	120,204	24,040
2001 – 2005	4.8	1,121,000	53,808	10,762
2006 - 2007	4.2	1,241,000	52,122	26,061

Source: Aidenvironment, 2009.

This calculation also includes the indirect effects, mainly due to conversion of forest in concession areas but not yet planted with palm oil, and displacement effects where palm oil plantations were established on agricultural lands or lands otherwise used by local communities. The results confirm the indications that deforestation for palm oil production has been strongest in the 1996 – 2000 period when the initial palm oil boom took place, illegal logging was rampant and also forest fires were very most widespread and severe. The Dutch imports have contributed to this increase in deforestation leading to a high Dutch annual contribution. Subsequently the impact on deforestation has become less in the 2001-2005 period, but after that has taken off again in 2006-2007, leading to the highest annual Dutch contribution in the three periods. Recent statistical data from Eurostat indicate that Dutch palm oil imports in 2008 have almost doubled as compared to 2007.

The Dutch contribution to forest degradation is indicated in Exhibit 24.

Exhibit 24: Dutch contribution to forest degradation in Indonesia associated with palm oil

Period	Proportion Dutch palm oil imports (%)	Forest degradation due to palm oil in period (ha)	Dutch contribution	
			In period (ha)	Annual rate (ha)
1996 – 2005	5.1	4,180,000	213,180	21,318
2006 - 2007	4.2	5,415,000	227,430	113,715

Source: Aidenvironment, 2009.

Forest degradation is due to effects of selective logging in palm oil concession areas which have not yet been converted. Sooner or later these areas will also be converted to palm oil plantations as the concessions have been assigned. The very rapid increase in palm oil concessions since 2005 has contributed to the rapid contribution to forest degradation.

Pulp
For pulp we assume that 10% of Dutch pulp is obtained from pulp plantations (established on areas converted), 30% is obtained from areas which have been cleared for plantations (and thus is

ignored in this calculation to avoid double-counting) and 60% of the pulp is obtained by logging from natural forests (see section 5.3). For pulp, we therefore distinguish between the contribution to deforestation and to forest degradation.

The Dutch contribution to deforestation can be calculated as indicated in Exhibit 25.

Exhibit 25: Dutch contribution to deforestation in Indonesia associated with pulp

Period	Proportion deforested	Proportion Dutch pulp imports (%)	Deforestation due to pulp plantations (ha)	Dutch contribution	
				In period (ha)	Annual rate (ha)
1996 – 2000	10%	0.61	540,000	329	66
2001 – 2005	10%	0.29	302,000	88	17
2006 - 2007	10%	1.05	322,000	338	169

Source: Aidenvironment, 2009.

The Dutch contribution to forest degradation can be calculated as indicated in Exhibit 26, assuming an average national yield figure of 40 RWE m3 logs/ha.

Exhibit 26: Dutch contribution to forest degradation in Indonesia associated with pulp

Period	Proportion logging	Total Dutch pulp imports (RWE m3)	Yield rate per ha	Dutch contribution	
				In period (ha)	Annual rate (ha)
1996 – 2000	60%	78,455	40	1,176	235
2001 – 2005	60%	80,510	40	1,207	242
2006 - 2007	60%	89,208	40	1,338	669

Source: Aidenvironment, 2009.

It can be observed that the annual contribution to deforestation is very limited, largely because (i) most pulp is acquired from natural forests, and (ii) the proportion of Dutch imports is very low. The contribution to forest degradation is a bit higher, and has more than doubled in recent years due to the strong increase of Dutch imports.

Timber

For timber the Dutch contribution to deforestation and forest degradation is determined by assuming, as explained above, that 40% of timber is obtained from logging of areas assigned as palm oil and pulp and timber plantations. These plantations have been partly established at the expense of original forest. This contribution to deforestation is ignored as it has been included in the calculation of the contribution to deforestation by palm oil and pulp plantations.

It is assumed that in total 60% of timber is obtained by selective logging of natural forests, at a yield conversion rate of 40 m3 RWE per ha. The Dutch contribution to forest degradation can be calculated as follows, assuming an average national yield figure of 40 RWE m3 logs/ha. The share of FSC certified timber, of which the production does not contribute to further forest degradation, has been subtracted but is still very limited (Exhibit 27).

Exhibit 27: Dutch contribution to deforestation and forest degradation in Indonesia associated with timber

Period	Proportion logging	Total Dutch timber imports (x 1,000 m3)	Yield rate (m3 RWE) per ha	Dutch contribution	
				In period (ha)	Annual rate (ha)
1996 – 2000	60%	906	40	24,462	4,892
2001 – 2005	60%	1,112	40	30,024	6,005
2006 - 2007	60%	382	40	10,314	5,157

Source: Aidenvironment, 2009.

