ENVIRONMENT

THE SCOPE OF OUR ENVIRONMENTAL RESPONSIBILITY

As a natural resource based company, we have a fundamental responsibility for the effective management of our environmental impacts throughout the entire value chain. In particular, we look at the acquisition of land, its development, the management of our plantations and mills, and also our manufacturing operations, the use of our product, and in some respects its disposal, re-use and recycling, as Chart 4.1 on the right shows.

In 2010, the public discussion of our environmental performance has focused on the backward linkages of the business, namely the acquisition of land and its development for palm production. This section of the report addresses those and related issues in plantation management. Other aspects of our environmental impact further along the value chain will be examined more fully in subsequent reports.

PALM OIL IN CONTEXT

Palm oil was first introduced into Indonesia by the Dutch colonisers. In the past twenty years or so, production has grown rapidly to become a major commercial crop serving national and international needs for vegetable oil as Chart 4.2 shows.

However, palm oil is only one of several commercial crops grown in Indonesia, and accounts for 18% of agriculture and plantation land use. Long established rubber and coconut plantations represent about 19%; maize and soyabean account for 12%; and other internationally traded crops such as coffee, sugar, cocoa, tobacco and pepper about 6%. Rice is the largest single agricultural crop; mainly grown by small farmers, and it accounts for 32% of agricultural land use.

In 2010, GAR's share of oil palm plantations in Indonesia was 442,500 hectares (including plasma), or about 6% of the total 7.8 million hectares of oil palm plantations in Indonesia. Since 2007, we have been adding approximately 15,000 to 25,000 hectares to our estates each year, and it is this rapid growth of the industry compared to other crops that has raised concerns.

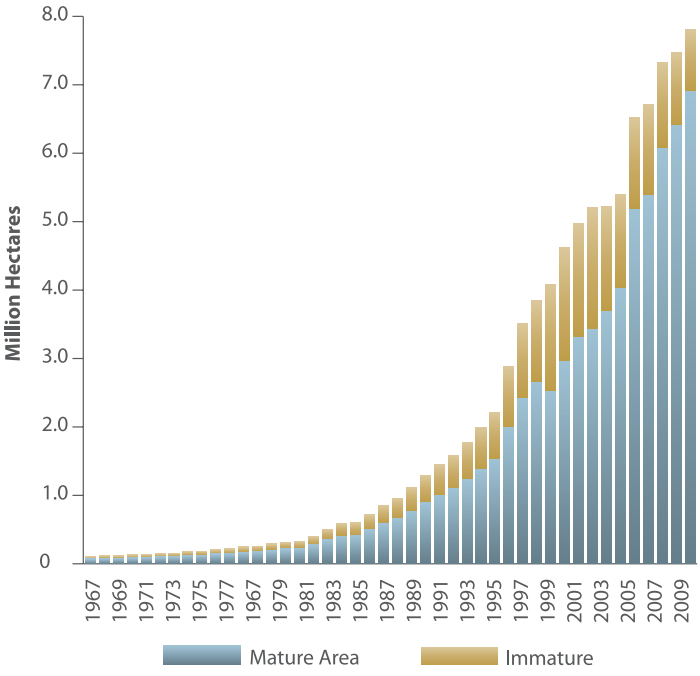
LAND ACQUISITION AND DEVELOPMENT

Indonesia has a land mass of some 187.75 million hectares spread over 17,504 islands which vary in population density from about 1,055 people per square km in Java and 105 people per square km in Sumatra to 25 people per square km in Kalimantan. The development of land in poorer, less populated and developed areas is seen as critical to the all-round development and social progress of the country.

The Government of Indonesia has made it a national priority to develop its land, and our business works in complete alignment with that policy. As Chart 4.4 on the next page shows, approximately 51.50 million hectares or 28% of the land in total is designated as "Protected Forest" or "Conservation Forest"; 43% of the country's land mass is other forms of forest with the potential for varying forms of development, while 28% of land is designated as "Land for Other Purposes" and development through urbanisation and agriculture.

