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Pullout

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Malaysia's Oil Palm – Hallmark of Sustainable Development

As the world's biggest exporter of palm oil, Malaysia accounted for 15.14 million tonnes (26.2%) of the global oils and fats trade in 2007 (Figure 1). Its oil palm sector is also seen as a beacon for sustainable development in agriculture (Yusof, 2007; Chan, 2003).

What is sustainability? According to Bruntland (1987), the key concepts are:

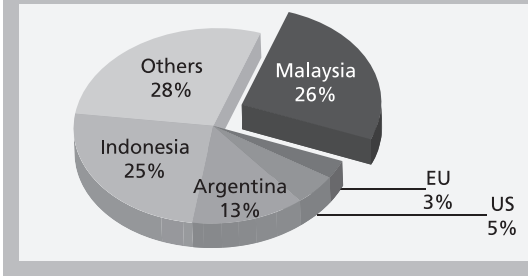
- Today's needs should not compromise the ability of future generations to meet their needs.
- A direct link exists between the economy and environment.
- The needs of the poor in all nations must be met.
- In order for the environment to be protected, the economic conditions of the world's poor must be improved.
- In all our actions, we must consider the impact upon future generations.

These concepts were applied at the Rio 'Earth Summit' to come up with a holistic approach towards sustainable development that protects the 3Ps and 1D – People, Planet, Profit and developing countries' right to development. The Malaysian palm oil industry sets an example in meeting the criteria.

Protecting people

It is recognised that the sustainability process includes eradication of poverty. The oil palm industry is a major employer in Malaysia. As the cultivated area increased four-fold, from 1.02 million ha in 1980 to 4.24 million ha in 2007, the workforce too expanded (Table 1) from 92,352 workers in 1980 to 405,000 workers in 2007.

Figure 1: Malaysian palm oil and palm kernel oil share in global oils and fats trade, 2007



Source: Oil World, 2008

Table 1: Malaysia – Oil Palm Acreage and Employment

Year	Area (ha)	Employment
1980	1,023,306	92,352
1985	1,482,399	103,748
1990	2,029,464	115,285
1995	2,540,087	240,422
2000	3,376,664	251,039
2005	4,051,374	362,000
2007	4,238,363	405,000 e

Sources: Ministry of Primary Industries, 1995; Ministry of Plantation Industries and Commodities, 2007
Note: e = estimated

The industry has been a major player in poverty eradication and mitigating migration of the labour force from rural to urban areas. It has created jobs, built infrastructure and contributed to social stability. The Felda Land Development Authority (Felda) is an example of a success story.

Set up 51 years ago to develop land and resettle the landless, it is today one of the world's largest plantation conglomerates. It has developed 853,313ha of land and resettled 112,635 families (Ahmad Tarmizi, 2008). In 2005, a survey was conducted on Felda settlers' quality of life based on the Malaysian Quality of Life index. The findings (Table 2) show that they enjoy a high quality of life.

Table 2: Felda Settlers' Quality of Life Findings

Components	Satisfaction Ranking
Income and distribution	High
Working life	High
Transport and communication	Average
Health	High
Education	High
Housing	High
Environment	High
Family life	High
Social participation	High
Public safety	Average

Source: Ahmad Tarmizi, 2008

Protecting the planet

Oil palm in Malaysia is cultivated on designated agricultural land, applying good agricultural and management practices which are friendly to the environment and planet.

Use of designated land

The Land Capability Classification System of Lee and Panton (1971) categorises land for agriculture, forestry or mining. Oil palm is planted on designated agriculture land that is deemed suitable for long-term use. Malaysia has classified 7.8 million ha or 23% of its land area for agriculture, while 18.3 million ha (56.5%) remain under forest and cannot be used for agriculture.

New oil palm plantings are only allowed on degraded logged-over land zoned for agriculture. Thus, the cultivation of oil palm is not the cause of deforestation or loss of wildlife habitat, including that of the *orang utan*, as claimed by certain NGOs.

Conservation of natural resources

The oil palm industry follows a long life cycle of 25-30 years, which means that the land needs to be cleared once only during this period. In contrast, intensive agriculture undertaken for annual oilseed crops leads to detrimental consequences for the environment, including soil erosion and contamination of waterways, due to pesticides and nutrients from greater use of fertilisers.

Oil palm cultivation creates the least damage to natural resources. This is enhanced by observing good agricultural practices:

- 'Zero' burning during land clearing activities; and
- Controlling soil erosion by
  - terracing areas where the gradient exceeds 5˚;
  - building stop bunds along terraces to reduce the speed of the run-off as well as to distribute the water to the plants;
  - introducing fast-growing leguminous crops during the immature phase of planting to cover the soil and reduce the impact of rain, thus minimising soil erosion; and
  - Allowing natural soft plant cover to grow when leguminous cover crops die during the mature phase of the plantation.