Conclusions

Exhibit 28 shows that in the period 1996–2000 Dutch economic activities contributed annually to about 24,000 ha of deforestation in Indonesia, compared to an annual contribution of about 11,000 ha in the period 2001–2005. The decline took place because the increase of palm oil and pulp plantations has been less in this second period (Exhibit 18). However, in the recent years of 2006-2007 the contribution to deforestation has much increased, mainly because of a strong increase in palm oil land concessions being allocated and converted in recent years. In 2008 it appears that palm oil imports to the Netherlands have strongly increased. These data include estimates of indirect effects associated with palm oil plantations, but not of pulp plantations. Note also that most areas handed out as palm oil and pulp plantation areas will sooner or later be deforested as the forest frontier moves forward and conversion of degraded forests proceeds (see section 2). As part of the indirect effects, we estimated that annually 5% of concession areas not yet planted with palm oil have been deforested, and 10% of converted agroforestry areas lead to displacement effects in other forestlands. Note that these additional effects are rough estimates with a certain level of uncertainty.

Exhibit 28: Dutch contribution to deforestation in Indonesia 1996 – 2007 (ha).

Period	Total deforestation associated with palm oil	Total deforestation associated with pulp	Total deforestation due to Dutch imports	Annual average
1996-2000	120,204	329	120,533	24,107
2001-2005	53,808	88	53,896	10,780
2006-2007	52,122	338	52,460	26,230
Total	**226,134**	**755**	**226,889**	**18,907**

Source: Aidenvironment, 2009.

Exhibit 29 shows the Dutch contribution to forest degradation. The total figure is less certain due to various assumptions and difficult to determine because of the risk of double counting. The Dutch contribution to forest degradation is at least what has been contributed by the logging industry (timber and pulp). We cannot add the contribution by the palm oil sector because this would involve double-counting.

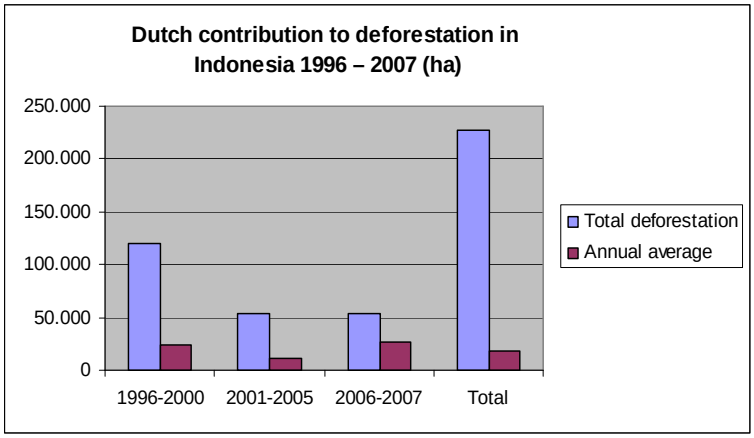
Exhibit 29: Dutch contribution to forest degradation in Indonesia 1996 – 2007 (ha).

Period	Total forest degradation associated with palm oil	Total forest degradation associated with pulp	Total forest degradation associated with timber	Total forest degradation due to Dutch imports (column b+c)	Annual average
	(a)	b)	(c)	(column b+c)	Annual average
1996-2000		1,176	24,462	25,638	5,128
2001-2005	213,180	1,207	30,024	31,231	6,246
2006-2007	227,430	1,338	10,314	11,652	5,826
Total	**430,610**	**3,721**	**64,800**	**68,521**	**5,710**

Source: Aidenvironment, 2009.

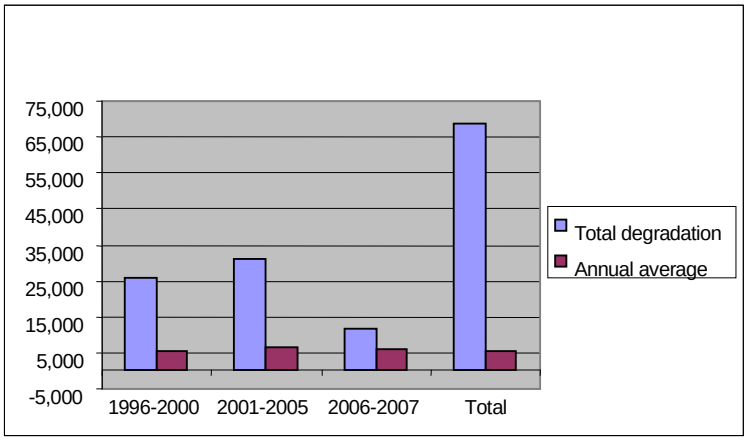
Exhibit 30 and 31 present total deforestation and forest degradation due to Dutch imports in the study period. Note that the periods vary in length (2006-2007 being a shorter period). Therefore the annual averages are included as well and are more indicative than the total values.

