

SUMMARY

An estimated 10% of all supermarket items contain palm oil with over 85% of the world's palm oil coming from plantations in Malaysia and Indonesia. Palm oil companies clear millions of hectares of lowland forest each year for oil palm plantations, causing widespread habitat destruction for the endangered orangutan, now facing the increasing risk of extinction. Indonesia is also one of the largest emitters of CO₂ as a result of the 'slash and burn' techniques often employed by palm oil companies to clear land. Palm oil companies risk becoming major contributors to global climate change if current methods of production continue.

Between 1985 and 2000 oil palm plantations were responsible for approximately 87% of the total deforestation in Malaysia. During the same period 66% of plantations in Indonesia also used converted forest areas. 'Calculations suggest that the amount of forest converted to this land use by 2003 had reached 3.2 million hectares in Indonesia, with a further 758, 000 hectares having been converted in Malaysia' (*The Oil for Ape Scandal, 2005, p 13*). 'It is estimated that on the Indonesian island of Sumatra, if present trends continue, the forest will be gone in five years' (*Wakker, 2004, p 13*).

Expanding plantations and fragmentation of orangutan habitat increase the occurrence of human/animal conflict. Orangutans found in palm oil plantations are often considered to be agricultural pests and are frequently killed by workers (*Whyte, S., Desilets, M. & Warwick, H., undated*). The infrastructure associated with palm oil plantations allows greater access into previously inaccessible orangutan habitat, increasing opportunities for poachers looking to kill or remove orangutans for the illegal pet trade (*Rijksen, H, 1974, p 21, Marshall, A., Nardiyono, Engström, L., Pamungkas, B., Palapa, J., Meijaard, E & Stanley, S. 2006, p 567, The Oil For Ape Scandal, 2005, p 21*).

The most common cause of forest fragmentation is the development of oil palm plantations (*Abdullah, S. & Nakagoshi, N. 2007, p 43, The Oil For Ape Scandal, 2005, p 21*). Most of this is occurring in low lying forest and peat swamp areas, the direct habitat of the endangered orangutan. Habitat fragmentation impedes orangutan movement through the forest, this results in the formation of isolated population groups, in turn leading to inbreeding. Lacking gene pool diversity these small segregated populations do not support the long term survival of the orangutan (*The Oil for Ape Scandal, 2005, p 16, <http://news.nationalgeographic.com/news/2000/12/122800orangutans.html>*).

Orangutans can survive, albeit in lesser densities, in secondary forest, previously degraded by selective logging practices (*Felton, A.M., Engström, L., Felton, A. & Knott, C. 2003, p 97, Marshall et al, 2006, p 576, Ancrenaz, M., Calaque, R. & Lackman-Ancrenaz, I, 2003, p 983*). The orangutan population risks further reductions and possible extinction as many areas of secondary forest surrounding or joining primary, orangutan habitat are being cleared for palm oil plantations (*Marshall et al, 2006, p 567*).

The risk of orangutan extinction is not the only significant impact of deforestation practices in South East Asia's rainforest regions; resulting CO₂ emissions are also a major concern. A net loss of previously trapped carbon, to the atmosphere is observed when tropical forests are cut down and replaced by palm oil plantations, as the accumulated carbon in primary forest biomass is greater than that of the introduced palm oil (*Henson, I. 2005, p 280*).

Deforestation due to palm oil plantations is estimated to cause CO₂ emissions of around 187 tons C/ha (*Reijnders, L. & Huijbregts, M. 2006, p 3*). With current palm oil plantations replacing tropical rainforest, there is a risk that the net greenhouse gas emissions benefit of using palm oil as a bio-fuel substitute to petroleum will actually be negative, this is even more evident when fire is used to clear land prior to plantation (*Rosenthal, E. 2007*).

The increasingly fragmented areas in which orangutan populations occur are becoming more and more vulnerable to the risk of being destroyed by fire (*DeFries, R., Achard, F., Brown, S., Herold, M., Murdiyarso, D., Schlamadinger, B. & de Souza, C. 2007, p 390*). A recent World Bank report also found that due to deforestation and forest fires, Indonesia was the world's third largest emitter of greenhouse gases, generating two billion tons of CO₂ every year (*Arga, A. 2007, Rosenthal, 2007*). Fire utilising, land clearing methods in Malaysia and Indonesia are contributing to both the risk of orangutan extinction and also the acceleration of global climate change.