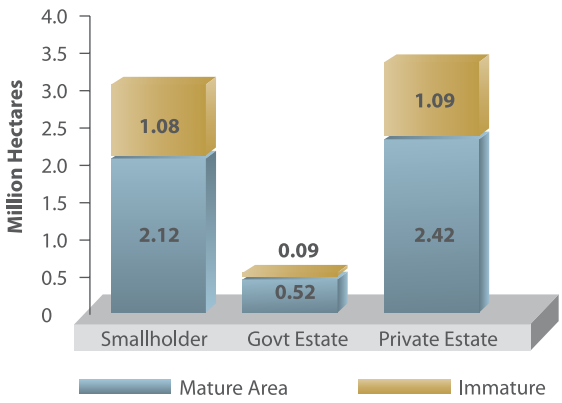
Chart 4.1: Components of Environmental Responsibility along the Value Chain

Chart 4.2: National Oil Palm Area in Indonesia



Source: Indonesian Palm Oil Commission (IPOC), Directorate General of Estate Crops, 2009

Chart 4.3: Palm Area by Owner in Indonesia



Source: Indonesian Palm Oil Commission (IPOC), Directorate General of Estate Crops, 2009

Chart 4.4: GAR's Role in National Land and Forestry Development

Types of land and forest	Hectares in millions	% of total land mass	GAR development
Land for settlements, farming and "other purposes"	54.09	29	YES
Legally designed forest lands			
Convertible or degraded forest with some HCV and peat	22.79	12	NO
Permanent production forest with some HCV and peat	36.64	19	NO
Limited production forest with some HCV and peat	22.50	12	NO
Protected forest mainly primary with peat	31.60	17	NO
Natural/conservation forest mainly primary with peat	19.90	11	NO
Hunting parks	0.23	0	NO
TOTAL	187.75	100	–

Source: The Ministry of Forestry, 2008

We only develop plantations on land that has been designated by the Government of Indonesia as "Land for Other Purposes" and not on any of the 71% of land formally designated as "forests" of any type. The Government of Indonesia only grants an *ijin lokasi* (land-use permit) to companies for development activities on land that has been used before and is considered to be degraded land. However, we accept that such degraded land can sometimes contain important pockets of high conservation value land and peat land. Following the developments discussed in the section on Stakeholder Engagement, we are addressing this issue in collaboration with TFT and the RSPO.

MANAGING SUSTAINABILITY IN OUR PLANTATIONS

There are many aspects to good sustainability practice in managing plantations. Seven key ones are considered individually here, along with an account of our investment in research and development for future productivity and sustainability.

Soil Fertility and Management

We know that agricultural activities pose a potential risk of soil degradation. In order to avoid this, we seek to implement best management practices that not only maintain but also enhance soil fertility. Along with a comprehensive mineral nutrition management plan, we maximise the use of the large biomass produced by the palms by recycling both fresh (fronds and other palm tissues) and waste products from our factories, for use as organic fertilisers in our fields.

A stringent SOP has been in use in all operation units for several years already. Our focus on applying fertilisers when the weather conditions are optimum is an important part of managing soil fertility. We avoid application when rainfall is too high (relative to soil texture), in order to reduce the risk of nutrient loss and ground and/or surface water pollution through run-off or leaching. Similarly, we avoid application of fertilisers susceptible to volatility (like nitrogen fertilisers) during the dry season and when the soil is water-saturated. This minimises nutrient loss as well as air pollution, since nitrogen fertilisers can lead to emission of greenhouse gases if not properly managed.

For the purpose of monitoring soil fertility, sampling is done every five years, and the samples are analysed in our laboratories. In 2010, 29,000 samples of soils were analysed, of which 42% were for soil monitoring, with the remainder for research purposes. The results of these studies help us to optimise our fertiliser recommendations for our fertiliser management strategies.

Pesticide Use and Natural Pest Control

We use only approved and registered agrochemicals permitted by the Ministry of Agriculture. These are applied by trained personnel in accordance with national laws and regulations. In addition, we have been researching and applying alternative methods of dealing with pests and diseases that affect oil palms. For the long-term, we have been using breeding methods to ensure that our oil palms are hardier, disease resistant and pest resistant, thus avoiding the use of chemical pesticides on our plantations.