Exhibit 30: Dutch contribution to deforestation in Indonesia 1996 – 2007.



Source: Aidenvironment, 2009.

Exhibit 31: Dutch contribution to forest degradation in Indonesia 1996 – 2007.



Source: Aidenvironment, 2009.

Uncertainties

The main uncertainties in the above calculations are twofold:

- Firstly, these are the estimated indirect effects on deforestation by palm oil and pulp expansion. For palm oil plantations, assumptions have been made on these indirect effects. For pulp plantations we consider the indirect effects as less important. We estimate the variation due to these assumptions at +/- 20%..
- Secondly, there are uncertainties with respect to forest degradation due to timber exploitation, associated with variable cutting / yield rates and double counting with timber derived from palm oil concession areas being cleared. Since exports to the Netherlands are mainly valuable timber species, it is likely that timber is mainly derived from primary forest areas, and not secondary areas already logged for palm oil concession areas. We estimate the variation due to these assumptions at +/- 30%..

6. Country study 2: Malaysia

6.1 Trends in deforestation and forest degradation

Deforestation
Malaysia's deforestation rate was 396,000 ha per year in the 1980s, a rate of forest loss of 2% annually. Over the 1990-2000 period FAO reported an annual rate of deforestation in Malaysia of 238,000 ha (FAO, 2000). However, in its FRA 2005, FAO reported an annual forest cover change in Malaysia of (only) 78,000 ha over the period 1995-2000, increasing to 140,000 ha annually over the period of 2000-2005 (FAO, 2000; FAO, 2005a; Exhibit 32). According to FAO (2005a), the area of primary forest in Malaysia remained unchanged, but the extent of semi-natural forest declined and so did the area of productive plantations. For the years 2006 to 2007 there are no new data available on deforestation or forest degradation.

The expansion of oil palm and tree plantations is by far the main cause of natural forest loss in Malaysia. Forest loss has been especially significant in Sabah and Sarawak where oil palm plantations, representing the primary drivers of deforestation, have been expanding particularly rapidly.

The decline in Malaysia's forest cover also includes the conversion of rubber estates into oil palm plantations because FAO classifies rubber plantations as planted forests since 1999. It is estimated that approximately 708,500 ha, or 65% of total deforestation in Malaysia between 1995 and 2005 comprised natural forest loss. The Malaysian government and industry have argued that oil palm plantations are also planted forests, but this view has not been accepted by FAO.

Exhibit 32: Deforestation in Malaysia 1995 – 2007.

Period	Total deforestation	Annual deforestation
1995-2000	390,000	78,000
2001-2005	700,000	140,000
1995-2005	1,090,000	109,000
2006-2007	No new data	Estimate based on palm oil expansion: 100,000

Source: FAO (2000); FAO (2005a).

As of 2005, the rubber estate area has now been reduced to an economic minimum. The 9th Malaysia Plan states that the rubber estate area will decline with only 77,000 ha in 2005-2010, whereas oil palm will expand with 506,000 ha. Considering that there are no plans for major land use changes for other commodity crops, the implication is that oil palm expansion will primarily depend on natural forest conversion in 2005-2010 (429,000 ha). The expected total deforestation figure resulting from palm oil expansion for 2005-2010 would thus be around 500,000 ha, or 100,000 ha per year, assuming that there are also some other processes which will contribute to deforestation. This estimate has been included in Exhibit 32.

Forest degradation
According to FAO (2005a) the area of primary forest in Malaysia remained unchanged in 1990-2005. This assessment is considered unreliable. According to FRA 1990 (FAO, 1993), Malaysia's logging

rates in the 1980s were as high as 455,000 ha per year, of which 84.7% took place in "newly logged forest". The proportion of timber obtained from Permanent Forest Reserves (PFR) – these are secondary forests used for logging - in the early 1990's was estimated at 40% and is assumed to have gradually increased from 35% in 1995 to 45% in 2005. Thus, the proportion of timber derived from State Forests (primary forests) has declined over the same period from 65% to 55%. The total logged area in the 1995-2005 period was about 2.4 million ha, of which the proportion of selective logging from primary forest and leading to forest degradation can be determined.

For 2006-2007, we assume that the proportion of timber derived from state forests has not changed since 2005. We also assume that forest degradation has certainly not declined, which is based on the fact that timber production appears to have increased from 2005 to 2006 (see Exhibit 33).

Exhibit 33: Logging / forest degradation in Malaysia 1995 – 2007 (in hectares).

Period	Total area logged	Annual rate of logging	Proportion logging in primary forest	Annual rate of logging in primary forest
1995-2000	1,050,990	210,198	65%	136,629
2001-2005	1,360,000	272,000	55%	149,600
1995-2005	2,410,990	241,099	60%	143,146
2006-2007				At least 150,000

Source: MTC (2002); FAO (1993).