The governments of Indonesia and Malaysia urgently need to review current practices and enforce methods of sustainable palm oil production that promote the long term-survival of the orangutan and decrease their level of greenhouse gas emissions.

Forest fragmentation, a major hazard faced by orangutans, is one aspect that has the potential to be better managed. As orangutans have displayed the ability to survive in slightly degraded forest (*Felton et al. 2003, p 97, Marshall et al, 2006, p 576, Ancrenaz, et al, 2003, p 983*), legislative protection of secondary forested areas will dramatically increase habitat availability for this endangered species. Forest conservation will also mean that over time, degraded forest will regenerate and potentially return to the primary rainforest habitat of the orangutan. Managing the forest fragmentation hazard in this manner will reduce the occurrence of small, isolated populations of orangutans prone to inbreeding. The chances of their species' long term survival will in turn be improved.

Millions of hectares of abandoned and severely degraded land exist in both Indonesia and Malaysia, on which palm oil plantations may be developed in the future (*The Oil for Ape Scandal, 2005, p 12 & 37*). Earmarking this land for use as palm oil plantations would greatly reduce the destruction of South East Asia's forests, granting the orangutan access to much more habitat and reducing the levels of CO₂ emissions that result from palm oil production.

Assignment 1

Hazard Identification

**Implications of the current
practices in palm oil production
in South East Asia**

SQE722

Environmental Risk Assessment

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03 August 2007

Introduction

Palm oil is a vegetable oil used globally as an ingredient in consumer products such as soap, toothpaste, cosmetics, ice-cream, biscuits and bread. An estimated 10% of all supermarket items contain palm oil (*Basiron, Y., 2007 p 289, Wakker, E. 2004, p 7*). Second only to soy, it accounts for 21 % of the global edible oil market (*Wakker, 2004, p 9*). Also used as a biofuel, an expansion of the biofuels industry due to recent increases in petrol prices and the quest for cleaner fuels, has resulted in a dramatic increase in the demand for palm oil (*Basiron, 2007, p 291*).

Over 85% of the world's palm oil comes from plantations in Malaysia and Indonesia (*Timms, R. 2007, p 287*). In 2005 Malaysia and Indonesia produced 14.9 and 14.07 million tons of palm oil respectively (*Timms, 2007, p 287*). Existing palm oil production practices in these countries present a number of very serious environmental and social issues. Palm oil companies clear millions of hectares of lowland forest each year for oil palm plantations, causing widespread habitat destruction for the endangered orangutan, now facing the increasing risk of extinction. Indonesia is also one of the largest emitters of CO₂ as a result of the 'slash and burn' techniques often employed by palm oil companies to clear land. Palm oil companies risk becoming major contributors to global climate change if current methods of production continue.

Deforestation and habitat fragmentation

Palm oil production in South East Asia often involves extensive deforestation. Between 1985 and 2000 oil palm plantations were responsible for approximately 87% of the total deforestation in Malaysia. During the same period 66% of plantations in Indonesia also used converted forest areas. 'Calculations suggest that the amount of forest converted to this land use by 2003 had reached 3.2 million hectares in Indonesia, with a further 758, 000 hectares having been converted in Malaysia' (*The Oil for Ape Scandal, 2005, p 13*). 'It is estimated that on the Indonesian island of Sumatra, if present trends continue, the forest will be gone in five years' (*Wakker, 2004, p 13*).

Expanding plantations and fragmentation of orangutan habitat increase the occurrence of human/animal conflict. Orangutans found in palm oil plantations are often considered to be agricultural pests and are frequently killed by workers (*Whyte, S., Desilets, M. & Warwick, H., undated*). The infrastructure associated with palm oil plantations allows greater access into previously inaccessible orangutan habitat, increasing opportunities for poachers looking to kill or remove orangutans for the illegal pet trade (*Rijksen, H, 1974, p 21, Marshall, A., Nardiyono, Engström, L., Pamungkas, B., Palapa, J., Meijaard, E & Stanley, S. 2006, p 567, The Oil For Ape Scandal, 2005, p 21*).

Studies on deforestation and forest fragmentation in Malaysia and Indonesia, have found the most common cause of forest fragmentation is the development of oil palm plantations (*Abdullah, S. & Nakagoshi, N. 2007, p 43, The Oil For Ape Scandal, 2005, p 21*). Most of this is occurring in low lying forest and peat swamp areas, the direct habitat of the endangered orangutan. Such disruptions to habitat present a number of serious threats to the long term survival of the species. Habitat fragmentation impedes orangutan movement through the forest, this results in the formation of isolated population groups, in turn leading to inbreeding. Lacking gene pool diversity these small segregated populations do not support the long term survival of the orangutan (*The Oil*

for Ape Scandal, 2005, p 16, <http://news.nationalgeographic.com/news/2000/12/122800orangutans.html>).