Good agricultural and land management practices

Several steps are taken in cultivating oil palm.

- Good water management
  - Low-lying areas with a high water-table are drained without exposing unfavourable soil horizons like the acid sulphate layer.
  - Soil moisture is conserved in other areas by constructing silt pits.
  - Plants are irrigated with palm oil mill effluent (POME) or other sources of water, if feasible.
  - Water is diverted to the field, away from roads.

- Management of pruned fronds:
  - Pruned fronds are placed in inter-rows.

- Management of empty fruit bunches (EFB):
  - EFB are placed around young plants or between mature plants as mulch for water conservation and as a source of organic fertiliser, where feasible.

- Avoidance of soil compaction:
  - Light vehicles such as mini-tractors or wheelbarrows, or even buffalo-drawn carts, are used for fruit collection.
  - Low-pressure tyres are used for vehicles during fruit collection in peat areas.
  - Natural grasses are retained to improve soil properties.

- Maintenance of the ecosystem including
  - natural swamp areas;
  - riparian reserves along streams; and
  - natural water-courses such as streams and rivers.

- Maintenance of soil fertility status:
  - Leguminous cover crops are grown during early establishment of the oil palm; the legumes will fix nitrogen in the root nodules.
  - A discriminatory fertiliser recommendation approach determines requirements for the oil palm so as to avoid over-manuring and wastage of fertilisers, and detrimental effects on the environment.
  - Fertilisers are applied to coincide with the right weather conditions to prevent losses due to washout by rain, consequently polluting waterways.
  - Nutrient recycling is encouraged alongside improvement of soil organic carbon content through the return of EFB if feasible, pruned fronds, male inflorescence and other plant biomass.
  - POME is applied to the field, if feasible.

Integrated Pest Management (IPM)

Article 2 of the FAO International Code of Conduct on the distribution and use of pesticides defines IPM as “a pest management system that, in the context of the associated environment and the population dynamics of the pest species, utilises all suitable techniques and methods in as compatible a manner as possible and maintains the pest population at levels below those causing economically unacceptable damage or loss”.

IPM, therefore, encompasses a balanced combination of cultural and biological control, with the judicious use of chemical control when necessary. This approach is in line with Good Agricultural Practice.

Implementation of IPM increases productivity with minimal or no adverse impact on the environment. As such, IPM is practical and adopted as the norm in the cultivation of oil palm in accordance with these principles:

- Use of non-chemical measures as the first choice;
- Judicious, safe and effective use of chemical control measures;
- Choice of pesticides with a favourable toxicological profile, such as Class III or Class IV pesticides, as classified by the Pesticides Board; and
- Training of the workforce in safe handling of pesticides, as required by the Occupational and Safety Health Act 1994.

Minimising waste and pollutants

The Environmental Quality Act 1974 prohibits and controls pollution for the protection of public health and environment. It achieves this by setting acceptable standards for the emission, discharge or deposit of pollutants.

In the palm oil industry, three subsidiary regulations apply:

- Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987
- Environmental Quality (Clean Air) Regulations 1978 (or CAR)
- Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977

Environmental Impact Assessment (EIA) assists in determining site suitability, potential environmental impacts and the necessary mitigation and control measures that are needed for the prescribed activity. An EIA is required when new land, covering 50ha or more, is converted to oil palm.

CAR is applied to the industry in both upstream and downstream activities. In upstream activities, Regulation 11 prohibits open burning of any combustible material unless with the written approval of the Director-General of the Department of Environment.

Approval can be obtained in special cases including fires set to agricultural lands for disease and pest control or fires set to carcasses of diseased animals and poultry, or for other agricultural practices such as in sugarcane planting. Thus, in the oil palm industry, 'zero' burning techniques have been developed.

In downstream activities, the combustion of waste materials such as EFB, mesocarp fibre and shells in boilers and incinerators may release dark smoke or air impurities into the atmosphere. The use of fossil fuel in power generator sets is another potential source of air pollution. The tolerable threshold limits for the emission of dark smoke and particulate matter from incinerators, boilers or generators – beyond which offences will be compounded – are stated in Regulations 15 and 16 of CAR.

In addition, the discharge of effluent or wastewater from palm oil processing is regulated by the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977. More stringent parameter limits for water-course discharge for palm oil effluent were introduced in the Second Schedule of the Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977, Amendments of 1982.

Protecting profits

The oil palm industry is a profitable business. On a national scale, the industry earned RM2.98 billion in revenue in 1980 and contributed to 6.1% of the value of primary commodities and commodity-based products (Table 3). In 2007, this went up to RM45.6 billion in export value or about half of all the primary commodities and commodity-based products. At farm level, a Felda settler's income of RM1,356 in 2006 was well above the national poverty line of RM529 (Ahmad Tarmizi, 2007).