Because Southeast Asia's forests contain relatively many commercial species, selective logging in Malaysia has been relatively intense. In the 1980s, each hectare yielded on average 75 m3 (compared to 40 m3/annum for the tropics overall). In the late 1990s, the average yield per hectare, according to the 8th Malaysia Plan was to be reduced to 55 m3 ha/yr.

6.2 Drivers behind deforestation and forest degradation

According to the FAO, in Malaysia in 2005 a total of 11,824,000 ha of forest are under selective harvesting management (FAO, 2005a). In theory, these forests would supply a sustainable yield of commercial timber species. However, the permitted harvestable volume per hectare combined with the rotation cycle has been criticized for not being sustainable (Appenah, 1999). Apart from the structural forest degradation caused by the forestry policy, Malaysia's forests are degraded as a result of poor logging practices, such as early re-logging and over-harvesting. Reduced Impact Logging (RIL) techniques are still not widely applied in Malaysia, and this contributes to considerable damage to soils and the residual stand, especially because most logging is confined to sloping to steep lands ("hill forests"). Studies reported that logging damage in Sabah is as high as 60-80% of the forest area being damaged by timber extraction (Richard, 1999). Once forests have been selectively logged out, their value as a future source of commercial timber is seriously reduced. The accessible sites are subsequently released for conversion into oil palm plantations, even when these sites could be part of the Permanent Forest Estate.

The timber industry does not rely on selective logging as a source of logs only; land clearings are another important source. Generally speaking, high value timbers taken from primary forest logging are exported to markets where technical specifications are important (e.g. the Netherlands/EU), while timbers from mixed species derived from land clearing are locally used or exported to markets with fewer technical requirements (e.g. Thailand).

In the first half of the 20th century, the expansion of rubber and cacao plantations was the main driver of deforestation in Malaysia but in the past 15-20 years, most deforestation in Malaysia is attributed to oil palm. Oil palm plantation expansion first took off in Peninsular Malaysia and Sabah, and at present most expansion takes place in Sarawak.

Tree plantations (for pulpwood or sawn timber) are another major driver behind the conversion of logged over natural forests in Sabah and Sarawak, and to some extent in Peninsula Malaysia.

Shifting cultivation is not a serious threat to forest cover in Malaysia, although in some areas it is still practiced (Sabah, Sarawak). Shifting cultivation in primary forests has not been a cause of forest loss for a long time now (Hong, 1987). In Peninsula Malaysia, the construction of new four lane highways has been another significant cause of forest degradation and deforestation, because these roads cross hilly terrain where land slide prevention measures result in significant additional (indirect) deforestation. New highways also enhance accessibility to loggers and, in lower laying areas, stimulate the establishment of plantations.

Exhibit 34: Plantations in Malaysia

Source: Aidenvironment, 2009.

In addition to legally endorsed logging, Malaysia's forests have been subject to illegal logging. In the period of 1996-2001 almost 700 offences were recorded in Peninsular Malaysia alone (Forestry Department, 2001). In addition, Malaysia has been a major importer of illegal Indonesian timber, especially in the period 1999-2003. According to a conservative estimate made for the World Bank – WWF Alliance, Sarawak ports received 250,000-500,000 m3 of undocumented timber supplies from Kalimantan yearly. Since then effective measures have been taken to reduce the extent of illegal

logging.[7] Moreover, there are also no new data available. We assume therefore that illegal logging has substantially reduced in recent years.

6.3 Production of selected commodities and deforestation

6.3.1 Palm oil and deforestation

Expansion of oil palm plantations is at present the main driver causing deforestation in Malaysia. Exhibit 35 provides an overview of the available data on oil palm expansion between 1980 and 2004. It can be observed that oil palm expansion has been continuous, but most intensive between 1995 and 2000. Oil palm plantation area has increased by more than 50% between 1995 and 2004 in terms of area planted. It can be observed that the increase has been far greatest in Sarawak (329% over this period) and Sabah (125% over this period), as compared to minor expansion in Malaysia mainland states. The largest oil palm growing states are now Sabah, Johor, Pahang and Sarawak accounting for 76% of the total planted area.

Exhibit 35: Relative importance of oil palm production areas in oil palm producing Malaysian states 1980-2004.
In ha, sorted by size in 2004.