Since the early development of the company, we have advocated the use of an Integrated Pest Management ("IPM") approach on our plantations to minimise and mitigate the possible impact of pest control on the environment. The preferred method is to deploy biological controls. Pesticides are deloyed only to control those outbreaks of infestation when biological controls are not successful. In such cases, pesticide is used carefully in compliance with national laws. Pesticide use is minimised throughout all growth phases of the palms.

Examples of natural methods of pest control that are used include using pheromones to prevent the population of detrimental insects from increasing, breeding and encouraging natural enemies like fungi and other predators to curb the caterpillar population, and using beneficial plants to attract more natural predators of these pests to our plantations.

In 2010, we used more than 165 tonnes of biopesticides such as Trichoderma and Cordiceps. These biopesticides were either produced directly in our units, using local natural bio-agents, or bought from commercial suppliers.

Chart 4.5 presents the quantity of pesticides used in GAR's plantations in 2010. Most pesticides used are herbicides (74%). They are applied according to our very stringent SOP which ensures safe environmental and human practices:

- Selective in space: Only the circle of the palms, and harvesting path are sprayed.
- Selective in time: Application is done at a specific time based on weed growth and weather conditions, i.e. once to thrice a year depending on the type of herbicide.
- Selective in the type of active ingredient: The type of herbicide used is chosen to make application compatible with conserving an under-storey of plants to cover the soil.
- Maintaining a buffer zone: Herbicide is applied no closer than 5 metres from any bodies of open water.

We are committed to reducing the quantity of all herbicides and paraquat in particular. To minimise the use of herbicides while promoting biodiversity in the plantation, we implement agricultural practices such as selective weed control, where most of the weeds are conserved and only the noxious plants are controlled. Areas cleared are kept to a small circle around the palm tree and paths to access the trees for harvesting. As a result, more than 75% of the soil surface is kept covered with a diverse population of soft weeds.

Paraquat is used very selectively and carefully. To reduce its use, we are testing new application procedures of paraquat based on the type and development of weeds, and testing new substitutes when these are available in the market.

Chart 4.5: Pesticides (Quantity of Commercial Products) Used in GAR's Plantations in 2010

	kg or litre/ha	kg or litre per tonne of CPO produced
Herbicides	1.170	0.272
Including Paraquat	*0.453*	*0.105*
Insecticides	0.015	0.003
Fungicides*	0.003	0.001
Acaricides*	0.002	–
Rodenticides	0.395	0.092
Total pesticides used	1.585	0.368

**Note: fungicides and acaricides are used only in nurseries*

Barn owls are used as part of our integrated pest management

High Conservation Value Areas

In line with our 4 February 2010 commitments, we will ensure that there is no conversion of High Conservation Value ("HCV") forest areas and we will not develop on any peat lands regardless of depth within our concessions. We will also seek to conserve biodiversity, as part of our policy to conserve HCV areas.

An HCV area is an area that possesses one or more HCVs. The revised HCV Toolkit for Indonesia defines six HCVs comprising 13 sub-values. These 13 sub-values can be classified into three categories: (i) Biodiversity, (ii) Ecosystem Services and (iii) Social and Cultural. For details, please refer to the Toolkit for the Identification of HCVs in Indonesia available at http://www.rspo.org.

Based on our assessment, there are currently 23,500 hectares of HCV areas in our new development area. We target to complete HCV assessment of all our existing plantations by the end of 2012.

Before starting any new plantation, we are committed to conducting careful and comprehensive risk assessments

Chart 4.6: The IUCN Red List of Threatened Species for Indonesia Identified in Our Concessions