Table 3: Malaysia – Export Value of Palm Oil and Derivatives

Year	Export value (RM million)	Percentage value of primary commodities & commodity-based products (%)
1980	2,981.7	6.1
1990	5,886.7	6.2
2000	14,944.2	35.1
2005	28,415	43.5
2007	45,609.5	50.9

Sources: Ministry of Primary Industries, 1995; Ministry of Plantation Industries and Commodities

Commitment to corporate social responsibility

Many oil palm companies are listed on Bursa Malaysia (the stock exchange) and are therefore profit oriented. However, their commitment to corporate responsibility is strong. As an example, the industry contributed part of its profits to subsidise the price of cooking oil to keep it affordable. This was done in the form of a levy collected by the Government, calculated at 15% of price difference above RM2,000 for Peninsular Malaysia and 7.5% for Sabah and Sarawak for every tonne of CPO produced, whenever its price exceeded RM2,000 (Kastam Diraja Malaysia, 2008).

The industry also supported the creation of the Malaysian Palm Oil Wildlife Conservation Fund (MPOWCF) in 2006 to back projects and studies that ensure the sustainability of flora and fauna. The MPOWCF was launched with an initial sum of RM20 million, of which RM10 million was a grant from the Government and the balance from the industry. The Malaysian Palm Oil Council (MPOC) administers the fund.

Projects being funded currently include:

- Establishment of a jungle patrol to protect wildlife in forest reserves bordering oil palm plantations in Sabah;
- Survey of the *orang utan* population in Sabah, carried out by Borneo Conservation Trust, Sabah Wildlife Department and the NGO Hutan;
- Collaboration with MK Land to operate the Orang Utan Island infant-care unit in Bukit Merah Lake Resort;
- Biodiversity conservation study on ox-bow lakes in oil palm plantations in Sabah;
- Improving riparian reserves;

- Handling elephant-human conflicts in forest reserves bordering oil palm plantations through the Department of Wildlife; and
- Production of educational materials on wildlife conservation with Tabin Wildlife Sanctuary and Sabah Forestry Department.

Sustainable oil palm crop

The oil palm is, by itself, an inherently sustainable oil crop, producing more oil per unit area than other oilseeds. It thus requires a smaller land area to feed the world compared to rapeseed, sunflower or soybean. As its productivity is 3.8 tonnes/ha/year compared to its main competitors (Table 4), oil palm produces 10 times more oil per unit area than the other oilseed crops.

Eco-friendly palm oil production

The amount of nutrients – using nitrogen and phosphorus as examples – needed to produce 1 tonne of oil is much lower for oil palm than soybean, sunflower and rapeseed (Table 5). The amount of pesticides and herbicides required to produce 1 tonne of palm oil is 5-10 times less. The volume of nitrogen, phosphorus, pesticides and herbicides leached into the soil and waterways is also much lower in oil palm cultivation.

Lower carbon footprint for bio-fuel production

Palm oil production leaves behind a lower carbon footprint than the other oil crops when used as bio-fuel (Figure 1). It is produced with a lower life cycle analysis (LCA) greenhouse gas (GHG) emission than soybean or canola at, respectively, 835, 1,387 and 1,562kg CO_2 equivalent per tonne of oil (van Zutphen, 2008). Compared to fossil diesel, with a LCA GHG emission of 4,288kg CO_2 equivalent per tonne of oil, palm oil – when used as a bio-fuel feedstock – is produced with at least 81% reduction of GHG. This does not take into account the carbon sequestration by oil palm trees.

Table 4: Comparison of Productivity of Oilseed Crops

Oil crop	Oil production (million tonnes)	Harvested area (million ha)	Average oil yield (tonnes/ha/yr)
Oil palm	42.70	11.20	3.80
Soybean	38.03	91.32	0.41
Sunflower	11.80	23.31	0.50
Rapeseed	19.31	29.49	0.65

Source: Oil World, Sept 19, 2008

Table 5: Input Requirements and Pollution Output in Vegetable Oil Production (per tonne)

	Palm Oil	Soybean Oil	Sunflower Oil	Rapeseed Oil
Input Needs				
Nitrogen (kg N)	47	315	96	99
Phosphorus (kg P_2O_5)	8	77	72	42
Pesticides & herbicides (kg)	2	29	28	11
Output in form of pollution to soil and water				
Nitrogen (kg)	5	32	10	10
Phosphorus (kg)	2	23	22	13
Pesticides & herbicides (kg)	0.4	23	22	9