	1980	1990	1995	2000	2004	Trend 95/04	Share 2004
Sabah	90,000	276,171	518,133	1,000,777	1,165,412	+ 125%	30%
Johor	288,883	532,866	587,686	634,716	666,368	+ 13%	17%
Pahang	276,464	439,663	498,417	514,710	578,848	+ 16%	15%
Sarawak	24,000	54,795	118,783	330,387	508,309	+ 329%	13%
Perak	122,610	236,385	265,427	303,533	302,938	+ 14%	8%
Terengganu	67,589	122,781	140,060	145,767	161,465	+ 15%	4%
Selangor	100,975	149,489	148,242	135,467	127,388	- 14%	3%
Negeri Sembilan	49,337	86,532	103,887	123,343	141,145	+ 36%	4%
Kelantan	18,238	60,490	70,834	72,065	87,644	+ 24%	2%
Kedah	11,211	29,296	37,166	57,375	72,321	+ 95%	2%
Malacca	12,184	26,856	36,278	43,859	49,586	+ 37%	1%
P. Pinang	8,116	14,149	15,174	14,665	13,868	- 9%	0%
Malaysia	**1,069,507**	**2,029,464**	**2,540,087**	**3,376,664**	**3,875,327**	**+ 53%**	**100%**

Source: Different official sources, summarized and analyzed in Kessler et al., 2007.

The expansion has continued in 2006 and 2007, especially in the states of Sabah and Sarawak (see Exhibit 36).

[7] Eric Wakker, personal comments.

Exhibit 36: Relative importance of oil palm in major production areas in Malaysia 2005-2008.
In ha, sorted by size in 2004.

	2005	2006 *	2007 *	Increase 2005-2007	Share 2007	2008 **	Increase 2007-2008
Sabah	1,209,368	1,239,497	1,278,244	68,876 (6%)	30%	1,330,000	4%
Sarawak	543,398	591,471	664,612	121,214(23%)	15%	711,135	7%
Peninsular Malaysia	2,298,608	2,334,247	2,362,057	63,449 (3%)	55%	2,438,865	3%
Malaysia	***4,051,374***	***4,165,215***	***4,304,913***	**253,539 (6%)**		***4,480,000***	***4%***

*Source: * MPOB (2007) ; ** MPOB (2008).*

The following Exhibit 37 summarizes the total area increase over 2 periods, including a projection for the last 5 years. When a distinction is made between forest cover of natural forest and rubber plantations, it shows a decline of primary forest of about 913,000 ha over 1990-2005. It shows that the increase in palm oil plantations in the period of 1990-2005 can be explained for 55% by the decline of rubber, cocoa and coconut plantations. The remaining 45% exactly corresponds to the area of new land opened up and decline of forest cover. Thus, all deforestation of primary forest can be explained by the increase of palm oil. No further decline of rubber, cocoa and coconut plantations is expected.

Exhibit 37: Changes in land-use including oil palm over 1990 – 2005 and projections 2010 (in 1,000 ha).

Year / period	1990	2005	Change 1990-2005	2010	Change 2005-2010
Oil palm	1,980	4,050	+ 2,070	4,555	+ 506
Rubber	1,823	1,250		1,179	
Cocoa and coconut	731	163		177	
Rubber, cocoa and coconut	2,554	1,413	- 1,141	1,416	+3
New land opened up	4,534	5,463	+ 929		
Natural forest cover, excl. rubber plantations	20,553	19,640	- 913		

Source: FoE (2008).

Almost all new land development in Malaysia over the 2005-2010 period, primarily for oil palm, will thus depend on the conversion of natural forest, and possibly Native Customary Rights land where a variety of crops are grown that remain unrecorded in the agricultural statistics presented in the 9th Malaysia Plan. Based on the projection made over the 2005-2010 period, deforestation due to palm oil expansion in the period of 2006-2007 can be calculated at 253,542 ha. This number corresponds to the area increase of palm oil plantations (253,539 ha, see Exhibit 36).

For oil palm in Malaysia we do not consider indirect effects, in contrast to the case of Indonesia. There are two main reasons to do so. First is the fact that palm oil concessions in Malaysia appear to be planted rapidly and thus there are no or few concession areas being cleared but not planted. Secondly, displacement effects are less likely because illegal land-use expansion by local communities is not likely to occur in Malaysia.

Timber exploitation
Timber can be obtained from tree plantations or from natural forest. Up to 2003, only 263,000 ha of tree plantations were established in Malaysia, but tree plantation development has more recently expanded more rapidly. However, tree plantations are also a major cause of deforestation because they are largely established at the expense of natural forests. Permits have been issued for tree plantation projects throughout Malaysia (but foremost in Sarawak) with a total gross area of at least 4.3 million ha. When tree plantations are established to produce sawnwood, their impact could be attributed to timber trade, but a significant part of plantations (to be) established in Malaysia will ultimately supply the local or regional pulp and paper industry.

Timber obtained from natural forests leads to forest degradation. To calculate the forest area that is degraded due to logging, we need to know the share of logs derived from selective logging operations vis a vis the share of logs from land clearing. Based on maximum prescribed yields per hectare in Peninsular Malaysia, we assume that yield per ha of valuable timber species has been 60 m3 RWE per ha. However, there are reasons to assume that yield per ha has declined in recent years to 55 m3 RWE per ha, as timber is increasingly obtained from hill forests which have a lower density of valuable tree species. Based on Malaysian timber production data (Forest Department Malaysia, various years) and above assumptions, we can calculate the proportion of timber originating from primary forest (Exhibit 38). The data show an initial increase but a recent decline.