Type	Common Name	Scientific Name	IUCN Status
Sumatra and Papua			
Mammals	Mitred Leaf Monkey	Presbytis melalophos	Endangered
	Pig-tailed Macaque	Macaca nemestrina	Vulnerable
Plant Species	Borneo Ironwood	Eusideroxylon zwageri	Vulnerable
Southern Kalimantan			
Mammal	Pangolin	Manis javanica	Endangered
	Proboscis Monkey	Nasalis larvatus	Endangered
	Bornean Gibbon	Hylobates muelleri	Endangered
	Pig-tailed Macaque	Macaca nemestrina	Vulnerable
	Chinese Egret	Egretta eulophotes	Vulnerable
	Sun Bear	Helarctos malayanus	Vulnerable
Reptile	Siamese Crocodile	Crocodylus siamensis	Critically Endangered
Plant Species	Hopea Mengarawan	Hopea mengarawan	Critically Endangered
	Borneo Ironwood	Eusideroxylon zwageri	Vulnerable
	Borneo Teak	Intsia bijuga	Vulnerable
Central Kalimantan			
Mammal	Bornean Gibbon	Hylobates muelleri	Endangered
	Orangutan	Pongo pygmaeus	Endangered
	Pangolin	Manis javanica	Endangered
	Bare-backed Rousette	Rousettus spinalatus	Vulnerable
	Binturong	Arctictis binturong	Vulnerable
	Pig-tailed Macaque	Macaca nemestrina	Vulnerable
	Rusa Deer	Cervus unicolor	Vulnerable
	Slow Loris	Nycticebus coecang	Vulnerable
Bird	Large Green Pigeon	Treron capellei	Vulnerable
	Lesser Adjutant	Leptoptilos javanicus	Vulnerable
Reptile	False Gharial	Tomistoma schlegelii	Endangered
Plant Species	Merawan	Hopea mengerawan	Critically Endangered
	Meranti	Shorea spp.	Endangered
	Mersawa	Anisoptera grossivenia	Endangered
	Borneo Ironwood	Eusideroxylon zwageri	Vulnerable
	Durian Merah	Durio kutejensis	Vulnerable
	Lign-aloes	Aquilaria malacensis	Vulnerable
	Ramin	Gonystylus bancanus	Vulnerable
Western Kalimantan			
Mammal	Agile Gibbon	Hylobates agilis	Endangered
	Bornean Gibbon	Hylobates muelleri	Endangered
	Orangutan	Pongo pygmaeus	Endangered
	Pangolin	Manis javanica	Endangered
	Proboscis Monkey	Nasalis larvatus	Endangered
	Grey Imperial Pigeon	Ducula pickeringii	Vulnerable
	Pig-tailed Macaque	Macaca nemestrina	Vulnerable
	Rusa Deer	Cervus unicolor	Vulnerable
	Sun Bear	Helarctos malayanus	Vulnerable
Plant Species	Light Red Meranti	Shorea teysmanniana	Critically Endangered
	Merawan	Hopea mengerawan	Critically Endangered
	Red Meranti	Shorea pallidifolia	Critically Endangered
	White Meranti	Shorea agamii	Endangered
	Durian Pekawai	Durio kutejensis	Vulnerable
	Tortoise Durian	Durio testudinarum	Vulnerable
	Lign-aloes	Aquilaria malacensis	Vulnerable
	Indonesian Ebony	Diospyros celebica	Vulnerable
	Ramin	Gonystylus bancanus	Vulnerable

and identification of potential HCV. The HCV assessment is conducted by RSPO-approved HCV assessors. As part of the assessment, the findings undergo a public consultation process. The HCV assessment is then reviewed by another RSPO-approved HCV assessor before it is finalised.

GAR's management of HCV areas involves internal management and key stakeholders such as local communities and government. All levels of GAR's management are committed to implementing our HCV management SOP. The SOP involves the assessment of HCV areas, management of the HCV to conserve biodiversity, and the quality of the HCV conservation area, and continuous monitoring of the HCV area to ensure that it remains conserved.

We are also committed to conserving High Carbon Stock ("HCS") forests. A provisional definition of HCS forest is land exceeding 35tC/ha. This provisional definition may change as applicable to the industry and as a result of fieldwork and after stakeholder consultations.

Biodiversity in Indonesia and Our Plantations

Our business operates in the context of Indonesia's rich and immensely varied eco-system of worldwide importance. Our policy on HCV land is one measure that addresses this issue and where rare species are encountered, we are committed to protecting and conserving them. The important orangutan is one example, being a vital part of Indonesia's heritage. Consequently, we have worked with NGOs to set aside 1,400 hectares of land in Central Kalimantan for an orang-utan sanctuary. Many other species of flora and fauna are under threat in Indonesia today; these are listed in Chart 4.6. We are conscious of their importance and we are committed to helping to conserve them, often in partnership with other stakeholders.