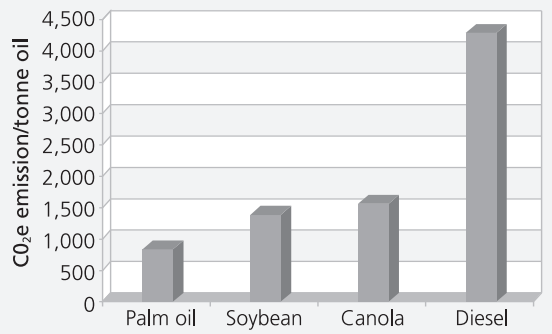
Source: FAO, 1996

Table 6: CO_2 Sequestered by Oil Palm based on Life Cycle Inventory Analysis

Scenarios	CO_2 emitted (-) or sequestered (+) kg /tonne oil produced	
	(when methane is not trapped in effluent ponds)	(when methane is trapped in effluent ponds)
When carbon fixed by oil palm is considered	+ 413	+ 665
When both carbon fixed by living oil palm and land-use change is considered	+ 331	+ 583

Notes:
1) Estimation based on data of Chen, 2008
2) GHG emissions allocated to crude palm oil, palm kernel oil, palm kernel cake and empty fruit bunch
3) Logged-over forest biomass is 110 t/ha
4) Life cycle of oil palm is 25 years

Figure 2: Life cycle carbon emissions to produce 1 tonne of oil



Source: van Zutphen, 2008

Table 7: Malaysia – Oil Palm Productivity

Year	Yield (tonnes/ha)
1975	17.95
1980	18.72
1985	22.15
1990	18.53
1995	19.83
2000	18.33
2005	18.88
2006	19.60
2007	19.03

Sources: Ministry of Plantation Industries and Commodities, 2007; Ministry of Plantation Industries, 1995

The annual rate of CO_2 sequestration by oil palm has been estimated by Henson (2004). If the carbon sequestered is factored into the life cycle analysis, the oil palm ecosystem is found to be a net carbon sink. A life cycle inventory analysis (Chen, 2008) shows that, for every tonne of palm oil produced, 413kg of CO_2 are absorbed from the atmosphere (Table 6). Even when land-use change is considered, the production of 1 tonne of palm oil is found to sequester 331kg CO_2.

Methane is produced in the effluent ponds of palm oil mills. If this is trapped and used as biogas, then the amount of CO_2 equivalent sequestered increases to 665kg per tonne of oil produced. This is reduced to 583kg CO_2 equivalent per tonne of oil when land-use change is a factor.

Proof of sustainability

The oil palm industry is almost a century old in Peninsular Malaysia where the first commercial plantation was created in Selangor in 1917. As the life cycle of the oil palm is about 25 years old, some plantations will soon undergo their fourth cycle of replanting. The results (Table 7) show that, over a 32-year period, the national yield has been constant at a sustained mean yield of 19.21 tonnes/ha/year.

Table 8: Malaysia – Distribution of Oil Palm by Sector, 2006

Sector	Peninsular Malaysia	Sabah	Sarawak	Total
Individual smallholders	336,791ha (14.4%)	95,289ha (7.7%)	22,816ha (3.9%)	454,896ha (10.9%)
Organised smallholdings	905,001ha (38.8%)	225,255ha (18.2%)	103,927ha (17.5%)	1,234,183ha (29.6%)
Estates	1,092,455ha (46.8%)	918,953ha (74.1%)	464,727ha (78.6%)	2,476,135ha (59.5%)
Total	**2,334,247ha (100%)**	**1,239,497ha (100%)**	**591,470ha (100%)**	**4,165,214ha (100%)**

Source: Ministry of Plantation Industries and Commodities, 2007

Sustainability certification system

In the international arena, palm oil is the only oil crop that undergoes auditing under a sustainability certification system introduced by the Roundtable on Sustainable Palm Oil (RSPO). This system is based on eight principles and 39 criteria (P&C). The stakeholders are from the whole supply chain including producers, investors, and both environmental and social NGOs.

Palm oil obtained from plantations that meet the P&Cs will qualify to be labelled as 'Certified Sustainable Palm Oil'. Estates belonging to United Plantations Bhd and Sime Darby Plantation Sdn Bhd have become the first two to be certified under the RSPO scheme.

Certificate of Assurance

In Malaysia, oil palm is grown by three major groups. In 2006, individual smallholdings comprised about 11% of the area; organised smallholdings such as Felda and Risda took up about 30%; and the estate sector 59% (Table 8). Thus, smallholders occupy 41% of the total acreage.

As the RSPO certification scheme involves expenses, not all smallholders can participate in the scheme. Also, they may not have certain data required, such as a soil map.

As such, MPOC will soon launch a simpler Certificate of Assurance (COA) Scheme for all growers licensed, registered and regulated by the Malaysian Palm Oil Board. The scheme provides them an opportunity to assure clients that their palm oil is obtained from sources that are cultivated on legal agricultural land using good agricultural and management practices, as done in production of rapeseed and soybean in the EU and US.

The industry is working to ensure that its sustainability efforts are promulgated through new initiatives. Malaysian palm oil can therefore truly claim to be the hallmark of sustainable development.