Orangutans can survive, albeit in lesser densities, in secondary forest, previously degraded by selective logging practices (Felton, A.M., Engström, L., Felton, A. & Knott, C. 2003, p 97, Marshall et al, 2006, p 576, Ancrenaz, M., Calaque, R. & Lackman-Ancrenaz, I, 2003, p 983). The orangutan population risks further reductions and possible extinction as many areas of secondary forest surrounding or joining primary, orangutan habitat are being cleared for palm oil plantations (Marshall et al, 2006, p 567). On a small scale, degradation of orangutan habitat simply causes disruptions to their traveling efficiency, due to their almost exclusive use of the canopy for traveling. However as their forest is extensively cleared for palm oil plantations their available habitat is becoming increasingly fragmented and diminished. Deforestation and fragmentation of habitat are hazards that are significantly contributing to the risk of further declining numbers of orangutans, and ultimately the extinction of their species.

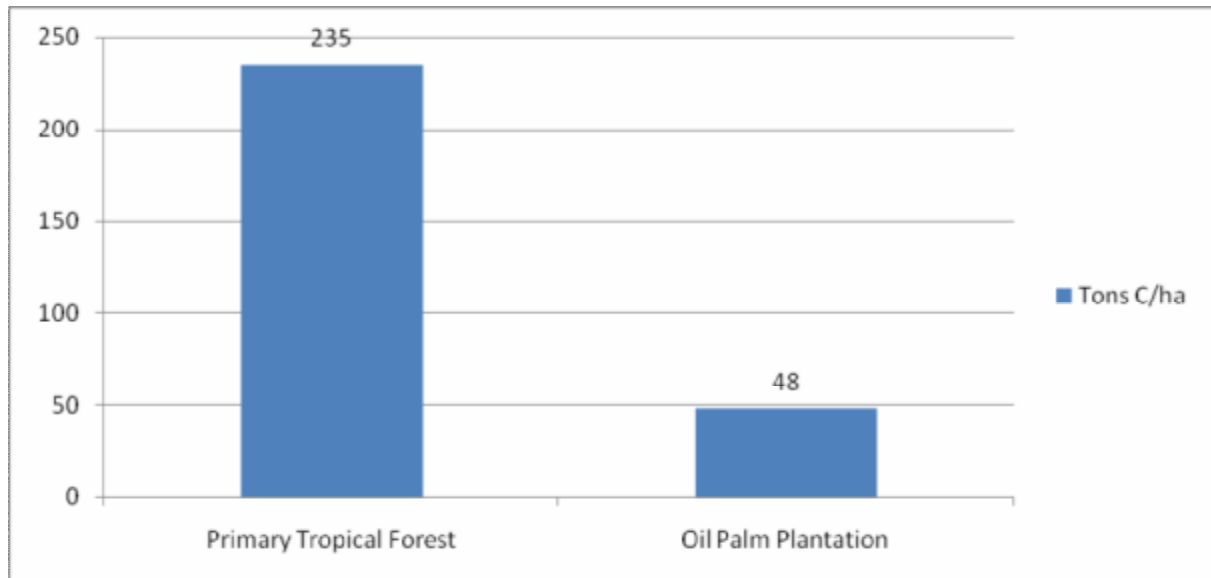
'An estimated 800 orang-utan are being lost every year in Sumatra, and even the largest remaining viable populations are predicted to plunge by 50 per cent in the next four to six years if the astounding rate of forest decline continues. This means that the effective extinction of the Sumatran orang-utan is imminent, and a call for a complete halt to habitat loss is more urgent than ever'.

'Taking into account an estimated rate of deforestation on Borneo of 1.3 million hectares per year, the outlook for the Bornean orang-utan is not much more favourable than that of the Sumatran species'.