Exhibit 38: Malaysia timber production, proportion from primary forest.

	1996 – 2000	2001 – 2005	2006 - 2007
Total area logged, see Exhibit 32 (x 1,000 ha)	1,050	1,360	
Annual rate of logging (x 1,000 ha)	210	272	
Annual area of primary forest affected by logging, see table 2 (x 1,000 ha)	137	150	150 *
Timber yield from primary forest (x 1,000 m m3)	15,000	16,000	15,000 *
Average annual timber production Malaysia (x 1,000 m3)	~ 54,000	34,273**	36,000 ***
Proportion obtained from primary forest (%)	27%	45%	42%

Source: Aidenvironment, 2009

** Estimates based on projections*

*** ITTO (2005a)*

**** FAOstat data*

For conversion from m3 to tons, the round off FAO factors weigh- to-volume have been used: wood in chips (1.5 m3/t), wood in the rough (1.6 m3/t), veneers/plywood (1.4 m3/t).

For conversion from m3 to m3 RWE, conversion factor based on FAO and the Forestry Commission (UK) were used, varying from 1 (wood in the rough) to 1.8 (roundwood), 1.9 (veneer) and 2.3 (plywood).

6.4 Best practices

The amount of FSC timber from Malaysia has so far been negligible.

6.5 Export data and share by the Netherlands

Palm oil
Exhibit 39 lists the data on crude palm oil (CPO) production in Malaysia and Dutch CPO imports from Malaysia, as annual production data averaged for 5-year periods. It appears that the proportion of Dutch CPO imports from total Malaysian production increased from 3% in the period of 1996-2000 to 5% in the period of 2001-2005 (Exhibit 39), and further increased to 6% in 2006/2007. The increase of Dutch imports significantly exceeds the increase of Malaysian palm oil production. Not all palm oil exported by Malaysia necessarily originates from Malaysian soil as Indonesia exports CPO to Malaysia which is then re-exported to third countries. This trade cannot be taken into account in this study due to lack of data. There is no risk of double counting as forest impacts attributed to Malaysia would then need to be attributed to Indonesia.

Exhibit 39: Average annual cycle crude palm oil (CPO) in Malaysia (x 1,000 Mt) per period.

	1996-2000	2001-2005	Trend (%) 1996-2005	2006-2007	Trend (%) 2007-2005
Malaysian CPO production	9,430	13,200	40%	16,500	25%
Dutch CPO imports from Malaysia	251	631	151%	1,027	63%
Proportion Dutch CPO imports	3%	5%		6%	

Source: Mielke, 2008; FAOstat, Eurostat.

Timber
The Netherlands is a significant import country for tropical sawn wood from Peninsular Malaysia and to a lesser extent Sabah. Sarawak is not a significant direct exporter to the Netherlands. Malaysian annual timber exports to the Netherlands ranged from 350,000 – 480,000 m3 RWE in the period 1995-2008 (see Exhibit 40).

In the late 1990s and early 2000s, a major share of Malaysian timber exports was believed to be derived from (illegal) Indonesian imports. Based on estimates from various sources, as much as 69% of Malaysian red meranti exports to the Netherlands in 1999 may in fact have originated from Indonesian forests, mostly from illegal logging or trading operations (Fraanje, 2001). This trade is not taken into account in this analysis, as the data are neither verified nor available for different periods. As stated above, in recent years the amount of illegal timber trade has substantially reduced due to more strict control measures that have been taken.

Comparing Malaysian timber production (Exhibit 40) with Dutch timber imports from Malaysia (Exhibit 39), we estimate that the proportion of Dutch timber imports from Malaysian timber production was 0.3% in the period of 1996-2000, and 0.4% in the period of 2001-2005, and has recently increased to 0.7%..

Exhibit 40: Malaysia timber production and Dutch timber imports from Malaysia (including logs, sawn wood, plywood, veneer)

	1996 – 2000 Annual average	2001 – 2005 Annual average	2006-2007 Annual average
Malaysian timber production (x 1,000 m3)	~ 54,000	34,273	36,000
Dutch timber imports from Malaysia (x 1,000 m3)	145	147	223
Dutch proportion of timber production	0.3%	0.4%	0.7%

Source: Data from FAOSTAT and Eurostat.

For conversion from m3 to tons, the round off FAO factors weigh- to-volume have been used: wood in chips (1.5 m3/t), wood in the rough (1.6 m3/t), veneers/plywood (1.4 m3/t).