Within our plantations, we aim to create habitats that promote favourable conditions for the development of a diverse flora under-storey below the palm trees. This has a high diversity of biological activity – from micro-organisms to insects, and other wildlife – which in turn promotes the influx of other species, such as birds that feed off this biodiversity.

Our agricultural practices also seek to promote biodiversity in our plantations. Such practices include selective weed control, applied only in the palm circle and harvesting path, which results in more than 75% of the soil surface being covered by diverse flora. Our recent research indicates that about 180 vascular flora species can be found in our plantations. This helps us to implement our IPM system and to minimise the use of pesticides through the natural ecosystem in our plantations.

In addition to this, GAR implements prevailing best practices during replanting, in terms of restoring specific habitats such as riparian areas along rivers and HCV areas. We expect to report more fully on biodiversity and related issues in future reports.

Waste Management

GAR's waste management strategy for plantations and mills is to reuse, recover and recycle all waste material where possible. With almost 1.85 million tonnes of palm oil manufactured by our units in Indonesia in 2010, we generated around 2.7 million tonnes of solid waste (empty fruit bunches, fibres and shell) and around 4.6 million tonnes of liquid wastes (mainly palm oil mill effluent).

Around 925,000 tonnes of fibres and 300,000 tonnes of shells are used in our mills as renewable fuel. The detailed breakdown of the use of our plantation waste is as follows;

Empty Fruit Bunches ("EFB")

- 88% is applied fresh, in the field as organic fertiliser;
- 2% is applied after co-composting with effluent;
- 10% is still incinerated because of specific site conditions. Although the ashes are then applied in the field as a substitute for potash fertiliser, the Company is seeking to stop this practice.

Palm Oil Mill Effluent ("POME")

- 96% is applied in the plantations after treatment in order to render their chemical and physical characteristics in accordance with national regulations (a specific application permit has been obtained for each location, with close monitoring of environmental impact as requested by the authorities);
- 2% is applied during composting with EFB (see above);
- 2% is treated before being disposed of.

Water Use

Despite our best efforts to reduce the use of water, the volume of water used per tonne of CPO produced increased slightly in 2010, as Chart 4.7 shows. This is due to the relative decline of the global fruit yield and oil extraction rate in 2010 as a consequence of the La Nina phenomenon.

Future reports will give a more detailed breakdown of our water use and how it is managed and conserved within the plantations, mills and beyond. We are in the process of collecting and compiling better data.

Chart 4.7: Water Consumption

Water Consumption (m^3/*tonne of CPO produced*)	
2008	3.03
2009	3.02
2010	3.09

Reducing Greenhouse Gas Emissions

Climate change is a global challenge and a fundamental issue for Indonesia, which is ranked third in the world as a greenhouse gas ("GHG") emitter. This is in large part due to deforestation through burning and other activities. Our industry has a vital role to play in addressing this issue. Defining the precise carbon footprint of new and existing oil palm plantations is controversial and supported by very little documentation .

Empty fruit bunches are recycled as organic fertiliser

Land preparation for the development of new plantations could initially release a significant amount of CO_2 from oxidation of existing biomass if the land use changes. On the other hand, oil palm plantations can store relatively high amounts of carbon, in the vegetation part of the oil palm and the increase of carbon content in the soil.

Our strategy to reduce our carbon footprint is two-pronged: firstly, to implement scientifically confirmed policies on our plantations; secondly, to work with the industry and/or research institutions to define methods of evaluation and quantification for carbon footprint accounting in palm oil production.

Implementing Established Policies on Plantations:

- Maximise usage of renewable energy in all GAR's mills through the use of shells and fibres. In 2010, we used around 925,000 tonnes of fibres and 300,000 tonnes of shells in our mills as a substitute for fossil fuels. The shells and fibres used represent about 1.5 million tonnes of equivalent CO_2. On page 24, we describe a project initiated in 2006 and which will come on stream in 2011 to turn biological waste from our mills into methane gas which is used in place of diesel to fuel the estate generators.