Source: Research report, The oil for ape scandal. How palm oil is threatening orang-utan survival, 2005, pp 17 - 18

The risk of orangutan extinction is not the only significant impact of deforestation practices in South East Asia's rainforest regions; resulting CO₂ emissions are also a major concern. A net loss of previously trapped carbon, to the atmosphere is observed when tropical forests are cut down and replaced by palm oil plantations, as the accumulated carbon in primary forest biomass is greater than that of the introduced palm oil (Henson, I. 2005, p 280), represented in Figure 1. Deforestation due to palm oil plantations is estimated to cause CO₂ emissions of around 187 tons C/ha (Rejjinders, L. & Huijbregts, M. 2006, p 3). With current palm oil plantations replacing tropical rainforest, there is a risk that the net greenhouse gas emissions benefit of using palm oil as a bio-fuel substitute to petroleum will actually be negative, this is even more evident when fire is used to clear land prior to plantation (Rosenthal, E. 2007).

Figure 1: Comparison of above-ground carbon stocks in primary tropical forest and palm oil plantations, represented as tons of carbon per hectare of biomass.



(Source: Reijnders, L. & Huijbregts, M. 2006, p 3)

Fires

One of the cheapest methods of clearing land for palm oil plantation development is to burn the forest (Whitehouse, A. & Mulyana, A. 2003, p 92). Although such practices have been banned by the Indonesian Government, this method of land clearing is still widely utilised (Wakker, E. 2004, p 14, Stein, G. 2007). Fires that destroy forested areas in Malaysia and Indonesia are environmental hazards that pose very serious risks.

The increasingly fragmented areas in which orangutan populations occur are becoming more and more vulnerable to the risk of being destroyed by fire (DeFries, R., Achard, F., Brown, S., Herold, M., Murdiyarso, D., Schlamadinger, B. & de Souza, C. 2007, p 390). In 2006 fires that were deliberately lit to clear land for new plantations in Malaysia and Indonesia released over one billion tonnes of CO₂ into the atmosphere (Stein, 2007). A recent World Bank report also found that due to deforestation and forest fires, Indonesia was the world's third largest emitter of greenhouse gases, generating two billion tons of CO₂ every year (Arga, A. 2007, Rosenthal, 2007). Fire utilising, land clearing methods in Malaysia and Indonesia are contributing to both the risk of orangutan extinction and also the acceleration of global climate change.

Management of forest fragmentation

A worldwide increase in demand is fueling the expansion of the palm oil industry. If current practices in production are not addressed then the risks to the threatened orangutans and CO₂ levels will become increasingly real. The governments of Indonesia and Malaysia urgently need to review current practices and enforce methods of sustainable palm oil production that promote the long term-survival of the orangutan and decrease their level of greenhouse gas emissions.

While the development of palm oil plantations in Malaysia and Indonesia presents many serious environmental risks, it is evident that through better management these risks may be considerably reduced. Forest fragmentation, a major hazard faced by orangutans, is one aspect that has the potential to be better managed. As orangutans have displayed the ability to survive in slightly degraded forest (*Felton et al. 2003, p 97, Marshall et al, 2006, p 576, Ancrenaz, et al, 2003, p 983*), legislative protection of secondary forested areas will dramatically increase habitat availability for this endangered species. Forest conservation will also mean that over time, degraded forest will regenerate and potentially return to the primary rainforest habitat of the orangutan. Managing the forest fragmentation hazard in this manner will reduce the occurrence of small, isolated populations of orangutans prone to inbreeding. The chances of their species' long term survival will in turn be improved.

Millions of hectares of abandoned and severely degraded land exist in both Indonesia and Malaysia, on which palm oil plantations may be developed in the future (*The Oil for Ape Scandal, 2005, p 12 & 37*). Earmarking this land for use as palm oil plantations would greatly reduce the destruction of South East Asia's forests, granting the orangutan access to much more habitat and reducing the levels of CO₂ emissions that result from palm oil production.

Appendix

Table 2: Environmental risks associated with palm oil production and their contributing hazards

ASSOCIATED RISKS	CONTRIBUTING HAZARDS
Orangutan extinction	<ul style="list-style-type: none"> -Deforestation causing habitat loss -Forest fragmentation as a result of deforestation and infrastructure development -Forest fires -Human/ animal conflict -Poaching to support illegal pet trade -Slow reproductive rates of orangutans -Increasing international demand for palm oil products
Acceleration of climate change	<ul style="list-style-type: none"> -Destruction of carbon sinks (primary tropical forest) -Forest fires release greenhouse gases into atmosphere -Draining of peat swamps releases greenhouse gases into the atmosphere -Energy intensive production methods utilize greenhouse gas emitting, fossil fuel combustion
Pollution	<ul style="list-style-type: none"> -Palm oil processing plant effluent released into nearby waterways -Toxic Pesticides used in growing of oil palms
Loss of indigenous livelihoods	<ul style="list-style-type: none"> -Subsistence farmers losing access to forest areas -Indigenous land rights not recognised
Sumatran tiger extinction	<ul style="list-style-type: none"> -Deforestation and fragmentation destroying tiger habitat -Increased poaching associated with greater access to tiger habitat -Forest fires -Human/ animal conflict resulting in tiger deaths -Increasing international demand for palm oil products