For conversion from m3 to m3 RWE, conversion factor based on FAO and the Forestry Commission (UK) were used, varying from 1 (wood in the rough) to 1.8 (roundwood), 1.9 (veneer) and 2.3 (plywood).

6.6 Results and conclusions

Introduction

The available data and calculations that were made can now be used to estimate the contribution by palm oil to deforestation and timber production to forest degradation in Malaysia, and the proportion taken by imports in the Netherlands.

Of the 1.1 million ha of deforestation that Malaysia has experienced between 1995 and 2005, an estimated 70% can be attributed to the economic driver of palm oil production. However, this includes the transition of rubber plantations. New insights (Exhibit 37) suggest that all loss of primary forest can be attributed to increase of palm oil plantations. A small remaining proportion may be attributed to pulp plantations, infrastructure and urban development, which will not be investigated as the Netherlands has no share in these developments.

There are indications that deforestation has been strongest in the period of 1996-2000 when the initial palm oil boom took place.

There is not a trade in plantation-based wood products with the Netherlands, nor a significant trade in pulp and paper products. Hence, up to date, the Dutch contribution to deforestation for tree plantation expansion is so far not significant.

Palm oil

For palm oil the direct contribution to deforestation in Malaysia is presented in Exhibit 37. The Dutch contribution can be calculated as indicated in Exhibit 41.

Exhibit 41: Dutch contribution to deforestation in Malaysia associated with palm oil

Period	Proportion Dutch palm oil imports (%)	Deforestation due to palm oil in period (ha)	Dutch contribution	
			In period (ha)	Annual rate (ha)
1996 – 2000	3%	440,000	13,200	2,640
2001 – 2005	5%	320,000	16,000	3,200
2006 - 2007	6%	253,542	15,212	7,606

Source: Aidenvironment, 2009.

The strongly increased contribution for the last two years can be attributed to two main factors:

- continuous expansion of palm oil plantations in Malaysia, but in recent years entirely at the expense of primary forest;
- increase of Dutch imports.

As mentioned above, for oil palm in Malaysia we do not consider indirect effects. In addition, we do not have any data or information to make estimates about indirect effects.

Timber

For timber the Dutch contribution to deforestation and forest degradation can be determined in two different ways.

The first one is by calculating the proportion of timber that is obtained by selective logging from primary forest, and thus the proportion of area of primary forest being affected. This proportion has changed over the years (Exhibit 38). The Dutch contribution can be calculated as indicated in Exhibit 42.

Exhibit 42: Dutch contribution to deforestation and forest degradation in Malaysia associated with palm oil (approach 1)

Period	Proportion selective logging	Forest affected by logging annually (ha)	Proportion Dutch timber imports	Dutch contribution	
				In period (ha)	Annual rate (ha)
1996 – 2000	27%	137,000	0.3%	2,055	411
2001 – 2005	45%	150,000	0.4%	3,000	600
2006 - 2007	42%	150,000	0.7%	2,100	1,050
1996 - 2007				7,155	

Source: Aidenvironment, 2009

The resulting Dutch contribution to forest degradation through timber imports is estimated at almost 7,155 ha in the 12 year period of 1996-2007, and has shown an increase over the years. The total is not very much due to the low proportion of Dutch timber imports from Malaysia. However, the area of degraded forest is expected to be considerably higher for two main reasons. Firstly, we can take into account that valuable timber is increasingly obtained from hill forests which have lower timber yields per hectare. Secondly, we assumed that the share of timber from permanent forest plantations increased from 35% in 1996 to 45% in 2005 and recent years. However, the timber imported to the Netherlands is mainly of high quality and may be obtained from primary

forests mainly, which would increase the contribution by Dutch imports to forest degradation by about 60%.

A second approach is if we assume that all Dutch imported timber is obtained from unsustainable forest management systems, and does not originate from areas that are being clear-cut for palm oil expansion, as the Dutch market consumes high-value species from selective logging operations. We can then simply divide the Dutch timber imports from Malaysia by the average yield rate from Malaysian forests. The yield rate has changed over time from 65 m3 RWE in the 1990's to 60 in early 2000 to 55 m3 RWE in recent years, due to less productive forest areas being used.

This type of calculation would generate the data presented in Exhibit 43.

Exhibit 43: Dutch contribution to deforestation and forest degradation in Malaysia associated with palm oil (approach 2)

Period	Dutch timber imports (x 1,000 m3)	Yield rate (m3 RWE / ha)	Dutch contribution	
			In period (ha)	Annual rate (ha)
1996 – 2000	145	65	20,075	4,015
2001 – 2005	147	60	22,050	4,410
2006 - 2007	223	55	14,600	7,300
1996 - 2007			56,725	

Source: Aidenvironment, 2009

For conversion from m3 to m3 RWE, conversion factor based on FAO and the Forestry Commission (UK) were used, varying from 1 (wood in the rough) to 1.8 (roundwood), 1.9 (veneer) and 2.3 (plywood).