- Since 1996, the Company has progressively increased the recycling rate for solid waste from mills. We currently recycle about 90% of the more than 1.5 million tonnes of EFB produced by our mills, and are working at further increasing this number. EFB are recycled by the Company as organic fertiliser, either applied fresh (88% of all EFB produced) or after co-composting with palm oil mill effluent (2% of all EFB produced). This represents 1.0 million tonnes of equivalent CO_2, and approximately 40,000 tonnes of mineral fertilisers.
- The Company currently recycles around 98% of its POME, or about 4.5 million tonnes. This contains almost 100,000 tonnes of equivalent CO_2, and is equivalent to around 33,000 tonnes of mineral fertilisers.
- Since 1997, we have adopted a zero burning policy in our operations and act to control fires where we can. Our policy is ahead of the Indonesian government's zero burning policy which was implemented in 1999.
- We enhance the soil carbon content in plantations through the application of oil palm biomass and mill wastes. Measurements on the ground show that in our 15-year-old plantations, recycling of biomass has resulted in an increase of soil carbon by as much as 3.8 tonnes/ha in the first 60 centimetres of soil observed.
- Where peat soil has been planted with oil palm, we apply strict water management practices in order to minimise CO_2 release by maintaining the water table at the appropriate level, compatible with the growth of the palms.
- In February 2011, GAR committed to conserving high carbon stock land. These measures will have a significant impact on our carbon footprint.

Working with the Industry and Research Institutions

- We work with the RSPO GHG Working Group 2 whose objective is to develop a methodology for GHG evaluation and define best practices to reduce GHG emissions.
- We work with Komisi Minyak Sawit Indonesia ("KMSI"), World Agroforestry Centre ("ICRAF") and other oil palm companies to develop a methodology for carbon footprint accounting.
- We collaborate with scientific teams in France and Australia to develop indicators that we will use to reduce GHG emissions from our operations.
- In 2010, the Company acquired specific equipment to measure the balance of GHG in the oil palm agro-system. This high-tech equipment, known as eddy covariance methodology, is being set up in representative areas.
- Our research findings have been presented in several papers at international conferences and workshops in South East Asia, Europe and South America.

Chart 4.8: Recycling of Waste

Waste	Usage	Quantity (*tonne or m^3*)	Energy equivalent (kCal x 109)	Fertiliser equivalent (tonne)	CO_2 Equivalent (tonne)
Fibers	Fuel	925,000	2,500	-	1,000,000
Shell	Fuel	300,000	1,200	-	500,000
EFB	Organic fertiliser	1,500,000	-	40,000	1,000,000
POME	Organic fertiliser	4,500,000	-	33,000	100,000

The Sei Pelakar Mill Gas Project

At our Sei Pelakar plantation and mill, west of Jambi in Sumatra, we are investing US$3.3 million to create a bio-digester system, to capture methane gas produced from the effluent treatment currently taking place in open ponds. The gas produced will be captured in a closed pond and used along-side the burning of palm kernel shells to replace approximately 640,000 litres of fuel used by the diesel generators which produce electricity for the estate at peak demand times.

This project has been developed under the Kyoto Protocol as a Clean Development Mechanism and will in due course be registered with the United Nations Framework Convention on Climate Change. Developed with extensive stakeholder consultation, this pilot project is designed to reduce methane from waste water treatment, improve the quality of that treatment and reduce the use of diesel and the resulting CO_2 emissions. It will also reduce odours and create a sustainable power supply in a remote part of Indonesia. The chart below shows the basic principles of the project in action.

When the project comes fully online in 2011, we estimate that it will produce a flow of methane at about 3.5 million cubic metres a year, enough to generate approximately 1.2 mega watts of electricity and reduce emissions by around 14,500 tonnes of CO_2 per year.

In line with the Company's emphasis on sustainable operations, we maintain our commitment to developing more renewable energy based processes for future developments and will attempt to minimise GHG emissions. Similar projects will be developed and we will report on their progress in future reports.