References

Journal Articles

- Abdullah, S. & Nakagoshi, N. (2007) 'Forest fragmentation and its correlation to human land use change in the state of Selangor, peninsular Malaysia', *Forest and Ecology Management*, Vol 241, pp 39-48
- Ancrenaz, M., Calaque, R. & Lackman-Ancrenaz, I, (2003) 'Orangutan nesting behavior in disturbed forest of Sabah, Malaysia: Implications for nest census', *International Journal of Primatology*, Vol 25, No. 5, pp 983 - 1001
- Bassiron, Y. (2007) 'Palm oil production through sustainable plantations', *European Journal of Lipid Science Technology*, Vol 109, pp 289 - 295
- DeFries, R., Achard, F., Brown, S., Herold, M., Murdiyarto, D., Schlamadinger, B. & de Souza, C. (2007) 'Earth observations for estimating greenhouse gas emissions from deforestation in developing countries' *Environmental Science and Policy*, Vol 10, pp 385 - 394
- Felton, A.M., Engström, L., Felton, A. & Knott, C. (2003) 'Orangutan population density, forest structure and fruit availability in hand-logged and unlogged peat swamp forests in West Kalimantan, Indonesia', *Biological Conservation*, Vol 114, pp 91–101
- Henson, I. (2005) 'An Assessment Of Changes In Biomass Carbon Stocks in Tree Crops and Forests in Malaysia', *Journal of Tropical Forest Science*, Vol 17, No. 2, pp 279-296
- Marshall, A., Nardiyono, Engstrom, L., Pamungkas, B., Palapa, J., Meijaard, E & Stanley, S. (2006) 'The blowgun is mightier than the chainsaw in determining population density of Bornean orangutans (*Pongo pygmaeus morio*) in the forests of East Kalimantan', *Biological Conservation*, Vol 129, pp 566 - 578
- Reijnders, L. & Huijbregts, M. (2006) 'Palm oil and the emission of carbon-based greenhouse gases', *Journal of Cleaner Production*, pp 1 – 6
- Rijksen, H, (1974) 'Orang-utan Conservation and Rehabilitation in Sumatra', *Biological Conservation*, Vol 6, No. 1, pp 20 - 25
- Timms, R. (2007) 'Palm oil – The oil for the 21st century?' *European Journal of Lipid Science Technology*, Vol 109, pp 287 -288
- Whitehouse, A. & Mulyana, A. (2003) 'Coal fires in Indonesia', *International Journal of Coal Geology*, Vol 59, pp 91 - 97

Research Reports

Friends of the Earth, The Ape Alliance, The Borneo Orangutan Survival Foundation, The Orangutan Foundation (UK) and The Sumatran Orangutan Society (2005) 'The Oil for Ape Scandal. How palm oil is threatening orang-utan survival'

Wakker, E. (2004) 'Greasy Palms – palm oil, the environment and big business', Friends of the Earth UK

Whyte, S., Desilets, M. & Warwick, H., (undated) 'Save orang-utans from extinction when you next shop', Nature Alert and the Borneo Orangutan Survival Foundation, UK

Electronic References

Arga, A. (2007) 'Palm Oil Firms Burning Indonesia Forests – Greenpeace'
<http://www.planetark.com/dailynewsstory.cfm/newsid/43070/story.htm> (Accessed July 25 2007)

<http://news.nationalgeographic.com/news/2000/12/122800orangutans.html> (Accessed July 25 2007)

Rosenthal, E. (2007) 'Once a Dream Fuel, Palm Oil May Be an Eco-Nightmare',
<http://www.nytimes.com/2007/01/31/business/worldbusiness/31biofuel.html?ex=1327899600&en=e653a375e67e8e49ei=5088partner=rssnytemc=rss&pagewanted=all>
(Accessed July 25 2007)

Television Report

Stein, G. (2007) 'Palm Oil – Green Gold?' *Dateline, SBS*, July 11