Comparing the first method with the second method gives an eight-fold difference. The reality will be somewhere in between.

Conclusions

Exhibit 44 shows that the annual contribution to deforestation by Dutch activities has increased over the years, especially in the last period of 2006-2007. The total Dutch contribution to deforestation has been about 44,400 ha. The Dutch contribution to forest degradation is more difficult to determine; two different methods have been followed which generate widely different data. Exhibit 44 shows the range of data, with an average determined on the basis of that.

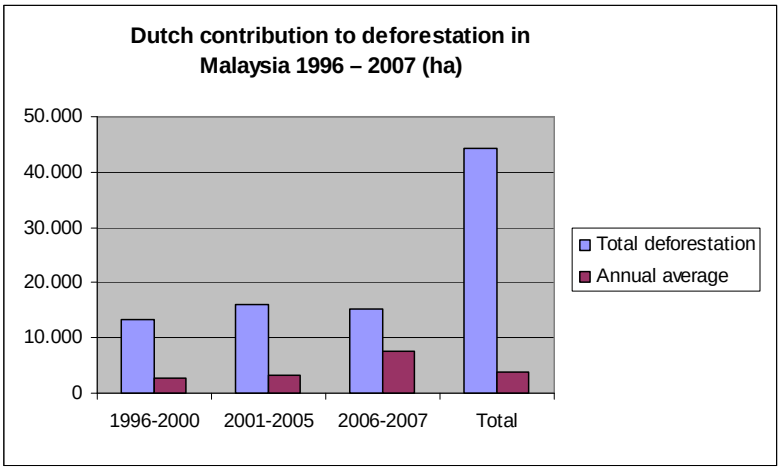
Exhibit 44: Dutch contribution to deforestation and forest degradation in Malaysia 1996–2005 (ha)

Period	Deforestation associated with palm oil	Annual average deforestation	Forest degradation		
			Range	Average	Average annual rate
1996-2000	13,200	2,640	2,055 – 20,075	11,000	2,200
2001-2005	16,000	3,200	3,000 – 22,050	12,500	2,500
2006-2007	15,202	7,606	2,100 – 14,600	8,350	4,175
Total	**44,402**	**3,700**	**7,155 – 56,725**	**31,850**	**2,654**

Source: Aidenvironment, 2009

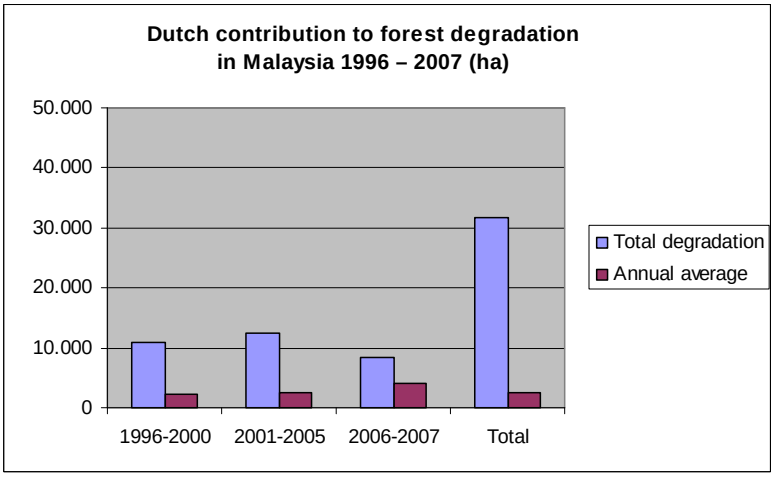
Over the three study periods, Exhibit 45 and 46 present total deforestation and forest degradation respectively due to Dutch imports in the study period. The annual average is included as well.

Exhibit 45: Dutch contribution to deforestation in Malaysia 1996 – 2007.



Source: Aidenvironment, 2009.

Exhibit 46: Dutch contribution to forest degradation in Malaysia 1996 – 2007.



Source: Aidenvironment, 2009.

Uncertainties

As indicated above, we did not make estimates of indirect effects associated with expansion of palm oil plantations. Thus, there are no uncertainties associated with this item. However, it has been difficult to determine the effect of timber exploitation to forest degradation. Basically two different methods have been applied. One is a complex approach which looks at the proportion of timber production to logging in natural forests. It only considers the share of this source of timber

to contribute to forest degradation, assuming that the remainder proportion of timber is obtained from forestlands being converted (for palm oil). The other approach basically states that there is no sustainable forest management system operational yet in Malaysia, so all timber being produced contributes to forest degradation. One argument to consider this approach is that mostly valuable timber species are exported, obtained from natural forests.

As a result, we estimate the variation due to these assumptions in calculating the contribution to forest degradation at +/- 50%.

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